INDUSTRIAL ARTS EDUCATION: RETROSPECT, PROSPECT

1979

American Council on Industrial Arts Teacher Education

28th yearbook

Industrial Arts Education: Retrospect, Prospect

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Editor

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Oxford, Ohio

28th yearbook 1979

American Council on Industrial Arts Teacher Education

A Division of the American Industrial Arts Association
and the National Education Association

Lithographed in U.S.A.

Yearbooks of the American Council on Industrial Arts Teacher Education are produced and distributed by the McKnight Publishing Company, Bloomington, Illinois 61701

Orders and requests for information about cost and availability of yearbooks should be addressed to the company.

Requests to quote portions of yearbooks should be addressed to the Secretary, American Council on Industrial Arts Teacher Education, in care of the publisher, for forwarding to the current Secretary.

Foreword

The Council has been blessed over the past 27 years with yearbooks that were timely and beneficial for the industrial arts discipline. These yearbooks have provided a considerable amount of information for not only teacher educators, but also for practicing teachers in the field, for those studying to be teachers, and for those who were in the process of attaining higher levels of education. Without these yearbooks the discipline of industrial arts would have experienced a great void in literature.

This 28th Yearbook of ACIATE is a comprehensive look at industrial arts education in the past, the present, and the future. This publication is a compilation of the thoughts, the happenings, and the dreams of a wide variety of people who not only have already helped make our present day discipline, but who are continuing to make it a viable force in our national education system. Industrial arts has made many contributions to the field of education.

The editor of this yearbook, G. Eugene Martin, assembled a group of highly qualified writers from our discipline. These writers, who are also qualified researchers, have prepared a wealth of content about the past, the present, and the future. To understand contemporary industrial arts is to know the happenings and theories of the early years of this discipline. To gain some understanding as to what the discipline will be in the future requires one to know what has happened in the past decades and is taking place in the present. Industrial arts is included in all levels of education from elementary through advanced graduate. It is a part of general education but also has some direct relationships to vocational education. Technology is also a major part of industrial arts education. Teaching methods, laboratory facilities, organizations, and publications have, are, and will be important to the industrial arts profession. Also, the discipline has needed leaders and many have come forth over the years to help provide the present status of the art. Modern leaders and future leaders will continue to make industrial arts a major force in the educational process.

This yearbook should be read by every person within the industrial arts education discipline. It also should be read by educational administrators from all levels of education. This book provides a most comprehensive look at industrial arts education. I commend it to your use and understanding.

Ervin A. Dennis
President 1978-1980

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Yearbook Proposals

Each year, at the AIAA national convention, the ACIATE Yearbook Committee reviews the progress of yearbooks in preparation and evaluates proposals for additional yearbooks. Any member is welcome to submit a yearbook proposal. It should be written in sufficient detail for the committee to be able to understand the proposed substance and format, and sent to the committee chairman by February 1 of the year in which the convention is held. Below are the criteria employed by the committee in making yearbook selections.

ACIATE Yearbook Committee

Guidelines for ACIATE Yearbook Topic Selection

With reference to a specific topic:

1. It should make a direct contribution to the understanding and the improvement of industrial arts teacher education.
2. It should avoid duplication of the publications activities of other professional groups.
3. It should confine its content to professional education subject matter of a kind that does not infringe upon the area of textbook publication which treats a specific body of subject matter in a structured, formal way.
4. It should not be exploited as an opportunity to promote and publicize one man's or one institution's philosophy unless the volume includes other similar efforts that have enjoyed some degree of popularity and acceptance in the profession.
5. While it may encourage and extend what is generally accepted as good in existing theory and practice, it should also actively and constantly seek to upgrade and modernize professional action in the area of industrial arts teacher education.
6. It can raise controversial questions in an effort to get a national hearing and as a prelude to achieving something approaching a national consensus.
7. It may consider as available for discussion and criticism any ideas of individuals or organizations that have gained some degree of acceptance as a result of dissemination either through formal publication, through oral presentation, or both.
8. It can consider a variety of seemingly conflicting trends and statements emanating from a variety of sources and motives, analyze them, consolidate and thus seek out and delineate key problems to enable the profession to make a more concerted effort at finding a solution.

Approved, Yearbook Planning Committee
March 15, 1967, Philadelphia, PA.

Previously Published Yearbooks

1. *Inventory-Analysis of Industrial Arts Teacher Education Facilities, Personnel and Programs,* 1952. Walter R. Williams, Jr. and Harvey Kessler Meyers, eds.
* 2. *Who's Who in Industrial Arts Teacher Education,* 1953. Walter R. Williams, Jr. and Roy F. Bergengren, Jr., eds.
* 3. *Some Components of Current Leadership.* Roy F. Bergengren, Jr. *Techniques of Selection and Guidance of Graduate Students.* George F. Henry. *An Analysis of Textbook Emphases.* Talmage B. Young. 1954, three studies.
* 4. *Superior Practices in Industrial Arts Teacher Education,* 1955. R. Lee Hornbake and Donald Maley, eds.
* 5. *Problems and Issues in Industrial Arts Teacher Education.* 1956. C. Robert Hutchcroft, ed.
* 6. *A Sourcebook of Reading in Education for Use in Industrial Arts and Industrial Arts Teacher Education, 1957.* Carl Gerbracht and Gordon O. Wilbur, eds.
* 7. *The Accreditation of Industrial Arts Teacher Education,* 1958. Verne C. Fryklund, ed., and H. L. Helton.
* 8. *Planning Industrial Arts Facilities,* 1959. Ralph K. Nair, ed.
* 9. *Research in Industrial Arts Education,* 1960. Raymond Van Tassel, ed.
*10. *Graduate Study in Industrial Arts,* 1961. Ralph P. Norman and Ralph C. Bohn, eds.
*11. *Essentials of Preservice Preparation,* 1962. Donald G. Lux, ed.
*12. *Action and Thought in Industrial Arts Education,* 1963. E.A.T. Svendsen, ed.
*13. *Classroom Research in Industrial Arts,* 1964. Charles B. Porter, ed.
*14. *Approaches and Procedures in Industrial Arts,* 1965. G. S. Wall, ed.
15. *Status of Research in Industrial Arts,* 1966. John D. Rowlett, ed.
16. *Evaluation Guidelines for Contemporary Industrial Arts Programs,* 1967. Lloyd P. Nelson and William T. Sargent, eds.
17. *A Historical Perspective of Industry,* 1968. Joseph F. Leutkemeyer, Jr., ed.
18. *Industrial Technology Education,* 1969. C. Thomas Dean and N. A. Hauer, eds. *Who's Who in Industrial Arts Teacher Education,* 1969. John M. Pollock and Charles A. Bunten, eds.
19. *Industrial Arts for Disadvantaged Youth,* 1970. Ralph O. Gallington, ed.
20. *Components of Teacher Education,* 1971. W. E. Ray and Jerry Streichler, eds.
21. *Industrial Arts for the Early Adolescent,* 1972. Daniel L. Householder, ed.
*22. *Industrial Arts in Senior High Schools,* 1973. Rutherford E. Lockette, ed.
23. *Industrial Arts for the Elementary School,* 1974. Robert G. Thrower and Robert D. Weber, eds.
24. *A Guide to the Planning of Industrial Arts Facilities,* 1975. Donald E. Moon, ed.
25. *Future Alternatives for Industrial Arts,* 1976. Lee H. Smalley, ed.
26. *Competency-Based Industrial Arts Teacher Education,* 1977. Jack C. Brueckman and Stanley E. Brooks, eds.
27. *Industrial Arts in the Open Access Curriculum,* 1978. Lowell D. Anderson, ed.

*Out-of-print yearbooks can be obtained in microform and in Xerox copies. For information on price and delivery, write to Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106.

Contents

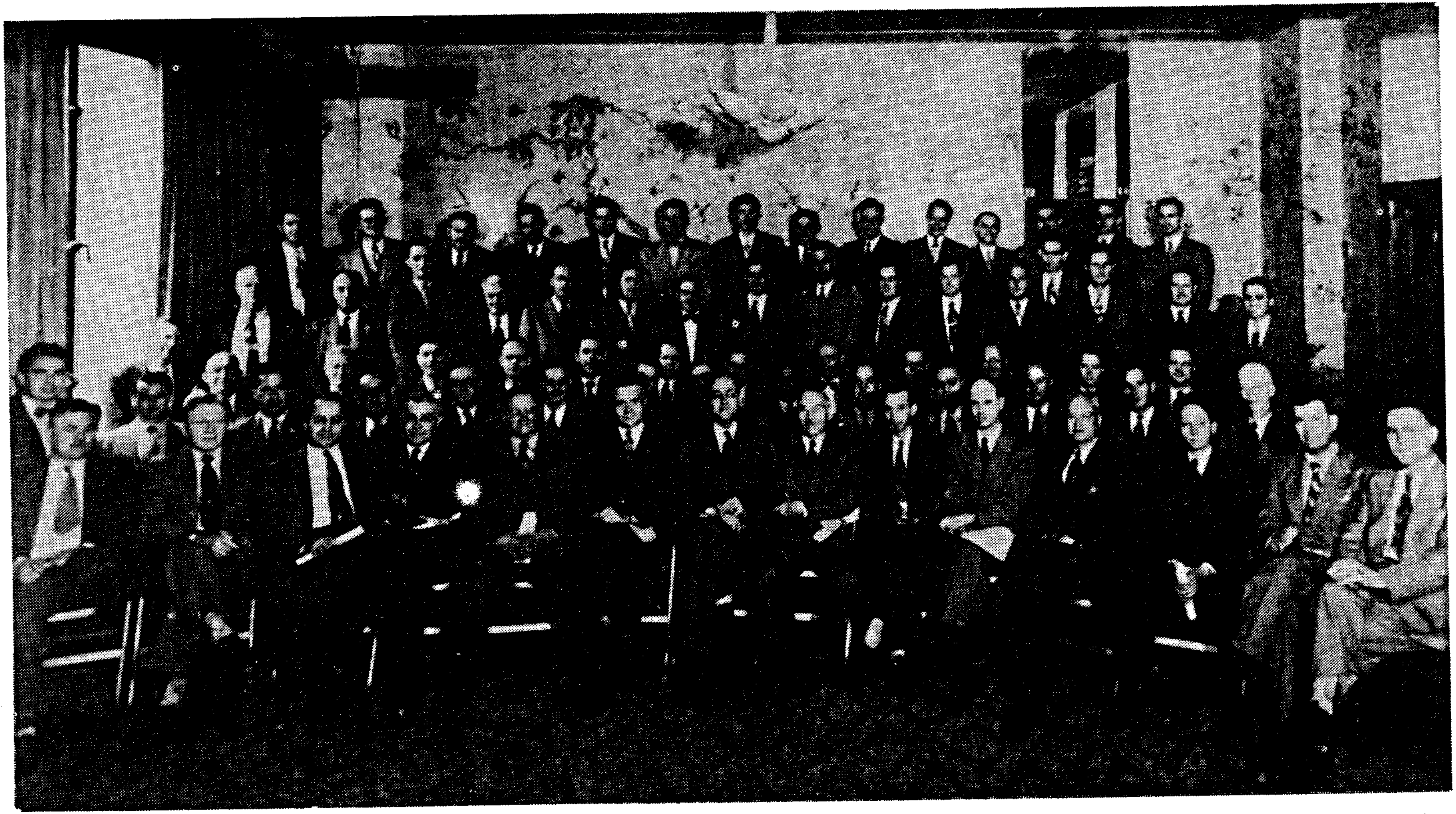
Preface

The publication of this, the 28th Yearbook of the American Council on Industrial Arts Teacher Education, represents the culmination of three years of active research and writing by 22 distinguished professionals in industrial arts education. These people have contributed to a professional publication most worthy of a place in every industrial arts educator's library.

Rarely is the term "unique" applied to a century-old educational program. Industrial arts education, though, is unique to the educational system of the world. During the past century, notable, distinguished events of the industrial arts movement have been adequately recorded as to time and place. However, the status and personality of industrial arts cannot be attributed to dates, but to the constructs of its unique offering. Curriculum, facilities, professional educators, journals, professional councils and associations, and allied disciplines have contributed to the present status of industrial arts and will influence that of the future. Following the first 100 years of what is now commonly referred to as industrial arts, it is only fitting that the profession pause and reassess its contributions to the past and the present and look to the future with some identifiable goals.

This yearbook examines how industrial arts has survived and suggests what it might accomplish in the future. Emphasis is placed on identifiable topics important to the development of industrial arts along with an examination of present and prospective developments. This yearbook should be considered a publication that gives the profession a look in retrospect and a prospect for the future.

The Editor is deeply indebted to the authors. They have given time, when time wasn't readily available; energy, when energy was already exhausted; and talent, when talent was demanded elsewhere. The Miami University administration and faculty have been most generous in their encouragement and support at all stages in the preparation of this yearbook. Finally, a special thanks to those teacher educators across the United States who in the late 1940's saw a need for a separate council of the American Industrial Arts Association to represent teacher educators. Their efforts culminated in an organizational meeting on May 10, 1950, at the Netherland Plaza Hotel, Cincinnati, Ohio. Those attending that meeting are shown in Figure 1. The idea for an American Council on Industrial Arts Teacher Education yearbook series was enthusiastically endorsed at that meeting. Although several teacher educators assumed important roles initiating plans for the series of yearbooks, the profession is most grateful to the following peo-



ple for making the series a reality: Walter R. Williams, Jr., John A. Whitesel, DeWitt Hunt, William McKnight, Jr., and Wesley D. Stephens. American Council on Industrial Arts Teacher Education officers and yearbook editors have made the yearbook series a significant piece of literature for more than 25 years.

It is my sincere desire that this yearbook will make a valuable contribution to the industrial arts profession, present industrial arts educators, and especially to the many young people contemplating entering the industrial arts profession now and in the future.

Fig. 1. People attending the ACIATE organizational meeting. Listed in order from left to right; rows from front to back.*

Row 1 (1) J. V. Melton, (2) Cary L. Hill, (3) Ivan Hostetler, (4) Charles R. Kinison, (5) Oran J. House, (6) Walter R. Williams, Jr., (7) DeWitt Hunt, (8) Otto A. Hankammer, (9) Kenneth McFarland, (10) William F. Tierney, (11) Gordon O. Wilber, (12) Kenneth W. Brown, (13) John M. Hurley, (14) John A. Whitesel.
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Row 5 (1) _____, (2) Lyman Goldsmith, (3) Ray M. Stombaugh, (4) _____, (5) Viron N. Hukill, (6) Chris H. Groneman, (7) Harold O. Woods, (8) _____, (9) Marion E. Franklin, (10) Menzo H. Stark, (11) Anthony T. Stavaski, (12) Dewey F. Barich, (13) Irvin J. Shutsy, (14) Hugh H. Butcher.

*The following were those listed as having been in attendance but were not positively identified in the photograph: Arthur W. Bauer, Walter Conacher, N. G. Deniston, D. W. Gordon, James J. Hammond, Dean F. Kittle, John A. Marbut, J. R. McElheny, Laurence Olewine, and Virgil Poling.

unit i

A Historical and Philosophical Orientation to Industrial Arts

chapter 1

The Movements That Led To Contemporary Industrial Arts Education

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Introducing the yearbook, Chapter 1 provides in three sections a synopsis of the past, present, and future of industrial arts. The first section, *Influential Movements Prior to 1870,* reviews the early influences in the development of industrial education. The topics include Primitive Life, Ancient Civilization, Medieval Period, and Sense Realism. The second section, *The Industrial Education Movement,* reviews the Russian System, Sloyd, Manual Arts Movement, and the Vocational Education Movement. The final section, *Industrial Arts Education,* includes topics on the origins, World War I, Decades Prior to World War II, World War II, and Post-War Era.

INFLUENTIAL MOVEMENTS PRIOR TO 1870

Primitive Life

A study of human biological nature makes evident the essential difference between people and animals. While animals live within the limits of a given environment, humans live in a continuous and continuing process of attempting to cope with their physical environment in order to meet basic needs and to satisfy wants. Through technology (human work) people attempt to subdue or control their environment by the combined efforts of intelligence and use of available resources (Kranzberg & Pursell, 1967, pp. 4-8). An awareness of this combination of the two unique characteristics of human beings – homo faber (tool maker) and homo sapiens (mind maker) – is the essence of modern industrial arts education.

To survive in a hostile environment, primitive people found it a necessity to teach their young the use of prevalent forms of technology. Children were taught the skills necessary to sustain life. Their learning was acquired through imitation of their elders, whether consciously by repeated training imposed by adults or unconsciously through play activities. This education (informal apprenticeship) remained the dominant method of instruction in the technical skills for many centuries (Bennett, 1926, pp. 11-12).

Ancient Civilization

In the early development of most civilizations, the craftmen's skills and practical knowledge provided a necessary contribution to the building of society. Since the craftsmen provided society with clothing, agricultural implements, utensils, means of shelter, and other essential forms of technology, they were therefore considered important members of the community and were held in high regard. However, as civilizations grew, a natural breakdown evolved. A small group assumed leadership positions for administrative purposes, while those remaining performed the necessary manual tasks. The latter group – the laboring class – formed the lower strata of society. Later with the growth of slavery, manual tasks that had been performed by the working class were relegated to slaves; and the social status previously accorded the craftsmen became that of the slaves. The slave-owning aristocracy gradually developed a deep prejudicial attitude against any form of manual labor or technology. The aristocracy, or leisure class, separated theory from practice: they considered the mind to be independent of the hand (Farrington, 1947, p. 30).

This form of dualistic thinking was prevalent not only in the city states of Greece at the height of their political power, but also later in the Roman civilization. Negativism toward technology is evident in the idealistic philosophy of Plato and Aristotle. The ideal Greek was one of theory who despised all manual work, a free citizen of the city-state, devoting life to intellectual pursuits and politics. Manual work was performed by slaves or foreigners. In his *Republic,* Plato argued that a free man must not practice a trade because such a physical occupation would interfere with his intellectual development as well as his political activities. Plato even asserted that a tradesman, because of his mundane activities, should not be allowed to be a citizen of the state (Klemm, 1959, p. 20).

The philosophical traditions of Idealism with their primary emphasis on theory are exemplified in the academic disciplines. Because Idealism negates technology, it has been inimical for centuries to any humane consideration of technology.

Medieval Period

The medieval period was dominated by a social system known as feudalism. Feudalism was made up of three social groups: the clergy, the nobility, and the working class. The working class was confined to agriculture, apprenticeship in the crafts, or other forms of manual work. Apprenticeship, therefore, became the primary educational institution available to youths of the working class. It was also a means for members of the working class to improve themselves socially and economically.

The apprenticeship system with its emphasis on instruction in technical skills and related knowledge was the primary means of developing skilled workers in the various handicraft technologies. Both engineering education and the technical dimension (tool skills) in industrial arts education were later outgrowths of the apprenticeship system.

Sense Realism

The close of the medieval period was brought about by three major social movements: the Renaissance, the Reformation, and the beginnings of scientific inquiry. With the expanding interest in science a parallel interest also evolved in the practical realities of life (Wilds, 1942, p. 313). The Renaissance was a reaction against scholasticism (theology and logic) that had dominated the medieval universities. Through time scholasticism had become pedantic. Reformers urged that medieval scholasticism be replaced by a return to the Greek and Latin classics reflecting human achievements.

According to reformers such as Desiderius Erasmus (1466-1536) and Francois Rabelais (1483-1553), the study of the classics (humanism) provided guidelines for life. During the Renaissance, humanism eventually did replace scholasticism as the dominant force in secondary and higher education and became the basis of a liberal arts education.

The Reformation was led by Martin Luther (1483-1546) and Ulrich Zwingli (1484-1531). Like humanism, the Reformation was also a reaction against the institutional church. Both movements were opposed to scholastic philosophy; its method, formalisms, and eventual sophistry. Both wanted to free the individual from the church and other social restrictions. And both expressed an interest in and an appreciation for the classics (Knight, 1940, pp. 152-184).

In the 17th century scientific research developed rapidly. Interest in practical realities led many theorists to introduce science into the school curriculum and to recommend the study of real things. Francis Bacon (1561-1626), an exponent of the sense realist movement, formulated what he termed the method of induction and advocated the use of it in the pursuit of knowledge. Induction began slowly to supplant the Aristotlean form of deductive logic prevalent up to that time.

Bacon was neither a teacher nor a writer, but was interested only in the problems of education. His writings, however, did influence the work of many later educators, and his naturalistic philosophy contributed to shape the spirit of modern education.

One of the earliest educational reformers to be influenced by the suggestions of Francis Bacon was Johann Amos Comenius (1592-1670). His book *The Great Didactic,* reflecting the sense realist philosophy, was a comprehensive treatise on education. The book also included a plan for a national system of education that later became the model used by many countries in developing their educational systems. Another of his important publications was *Orbis Pictus,* a Latin language book especially for children. The work included pictures of objects with their formal names as well as an explanatory text both in Latin and in the vernacular. It was the first illustrated textbook – another reflection of his sense realist philosophy.

Comenius' major contributions to education were his emphases on the following concepts: that knowledge must be acquired through the five senses, that objects must be taught before words, that education must be universal, that schools should be graded, and that teachers should be professionally trained. His work established a new form of education based on the principles of realism (Hoyt, 1910, pp. 21-46).

The writings of John Locke (1632-1704) bridged the works of Comenius with those of the later educational reformers such as Rousseau, Pestalozzi, the Philanthropinists, Froebel, and others. Locke's famous treatise on education, *Some Thoughts Concerning Education,* was keyed to the education of the gentleman. Like Comenius, he insisted on the use of the concrete in giving instruction, the recognition of individual differences, and the importance of environment as a factor in education. Locke also included as a part of the young nobleman's education the learning of one or more of the skilled trades – not for vocational purposes, however, but for the physical exercise and recreational values involved.

Jean J. Rousseau (1712-1778) drew freely from the writings of John Locke to stress his own ideas concerning the form and nature of society. Rousseau wrote that civilization – as reflected in its art, culture, formal education, and other social organizations – was totally corrupt. He concluded that truth, courage, and other virtues could be found only in nature. This rejection of civilization for nature was also reflected in Rousseau's concepts of education. In his book on education, *Emile,* Rousseau emphasized the importance of two things: the natural development of the child and the methods of instruction relating to or corresponding with these natural stages of development. The underlying theme of the book was that education "must seek to nullify the effects of civilization and culture, and reduce man to the primitive condition of nature" (Hoyt, 1910, p. 65).

Influenced by Locke, Rousseau's educational plan in *Emile* was also designed for the youth of the upper classes. Although Rousseau rejected academic schooling, he wanted Emile to learn a trade. He considered labor a duty for rich and poor. According to Rousseau, the manual arts, which provided subsistence to humanity (agriculture, woodworking, and smithing), were the nearest occupations to the state of nature and should be used as an important part of the education of children. The trades were not to be taught for their utilitarian value but to be used as a vital process or method of instruction (Bennett, 1926, pp. 80-82). *Emile,* which stressed such revolutionary ideas in education, was read throughout the world and has influenced educational reformers since its publication.

The writings of Bacon, Locke, Comenius, and Rousseau on education and on their acceptance of the manual arts as a part of their educational theories influenced the work of Johann Pestalozzi (1746-1827) in Switzerland and Johann Basedow (1723-1790) in Germany. Both Pestalozzi and Basedow were interested in educational reform. The two men started experimental schools wherein they tried to implement the educational theories of the sense realists. Both introduced the use of handtools into their respective schools but with differing objectives. Because Pestalozzi was interested in the plight of the poor and in general social reform, he taught the use of handtools as a vocational objective. Working with upper class children and following the theory of Locke and Rousseau, Basedow stressed the use of handtools as a recreational objective.

Like Comenius, Pestalozzi believed that education should be universal as well as the primary means of regenerating society. He saw education as a means to eradicate poverty and other social ills in society (Hoyt, 1910, p. 95). In two of his early schools (Neuhof and Stanz), Pestalozzi worked with orphans and other poor children in an attempt to combine occupational training with formal education. The children were instructed in and subsequently worked at knitting, sewing, spinning, gardening, and other tasks necessary for school maintenance. Lessons in such formal subjects as religion, reading, arithmetic, and writing were correlated with occupational instruction where applicable. In many instances the children were taught formal subjects while actually working at various occupations. Through his efforts in behalf of the poor, Pestalozzi's work was recognized throughout Europe.

These special efforts with the destitute were later expanded and continued by his contemporary Philip Emanuel von Fellenberg (1771-1844). The influence of Fellenberg later led to the reform school movement and the manual labor school movement in America (Bennett, 1926, pp. 106-146).

Although Pestalozzi's initial successes in education were with poor children, his major contributions came in his work with upper class children at schools located at Burgdorf and Yverdun. As these children were not obliged to support themselves through manual labor, Pestalozzi was able to experiment with various methods of teaching the regular academic subjects, especially mathematics (Anderson, 1926, p. 89). From these experiments, Pestalozzi developed and formulated a teaching method based on the natural development of the child: sense impression and the object method of teaching (Hoyt, 1910, p. 96).

Imbued with the scientific spirit and revolting against the dominance of the Church, Johann Basedow (1723-1790) became one of the dominant educational reformers in northern Europe. Influenced by the work of Bacon, Comenius, Locke, and Rousseau, Basedow published several works on education. These works, advocating the "naturalistic" approach to education, became popular throughout Europe. Assisted financially by prominent people influenced by his writings, Basedow opened his famous school, the Philanthropinum, in 1774. The Philanthropinum was an experimental school stressing natural methods of teaching. As a part of the new curriculum, children were treated as children rather than as miniature adults; languages were taught by conversational methods; natural sciences, mathematics, music, drawing, and physical training were included in the program; and each child was taught a handicraft for both social and educational reasons (Cubberly, 1920, p. 536).

The Philanthropinum, awakening widespread interest in the new forms of education, attracted teachers and students from all over Europe. The school itself, however, closed in 1793 because of the intense internal conflict caused by the iconoclastic and quarrelsome personality of Basedow.

One of Basedow's most important followers was Christian Salzmann (1744-1811), a teacher for a few years at the Philanthropinum. He later founded his own school at Schnepfenthal. In Salzmann's school (opened in 1784) gardening, animal study, home geography, nature study, gymnastics, and other similar studies were stressed. The students were given instruction in woodworking, paperworking, and basketmaking by specially trained teachers rather than by craftsmen (Salomon, 1911, p. 132). Salzmann believed that if an education were to prepare a young child for life, it should include play activities reflecting roles in the existing adult world. As the child matures, preparation for life should include instruction in the use of tools and other important utensils. He maintained that all teachers should be able to work with their hands, especially with wood and paper.

The use of play activities and handwork as an important part of the school curriculum was further developed by two instructors of Schnepfenthal, Bernard Blasche (1765-1832) and Johann Heusinger (1776-1837).

Blasche, the director of handwork at Schnepfenthal, published a four volume text *Workshops for Children.* In it he identified a series of manual occupations for general education and correlated these occupations with other school subjects (Anderson, 1926, p. 59). Blasche held that three primary benefits derived from this form of instruction were a development of the impulse to activity, an increase in psychomotor skills, and a receptivity for scientific instruction.

In 1797 Heusinger published a text *On the Utilization of the Child's Powerful Tendencies Toward Activity* demonstrating, from psychological principles, the right of the industrial occupations to the primary place in the school curriculum. He claimed that the strongest and most enduring impulse in children was the impulse toward bodily activity – that it should, therefore, play a dominant role in education and that this education be achieved primarily through industrial occupations. He recommended a carefully arranged succession of manual occupations during the entire education of the child (Anderson, 1926, p. 100). The handwork was correlated with the regular school subjects.

Thus it was through the experimental schools of Basedow and his followers (the Philanthropinists) that the movement developed to utilize handwork as a chief means of general education. It is in their work, therefore, that the origins of industrial arts education may be found.

The individual who popularized the movement to utilize the industrial occupations as a means of general education was Friedrich Froebel (1783-1852). He extended the work of Pestalozzi and the Philanthropinists by incorporating the principle of self activity into his school curriculum. He believed that since "activity precedes thinking, education must begin with doing, and that from this impulse to activity all education must evolve" (Bennett, 1926, p. 166).

In Froebel's kindergarten, the "gifts and occupations" were organized to meet the activity need. The gifts and occupations were intended to stimulate both motor expression and intellectual development of the child. The gifts consisted of a series of geometric forms such as balls, cubes, and other variously shaped blocks. They were playthings with which the child could build, rearrange, or combine the geometric figures – without changing their form. The gifts could lead the child to insights and discoveries about the external world. The occupations, on the other hand, were designed to develop qualities inherent in the child such as creativity, initiative, and invention (Bennett, 1926, p. 165).

The work of the sense realists (with the use of handwork as an important part of their educational theories) was to influence such early movements in industrial education as the Russian System, Sloyd, and Manual Arts as well as the educational theories of such men as John Dewey and Frederick G. Bonser.

THE INDUSTRIAL EDUCATION MOVEMENT

The Russian System

The Russian System of tool instruction was an outgrowth of the work of Victor Della Vos and his staff at the Russian Imperial Technical School at Moscow in the late 1860's. The system was to teach engineering students, in a new manner, the required tool skills for their occupations. Rather than the inefficient and imitative method of apprenticeship previously used, the Russian System introduced a systematic, efficient method of instruction within a laboratory or classroom environment.

The system was designed to give tool instruction through a series of exercises involving the various tool skills presented in a systematic, logical sequence. The process of teaching tool skills developed by Della Vos and his faculty was comprised of a two-step sequence; the analysis of tools, processes, trades, and materials into their elements and the arrangement of these elements into courses of instruction (Vaughn & Mays, 1924, p. 27). Each distinct type of work had a separate instruction shop wherein each student was provided with a work place and set of tools. Models and exercises were also provided and were used for teaching the manipulative skills. Upon completion of the program in the instruction shops, the student was allowed to work in various construction shops – operating factories attached to the technical school.

At the Centennial Exhibition in Philadelphia in 1876, an exhibit of the work of the Russian technical schools displayed the various exercises used for tool instruction. John Runkle of the Massachusetts Institute of Technology (MIT) and Calvin Woodward of Washington University were influenced by the display and advocated the adoption of the Russian System into their respective institutions. Through their influence, the School of Mechanic Arts of MIT was opened in 1877, and the Manual Training High School of Washington University was opened two years later. Both schools were designed as high school level preparatory schools for future engineering students or for those who wanted technical training for immediate employment. This movement became known as the *manual training movement.* It drew recognition through the speeches and writings of Runkle, Woodward, and others. The manual training movement spread throughout the United States; civic groups established private manual training high schools, and boards of education began to use tax money to establish manual training high schools (Stombaugh, 1936, pp. 20-89).

Woodward and Runkle considered their concept of classroom shopwork as the equal in all aspects of the other more academic subjects. Manual training was not to be taught as a trade. It was to follow the same pedagogical principles used in teaching other academic subjects. The shops were to be taught and administered in the same manner as other laboratory subjects such as the sciences. Although the initial objective of the Russian System was vocational, the rationale as later espoused by Runkle and Woodward was that of general education within the tenets of faculty psychology — the prevailing psychology of learning at that time.

According to the theory of faculty psychology, the mind has separate or independent capacities or faculties including such distinct functions as memory, will, reason, judgment, imagination, and taste. These faculties were viewed as potential capacities that had to be brought into actuality by training or practice in certain prescribed subjects such as mathematics, Latin, and other classical studies (Butts, 1955, p. 477). Any prescribed subject was therefore considered important for the education of the young and necessary to their general education. Accepting the tenets of faculty psychology, Woodward (1887) claimed that manual training would lead to better intellectual development, more wholesome moral education, better choice of occupations, a higher degree of material success, sounder judgments of men and things, and the solution of labor problems (p. 202).

Although the rationale for manual training under faculty psychology was soon to be replaced, the Russian System of tool instruction and instructional shops did provide the foundation for the later historical movements in industrial education. Many of the elements found in the manual training movement are still visible in contemporary industrial arts programs, some of which include the technical subject matter offerings (wood, drawing, metals, etc.) and instructional techniques (group instruction and instructor-dictated exercises).

The Russian System was later refined by such men as Robert W. Selvidge and Charles Allen and was included as part of curriculum development in industrial arts education and vocational education respectively.

Sloyd

In the Swedish language "the adjective slog means 'handy' and from it comes the noun 'Slojd' (modified sloyd), which means dexterity, manual skill, or artistic skill" (Salomon, 1911, p. 8). However, "slojdare" in Swedish was a dexterous person who was neither a tradesman nor a skilled artist. The idea of preparation for a trade was excluded from the meaning of the noun "Slojd" – a concept also basic to the theory of industrial arts education.

The origins of the sloyd system were found in the household crafts of the Scandinavian people. During the long winters, the men and boys made and repaired agricultural tools, utensils, and household articles while the women and girls engaged in spinning and sewing. In the spring, many of the handcrafted products were sold throughout the area at various fairs, and itinerant peddlers carried them for sale in other areas. The sale of these items provided a source of income to the people. In the 19th century, the introduction of the factory system with its mass produced articles and its many inherent social problems brought about a serious decline in this handicraft tradition.

The introduction of sloyd as a part of the general education of youth was made possible through the efforts of Uno Cygnaeus, referred to historically as the father of the primary school in Finland. Cygnaeus traveled through Europe in 1858 and was influenced by the educational theories of Pestalozzi and Froebel. After returning home, Cygnaeus introduced their ideas into the elementary schools in Finland using "handcrafts" of the people (sloyd) as the basis of the curriculum. The course focused on making common household items. These items were in an order of increasing difficulty. The system did not include an analysis of tool processes (Bennett, 1937, pp. 58-61).

Through the work of Otto Salomon, a friend and colleague of Cygnaeus, the sloyd system was further developed pedagogically in his school at Naas, Sweden. In his writings and work, Salomon publicized the sloyd system, which became popular throughout northern Europe. The sloyd system was introduced into the United States through the efforts of John Ordway of MIT. Ordway traveled to Sweden during the summer of 1882 to study the sloyd system and to consult with Salomon. Through the efforts of Ordway, Lars Erickson (an exponent of sloyd) came to America in 1884 and introduced the system in Minneapolis (Feirer & Lindbeck, 1964, p. 12).

Four years later, Gustaf Larsson, a graduate of Naas, opened a sloyd school in Boston. This school followed the traditional Swedish sloyd system where pupils worked from models rather than from drawings. Larsson learned, however, that mechanical drawing had already been introduced into the Massachusetts schools because drafting was a vital factor in American industry. He therefore modified the Swedish sloyd system to include mechanical drawing in what he termed "American Sloyd" (Bennett, 1937, p. 432).

The sloyd system spread rapidly throughout the country and was influential in modifying the educational concepts of manual training. The outstanding characteristics of the sloyd system were individual methods of instruction, a useful project, and the encouragement of pupil initiative and self-direction (Stombaugh, 1936, p. 101).

Manual Arts Movement

The third movement contributing to the development of contemporary industrial arts education was the *arts and crafts movement.* This movement began in England with John Runkle, William Morris, and others. It was a reaction against the ugliness and poor design characteristics of manufactured products that dominated the latter half of the 19th century. The arts and crafts movement was an attempt to restore the spirit of craftsmanship and art (characteristic of the medieval guild method) to the production of useful articles. The early proponents of the movement were reactionary. They totally rejected the machine-produced articles of mass production and stressed the aesthetic value of handicraft. They continually called attention to the bad design and construction in industrial products (Stombaugh, 1936, p. 103).

The arts and crafts movement was introduced into the United States through the work of Charles Leland and J. Liberty Tadd. While he was in England, Leland studied under William Morris. After his return to the United States, Charles Leland in 1880 established in Philadelphia an experimental school reflecting the influence of the arts and crafts movement. The school, which had opened with the permission of the Board of Education, proved successful and was incorporated the following year into the public school system as the Philadelphia Public School of Industrial Art. Upon Leland's return to England a few years later, the school was continued by his colleague J. Liberty Tadd, who further popularized the aesthetic dimension in shop work. The new emphasis on "design or art in construction, and construction in art" (Anderson, 1926, p. 190) led many associations of art and manual training teachers to organize or combine into common groups. This combining of shop work and art instruction was a major emphasis of the arts and crafts movement and influenced manual training teachers to be conscious of design and proper construction — an awareness that marked the beginning of the movement later known as *manual arts.*

Vocational Education Movement

The beginning of the vocational education movement in America is usually identified with the report of the Commission on Industrial and Technical Education for the Commonwealth of Massachusetts issued in 1906. The Commission was appointed in 1905 by Governor William L. Douglas "to investigate the needs for education in the different grades of skill and responsibility in the various industries of the Commonwealth" (Bennett, 1937, p. 513). For several decades prior to the report (which later became known as the Report of the Douglas Commission), there had been an increasing interest and demand for vocational education programs in the public schools.

The precedent for federal and state support of vocational education at the college level had already been established through the Morrill Act of 1862 – the Federal Act that established land grant colleges. Many other vocational programs had also been established in private and reform schools, corporations, and prisons.

The report of the Douglas Commission included two major recommendations. The first recommendation stressed the importance of modifying both the elementary and secondary education programs in the public schools to include more practical subjects. The second recommendation urged the establishment of an independent system of industrial schools. These recommendations were subsequently implemented by the state legislature.

In the same year that the report of the Douglas Commission was issued, the National Society for the Promotion of Industrial Education (NSPIE) was formed in New York by a group of individuals interested in promoting vocational education. This organization – through its annual conventions, publications, and other efforts – was successful in persuading Congress to pass the Smith-Hughes Act in 1917. This Act established federal support for vocational education in the public secondary schools. After the passage of the Smith-Hughes Act, the NSPIE changed its name to the National Society for Vocational Education (NSVE). In 1926, the NSVE united with a similar organization located in the middle west and became known as the American Vocational Association (AVA).

The Smith-Hughes Act allowed federal monies on a matching basis to be used for the salaries of teachers in agriculture, home economics, and trade and industrial education. Since 1917, the relationship between industrial arts education and trade and industrial education has been rather tenuous. The major conflict has centered around whether industrial arts should be considered general education or prevocational education.

INDUSTRIAL ARTS EDUCATION

Origins

According to Bennett (1930), John Dewey's publication *The School and Society* marked a new era in the history of the industrial education movement. The book described the work Dewey and his colleagues were involved in at the Laboratory School of the University of Chicago.

Their work emphasized the social meaning of education in an industrial society. The curriculum of the laboratory school, reflecting the influence of the activity movement developed by Heusinger and Froebel, was designed around industrial occupations. These occupations were not to be taught as distinct subjects (woods, metals, weaving, sewing, etc.). Instead they were taught as methods of living and learning and as processes by which society maintains itself and meets its basic and secondary needs.

Dewey (1899) defined occupations as a "mode of activity on the part of the child which reproduces, or runs parallel to, some form of work carried on in social life" (p. 131). The activities selected for instruction were those which possessed educational value and represented the fundamental needs of humans (such as food, clothing, and shelter). As these basic needs were already known to the children and of interest to them, they helped stimulate their educational efforts. The selected activities also provided ways of using the four natural instincts of the children as identified by Dewey in his "psychology of occupations." These instincts were the constructive (which employed physical coordination and developed into the use of tools and technical skills), the investigative and experimental, the social, and the expressive.

Dewey's concept of education thus put the study of the industrial occupations as the focal point of his elementary school curriculum. The occupations provided both the content and the method of instruction.

One of the first individuals in the manual training field to be influenced by the work of John Dewey was Charles R. Richards, head of the Manual Training Department of Teachers College, Columbia University. Dewey's influence was evident in the speeches and writings of Richards from 1900 to 1904. In these published speeches and writings, Richards advocated the Deweyan concept of industrial occupations as opposed to the manual training position. In the famous editorial in *Manual Training Magazine*, Richards (1904b) recommended that the industrial education profession use the term "industrial arts" (also referred to as "industrial art" in the same editorial) in place of "manual training." It might be noted historically, however, that he initially recommended the use of the term industrial arts six months earlier in an article in *Educational Review* (1904a). And even before Richard's recommendation, the term industrial arts (in the connotation of the Dewey interpretation) can be found as early as 1901 in a speech before the National Education Association by Clara Mitchell (1901), a teacher in Dewey's Laboratory School.

The industrial arts movement was furthered through the work of James E. Russell, Dean of Teachers College, Columbia University. In 1909 Russell proposed that the prevailing twofold humanistic and scientific curriculums be changed to include a third area. The new area was a study of dominant industries of the time. He felt that his threefold curriculum would provide the student with a more liberal form of education.

The ideas of Dewey and Russell were further implemented by their colleague at Teachers College, Frederick G. Bonser. Bonser developed the elementary school curriculum around Dewey's theory of occupations both from his earlier work at two laboratory schools (the State Normal School in Cheyney, Washington and Western Illinois State Normal School at Macomb, Illinois) and from his later work at the Speyer School (the experimental laboratory school of Teachers College). Bonser called this activity-oriented curriculum industrial arts since it was designed to provide the child with an intelligent understanding of the processes of industrialization as well as of the nature of an industrial society.

Influenced by Dewey's psychology of occupations, Bonser identified six natural impulses of children: to manipulate, to investigate, to engage in art activities, to play, to communicate, and to socialize. These natural impulses were the basis for Bonser's psychology of industrial arts. Dewey's use of those activities stemming from human's fundamental needs (food, clothing, and shelter) were also accepted by Bonser in the curriculum of the famous Speyer School when he was its director from 1910 to 1913.

The report of the school on this unique form of education, *The Speyer School Curriculum*, was in demand throughout the country and went through several reprints long after the school was discontinued. The report was later used as a basis for the book *Industrial Arts for Elementary Schools* by Bonser and Mossman (1923). The book contained Bonser's most popularized definition of industrial arts even though he had published many definitions of industrial arts prior to the book's publication.

> The industrial arts are those occupations by which changes are made in the forms of materials to increase their values for human usage. As a subject for educative purpose, industrial arts is a study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to their changes. (p. 5)

In later definitions of industrial arts, Bonser placed more emphasis on consumer knowledge as industrial arts' primary objective. The significance of the 1923 definition, however, was that it became the basis for many of the contemporary definitions of industrial arts education (Luetkemeyer & McPherson, 1975).

World War I

The entry of the United States into World War I had an immediate impact on the industrial arts movement. The need for trained manpower both for the military and for the war production factories involved all high school shop programs.

A special advisory group of industrial arts educators met in Washington in May of 1918 to suggest various ways for the schools to participate in the war effort. The advisory committee issued a series of recommendations designed to increase enrollment in industrial arts programs throughout the country and to improve the practical effectiveness of shop instruction by relating it to the needs of the war crisis. Another influencing factor coming from the war was the organization of the Junior Red Cross. As participants in the organization, students in industrial arts programs throughout the country constructed various articles of direct benefit to the war effort. A unique curriculum feature of this effort was that the construction of the articles was planned to be part of the regular instructional program in industrial arts. This involvement in the war effort by industrial arts programs had a decidedly favorable impact on students as well as on the general public (Barlow, 1967, pp. 241-244).

Decades Prior to World War II

The decades prior to World War II saw a rapid development of the junior high school movement in the United States. In response to this education movement, industrial arts educators began to emphasize both an exploratory objective and the concept of the general shop. The professional literature of this time was concerned with such junior high school-oriented programs as household mechanics, the comprehensive general shop, the general unit shop, and the laboratory of industries.

One of the major problems facing the industrial arts profession during this period of expansion was one of terminology. The many terms used to describe shop-oriented programs led to confusion concerning definitions, purposes, and program development. This problem of terminology was pointed out by William E. Warner in his dissertation. Warner (1928) found 28 different terms used by shop teachers in naming their programs (p. 5). Noting the frequency of their occurrence, Warner indicated that the term manual arts was used most frequently. Manual training and industrial arts were second and third respectively in terms of use.

Another problem of this period was the attempt by the two diverse groups representing industrial arts education to clarify its role and function in the schools. These clarifications were effected through a series of publications and the establishment of two national organizations. In 1928, the AVA appointed a Committee on Standards to study the possibility of formulating a set of commonly accepted standards for industrial arts. After six years of study and a series of revisions, the committee published its final report in 1934. The report, entitled *Standards of Attainment in Industrial Arts Teaching*, outlined a set of standards including specific examples and materials that could readily be applied by industrial arts teachers and administrators. Influenced by

Robert W. Selvidge, the report emphasized the trade or occupational analysis approach to curriculum development. The report went through several printings and became for many industrial arts teachers the basic guide for curriculum development. Many industrial arts educators saw the need for a separate division within the AVA to reflect their views. Therefore, in 1932 the Industrial Arts Division of the AVA was founded. Robert W. Selvidge, who was highly influential in the drive for a separate division, was named the first AVA vice president for industrial arts.

In honor of its 25th anniversary (1934), the Manual Arts Conference published a report entitled *Industrial Arts in Modern Education.* This publication was an extension of the philosophical position enunciated earlier by the AVA Committee on Standards.

In 1933 a committee of the Western Arts Association published *The Terminological Investigation of Professional and Scientific Terms from the Literature of Vocational and Practical Arts Education,* another attempt to clarify the confusion over terminology rampant at that time. Under the chairmanship of William E. Warner, the committee's publication reflected the Dewey-Bonser philosophy. The report included the following descriptive definition:

> Industrial Arts is one of the *Practical Arts*, a form of general, or nonvocational education, which provides learners with experiences, understandings, and appreciations of materials, tools, processes, products, *and* of the vocational conditions and requirements incident generally to the manufacturing and mechanical industries. (p. 27)

One year later *A Prospectus For Industrial Arts In Ohio* was issued. Also written within the Dewey-Bonser tradition, the document called for a broadened interpretation of industrial arts based on the needs of students in an industrial society. A new concept in laboratory design and facilities evolved from the report and assumed the title of *Laboratory of Industries.* Because of the complexity and difficulty of defining the term "industry," as well as of the further problem of segmenting the term, areas of instruction were labeled wood industries, ceramic industries, etc. (State Committee on Coordination and Development of Industrial Arts Professional Interests, 1934).

As the profession of industrial arts education was divided into two groups (each with a differing philosophical interpretation), there was a persistent demand for a unified position within industrial arts education that would be acceptable to all educators and administrators. In response to this demand, the Bureau of Education appointed a Committee on Industrial Arts (1934) to develop a document to represent an acceptable and unified concept of industrial arts education. After two years of work, the final report of the committee was published by the Bureau of Education (1938) under the title of *Industrial Arts: Its Inter-*

pretation in American Schools. The committee defined industrial arts as a "phase of general education that concerns itself with the materials, processes, and products of manufacture, and with the contribution of those engaged in industry" (p. 1). This definition emphasized the position that industrial arts education be considered a curriculum area rather than a specific subject and that it have general values to apply to all levels of education. Although the report was intended to reflect a unified position acceptable to a majority of educators, the efforts of committee members such as William E. Warner and Lois C. Mossman clearly reflected the philosophical position of Dewey and Bonser.

During the late 1930's a group of industrial arts educators began to discuss the need for an independent national organization to further the cause of industrial arts at all levels of education. These industrial arts educators were led by William E. Warner. They met as a group during the annual convention of the American Association of School Administrators in 1939 and founded the American Industrial Arts Association (AIAA).

World War II

The outbreak of World War II profoundly affected industrial arts education and every other aspect of American life. The scarcity of new tools, equipment, supplies, and materials hampered all industrial arts laboratory programs and necessitated an emphasis on repair and maintenance of existing equipment. It forced many programs to use supplies obtained from second-hand sources. The manpower demands of the military and defense industries also resulted in a drastic teacher shortage in industrial arts education. During the war years industrial arts educators emphasized as their primary objective the prevocational purpose. In close cooperation with vocational education, industrial arts educators helped prepare skilled workers needed for defense industries. An immediate but later permanent effect of the emphasis on the training of defense workers was the dramatic increase in the number of girls enrolled in industrial arts education. As women were an important source of potential workers in the defense industries, many young women enrolled in industrial arts classes during their high school years in order to receive skill training prior to employment.

One of the major curriculum innovations of the war years was the inclusion of the aviation industry as a source of content. The major project of this new curriculum approach was the Model Airplane Project. Sponsored by the United States Office of Education (USOE) and the United States Navy, the project was originated in 1942 to meet the armed forces' demands for model aircraft used in training purposes. During the two years the project was in operation, thousands of students in industrial arts classes throughout the country produced almost one million model aircraft for the military. The role of the industrial arts teacher was to provide the student with a valid educational experience in addition to the laboratory exercise of building the model aircraft. The teacher was to include instruction in the theory of flight and in other scientific principles related to the aviation industry. As the program progressed, the method of construction (one plane-one student) was dropped in favor of mass production techniques (Sredl, 1966).

Post-War Era

The immediate post-war years, 1946-1949, began an era of growth and development for industrial arts education. The Industrial Arts Division of the AVA revised its bulletin on industrial arts and published it during 1946 under the title of *Improving Instruction in Industrial Arts*. At the AIAA Convention at Columbus, Ohio in 1947, Wiliam E. Warner and a group of his graduate students introduced *An Industrial Arts Curriculum to Reflect Technology at all School Levels*. These two publications reflected two distinct philosophical approaches to curriculum development in industrial arts education, and both were highly influential for many years. Another influential publication was Gordon O. Wilber's (1948) book *Industrial Arts in General Education*. Used by colleges throughout the country as a basic text in professional courses in industrial arts teacher education, Wilber's book became famous for its contemporary definition of industrial arts and its theory of curriculum development. Wilber's definition of industrial arts "as those phases of general education which deal with industry – its organization, materials, occupations, processes and products – and with the problems resulting from the industrial and technological nature of society" (p. 2) has become the basis for most contemporary definitions. As outlined by Wilber, the process of curriculum development was based on statements of objectives; changes in behavior on the part of the students in relation to the objectives; and the activities, lessons, demonstrations, and projects related to bring about the behavior changes. Another important event of this post-war era was the appointment in 1948 of John Ludington to the new post of Specialist for Industrial Arts within the USOE.

Led by the two national associations (the Industrial Arts Division of the AVA and the AIAA), the 1950's were a continuation of the general expansion and revitalization of industrial arts education begun at the conclusion of World War II. During this period the following three auxiliary and affiliated groups were established within the AIAA: American Council on Industrial Arts Teacher Education (1950), American Council of Industrial Arts Supervisors (1951), and American Council of Industrial Arts State Association Officers (1955). Since their inception, these organizations have been instrumental in promoting industrial arts through a series of publications and through other professional efforts. The yearbook series of the American Council on Industrial Arts Teacher Education (ACIATE), first published in 1952, is one example of the contributions of these organization.

In 1953, the AVA published the second revision of its famous *Improving Instruction in Industrial Arts* under the new title of *A Guide To Improving Instruction in Industrial Arts*. As Gordon O. Wilber was a member of the editorial committee reviewing the final drafts of the revision, the published report emphasized a position reflected in his earlier work *Industrial Arts in General Education*. The 1953 revision represented a change in the recommended approach to curriculum development. It adopted an approach based on behavioral changes in preference to the trade or occupational analysis approach used in the earlier publications.

One of the innovations of this period was the emphasis on mass production as a method of teaching or as a unit of study. The literature in industrial arts was replete with articles describing attempts to introduce mass production as a part of the program (Sredl, 1967). This period also saw an increased emphasis on integrating science and mathematical concepts into industrial arts. Many industrial arts educators held the position that concepts of modern industry could not be fully comprehended without a strong scientific and mathematical background.

This era also saw greater emphasis on research and experimentation as a method of teaching in industrial arts. Spearheaded by Donald Maley, the movement also stressed the sciences, mathematics, and methods of research as important phases of industry that should be reflected in industrial arts education. Maley (1959) emphasized that this concept of industrial arts would concern itself with "student activity centered around the testing, analysis, and investigation of tools, materials, and processes" (p. 12).

Closely related to the research and experimentation movement was the influence of Gestalt psychology during the 1950's. Gestalt psychology emphasized problem solving or "discovery" as the method of teaching rather than drill. Problem solving as a method of instruction became an important part of industrial arts curriculum development.

In the field of industrial arts teacher education, *The Minnesota Plan for Industrial Arts Teacher Education* published in 1958 played an important role in the revision of teacher education programs throughout the country. The proposed teacher education program was the result of a two-year study designed to prepare teachers for industrial arts programs reflecting a society dominated by technology (Micheels et al., 1958).

One of the significant efforts at curriculum revision in the late 1950's was the publication of Delmar Olson's dissertation, "Technology and Industrial Arts." Influenced by the work of William E. Warner, Olson recommended that the subject matter for industrial arts should be derived from a study of technology as represented in industry. Olson listed eight major categories of technology: manufacturing, construction, power, transportation, electronics, research, services, and management. The industrial arts program as recommended by Olson would include a laboratory of industries at the seventh grade level to reflect all eight areas of technology. Laboratories would be established for each of the categories through the remaining grades with research and experimentation as part of every laboratory (Miller & Smalley, 1963).

With an initial impetus coming from Sputnik, the late 1950's and 1960's began a period of intense curriculum reform throughout the country. Immense funding through the National Defense Education Act, the National Science Foundation, the Ford Foundation, and other private sources led to substantial changes in many phases of curriculum development.

It was an era that saw the collaborative efforts of learning specialists with subject matter scholars in curriculum development. Many curriculum theorists, influenced by the ideas of Jean Piaget and Jerome Bruner, attempted to establish a sequential pattern between subject matter and the cognitive development level of the child. Such terms as structure of knowledge, disciplines approach, and cognitive development dominated the literature of education.

Industrial arts education, as an integral part of this reform movement in formal education, witnessed many new and innovative curriculum movements during the 1960's. Curriculum projects such as the Industrial Arts Curriculum Project, American Industries Project, and others evolved during this formative period (Cochran, 1970).

The 1960's also witnessed the formation of one new council and two national student industrial arts clubs. In 1962 the American Council for Elementary School Industrial Arts was formed during the AIAA national convention in Pittsburgh, Pennsylvania. The American Industrial Arts Student Association was formed in 1965 at the AIAA national convention in Tulsa, Oklahoma. The Industrial Arts College Club was formed in 1967. This group became known as the American Industrial Arts College Student Association at the AIAA national convention in Dallas, Texas in 1972.

In 1961 and 1962 respectively, the USOE issued two publications concerned with industrial arts education. The first publication, *Industrial Arts*, was a 1961 report of a USOE survey conducted on various types of industrial arts programs offered throughout the country. The results were based on the examination of 39 state curriculum guides from 22 states. The survey found that most of the programs listed in the state guides were technically oriented. These results indicated the continuing predominance of the trade and job analysis philosophy in industrial arts education.

The second publication, *Improving Industrial Arts Teaching,* was a conference report by leaders held in June of 1960 to consider the significant problems affecting industrial arts education. One of the significant outcomes of the conference was the contribution of Ivan Hostetler. He identified the four following objectives that should be emphasized in industrial arts education:

1. To develop in each student an insight and understanding of industry and its place in our culture.
2. To discover and develop talents of students in the technical fields and applied sciences.
3. To develop technical problem-solving skills related to materials and processes.
4. To develop in each student a measure of skill in the use of the common tools and machines. (pp. 19-20)

These four objectives provided the framework for many of the curriculum innovations of the 1960's.

In 1966, the USOE issued another report on the status of industrial arts. The publication, *Industrial Arts Education,* reported the results of a survey conducted during the 1962-1963 school year. Two questionnaires were used to obtain the data for the study. One questionnaire was sent to 2,259 principals and the other to 3,040 industrial arts teachers. Both groups were selected from the secondary level (grades 7-12) based on a random sampling. The results of the survey were similar to those of the 1961 report cited previously: Both principals and teachers agreed that the primary purpose of industrial arts was "to develop in each student a measure of skill in the use of common tools and machines" (p. 28). Instructional programs were concentrated in drafting, woods, and metals. The results indicated a gap between theorists at the professional level and actual programs at the secondary school level. "The current industrial arts curriculum does not even measure up to the program recommended by the profession 10 to 20 years ago" (p. 30). However, the report did imply that instructional content reflecting technology (manufacturing, communications, power, transportation, etc.) was beginning to emerge.

The passage of the Vocational Education Act (VEA) of 1963 had a decided effect on industrial arts education. The VEA of 1963 was the first of a series of federal acts that changed the philosophy of vocational education initiated under the Smith-Hughes Act. The VEA of 1963 initiated a shift in philosophy from the original emphasis on specific programs to an increasing awareness of the employment needs of people. This shift in the underlying philosophy of vocational education reduced the distinctions between the two fields. The Act also provided money for research purposes, an area previously unfunded in vocational education. Many of these funds were used to support curriculum movements in industrial arts education. This emphasis on research in curriculum development was reinforced with the Vocational Amendments of 1968.

In 1968, the Industrial Arts Division of the AVA issued the fourth edition of its highly influential *A Guide To Improving Instruction In Industrial Arts*. As a composite document, the guide reflected the industrial arts curriculum innovations of the 1960's. It was concerned with the objectives of industrial arts education in terms of student outcomes, the structure of industry, laboratory facilities, and evaluation.

During the present decade curriculum innovations continued to be emphasized in industrial arts education; at the same time the vocational education movement, under the influence of federal legislation, was continuing to expand the scope of its programs.

In cooperation with the National Aeronautics and Space Administration and supported by funds from USOE, the AIAA conducted a national forum involving leaders from industry, labor, government, and other professional organizations during January, 1970. The purpose of the forum was to study the role industrial arts education could play (in cooperation with the other groups) in helping youth understand and cope with the sociological and technological problems they might face in the future.

The national forum led to the establishment of eight regional forums held between March, 1970 and November, 1971. These forums also stressed the need for interdisciplinary coordination between education, industry, and other interested groups in trying to resolve the many problems inherent in a technologically dominated society. The forum series (including others held later at the state level) strengthened the movement toward the study of technology as the content area of industrial arts education (AIAA, 1972).

In 1971, Sidney Marland the Commissioner of Education began the drive to introduce career education into the public schools. The purpose of career education was to redirect the schools from their historical role (transmission of academic knowledge) to one focusing on a career development model. The curriculum framework for the career development model was in four stages: Awareness (Grades k-3), Accommodation (Grades 4-6), Orientation (Grades 7-8), and Exploration and Preparation (Grades 9-12) (Bailey & Stadt, 1973). As several of the proposed outcomes of career education were similar to the objectives of industrial arts education, many industrial arts programs became an integral part of the career education movement.

In response to the lobbying efforts of the two national organizations in industrial arts education, the Congress under the Education Amendments of 1972, allowed federal funds for vocational education to be used to support certain programs in industrial arts education. In order to use their vocational funds for industrial arts education, the various states had to include the program in their State Plans for vocational education. If the plans were approved by the Commissioner of Education, the funds could be used to support industrial arts programs. This precedent was continued under Title II of the Education Amendments of 1976.

Interest in the study of the future or futurology began to influence the industrial arts movement during the early 1970's. At the 33rd AIAA Convention it was recommended that a committee on the future be formed within ACIATE. This committee was subsequently formed and became active in future research. This group, through many publications and speeches, has added a new and scholarly dimension to industrial arts education (Smalley, 1976).

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chapter 2

Evolution of Industrial Arts in the Elementary School Curriculum

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Today's elementary school industrial arts program is the product of an evolutionary process through which educators have attempted to interpret the philosophy of many early proponents of the activity-centered school. As a result, a multi-faceted program of elementary school industrial arts has evolved.

Terms usually associated with industrial arts activities at the elementary school level are *constructional activities, handcrafts, arts and crafts, creative arts, handwork, manual arts,* and *shop*. Regardless of its synonyms, industrial arts at the elementary school level exists either as a curricular area of the school program focusing upon the study of tools, materials, processes, products, and occupations existing in an industrial and technological society or as an element of an integrated curriculum whereby the content of industrial arts is fused with other subjects to provide a more meaningful whole.

The myriad of programs currently existing can be categorized into five major groups based on the primary purpose which, in a given setting, a program seeks to serve (Miller, 1974, pp. 162-164).

1. Industrial arts as a means of developing habits, attitudes, problem-solving, and interests.
2. Industrial arts as a program designed to meet developmental needs of children.

3. Industrial arts as a program involving students in making objects for the inherent value of the objects themselves.
4. Industrial arts as a vehicle through which children acquire occupational awareness.
5. Industrial arts as a means of correlating and enriching the elementary curriculum.

The activity-centered program of elementary school industrial arts can be readily traced to the European educational experiments of Johann H. Pestalozzi and Friedrich Froebel during the late 18th and early 19th centuries.

This evolutionary process has not been smooth and orderly, as the work of these two pioneer educators in Europe was not recognized in the United States until the latter part of the 19th century when elementary school educators began to look to the European accomplishments of men like Pestalozzi, Froebel, and Johann Herbart as a means of revitalizing elementary school programs. This revitalization promoted the use of real objects and firsthand experiences to break down abstractions and to focus the educational process upon the individual learner.

As this broadened concept of education gradually began to be accepted, it was given an additional stimulus through the publication in 1899 of John Dewey's *The School and Society.* Dewey's chief concern was that the school experience should better reflect life outside the school building.

In the first quarter of the 20th century, two individuals, Frederick G. Bonser and Lois C. Mossman of Teacher's College, Columbia University, were recognized as leaders attempting to apply the social philosophy of John Dewey to the elementary school program through the "industrial arts." In their book, *Industrial Arts for Elementary Schools* (1923), they attempted to apply the content and methods of industrial arts to the elementary education program.

The professional leadership in elementary school industrial arts, represented by the American Council on Elementary School Industrial Arts (ACESIA), has consistently advocated a broad interpretation of elementary industrial arts and has not advocated the use of elementary school industrial arts to achieve any single educational purpose. Instead, the emphasis has been placed upon the variety of needs of elementary school children that can be met through industrial arts activities (Miller, 1975).

THE EVOLUTION OF THE ELEMENTARY SCHOOL IN AMERICA

Even though American education began to develop some uniqueness during the 19th century, it wasn't until the 20th century that an

American philosophy of education emerged to shape the educational system of the United States; therefore, to trace the evolution of the American elementary school movement, it is first necessary to analyze the forces that shaped European educational philosophy during the 18th and 19th centuries. Prior to the 18th century, education for the "common man" was accomplished in the apprenticeship program, in the home, the church, or not at all. The children of the aristocracy in Europe were tutored until they could enter a university. This practice was continued in the American colonies well into the 19th century when the free public school movement became more fully accepted.

THE IMPACT OF 18TH AND 19TH CENTURY PHILOSOPHICAL THOUGHT ON ELEMENTARY EDUCATION

Perhaps the most substantial influence on educational theory and practice in Europe and, subsequently, in America resulted from the philosophy of Jean J. Rousseau, Immanual Kant, Georg W. F. Hegel, and Johann Herbart, as well as the experiments of Pestalozzi and Froebel during the last half of the 18th and the early 19th centuries. Even though there was no universal agreement among these philosophers, the experimenters and practitioners did forge links of selected ideas and consequently developed educational programs reflecting both their positive and negative influences.

Jean J. Rousseau

Jean J. Rousseau's educational theory revolutionized education by making children the center of the educational process. Central to this theory was the concept that the children were shaped by their environments; and, therefore, education should furnish an environment filled with opportunities that would enable the children to realize their potentiality. According to Rousseau, the teacher must forget the prejudices, preconvictions, and ideals that could distort and mislead the children's ideals of themselves and their world. Rather, *the teacher must learn by careful study of the children's characteristics and potentials, then construct the environment so that each child's fullest potential is reached.*

Rousseau also believed that maturation is a progression of stages from birth to adulthood. Each stage is distinguished by its own pattern consisting of a beginning, a middle, and an end. Knowing the nature of each stage of development, the teacher could then direct activities that would allow students to complete fully their development in each stage. Since each stage has its own needs, the environment should serve these needs and not those of a later stage. The best preparation for each successive stage is complete development in the present stage.

Rousseau laid the foundation for progressive education as his educational theory was to be followed by other educational theorists. As a result, he had substantial influence on the contemporary educational philosophy and practice of the 20th century (Frost & Bailey, 1973, pp. 306-314).

Immanual Kant

Immanual Kant's philosophy, which opposed Rousseau's educational theory, placed the children in a highly controlled environment. Kant apparently believed that civilization was a prerequisite for education and that the children should be subject to a highly disciplined school environment with emphasis upon fixed principles of cultural enlightenment.

Although Kant is considered an idealist and his educational theory differs with that of Rousseau, both emphasized the point that children have certain potentials or powers within themselves that need to be developed to their fullest potential (Mayer, 1973, pp. 259-262).

Georg W. F. Hegel

To best interpret the forces that shaped Georg W. F. Hegel's educational philosophy is to view the nationalistic spirit of 18th century Europe.

Hegel believed that education was a process whereby freedom could be achieved. However, freedom was not viewed as self-direction, but rather as identification with a "universal idea." In the first phase of education, the family was acknowledged as the controlling factor in shaping children. In the second phase, the school, according to Hegel, should help students to develop their own powers and, at the same time, to become acquainted with universal concepts (Mayer, 1973, pp. 265-266).

Johann H. Pestalozzi

Johann H. Pestalozzi's educational philosophy dwelt upon the contention that the student was a three-part being consisting of a mind, a heart, and a body, and that education must be concerned with all three parts. Pestalozzi further expressed the idea that the teacher and the student share common goals in discovering the laws governing humanity and nature.

1. *Education of the head:* Pestalozzi was convinced that the education of children should begin with objects, not pictures, words, or vague generalizations and that children must be trained to observe, analyze, count, name, and compare various objects.
2. *Education of the hand:* Pestalozzi believed that children should learn by experience and that insight came through doing. So convinced of the importance of skills necessary for efficient living was Pestalozzi that he considered skills not a means to an end but the

means of moral and social regeneration. He contended that the more varied experiences one attains in life, the greater his or her knowledge and open-mindedness.

3. *Education of the heart:* Pestalozzi emphasized the importance of maternal love and affection. If the mother fails to convey her love or devotion to the young child, then the child will suffer throughout life.

Pestalozzi died without full realization of his impact on education. Little did he know that his ideas and his faith in the child would spread throughout the world. He was truly "the educator of humanity" and considered by some as the father of manual training, the forerunner of industrial arts (Frost & Bailey, 1973, pp. 374-381).

Johann Herbart

Johann Herbart, who lived during the latter half of the 18th and early 19th centuries, was a fundamentalist in his ideas on education and was systematic in his approach to the study of educational processes, as he attempted to make it an autonomous science divorced from metaphysics. Herbart maintained that without a psychological approach to the understanding of the learner, the teacher could not be conscious of the needs of the learner. It was his contention that learning involved an internal change and that instruction involved four phases, which became known as the *Herbartian Method.*

Herbart has been criticized by contemporary scholars for his lack of emphasis on feelings and his concentration on the intellectual side of people as opposed to the "total child" concept espoused by both Rousseau and Pestalozzi (Mayer, 1973, pp. 276-281).

Friedrich Froebel

Friedrich Froebel, the founder of the kindergarten movement and a contemporary of Herbart, was at great difference with Herbart's philosophy of education. Froebel believed that children should cultivate their sense of self-identity in play and that such activity was necessary to develop the children's perception of the world. For several years, Froebel worked with children and developed a rich assortment of kindergarten material, including "gifts," "occupations," and "games," all designed to teach youngsters about the world.

Froebel's educational theory contended that during infancy the child develops simple motor skills, the sense of hearing, and the sense of sight. Like Rousseau, Froebel believed that children, having progressed through an ordered sequence of activities from one stage of development to the next, should reach their full potentiality with self-activity. He also believed that all education must serve the natural unfolding of children's inner spirits.

So popular were Froebel's ideas that kindergartens were soon to spread over the entire western world with Froebelian principles widely adopted by teachers of children (Frost & Bailey, 1973, pp. 382-401).

This all-too-brief summary of the impact of 18th and 19th century European philosophers and their contemporaries upon elementary education in America seeks to highlight these individuals and the ideas that have exerted a continual influence.

ELEMENTARY EDUCATION AND INDUSTRIAL ARTS EDUCATION: MERGING CONCEPTS IN THE 19TH AND 20TH CENTURIES

As previously emphasized, American elementary school education has been greatly influenced by European educational philosophies and practices. In a similar manner, the curricular area of industrial arts in American education also evolved from such European educational movements as the "English Manual Training and Arts and Crafts Movements," "Manual Training for the Children of France," "Sloyd from Scandinavia," and the "Russian Manual Training Movement" (Bennett, 1937, Chapters I, II, III, VII, & VIII). Each movement was a reflection of the economic and social changes occurring in Europe. This eventually resulted in an emergence of a middle class composed of skilled tradesmen and merchants. At the same time, the American industrial revolution brought about economic and social changes as the United States began a transition from the agrarian way of life. With this transition came free public education with compulsory school attendance laws, child labor laws, and a new viewpoint of manual arts in its relationship to other subjects in the school curriculum. The development of the industrial arts movement in America is further described in Chapter I of this yearbook and will not be dealt with here.

ANTECEDENTS OF ELEMENTARY SCHOOL INDUSTRIAL ARTS

During the 1880's in New York City, the kindergarten patterned after Froebel's school in Blankenburg, Germany was introduced by Felix Adler. Adler was instrumental in establishing the first free kindergarten in America, which became the Workingman's School under the direction of the New York Society for Ethical Culture. The school extended its instruction to include the elementary school grades. As the school's name implies, Adler was concerned with the plight of the working man and his family. It was this concern that led him to provide school work of a practical nature for the working man's children. Even though he was concerned that these children be given a practical education that would help them adjust better to their vocational future, he also wished to imbue the children with an appreciation for the dignity of labor. However, his unique contribution stemmed from his belief that the constructional activity should be an organic part of the whole. The idea that constructional activity should be correlated with other areas of the elementary curriculum rather than separated from the rest of the elementary program proved to be sound and continues to be the dominant concept even today. Adler and his contemporaries were convinced that mathematical concepts, physics principles, aesthetic values, and geometrical forms were better understood by children through experiences in related physical activities (Bennett, 1937, pp. 415-425).

There were several notable events during the last quarter of the 19th century giving impetus to the movement that resulted in the inclusion of constructional activities in the elementary school curriculum. As indicated by Bennett (1937), the principal developments were in the industrialized northeast. Among the examples cited were school programs initiated by Frank Rowell, James A. Page and George L. Chaney, whose school can best be remembered for its approach in teaching drawing and woodworking to primary students. The records indicate that career information related to the occupations of the woodworking industry was included in the curriculum (Bennett, 1937, pp. 403-410).

The secondary school program of practical shop activity, although continuing as a separate subject in the curriculum, apparently was influenced somewhat by the broader concept promoted by elementary school educators. Secondary education leaders began to promote the activity for educational reasons other than the development of manual skills. The secondary program, which had been known as *manual training,* began to broaden its function, and, as a result, the name *manual arts* became the term accepted to describe the program. This name was to imply a greater concern for better designed objects of construction and increased emphasis on the creative approach to activity as opposed to set patterns of exercises that had been utilized as the vehicle for manual training.

It has been previously noted that John Dewey's publication, *The School and Society,* gave an additional stimulant to this concept. It was his concept that a broad study of society's industrial occupations would provide an ideal vehicle for the realistic use of reading, writing, numerical computation, and other fundamental skills. This separation of such subjects as history, arithmetic, and reading at the elementary school level was to Dewey unnatural and totally unrealistic (Dewey, 1899, pp. 22-24).

DEVELOPMENT OF INDUSTRIAL ARTS PROGRAMS AT THE ELEMENTARY SCHOOL LEVEL

As one looks in retrospect on the chain of events, the personalities and the ideas influencing American education prior to the 20th century, the emergence of elementary school industrial arts appears to be a most logical result. Through John Dewey's philosophy can be seen the essence of Rousseau, Pestalozzi, and Froebel. More than that, Dewey incorporated the new discipline of psychology spearheaded by G. Stanley Hall and William James.

First Quarter — 20th Century

The establishment of the first philosophical base for the existence of industrial arts in the elementary school is largely attributed to the work of James E. Russell and Frederick G. Bonser at Teachers College during the early 1900's. Their course of study, *The Speyer School Curriculum,* was published in 1913. It was based on the philosophical thought that industrial arts should be a subject matter discipline concentrating on those industrial processes fundamental to the survival of people. Bonser and Mossman (1923) refined this philosophical thought in the publication *Industrial Arts for Elementary Schools.* Hoots (1974) summarized the basic points underlying this philosophy.

1. Industrial arts is a subject matter discipline and has its own unique body of content.
2. Industrial arts derives its content from industry, with emphasis on the changing of raw materials into useful products, from the life related to these changes, and from the consumer aspect of utilizing these products.
3. Industrial arts is a part of the total school curriculum and has a close relationship to the other subjects within the curriculum.
4. The elementary school classroom teacher must provide industrial arts instruction at the elementary school level. (p. 222)

During the first quarter of the 20th century, Bonser and Mossman were leaders in the application of John Dewey's social philosophy to the elementary school program through industrial arts. As previously stated, they attempted to apply industrial arts to the elementary school program as both content and method. As *content,* industrial arts was conceived as helping children to develop an appreciation and understanding of industry in the culture – a study of the related and resultant social problems, and the development of judgment in the selection and use of industrial products. As indicated here, the emphasis was definitely shifted from the development of manipulative skill toward the conveyance of understanding through concrete experience. As a *method* that would implement the understanding of certain content, industrial arts (broadly conceived) would involve a variety of activities through which children would experience the traditional content of the elementary school such as arithmetic, geography, history, science, and reading. This method involved the individual in a variety of problem situations enabling learning through experience.

Second Quarter — 20th Century

Following the work of Bonser and Mossman in the first quarter of the 20th century, the absence of citations in the professional literature indicates that there were no substantial new developments in elementary school industrial arts. However, during the period between 1925 and 1950, the industrial arts education profession made rapid strides. Numerous professional organizations were developed that served this new and expanding discipline, e.g., the American Industrial Arts Association (AIAA), the Industrial Arts Division of the American Vocational Association, as well as many state and regional organizations. These organizations provided the forum for interested individuals with expertise in the various areas of industrial arts to exchange ideas and stimulate professional development. This time period spanned the progressive education and life adjustment education movements as well as a new industrial and technical revolution brought about by World War II. Collectively, these events had a reinforcing influence on the continuing development of industrial arts at the elementary school level. However, this continuous and gradual growth, which followed the guidelines established by Bonser and Mossman, did not leave any major landmarks as one studies the evolution of the field. One indicator of the status of the field during this period is the fact that only six doctoral research studies were completed in the area prior to 1950, while a survey conducted by Downs in 1974 revealed that 52 dissertations related directly to elementary school industrial arts were completed during the period 1950 to 1972 (Downs, 1974, p. 280).

Third Quarter — 20th Century

The period of time since 1950 has produced a wide variety of professional activities related to industrial arts at the elementary school level. In addition to the increase in the number of doctoral dissertations, other evidence can be cited. Many colleges and universities established courses in industrial arts for elementary teachers, and six books were published specifically for the purpose of facilitating the preparation and in-service development of elementary and special education teachers in the area of industrial arts at the elementary school level. Numerous school systems employed industrial arts specialists to work exclusively with elementary school teachers and children.

In 1962 ACESIA was chartered as a council of the AIAA. ACESIA has provided considerable stimulus for further development of the field during the past 15 years. In addition to providing a forum for interaction among professionals in the field through a quarterly newsletter and annual conference programs, ACESIA has initiated a monograph series, provided bibliographies, directories, and a handbook for teachers and administrators. From an original membership of 49, ACESIA now has approximately 400 members. Although teacher educators comprise the largest group of members, elementary classroom teachers and curriculum specialists are becoming involved in ACESIA in increasing numbers. If space would permit, numerous individuals who have served the profession through positions as officers and committee chairpersons could be cited for their positive contributions, but only two who have had a substantial impact on the movement will be mentioned by name – Mary-Margaret Scobey and Elizabeth Hunt. These two professionals made substantial contributions to the literature of the field, served in a variety of capacities for ACESIA, and participated in numerous programs for state, regional, and national conferences.

In 1969 the United States Office of Education funded a project that culminated in the National Conference on Elementary School Industrial Arts. The conference brought together recognized national leaders in the field who drafted statements of definition, philosophy, objectives, and instructional approaches. These were subsequently published as a conference report entitled *Industrial Arts in the Elementary School: Education for a Changing Society* (Hoots, 1971).

Even though there is substantiated evidence that industrial arts programs now exist in a variety of forms in elementary schools across the United States, no data regarding the number of children who have these experiences or the number of classrooms in which planned and organized industrial arts activities take place are currently available. Industrial arts is seldom advocated as a separate course in the elementary curriculum. As a result, it frequently exists as part of other curricular areas of the elementary school; therefore, definitive data are difficult to secure.

As previously discussed, the field of elementary school industrial arts has evolved out of a child centered philosophy of education, and it has weathered educational change. The field or "discipline" has prevailed because of its unique contribution to the development of children; however, its relatively low profile may result from the fact that elementary school industrial arts has been without a "champion" in the broad discipline of elementary education or within the political arena of federal and state government.

Evidences of various evolutional stages of industrial arts can be found in the contemporary elementary school. Many of the ideas advocated by the proponents of the activity centered school have found their way into the elementary school curriculum. In some cases the concepts are implemented in much the same manner as originally proposed. However, in some instances, the concepts have embraced new meanings and now assume quite a different form than originally proposed. For example, the study of industries or occupations advocated by Dewey and later by Bonser and Mossman has been acknowledged as being the type of content generally included within social studies at the elementary school level (Bonser & Mossman, 1923, pp. 5-8). In fact, it is difficult to imagine an attempt to interpret the American culture without referring to the arts of industry that have played such a significant part in the development of the way of life in America. However, a realistic and meaningful understanding of industry as a part of our culture at the elementary school level is not likely to be gained without firsthand experience with tools and materials. When verbal abstractions alone are used to tell the story of America's people at work, the elementary school child is less likely to gain the depth of understanding of concepts that is possible when concrete, realistic experiences are provided. This is only one example, demonstrating that while constructional or industrial arts activities cannot answer all of the needs of the elementary school child, it is equally unlikely that all of the needs of the elementary school child can be met without these activities (Miller, 1970, p. 21).

CONTEMPORARY PROGRAMS OF ELEMENTARY SCHOOL INDUSTRIAL ARTS

The background provided in this chapter provides a vantage point from which the evolutionary processes of program development in elementary school industrial arts can be viewed.

Even though there has been a recent surge of professional interest and program development in elementary school industrial arts, the dominant programmatic thrusts continue to focus on industrial arts as both *content* and *method* (Miller, 1974, p. 169). Typical of the point of view emphasizing the content or "discipline of industry" approach is the contention by Hackett, at the 1965 convention of the AIAA, that occupations (the work one does) and industries (the institutional setting or environment in which one works) could provide the basis for integrated units of study at each grade level. This *occupational awareness* approach is currently being amplified as a means of implementing the *career education* concept introduced by former Commissioner of Education Sidney P. Marland in January, 1971, at the national convention of the American Association of Secondary School Principals. At the present time, programs placing emphasis upon occupational awareness are receiving stimulation through special federal and state funding.

The value of industrial arts as a *method* at the elementary school level is emphasized by those who contend that activities related to tools, materials, and processes provide the learner with (a) motivation, (b) reinforcement, (c) problem solving experiences, (d) reduced abstraction, (e) a purposeful learning environment, and (f) opportunities to apply knowledge through direct participation.

A research study conducted in 1972 by the author and reported in the 23rd yearbook of the American Council on Industrial Arts Teacher Education provides the most current and complete information available regarding programs of industrial arts as conducted in the elementary classroom (Miller, 1974, pp. 161-170).

The reader is reminded that Chapter V of the 23rd yearbook does not seek to describe a group of programs judged to be innovative or exemplary. It is, however, a report that seeks to describe the common features and characteristics of approximately 170 programs of industrial arts at the elementary school level as then reported by teachers and administrators of local programs.

The writer deliberately took an eclectic approach to the description of contemporary programs rather than an exemplary approach that would have revealed a dozen or so of the more innovative programs, the exceptions rather than the general rule. A more complete summary of the literature and a thorough analysis of ten innovative, contemporary programs of elementary school industrial arts can be found in a Master of Education thesis titled, "A Description and Comparison of Selected Contemporary Elementary School Industrial Arts Programs in the United States of America" by Geoffrey T. Nicholls, completed in 1972 in the Department of Industrial and Vocational Education at the University of Alberta under the direction of Darius R. Young.

In the five-year period between 1972 and 1977, the most significant shift in elementary school industrial arts resulted from an increased emphasis on career education. This emphasis allowed educational activities to be designed to facilitate each child's career development. Because of the space limitation imposed in this chapter a complete description of *career education* and *career development* will not be presented. The reader is directed to two references for a more thorough explanation of these topics (Gysbers, Miller, & Moore, 1973; Hoyt, 1973).

For the purposes of this chapter the concepts are described only in operational terms. The word career in the context of *career education* refers to an individual's involvement in the process of living. In other words, one's career refers to his/her various life roles (a) as a member of a family and a community, (b) as a producer and consumer, (c) as a participant in leisure activities, and (d) as a participant in the religious, moral and aesthetic activities of the culture. *Career development* then, in a real sense, refers to self-development over the life span. In this perspective it can be readily seen that career education refers to those planned experiences that facilitate the individual's career development.

Much of the emphasis in the career education movement has been upon the role of the individual as a producer of goods, as a renderer of services, and as a consumer. This emphasis upon the economic role by many career educationists recognizes the centrality of occupations in shaping the lives and lifestyles of people. One's occupation frequently determines or limits locality, friends, possessions and other dimensions that are significant in defining one's total lifestyle. As important as an occupation is over the life span, it must be viewed within the total context of the individual's career development.

A key component of career education consists of efforts of all classroom teachers, at all levels of education, to teach career implications of their subject matter. There are significant motivational advantages inherent in helping students see some relationships between that which they are being asked to learn and the society in which they will play an increasing role.

FUTURE DIRECTIONS AND EXPECTATIONS

As one views the evolutionary development of the theory and practice of elementary school industrial arts, it becomes readily apparent that the decades of the 1960's and 1970's encompassed the most significant growth period to date. All of the indicators, i.e., research, publications, program development, professional organizations, support this observation.

From the author's perspective, the decade of the 1980's should provide a period of continued growth in the program of elementary school industrial arts. The professional organization for the field, ACESIA, is well structured to provide leadership to developmental efforts. The career education movement which began in the 1970's shows no signs of abatement, and this movement is quite compatible with elementary school industrial arts. Even though there is a "back to basics" trend with a possible dampening effect, it is the author's belief that the continuance of an industrial and technologically based society will demand an increased degree of technical literacy of the citizenry. In fact, this concept could be the "rallying cry" or point of focus for elementary school industrial arts during the 1980's.

Career Education Through Elementary School Industrial Arts

The uniqueness of elementary school industrial arts methodology lies in the fact that its activities can provide a greater variety of elements to enhance a career education program than any other single educational discipline. It can provide hands-on activities and group experiences so necessary for motivating children and giving them true-to-life experiences. Nothing gives the feel of work so much as work itself. The more actively children can explore and test their interests and abilities in real work situations, the more perceptive they will be in deciding upon an appropriate vocational goal for later adult life. Traditional occupational units taught in the classroom emphasizing occupational literature, lectures, and "canned" lectures on tapes or films have not been very successful, and there seems to be a growing dissatisfaction with this approach. These programs focus on telling children about the world of work rather than on providing them with opportunities to engage in it. The methodology of industrial arts provides an organized, sequential, and systematic method for career planning centered around the individual child and easily correlated with the curriculum of the elementary school. This, in addition to being a meaningful approach that motivates children, is a practical method that makes mathematics, social studies, language arts, and the other subjects more relevant (Hoyt, 1973, pp. 29-30).

Developing Technical Literacy

In the past, youth had many opportunities to observe and participate in the "world of work" around them; however, as a society becomes more complex, youth become more removed from occupational life. No longer is it possible for a boy or girl to become familiar with many occupations existing in their society through the natural process of "growing up."

To become effective producers and knowledgeable consumers, citizens must learn how goods are produced and how services are rendered. More that 50% of the nation's labor force is employed in occupations directly related to industry; therefore, an industrial arts program can provide a context wherein youth may experience, directly or indirectly, a wide spectrum of the world of work.

In addition to studying the occupations involved in the production and servicing functions of industry, youth need to have experiences with some of the major concepts underlying the development of a technological society, such as the division of labor, specialization of functions and interchangeability to make volume manufacture or mass production possible.

The rate of change in a technological society requires that producers and consumers develop attitudes that are flexible and compatible with change and continually seek "a better way." The principles of mechanization, work simplification, materials handling, and electronic controls underlying the concept of automation need to be understood by youth. Youth need to understand the effect of mechanization and ultimate automation upon various occupations. For example, they need to know that there is a decreasing need for workers to tighten bolts, turn handles, move levers, and directly operate production machines. Increasingly, these operations are being accomplished automatically by machines; however, the greater challenge is for the worker who designs, produces, adjusts, and maintains the automatic machines. Obviously workers of the latter type require more training and a different type of training. In fact, their training, like that of all who work in a complex technologically oriented society, never really ends. They must continually assimilate new knowledge and develop new skills required by a dynamic technological society.

SUMMARY

The evolution of industrial arts in the elementary school can be traced back to the 18th century European educational philosophers. Early emphasis upon the total child's development and the importance of active participation and experience to that development formed a cornerstone upon which the structure of elementary education in America has been built. This same cornerstone is revealed in John Dewey's works that shaped the philosophy of the educational leaders of America during the 20th century.

Indeed the contemporary leaders in the movement to increase the opportunities for children to be involved in industrial arts at the elementary school level cite the contributions of industrial arts to the child's developmental needs as the raison d'etre. In recent years the emphasis has been upon the integration of the *content* of industrial arts into the traditional curriculum of the elementary school and upon the use of the *methodology* of industrial arts to increase the experiential base of such subjects as science, mathematics, social studies and language arts.

The approach taken by contemporary leaders of the elementary school industrial arts movement is quite consistent with both the rationale and the programmatic thrusts of the career education movement as they have developed during the 1970's and as projected for the coming decade.

Industrial arts educators and career educationists have observed that the elementary teacher most concerned with the child's total development is the quickest to incorporate industrial arts activities into the instructional program. Regardless of the emphasis the program may take in a given school or community, the regular elementary classroom teacher is the key to the program's success, since it is the elementary classroom teacher who knows the total elementary curriculum as well as the needs, interests and abilities of the children. Specialists in industrial arts can provide administrative, curricular and logistical support as well as assist with the inservice development of teachers; however, their role at the point of the teaching/learning interface is limited.

For the future growth and development of elementary school industrial arts, emphasis must be placed on the preparation and inservice development of elementary classroom teachers. In the final analysis, the achievement of the objectives of elementary school industrial arts and those of career education would lead to a thorough integration within the curriculum and a resultant loss of identity.

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chapter 3

An Examination of the Relationship of Industrial Arts to General Education

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A review of the literature pertaining to industrial arts and general education reveals countless authors attempting to keep education abreast of cultural and technological changes of their time. Human nature tempts these authors to look to the past for guidance in understanding present educational issues, trends, and problems; although it is not always clear how the present learns from the past or how the future may evolve from the present. Therefore, scholarly research on educational topics often contain a historical analysis.

A historical review of the literature to ascertain the relationship of industrial arts to general education reveals that a commonly agreed upon definition of either term has yet to be formulated. The origin of each field is also questioned. The industrial arts literature reveals that much has been written relating industrial arts to general education, while little of the literature on the topic of general education recognizes industrial arts as a part of the overall general education picture. Two reasons are offered as a partial answer to this circumstance: (a) the late addition of industrial arts activities to the traditional school curriculum and (b) the failure of members of the industrial arts teaching profession to properly articulate their field to the other areas of education. Many other commonalities and differences may also be drawn between these two terms. The nature of general education, industrial arts, and their past, present, and future relationship will be explored in the chapter.

GENERAL EDUCATION IN RETROSPECT

Understanding the Goals of General Education

Advocates of general education claim that a general curriculum produces an educated person. However, several questions remain to be answered. What is an educated person? Would a general education today be the same as a general education of the early 1900's? How will general education be viewed 20, 50, or 100 years from now? A review of the trends in general education indicates that the definition of an educated person is embedded in its own time frame. McGrath (1947, p. 3) described general education as "that which prepares the young for the common life of their time and their kind." He further described general education as knowledge, beliefs, habits of language, thoughts that characterize, and education that gives stability to a particular social group. McGrath considered general education as a unifying element of a culture that embraced the moral truths of the time. General education attempts to make individuals capable of understanding themselves and the world they live in through the knowledge of spiritual values of the race and the presentation of scientific generalizations that contribute to the development of the individual.

Charters (1946) viewed general education as primarily concerned with people and only secondarily concerned with knowledge, skills, and techniques. He described general education as a continuous program of life experiences for all children, youth, and adults. The life experiences were to focus on common needs, interests, and problems. Charters cited the following responsibilities for general education:

> General education should accept as its chief responsibility the development of individual and group personality patterns that will free intelligence, and enable all persons to operate rationally in situations where choices and judgments have to be made. (p. 68)

According to Charters, general education was to provide facts relating to personality patterns, the universality of change, background for needs and interests, in addition to issues and parodies in values. General education was to be the conscience of education. Accordingly, Hancher (1947) noted that the goal of general education was one of producing intelligent, responsible, cultured, human beings.

The writings of the aforementioned educators provide a perspective to the definition of a person considered as "educated" in a general education setting. The thoughts and projected goals indicate that the values held during the time frame that the general education occurs become a most important factor in assessing the quality of a person's education. The nature of one's general education should be viewed in relationship to the events occurring in society during the time of that education.

Evolution of General Education

Although it is difficult to identify or define exactly when it originated, general education is assumed to have started long before industrial arts. The following paragraphs identify viewpoints of various researchers. Historians and scholars have noted that general education could have originated as early as the days of Homer when specific and general education were differentiated for warriors and scribes (Bouwsma, 1975). Bouwsma noted that even at this time the earliest hints of a general education ideal were the products of professionalism. The occupational groups of warriors and scribes developed high levels of competence and, thus, exhibited a tendency toward idealization that regularly accompanies the formation of a professional ethos.

Mayhew (1960) indicated that general education started in the 1830's as an alternative to the liberal arts curricula of the times. He further noted that although the term "general education" was not commonly used until the 1940's and 1950's, it represented one more step in the long line of changing educational patterns that have evolved to correlate education with cultural and technological changes (p. 1).

Rattigan's (1952) work entitled, *A Critical Study of the General Education Movement,* suggests that general education may have evolved in the 1930's as a result of displeasure with the school curricula at that time. He noted that the movement revealed itself principally as a reaction against over-specialization, a quest for unity, and an emphasis on the need for a curriculum suitable for universal education (p. 42).

The previously cited research offers three time periods with bases for the actual evolution of general education. General education evolved as the result of a quest for excellence and a desire for highly developed standards of competency with a propensity toward idealization. For example, in the days of Homer, the class known as aristocrats was given a type of education different from that of the lower ranked peasants. Individuals in both classes endeavored to excel in their professional occupations regardless of their social rank. General education was used as a vehicle for attaining excellence. Education was applied in a different manner to meet the needs of both classes. Further evidence of the different levels of application of general education was presented by Howie (1968) when explaining the works of Aristotle. Aristotle differentiated between the education of the "free" and the slaves of the time. General education for each class was different. However, education for both classes was supposedly appropriate for each group's daily tasks. The application of general education during the times of Homer and Aristotle indicates that regardless of the class, learning was regarded as an experience that enabled individuals to transcend the limits of their own existence – to excel if the desire was present within the individual.

Educators, social theorists, and laymen have frequently criticized general education. This criticism has assisted educators in assessing the quality of general education during a given time period. Russell (1939) conducted a study to determine whether colleges had different definitions and meanings for general education. The results indicated that 22 of the 35 colleges responding to the survey did indeed have different definitions and meanings for general education. Russell discovered a tangle of confusion:

> We can hardly avoid the conclusion that confusion pervades the minds of many of those who discuss the subject. The respondents in these colleges that have received publicity regarding their programs of general education seem to have no commonly understood, clear-cut, or accordant definition of that term in mind; some of the respondents are in open disagreement with others. (p. 183)

Despite this disagreement regarding the definition of general education, McConnell (1947) noted that the general education movement began as a reaction against the disunity that had spread through the liberal arts curriculum. The liberal arts education cultivated intellectual interests, liberal views, and attitudes that developed the scholars during the times of Plato, Aristotle, and St. Augustine. Scholars of the two forms of education (general education and liberal education) constantly made comparisons between the educational movements. General education was to have evolved because of the overspecialization and lack of effectiveness of the liberal arts education. Rice (1964) differentiated between liberal and general education in the following manner.

> *Liberal Education:* subject centered; fairly fixed body of content material, logically organized, one goal of stimulation of reflective thinking, less emphasis on behavior, draws its clientele from the intellectual elite. implies a concentration in depth with frequently a more intensive cultivation of one or two special fields of knowledge. clings closely to tradition in the kinds of learning it sanctions.
>
> *General Education:* concerned more with learner than content which may be organized and reshuffled with less regard to traditional fields. goals are individual development in their various aspects. places emphasis upon behavior and social usefulness as well as intellectual develop-

> ment as an outcome in learning; manifestation of democratic spirit in higher education admits a wider scope of abilities and a far broader clientele. (p. 11)

The concept of general education provides for a universal education; it is an education for the general population designed to encourage the development of people into contributing members of society. The importance of the contribution towards universality of education was stressed by Baker (1947). He wrote that general education in theory evolved to assist all students in living in their time. General education was designed to prepare students to be helpful contributing members of society by giving the individuals as much training and learning as they could comprehend, use, and enjoy.

The advancement of technology and the expansion of knowledge created an important need to prepare individuals with a background in elements of all spheres of human learning. This expansion of knowledge along with the development of an increasingly complex industrial society created a need for many varied skills not previously required of the less sophisticated technological environments. The nature of education was affected by the knowledge explosion, for an individual could no longer be expected to know everything or even most things about a particular topic as may have been the circumstance before technological expansion greatly affected society.

The purpose of general education during a period of change is to develop a mature concept of the relationships between individuals, and between individuals and society and industry. Unfortunately, education often occurs a generation behind the accomplished fact. But in an age when technological sophistication constantly increases, much learning becomes outdated. Willkie (1947) stated the following:

> Perhaps general education for the people of industry should de-emphasize teaching about the world as it has been and shift the stress to a realistic treatment of the world as it is, and the world as it should be. (p. 274)

Although Willkie's statement was written some time ago, educators are still basing many of their practices on historical information rather than preparing the student for the years to come. Willkie also warned against turning blindly to technology without giving much thought to the basic underlying philosophies and meanings related to the application of technology. Perceiving the correct type of general education needed by society could allow a student to be educated to live where change becomes a habit, where intellectual stamina can be acquired, and where imaginative talent can be utilized.

The previous paragraphs have indicated that a person having a general education may have been a scribe in the days of Homer or a student in a public school anywhere in the United States during the past year. When viewing the worth of general education, one must study the common life of the time in which the education occurs. Characteristics of general education include factors that give stability to the particular social group involved. Several definitions and purposes have been listed as being a part of general education. These descriptive phrases have been refined to express the opinion of the authors attempting to convey educational philosophy to their audiences. The nature of general education has also been altered as technology has changed. Few people will argue that the advancement of technology has not affected the nature of one's life and educational needs. The written materials of the past indicate that future general education will exist to aid members of society in keeping abreast of cultural and technological changes of their time.

INDUSTRIAL ARTS AS A PART OF GENERAL EDUCATION

The Evolution of Industrial Arts as a Part of General Education

Educators in the field of industrial arts are in general agreement that the term describing the profession evolved through the work of Charles R. Richards (1904). Depending upon one's viewpoint of when the actual evolution of general education started, industrial arts is generally considered as evolving after the advent of general education. The name, industrial arts, (also referred to as "industrial art" in the Richards' editorial, 1904), was suggested by Richards because he believed that it was time for American education to leave behind the pure disciplinary thought of manual training and move toward content that included the scope of work relating to the elements of industries. It was at this time that the Dewey (1900) philosophy placed new psychological emphasis on "shopwork." Consideration was given to the individual student who selected, designed, and constructed a project. The work of Richards and later Bonser and Mossman (1923) tends to align the purposes of industrial arts with general education. Industrial arts educators have since related general education to their field for the purpose of better describing their educational efforts. For example, Hornbake and Maley (1955) described general education as "that education which leads to an understanding of the major fields of knowledge and of the interrelationships among them" (p. 44). General education was an "education for common life" and industrial arts was to be a part of that experience. Brown (1977) expressed the following view:

> To speak of industrial arts as general education is to say that it is inextricably bound to one of the great themes running through human history. (p. 7)

The initial intentions of Richards were left stagnant until Frederick G. Bonser, with the help of Lois C. Mossman, developed a child-centered elementary industrial arts program. Bonser proposed to implement many of Dewey's theories by using the project to emphasize the educational ends of a student's work. Bonser's work resulted in the creation of the general shop or laboratory in which many activities were presented. A new type of teacher was required, to be trained in methods and procedures evolving around children and their activities. The influence of project work on the student represented a new emphasis for industrial arts teaching at that time. Bonser's work was child-centered and activity oriented with a concentration on the life needs of people, e.g., clothing, shelter. The Dewey-Bonser friendship resulted in a close relationship of Dewey's psychology of occupations with Bonser's psychology of industrial arts. Bawden (1950) reported the nature of Bonser's educational intentions for industrial arts.

> As a subject for educational purposes, industrial arts is a study of the changes made by man in the form of materials to increase their values, and of the problems of life related to these changes. (p. 38)

Industrial arts education was adapted to fit the needs of the student. Courses were organized as an integral part of general education on a functional basis and were flexible enough to meet individual needs and influences. Latimer (1976) reported the following:

> The Dewey-Bonser concept of industrial arts as a general education conflicted specifically with the status quo of several programs: manual training, manual arts to a degree, vocational education, and most programs that were called industrial arts. (p. 332)

However, Bonser's work continued to gain notoriety and remained one of the most important early works relating industrial arts to the overall goals of general education.

Similarities of Industrial Arts and General Education

During the years following the efforts of Richards and Bonser, many similarities can be drawn between industrial arts and general education. The number of educators promoting industrial arts increased substantially. Thus, numerous definitions of industrial arts soon followed as had occurred with general education. Educators such as Friese (1964), Parker (1948), Sotzin (1961), and Struck (1930) were just a few of the individuals defining industrial arts in their attempt to provide direction for the field. An equal number of purposes were also identified for the profession. The majority of these definitions and purposes have included industrial arts as a part of general education, either directly or indirectly.

Industrial arts educators have attempted to keep their profession in tune with societal characteristics and events of the time. For example, Struck (1930) emphasized the consumer characteristics in industrial arts when he described the field as a fundamental part of general education. He noted that individuals became intelligent consumers through experiences with tools, processes, materials, design, and life problems.

A few years later, Parker (1948) emphasized the importance of industrial arts in general education citing many of the same characteristics as Struck with additional values of industrial arts.

> Industrial arts is fundamentally important in general education as it enables every student to better understand our country and its important activities, materials, products, processes, tools, machines, services, etc. Provisions are also made for developing the various fundamental requirements of a technological democratic society. (p. 15)

Parker concluded that all education should be geared to fit the needs of the students. He was concerned that courses be organized as integral parts of general education on a functional basis.

Another perspective of industrial arts was presented by Sotzin (1961) who suggested that industrial arts be an aspect of general education concerned with satisfying people's innate desire to construct projects with tools and materials. Sotzin noted the following:

> It (industrial arts) is a curriculum area rather than a subject or course, being comparable in this respect to the areas which comprise social studies, health activities, language arts and the fine arts. (p. 4)

Sotzin's statement reflected the difficulty that industrial arts experienced at that time in being recognized as an important viable part of general education. Others such as Friese (1964) wrote articles supporting Sotzin's position. In spite of the writings of these educators and others, the field of industrial arts continued to be ignored in the majority of literature written by general education advocates.

Confusion Concerning the Degree of Specialization of Industrial Arts

Both general education and industrial arts have experienced a confusing evolution. It was previously noted that considerable debate occurred among general educators in an attempt to differentiate between a general and a liberal education. Industrial arts educators have had their own debate regarding the degree of specialization that should take place in programs, particularly at the secondary level. The relationship of industrial arts to vocational education (specialization) has also been a constantly debated issue. McGrath (1944) wrote that "general education refers to those phases of non-specialized and non-vocational education that should be common possession, the common denominator, so to speak, of educated persons as individuals and as citizens in a free society" (p. 7). The debate regarding general versus specialized education results from the nature of the definition used by educators. Specialized education has two generally accepted definitions. First, it can be very narrowly defined as vocational education and, secondly, it can be broadly defined to include content that may be used in both industrial arts and vocational education subjects. Normally, vocational subjects are taught using a more specialized content. This misunderstanding as to the exact content of industrial arts and vocational education has contributed to much of the misunderstanding among general education advocates about the attributes of industrial arts as a general experience for people. The close relationship between industrial arts and vocational education has caused many general educators to view industrial arts as vocational (specialized) education rather than general. This perspective has not assisted industrial arts educators in their identity problem and quest to be considered a part of general education. It also explains why industrial arts educators are constantly writing about their contribution to general education while the general educator continues to ignore the industrial arts profession.

Additional confusion evolves when considering whether general education should occur before, during, or after specialized education. Typically, general education occurs *before* specialized education when the primary responsibility is one of making the adolescent a responsible citizen. Finally, general education should occur *after* specialized education when it is necessary to first learn the skills and tools of literacy or for making a living. Since industrial arts can occur before, during, or after specialized education, much confusion has resulted over the relationships of these types of education. Typically, industrial arts educators perceive the relationship as described by Silvius and Bohn (1961).

> General education provides the full program of instruction in the early grades and gradually gives way to specialized education, which becomes more and more prominent, eventually encompassing all, or nearly all, of the curriculum activities. (p. 65)

It should be noted that any sound vocational education consists of both general education and technical preparation. The conception of vocation or profession should not be limited to a set of special skills; it should include skills that every competent citizen should possess. Industrial arts educators profess to give students the necessary general and technical preparation for specialized activities that occur during an individual's lifetime.

Advancing Technology and Industrial Arts

The literature pertaining to the industrial arts/general education relationship has increasingly reflected the study of industry and technology as an integral part of education. One strong proponent of this theory whose work furthered the ideas of Dewey and Bonser was William E. Warner. Warner perceived industrial arts as a part of general education that provided students with a broad orientation to industry and the industrial society (Latimer, 1976). Warner advocated a curriculum built on the study of power, transportation, manufacturing, communications, and management, rather than on the traditionally studied woods, metals, and other unit shop areas. His philosophy led to the formation of the American Industrial Arts Association, founded to promote the objectives of industrial arts as a part of general education. Warner's approach dictated the use of a wide variety of tools and materials in a broadly based integrated situation. Thus, the general laboratory setting worked better with this approach than the specific or unit shops that had been used in past teaching situations. Warner further stressed the importance of social-economic factors, consumer literacy, material culture and heritage, education for leisure activities, and the study of technology. The contributions of William E. Warner toward the advancement of industrial arts as a part of general education continue to have a considerable influence upon the industrial arts profession.

Another dedicated educator who considered technology and industry in applying industrial arts to general education was Gordon O. Wilber (1948). Wilber described industrial arts as

> those phases of general education which deal with industry – its organization, materials, occupations, processes, and products – and with the problems resulting from the industrial and technological nature of society. (p. 2-3)

Wilber believed that industrial arts through general education could transmit a way of life, improve and reconstruct life, and meet the needs of individuals. Many other educators held the ideas of Warner and Wilber. Educators such as Feirer and Lindbeck (1964), Hammond (1959), Hutchcroft (1956), Karnes (1960), Maley (1973), and Osburn (1955) all related industrial arts to the study of industry, technology, and general education. A strong relationship can be made between the industrial arts definition by Wilber and the philosophy and definition used by Maley. Maley (1973) defined industrial arts as

> those phases of general education which deal with *technology*, its evolution, utilization, and significance; with *industry*, its organization, materials, occupations, processes, and products; and with the problems and benefits resulting from the technological nature of society. (p. 2-3)

Maley became known for the development of a program that was to challenge other areas of general education in terms of meeting the life needs of the student regardless of the student's ability level. This humanistic philosophy considered the developmental tasks of individuals. An important characteristic found in Maley's and other industrial arts programs was described in an article by Waetjen (1973):

> it can be said that one function of industrial arts is the exploration of the tools, processes, and materials of industry. Of equal importance is the exploration and development of an important factor in human behavior: the concept of self. (p. 167)

Waetjen's emphasis on the development of the self through industrial arts education was considered to be a prime method of producing intelligent, responsible, and cultured human beings, all of which relate to the purposes of general education.

The decade of the 1960's was a time when change in the field of industrial arts was most pronounced. Many new curriculums were developed, tested, and disseminated. New programs such as the Industrial Arts Curriculum Project, the American Industry Project, the Maryland Plan, and many others evolved (Cochran, 1970). This was a time of articulation and the presentation of new methods that interpreted industry and technology as a part of general education for all people.

A retrospective examination indicates that many outstanding industrial arts educators have made a contribution toward numerous plans to alter, upgrade, and improve the nature of content relating industrial arts to general education. Many words have been used to describe industrial arts since the time when Richards first suggested the term. Industrial arts as a part of general education has been related to manipulative skills, leisure activities, consumer literacy, cultural heritage, the industrial society, and the study of technology. Numerous other terms have been used to describe and define industrial arts.

FUTURE DIRECTIONS AND EXPECTATIONS

As the field of industrial arts and general education exists at the turn of the next century, many new characteristics will be representative of the two terms (Starkweather, 1975). Industrial arts and general education will involve a strong interaction with the world outside the formal school. Course content will emphasize environmental considerations, safety, pollution, and resource utilization. Product disposal and salvage will become important factors in discussions occurring in the industrial arts classroom. The positive and negative aspect of technology on society will be stressed and the traditional areas of industrial arts activities such as metals, printing, etc., will be grouped into broader areas of study, such as materials and communications. Countless other characteristics will be a part of those phases of general education known as industrial arts. A more detailed description of industrial arts as a discipline for studying the future is presented in another chapter in this yearbook.

SUMMARY

Some type of general education will exist in societies in the future although it may not be identified by that term. The sophistication of technology will continue to increase to the point where one's vocation will become extremely specialized. Such specialization falsely leads one to think that general education will not exist. A closer examination reveals that there will still be a need to prepare all for "the common life of their time and their kind." As previously indicated, the type of general education needed in a future society will be much different from that experienced today or during the past century.

The existence and relationship of industrial arts to general education will also change. Industrial arts, just as general education, may be identified by a new name. Industrial arts has represented industry and technology in the general education needs of youth. Assuming that industrial arts will properly reflect industry and technology in education, a change in the field will occur. Proper interpretation of industry and technology by members of the profession will change the nature of industrial arts simply because technology will become more sophisticated and industry will reflect that sophistication.

Advocates of general education will, no doubt, continue to ignore industrial arts in presentations and writings. Industrial arts educators will also continue to tie their field to general education despite the apparent lack of recognition by the other general educators. Confusion will still exist over the definition and relationship of industrial arts, general education, specialized education, and vocational education. Regardless of the confusion that may exist, the need to educate societal members about the relationship of industry and technology to our culture will always be necessary.

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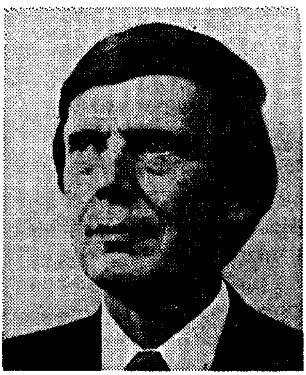
chapter 4

Industrial Arts and its Relationship to Vocational Education



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OVERVIEW: A CHRONOLOGICAL DEVELOPMENT

Historically, the various disciplines and subject fields comprising the American educational system have been inclined to identify each field as an entity unto itself. This seeking of individual subject status has overshadowed the multiple objectives and interdisciplinary skills necessary to satisfying life roles of the student. Predominant in the status-seeking milieu has been the conflict of academic and vocational education. Having an identity with general education for more than 50 years, industrial arts found it especially difficult to relate to vocational education. Funding policies for vocational education and the accompanying social stigma perpetuated the dichotomy in the past.

For purposes of educational planning, the relationship between industrial arts and vocational education from about 1920 until 1970 was one of separatism with industrial arts declaring its role among the general education disciplines. Only during the past decade has industrial arts joined the vocational family of subject fields. The major thrust to commingle with vocational education followed the legal addition of industrial arts education to the Vocational Education Act of 1963 by the Education Amendments of 1972.

Based on actual practice and organization of industrial arts during the years prior to the 1960's, only a very few industrial arts educators even proposed a joint relationship with vocational education. But time and both economic and societal circumstances affect educational evolution. Economic, social, and technological change accelerated rapidly during the past decade and dictated new emphases for the structuring of most subjects in the curriculum. Among these educational changes have been legislated efforts to make vocational education more comprehensive and responsive to identified needs of client groups. One intent of the Vocational Education Act of 1963 was to shift from the categorical funding of subject fields, such as agriculture, trade and industrial, and business education, to a more comprehensive delivery system of services for identified groups in order to achieve the objectives of that Act. Recommendations were made to establish or increase articulation within vocational education. This articulation has been both horizontal – broader offerings within a grade level – and vertical – an expanded sequence or range among the grade levels.

When educators refer to the relationship of industrial arts to vocational education, the fundamental and most frequently verbalized concern is the relationship of industrial arts to trade and industrial education. These two subject areas had a common beginning a century ago. But in 1917, federal vocational legislation (Smith-Hughes Act) created a separation by providing federal funds for trade training. Then in 1972, a federal law (Education Amendments of 1972) authorized the regrouping of these subject fields to include industrial arts when it fulfills the objectives of that law.

The literature tracing the chronological development of industrial arts, trade and industrial, and vocational education is extensive and, therefore, will not be repeated in this chapter. The historical scholar may trace the evolution of the name for industrial arts from its inception at the Philadelphia Centennial Exposition of 1876 from manual training to manual arts to industrial arts. Today the evolution of the name continues in the literature where such terms as industrial technology, industrial education, and industrial occupations are found.

Throughout the past, as evidenced by the publications and convention proceedings of the American Industrial Arts Association (AIAA), the leaders of industrial arts education have tended to be strongly antivocational as a result of their early rejection by trade and industrial educators. Antagonism on both sides heightened after the passage of the Smith-Hughes Act of 1917 and continued for the next 50 years.

Periodic skirmishes took place. For example, concerted industrial arts opposition arose to proposed federal legislation in 1950 that purported to provide supervision of industrial arts within a vocational education bill. Based on the fear that vocational education would dominate industrial arts, the overwhelming negative response from the field caused the provision to be deleted (Evans, 1970, p. 281).

A New Outlook Dawns

The 1960's brought an expansion of thought by both industrial arts and vocational educators. During these years there was much speculation and experimentation concerning the place and content of industrial arts in the curriculum. A variety of themes or philosophic bases was reflected across the country in more than a dozen innovative curriculum projects and plans. At the same time Congress passed the Vocational Education Act of 1963 and further Education Amendments (1968) broadening the traditional vocational schema and facilitating the organization of sequential, articulated, occupationally related education.

While industrial arts and trade and industrial educators could have defined a new comprehensive position at that time, the history of the breach was too entrenched for early closure. A few industrial arts state supervisors took the leadership to demonstrate what might evolve when state curriculum development considered articulation with trade and industrial education. These early curriculum plans were developed by Lawrence J. Foth, Kansas; Raymond S. Ginn, Georgia; Thomas A. Hughes, Virginia; Ralph V. Steeb, Florida; and Leonard F. Sterry, Wisconsin. A number of journal articles, monographs, and guides addressed the potential relationship as the decade closed. An example is found in the series of AIAA convention proceedings. The 1969 AIAA proceedings book was the first to carry a section and addresses directed to vocational education and industrial arts (Kelly, 1969; Larson, 1969).

Although industrial arts had not been included by name in federal vocational legislation prior to 1972, certain states began to fund learning activities and programs related to industrial arts but under an approvable vocational title or classification. Thus, in very isolated and minor instances, some vocational funds were applied in subtle ways to industrial arts programs, but under vocationally approved course titles such as Diversified Mechanics. The first major breakthrough for true and extensive vocational funding of industrial arts by title came in Florida in 1970 when the State Legislature passed a definition of vocational education (Florida School Laws, Chapter 228.041 [25]) that included industrial arts as a vocational subject.

In 1972 Congress passed Public Law 92-318, The Education Amendments of 1972, amending the Vocational Education Act of 1963 and permitting the funding of industrial arts education programs in cases where the Commissioner of Education determines by regulation that such programs will accomplish or facilitate one or more of the purposes of vocational education as defined in Section 108 (1) of Vocational Education Act of 1963.

Following the passage of this provision for industrial arts, the development of the Federal Rules and Regulations became imminent. The basic input to the United States Office of Education (USOE) was a position paper prepared by an Ad Hoc Committee on Criteria and Guidelines for Funding Industrial Arts (*School Shop,* 1972). With knowledgeable foresight, Commissioner Sidney P. Marland, Jr. had initiated and funded this Ad Hoc Committee prior to the passage of the Education Amendments of 1972. Twelve nationally recognized industrial arts leaders were selected by the USOE to committee membership: T. Gardner Boyd, Karl Gettle, James E. Good, Frederick D. Kagy, George Lipman, Rutherford E. Lockette, William W. Mamel, Howard F. Nelson, Herbert Siegel, Ralph V. Steeb, Leonard F. Sterry, and Robert L. Woodward.

On December 20, 1973 the Federal Rules and Regulations (*Federal Register,* 1973, pp. 32212-32213) for conduct of industrial arts programs under the Vocational Education Act of 1963, as amended, became effective. For the next four years these regulations were the guidelines by which states could include industrial arts in their State plans for the implementation of vocational education. The degree of inclusion of industrial arts that followed in the separate states covered the full range from no activity in some states to full endorsement in others.

When the term of the Vocational Education Act of 1963 expired in 1975, Congress deliberated through two sessions before passing the Education Amendments of 1976: Public Law 94-482. Because the proposed bill made no reference to prevocational education and because not all states had included industrial arts in their state plan for vocational education, the leadership of the AIAA (Donald L. Rathbun, Executive Director; Alvin E. Rudisill, President 1975; Lee D. Carter, President 1976; James E. Good, Legislative Committee Chairman) and the Industrial Arts Division of the American Vocational Association (Richard Erickson, Vice-president; Ralph V. Steeb, Legislative Committee Chairman) mounted jointly an extensive legislative campaign to have industrial arts identified by line item in the new law so that its recognition would be assured at the state level. Congress endorsed the significant role industrial arts plays in vocational education by specifically including its definition and name in Public Law 94-482.

Subsequent Federal Rules and Regulations transmitted in the *Federal Register* on October 3, 1977 provide the legal authority for administering industrial arts programs that assist in meeting the purposes of the Act. In just five years, fast developing federal legislation has established a relationship for industrial arts and vocational education. The extent of the relationship will be determined by state decisions in the coming years. The continuing evolution of a relationship will depend upon the perceptions and adaptability of the personnel involved.

LEGAL AUTHORITY

Prior to the first inclusion of industrial arts in federal vocational legislation in 1972, only a very few, limited, and scattered incidents of federal vocational monies flowing to local industrial arts programs could be identified. The reason for the lack of identification was that funds were drawn from research, innovative programs, or industrial education. Educators were reluctant to use the name "industrial arts" in the event it might be disallowed by a federal audit. Following release of the regulations of November 21, 1973 with the effective date of December 20, 1973, industrial arts became legally eligible for funding under the Vocational Education Act of 1963. The immediate response by the states may be found in the section in this chapter entitled *Status of Vocational Funding for Industrial Arts.*

Today the legal authority to apply federal vocational funds to industrial arts comes from the Federal Rules and Regulations in the *Federal Register* of October 3, 1977. These regulations implement the Vocational Education Act of 1963 as completely revised by the Education Amendments of 1976 and strongly support the intent of Congress concerning industrial arts.

Industrial Arts Defined

Industrial arts is mentioned by name in the basic grants section of the Act. Eighty percent of the funds appropriated for the Act are earmarked for this section. Specifically the regulations say

INDUSTRIAL ARTS

§104.591 Use of funds.

A State may use funds under its basic grant (section 120 of the Act), when included in the approved five-year State plan and annual program plan, for industrial arts programs which meet the requirements set forth in §104.592.

§104.592 Industrial arts programs

Industrial arts education programs which may be funded under §104.591 are those industrial arts programs which are designed to meet the purposes of this Act (including the elimination of sex stereotyping) and which:

(a) Pertain to the body of related subject matter, or related courses, organized for the development of understanding about all aspects of industry and technology, including learning experiences involving activities such as experimenting, designating, constructing, evaluating, and using tools, machines, materials, and processes; and

(b) Assist individuals in making informed and meaningful occupational choices or which prepare them for entry into advanced trade and industrial or technical education programs. (*Federal Register*, 1977, p. 53847)

The above quotation includes the definition of industrial arts in (a) and the two purposes of industrial arts programs in (b).

Secondary Education Defined

During the hearings on the proposed regulations, extensive concern was voiced regarding the definition of secondary education stating the grade levels as usually 9 through 12. The final regulations clarify the definitions in Appendix A.

"Secondary program" means vocational education for persons in secondary grades as defined by State law.

"High school program" means vocational education for persons in grades 9 through 12. (*Federal Register*, 1977, p. 53864)

With the above definitions, states may include grades below nine in their State plan if they so desire. The following interpretive response is directly related to grade levels and the eligibility of industrial arts for prevocational and exploratory levels.

Question No. 27: What programs are eligible for funding under the assurance which specifies "of significant assistance to individuals enrolled in making an informed and meaningful occupational choice as an integral part of a program of orientation and preparation"? At what grade level may these programs be offered?

Answer: Prevocational or exploratory programs which are designed to be of significant assistance to individuals enrolled in making an informed and meaningful occupational choice may be funded under the Act. Specifically, programs in industrial arts may be supported with funds under section 120 of the Act beginning at the secondary level (as defined by the State). (*Federal Register*, 1977, p. 53866)

The regulations further state that the cost of prevocational and exploratory programs in industrial arts for the handicapped and disadvantaged may be charged against the minimum percentages earmarked for such special programs (*Federal Register*, 1977, p. 53882).

The regulations speak to industrial arts as it fulfills one of the major purposes of the Act – the development of programs to overcome sex stereotyping. For this purpose, specific wording was added to the definition (*Federal Register*, 1977, p. 53882).

Although the legal eligibility of industrial arts is clearly stated in the regulations and Public Law 94-482, each state must include industrial arts (as it defines the program) in the State annual and five-year plans for vocational education. Defining an approved industrial arts program requires strict interpretation of the validity of a program/course to meet the purposes of the Act.

The objectives for industrial arts stated in the regulations are limited to those that relate to the purposes of vocational education. Practitioners of industrial arts readily identify concomitant objectives that are not included. Therefore, certain comprehensive general education courses in which students enroll for personal or avocational reasons, such as crafts, home mechanics, personal woodworking, are not directly related to vocational education and do not qualify for vocational funding.

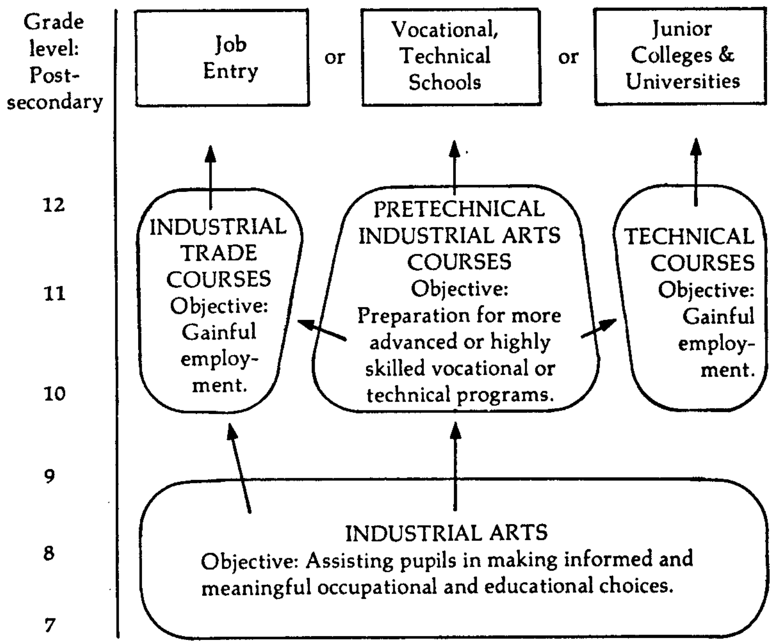
The objective listed in the first part of the industrial arts definition, section (b), of the regulations previously quoted supports the role of industrial arts courses at the prevocational or exploratory level, generally considered the lower secondary or middle grades. The second part of the definition, section (b), supports courses for the prespecialization level, generally considered the upper secondary or high school grades.

STRUCTURING A RELATIONSHIP

For decades vocational and general academic educators have organized and taught their content courses in isolation from each other. More recently educational, technological, economic, and societal changes have brought attention in curriculum development to a concern for career education and the developmental education process that leads to a satisfying adult role for all students. A current trend reveals students shifting from an inflexible sequence of courses required for college entrance to a sequential, comprehensive, and articulated program that balances general and vocational education.

As industrial arts leaders studied the legislation and regulations to define the relationship to vocational education, it became immediately apparent that structuring a relationship to trade and industrial education and technical education was of first priority if the funding benefits were to be received. In Florida and Virginia, developing a relationship proceeded amicably. In other states, traditional philosophies of all parties made a mutual acceptance difficult, if not actually opposed.

However, a concensus on the relationship of industrial arts to trade and industrial and technical education emerged. To assist in the process, the AIAA (1976) published a booklet entitled *Industrial Arts: A Means of Preparing Youth To Understand And Contribute To Our Technological Society*. This booklet contained a chart as shown in Fig. 4-1 that graphically displayed the generally accepted relationship by grade level and objective. Having identified a relationship for industrial arts, trade and industrial, and technical education, the curriculum developer can select courses to fit the structure.



Note: Objectives shown above refer only to the three objectives of the Vocational Education Act.

Fig. 4-1. Relationships Between Industrial Arts, Technical and Industrial Vocational Courses in Comprehensive Vocational Education.

COURSE ORGANIZATION

Throughout the decade of the 1960's more than a dozen new approaches to the organization of industrial arts content were initiated and practiced experimentally. But with the inclusion of industrial arts in vocational education by the passage of the Education Amendments of 1972 to the Vocational Education Act of 1963, serious analysis of the role of industrial arts and its course organization to fulfill the objectives of this Act was encouraged within the states (Steeb, 1974). Those courses or programs providing occupational exploration and the basic skills to prepare students to enter vocational preparatory courses were generally judged vocationally acceptable.

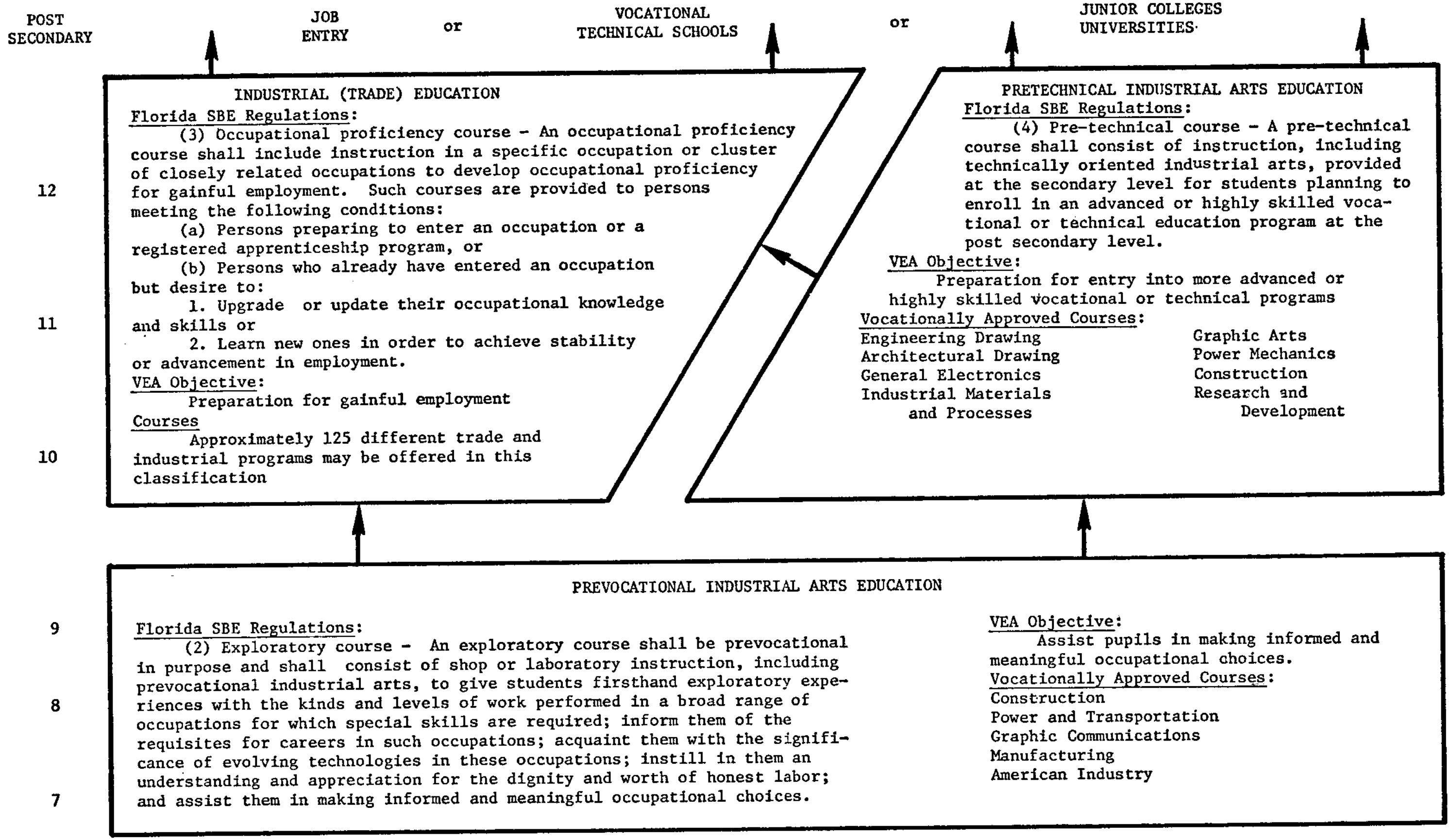


Fig. 4-2. Florida Plan for the Relationship of Industrial Arts and Trade and Industrial Education.

As a member of the generic industrial education family, industrial arts courses were organized to place new emphasis on the career and occupational goals. A categorizing of industrial occupations became the basic rationale for the structure of industrial arts courses. An analysis by the USOE classified all occupations into 15 career clusters. Of the 15 career clusters, four were clusters of industrial occupations: manufacturing, construction, communications, and transportation. These four categories form a logical organization for industrial arts courses at the exploratory level.

Career education characteristics that the USOE assigned to various developmental phases or grade levels were used to support the instructional activities and content within the four industrial categories (Steeb, 1972b, p. 263). At the awareness phase, a broad study of American industry taught the concepts of industry and career information in all four occupational areas. At the exploratory phase, separate courses related to the four industrial categories gained wide acceptance. At the pre-specialization phase, in-depth skills required courses in separate sub-fields that were articulated to occupational preparatory programs at the secondary and post-secondary levels.

The system used in Florida to articulate industrial arts courses to trade preparatory courses and to organize content without overlapping or duplication is shown in Fig. 4-2.

STATUS OF VOCATIONAL FUNDING FOR INDUSTRIAL ARTS

A study of the inclusion of industrial arts in the State plans for Vocational Education and the resulting funding was conducted jointly at end of Fiscal Year 1975 by the Legislative Committees of the AIAA and the Industrial Arts Division of the American Vocational Association (Steeb, 1976). This study reported that approximately 76% of the states had included industrial arts in their State plans. Vocational funding for industrial arts in excess of $100,000 was reported by almost 24% of the states. Another 40% received small grants and support, while 36% of the states had not yet provided any vocational funds to industrial arts one year after the enabling federal regulations became effective. The figures reported from many states were approximate because discrete figures by subject field were not available in the state accounting system. However, the national trend and progress for applying state and federal vocational funds to industrial arts after its first full year of eligibility was highly significant and positive.

CONCERNS AND LIMITATIONS RELATED TO A VOCATIONAL RELATIONSHIP

Although the vocational funding of industrial arts proceeded at an encouraging pace, related concerns about the future of the field and limitations imposed by legislated objectives maintained some skepticism on the part of industrial arts teachers and supervisors. Steeb (1972a) addressed the concerns, limitations, benefits, and cautions to implementing industrial arts programs under the vocational legislation at the October 1972 national conference on the role of industrial arts in career education sponsored by the Industrial Arts Division of American Vocational Association and the USOE. Topics of concern included:

1. The retention of the identity of industrial arts when its courses are reclassified as industrial education. (Example: Kansas, Wisconsin, Minnesota)
2. The suggestions to limit industrial arts for funding to only a prevocational role in grades 7-9, precluding its unique value to many senior high school students who may not have made an occupational decision. (Example: Georgia)
3. The supervision or governance of industrial arts, especially when industrial arts at the state and local levels was assigned to an existing vocational administrator. Thirteen states assign state supervision to persons with other primary assignments (Steeb, 1976, p. 172).
4. The competition of funds because no added appropriations were made by Congress for the inclusion of industrial arts. Funding priorities were often assigned to existing vocational programs (often reported by state supervisors at national meetings).
5. The incidents in some states that required the industrial arts teacher to meet vocational certification requirements (work experience) in order to receive program funding. (Example: Minnesota)
6. The traditional, biased thinking by both vocational educators and industrial arts personnel that kept program planning inflexible (often reported at national meetings).

While it is true that the federal legislation restricts the industrial arts program to the purposes of the Vocational Education Act of 1963, as amended in 1972 and 1976, more than half the states developed comprehensive and non-duplicating relationships within vocational education. For many industrial arts educators, the acceptance was based on the legal feasibility rather than on an expanded vocational philosophy of existing state administrators.

THE FUTURE OF INDUSTRIAL ARTS IN VOCATIONAL EDUCATION

The concerns and limitations expressed by vocational and industrial arts educators tend to suggest that the provocative and sensitive state of the relationship will continue until experience indicates the optimum or alternate relationship. The near future will be conditioned and guided by the Education Amendments of 1976 and the subsequent regulations. Vocational education planning will be directed by this legislation for the next several years. However, industrial arts program planners must look beyond the immediate emphasis on occupational related goals to the comprehensive, broad objectives of industrial arts. All of industrial arts is not in vocational education. There are areas of industrial arts education that include technological studies and common citizenship education.

The future direction of and constraints on education will be determined, as in the past, by the economic, social, political, and technological changes that emerge. The education that best serves the youth of the future will not be based on a consideration of the relationship of one subject field to another. Rather it will be an integrated curriculum interrelating experiences of academic and world of work programs to prepare students for life as adults in a society not clearly definable by what is today.

For the long term, industrial arts education must not become sterile by vocationalization. Industrial arts must not lose sight of its goals as it prepares individuals for satisfying human relationships in a technological culture of economics, materials, and processes.

The relationship of industrial arts to vocational education is still new enough to be fluid. States are considering alternatives, content organization, and sequential program structures. A few states have reached acceptable relationships, a few have made no progress, and the great many in the middle proceed cautiously, yet positively, as they test the vocational environment in which they are situated. State supervisors of industrial arts are recognizing that there is no one best relationship plan and that the trail must be broken in each state. For this reason industrial arts personnel must continue to exchange information and share opinions.

And because industrial arts has objectives broader than preparation for work alone, the two national associations for industrial arts have launched a study of the future to define the role of industrial arts in a post-industrial, technological society.

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chapter 5

Industrial Arts Laboratory Facilities: Past, Present, and Future

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Contemporary industrial arts laboratory facilities include equipment, instructional materials, and a flexible environment for learning about industry and technology. Historically, these facilities have been continually involved in change. They have changed from the unit construction shops of the late 1800's designed for their economic benefit to comprehensive general laboratories of today designed for their educational value. The atmosphere has progressed from the drab, poorly lighted, adapted basement areas to the aesthetically pleasing, environmentally controlled, and functionally planned instructional areas.

This chapter examines the development of industrial arts laboratory facilities from a historical perspective, while focusing on the growth and development of facilities at all levels of education. In addition, this chapter examines principles of good facility planning, identifies the people involved in planning facilities, and outlines the process in planning a typical industrial arts facility. Finally, a comparison and analysis is made of the various types of facilities and some observations are put forth concerning future directions and expectations in the development of industrial arts laboratory facilities.

HISTORICAL PERSPECTIVE

The development of industrial arts laboratory facilities in America naturally progressed concurrently with the development of industrial arts curricula. To interpret the content and skills of the trades in the late 1800's, unit shops were designed and fully fitted with duplicate equipment and tools. Later, when emphasis was placed on industrial arts as a method of teaching in the early 1900's, elementary classrooms were equipped to permit the solving of industry-related, realistic, life problems. Concurrent with the junior high school movement and its emphasis on exploration and guidance in the late 1910's and 1920's, multiple activity shops were designed and furnished to permit instruction in a variety of industry-related processes and problems. With emphasis on production during World War I and World War II, industrial arts facilities were adapted to assist the war efforts. Inclusion of technology in the industrial arts curriculum in the late 1940's resulted in the design of laboratories to reflect technology and the later application of research and experimentation equipment for the scientific method of solving and testing problems. The study of industrial organizational structures and industrial-technical social aspects in the 1960's strengthened the need for flexible laboratory arrangements. An awareness of the knowledge explosion and the desire for career diversity in the 1970's caused laboratories to be designed for the study of concepts within identifiable technology clusters.

Today, industrial arts facilities are designed, organized, and equipped to offer a variety of courses. Generally, courses are offered in a unit laboratory, a general unit laboratory, or a comprehensive general laboratory. The *unit laboratory* is designed for the specialized study of a single industrial-technical area (e.g., lithography) in a single industrial arts subject (e.g., graphic arts). The *general unit laboratory* is designed for the simultaneous, limited exploration of two or more related industrial-technical areas (e.g., lithography, letterpress, screen printing) in a single industrial arts subject (e.g., graphic arts). Other names for the general unit laboratory are general area, limited general, and single-field industrial. The *comprehensive general laboratory* is designed for the simultaneous, broad exploration of various industrial-technical areas (e.g., orthographic projection, lithography, electron theory) in two or more industrial arts subjects (e.g., drawing, graphic arts, electricity-electronics). The comprehensive general laboratory is also referred to as multi-activity, multi-field industrial, general shop, laboratory of industries, vestibule laboratory of technology, and cluster technology laboratory.

GROWTH AND DEVELOPMENT

As previously mentioned, facilities suitable for industrial arts instruction were developed in congruence with developing and changing industrial arts curricula. This section of the chapter examines the origin, influences, functions, and physical characteristics of typical industrial arts facilities that have existed in America. The facilities described are only representative examples and should not be interpreted as including all types of industrial arts facilities. This section is organized into the three time periods of pre-1920, 1920 to 1965, and 1965 to present.

Facilities Prior to 1920

The physical make-up of manual training and industrial arts facilities in America was influenced by the work of various individuals. For example, manual training instruction shops around 1880 were affected by the Russian mechanic arts developed by Victor Della Vos at the Imperial Technical School in Moscow. In the late 1880's, manual training facilities were also influenced by the Swedish educational sloyd developed by Otto Soloman in the schools of Näās. Then in the early 1900's, industrial arts learning environments that represented multiple industrial areas were encouraged by such persons as John Dewey, Charles R. Richards, and Frederick G. Bonser.

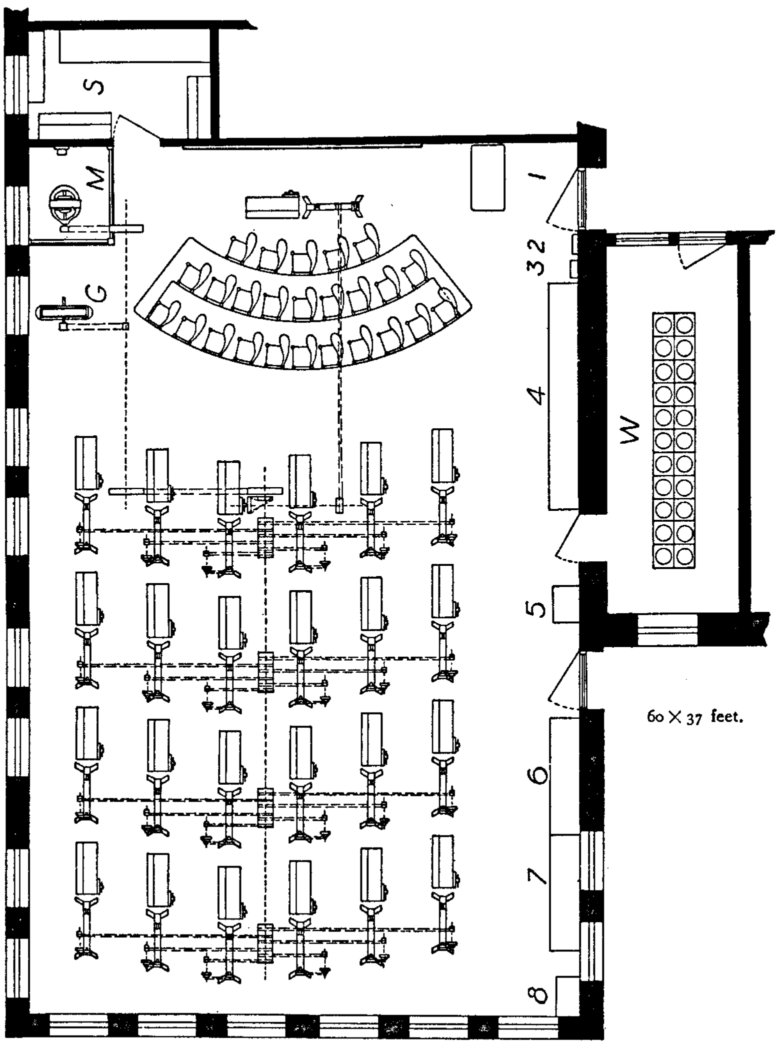
Regular classrooms, as well as special rooms, at the elementary school level were often equipped to include activities in woodwork, mechanical drawing, and kitchen garden work. The latter activity was influenced by the formalized kindergarten philosophy of Friederich Froebel. At the elementary school level, it was common for each student to have a workbench that housed a vise and a drawer for holding a knife, plane, saw, hammer, chisel, and gouge. The facilities were often used to reinforce other school subjects at the elementary school level, while either a regular classroom teacher or a special teacher provided the instruction.

When facilities representing multiple industrial areas were utilized, the child's development, along with an ability to explore society, was emphasized. Industrial arts was viewed as a teaching method that developed the elementary school children's manipulative, investigative, aesthetic, and social abilities. The students studied industrial processes and problems involved in increasing the value of industrial materials.

Through the efforts of Calvin M. Woodward at the St. Louis Manual Training School, educationally organized shopwork became an integral component of the curriculum in the general high schools of America. Unit instruction shops were designed and equipped in the 1880's to teach blacksmithing, machining, turning, carpentering, and drawing.

Emphasis was placed on the teaching of tool skills through the performance of simple to complex exercises and the construction of models. Each shop contained duplicate work stations and sets of tools so that as many as 20 students could perform the same exercises and construct similar useful articles simultaneously.

Figure 5-1 shows a typical high school woodworking shop of this time period equipped with 24 carpenter's benches having vises, stops, and tool racks. Each bench was situated for adequate light and space. The lower part of each bench contained individually locked compart-



W = Washroom.
S = Storeroom.
M = Electric motor.
G = Grindstone.

1 = Teacher's desk.
2 = Key board.
3 = Switch board.
4 = Case for unfinished work.

5 = Case for carving tools.
6 = Bench for gluing.
7 = Finishing bench.
8 = Case for finishing materials.

Fig. 5-1. A Manual Training Woodworking Unit Shop (Bennett, 1902).

ments, each containing a set of edge tools. Bennett (1902) described the major equipment characteristics of this woodworking shop.

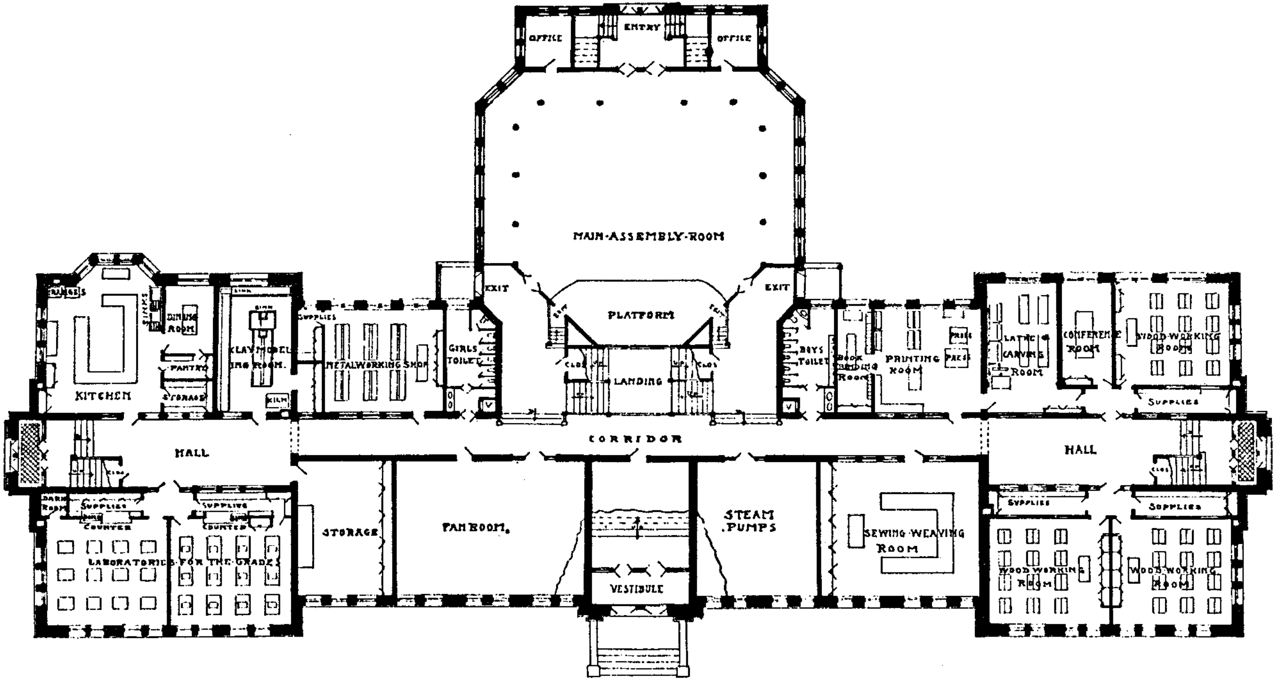
> Among the leading features of this equipment will be noticed: (1) washroom and storeroom connected with the workroom; (2) the demonstration theater, and its relation to the demonstration bench and lathe and to the blackboard; (3) the relation of benches and lathes to each other and the arrangement of belts to furnish the power from a single central shaft; (4) the case for unfinished work, the carving-tool case, bench for gluing, bench for finishing with case for finishing materials beside it; (5) the toolsharpening outfit at each bench and the blueprint, drawing, or sketch holder easily transferred from lathe to bench. (p. 146)

While many secondary schools employed unit shops to provide instruction in woodworking, mechanical drawing, and metalwork, other schools developed multiple activity facilities. These latter facilities are typical of those utilized in the Menomonie, Wisconsin public schools in the mid 1910's for grades seven through twelve (Buxton, 1918; Rogers, 1916). Tools, materials, and benches from two or more shops were placed in one room to teach techniques of tool utilization and construction. Equipment was less expensive, processes were simpler, and a smaller number of students were involved with each unit area than was usually found in the unit shops.

Manual training in teacher training institutions occurred as early as 1861 in the Oswego Training School of Oswego, New York, where the teachings of Johann Pestalozzi influenced the program. Handwork activities were often included among the regular school activities. For example, in 1881 the State Normal School at Bridgewater, Massachusetts contained a woodworking shop in which the regular science teacher provided handwork instruction. The students in the shop produced useful products such as insect boards and collection boxes, test-tube holders, botany presses, and mineral cabinets.

Entire buildings were often designed to prepare teachers of manual training subjects. One example is the Macy Manual Arts Building at Teachers College (Columbia University), New York City. This five-story building contained a foundry, a blacksmith shop, an engine room, a stockroom, a repair shop, a machine shop, a woodturning and pattern shop, a benchwork wood shop, a modeling and wood carving shop, an elementary manual training room, a high-school mechanical drawing room, clay modeling rooms, drawing and painting art studios, lecture rooms, a library, and offices (Bennett, 1937).

Within the Department of Manual Training at Chicago Teachers College, college students gained practical experiences while working with students in kindergarten through all grammer school grades. Figure 5-2 shows the entire ground floor (286 ft. × 100 ft.) of the Prac-



GROUND-PLAN-OF-NORMAL-PRACTICE-SCHOOL
(TO-BE-COMPLETED-IN-1903.)
SHOWING-ARRANGEMENT-OF-ROOMS-DEVOTED-TO
DEPARTMENT-OF-MANUAL-TRAINING.

Fig. 5-2. The Department of Manual Training in the Normal Practice School of Chicago Teachers College (McMurray, 1903).

tice School. Shops were designed and equipped to provide instruction and activities in cooking, claymodeling, metalworking, printing, woodworking, cardboard, sewing, and weaving. Certain elementary school classrooms were also equipped for construction activities (McMurray, 1903).

Facilities, 1920-1965

Special industrial arts facilities within elementary education continued in the 1920's and 1930's as "activities" rooms. Under the supervision of an experienced teacher, children in grades one through six constructed projects that required experimenting with various industrial materials and equipment. Warner (1930) indicated that these "activities" rooms were usually centrally located on the first floor and contained sufficient space for supply and tool storage, a teacher's office, a library, a fireproof area, and a display case. Typical items found in these rooms included work surfaces, printing and bookbinding equipment, papermaking equipment, spinning wheels, a loom, a sink, a wringer, a sewing machine, a flat iron, and a kiln.

Newkirk and Johnson (1948) described elementary integrated handwork in the 1940's in their book *The Industrial Arts Program.* Unit construction was offered in woodwork, metalwork, textiles, plastics, paper, and ceramics. The students were required to identify and utilize good quality, medium-sized tools and equipment for their construction activities. A desk tool kit and movable craft cart provided the necessary hand tool storage and work space in the regular classroom. In a separate craft room, exemplary equipment was provided including four-vise work benches, construction tables, storage cabinets, jigsaws, a power drill, a grinder, a sewing machine, a stove, and a sink.

General shop. Concurrent with the junior high school movement, diversified shops were implemented for their exploratory and guidance value. The term, "general shop," was first used in the early 1920's to identify the facility specifically designed for industrial arts instructional activities. Howell (1922) stated that the "general shop, the tinker shop, or the all-purpose shop" (p. 261) was preferred for offering a variety of experiences when the school could afford only one industrial arts facility.

Two types of general shops were developed. One type consisted of a collection of small unit shops through which students were periodically rotated. The other and more common type of general shop contained a work station for each student where a project was to be developed and constructed utilizing the various industry-related instruction areas.

Typical general shop courses included household mechanics, farm mechanics, and industrial mechanics (Bedell, 1928). An early implementation of a household mechanics course occurred in the Detroit elementary schools in the late 1910's. This course in handwork was offered in a multiple activities shop where experiences were gained in wood, bench metalwork, electrical construction, and various home-related operations (Trybom, 1921).

During this same time period, seventh and eighth grade students in Chicago constructed, utilized, and maintained numerous home-type industrial products. Figure 5-3 shows a home mechanics facility that was designed for 24 students. Furniture and machines were included for working in the areas of woodworking, cooking, sewing, planning, display, and storage. The room had an acoustically treated ceiling, pleasing wall and equipment colors, artificial lighting, roller shades, and tilting venetian blinds.

Courses in farm mechanics were offered because they were effective and economical for consolidated rural schools. A general shop was often equipped so students in several grade levels could learn about tools and materials such as concrete, wood, metal, and electricity that were relevant to farm maintenance and construction.

In Detroit, a course in industrial mechanics was developed for tenth graders and above in cosmopolitan high schools. Students who were expected to enter the professions or business world conducted experimental and research work while studying the processes and materials and the social and economic conditions in industry. The Detroit general shop was equipped with woodworking and metalworking power driven machines, electrical instruments, gas engines, and automobile parts.

The facility for general shop instruction was at times considered a laboratory. Warner, Bollinger, and Hutchinson (1933) made the following distinction:

> The term *laboratory* is more appropriate when the offering is provided upon an experimental or developmental basis, as is commonly done in the junior high school; and the term *shop* may be more appropriate where the work is carried on rather upon the production or economic basis, as may be done in the senior high school. (p. 27)

Laboratory of industries. William E. Warner (1928) developed the general shop idea into the "Laboratory of Industries." When well organized, this general industrial arts laboratory encouraged activities in experimentation, investigation, construction, observation, purposeful reading, and discussion. The laboratory was a facility where students could solve problems of industrial production as opposed to the acquisition of specialized skills typical of earlier programs and facilities. The Laboratory of Industries was viewed "as a center from which the whole panorama of industry is seen as a field for study and participation by the pupils" (Warner, 1935, p. 41).

Figure 5-4 shows a typical Laboratory of Industries facility that was designed by William E. Warner for an existing laboratory at Grove City, Ohio. The facility was developed by Kenneth W. Brown and Paul

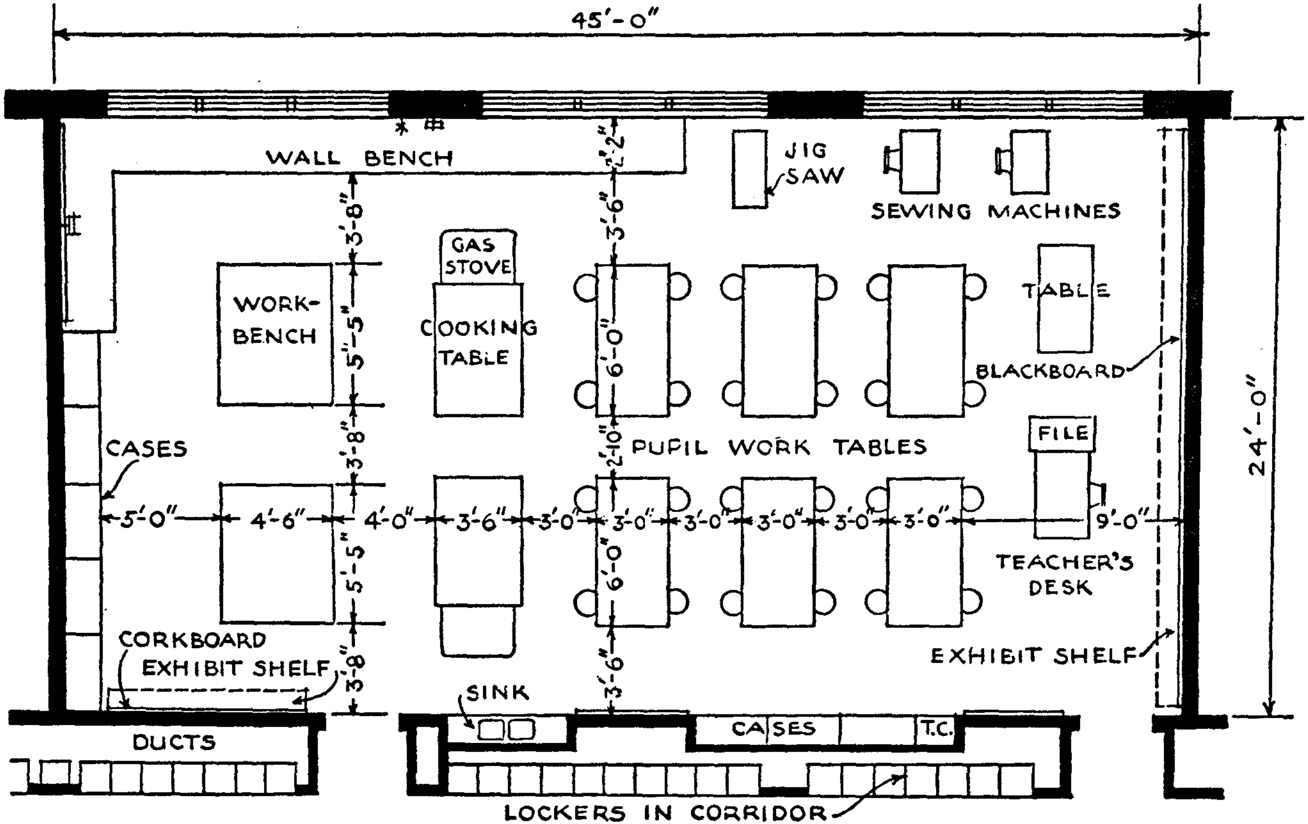


Fig. 5-3. A Home Mechanics General Shop (Newkirk & Johnson, 1948).

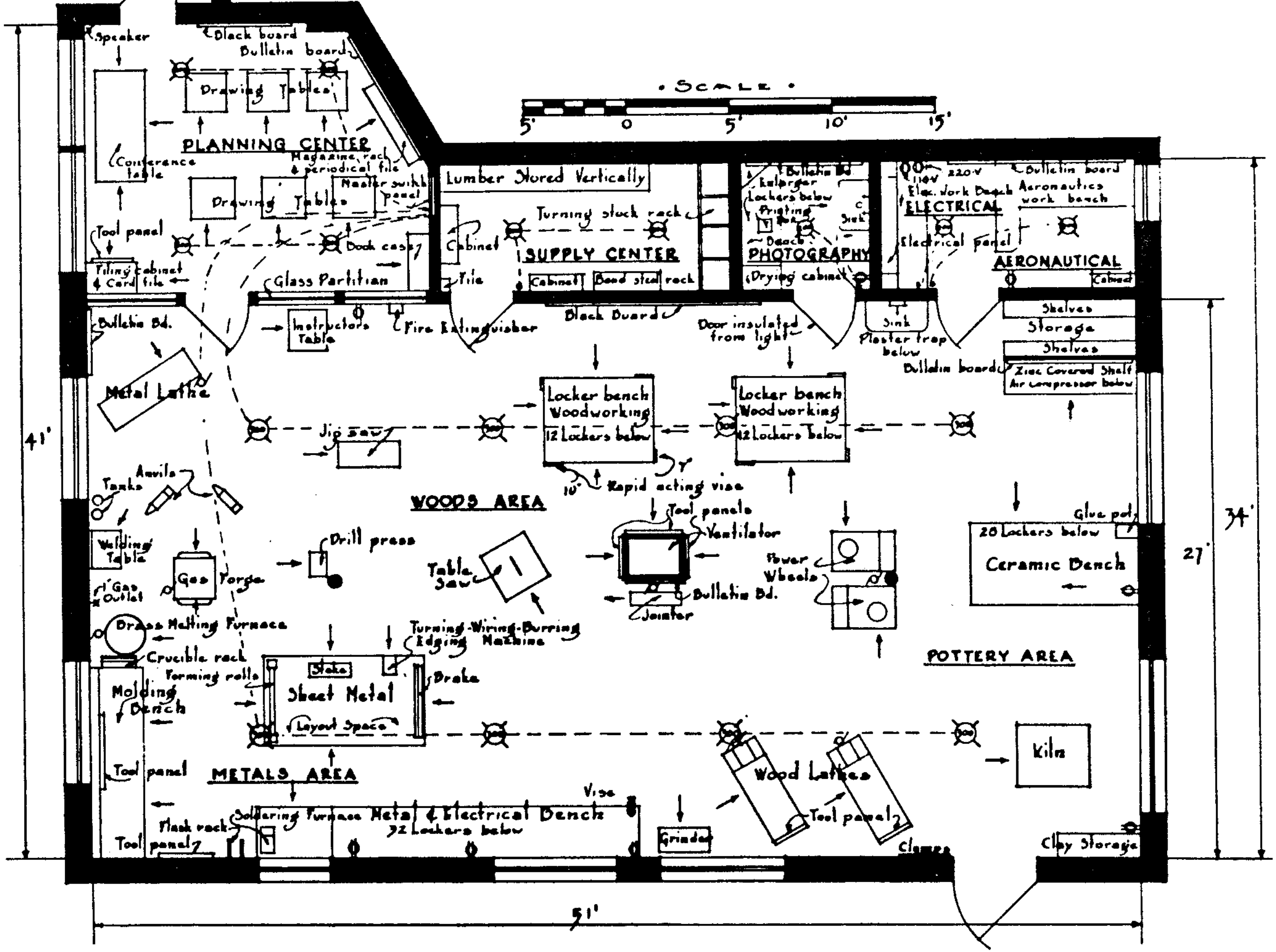


Fig. 5-4. Laboratory of Industries for Grove City, Ohio.

T. Hiser between 1935 and 1939 to meet orientation, technical, recreational, and cultural objectives. It was designed so 30 elementary, secondary, or adult individuals could have educational experiences in planning, woods, metals, ceramics, photography, electricity, and aeronautics.

Facilities for wartime use. Industrial arts facilities were readily adaptable to World War II needs when shortages of raw materials influenced industrial arts activities. Model aircraft and repair experiences were provided using available wood and sheet metal. Whitesel (1943) specified the following laboratory characteristics as aiding the programs in meeting wartime needs: (a) materials, tools, and equipment for a wide range of industrial activities, (b) production equipment for evening classes, and (c) flexible layouts including sufficient service outlets, semi-portable machines, movable partitions, and sufficient space for expansibility.

Vestibule laboratory of technology. Following World War II, William E. Warner and a group of graduate students at The Ohio State University promoted a socio-economic analysis of technology as an essential part of industrial arts. The rationale developed suggested that since all individuals in a democratic society are consumers, many are producers, and countless are recreators, industrial arts should provide experiences so that people of all ages and sexes could profit by technology (Warner et al., 1953).

The facility that was planned for this exposure to technology was called a Vestibule Laboratory of Technology. Figure 5-5 represents a comprehensive general industrial arts laboratory that was designed for this technological orientation. The floor plan was drawn by William C. Green in a course taught by John A. Whitesel at The Ohio State University in 1948. It contained areas to reflect elements of power, transportation, manufacturing, construction, communication, and management. A study of technology was also accommodated through research, planning, work experience, field study, personnel and physical organization, illustrative aids, conferences, and creative expression.

Facilities, 1965-present

In the 1960's, custom produced projects were often criticized by members of the profession as not reflective of existing industrial practices. Emphasis, therefore, was being placed on the organizational structure of major industries and the social implications of industrialization. The study of mass production and group project production increased the need for flexible facility arrangements and student produced apparatuses. Controlled thermal environments and

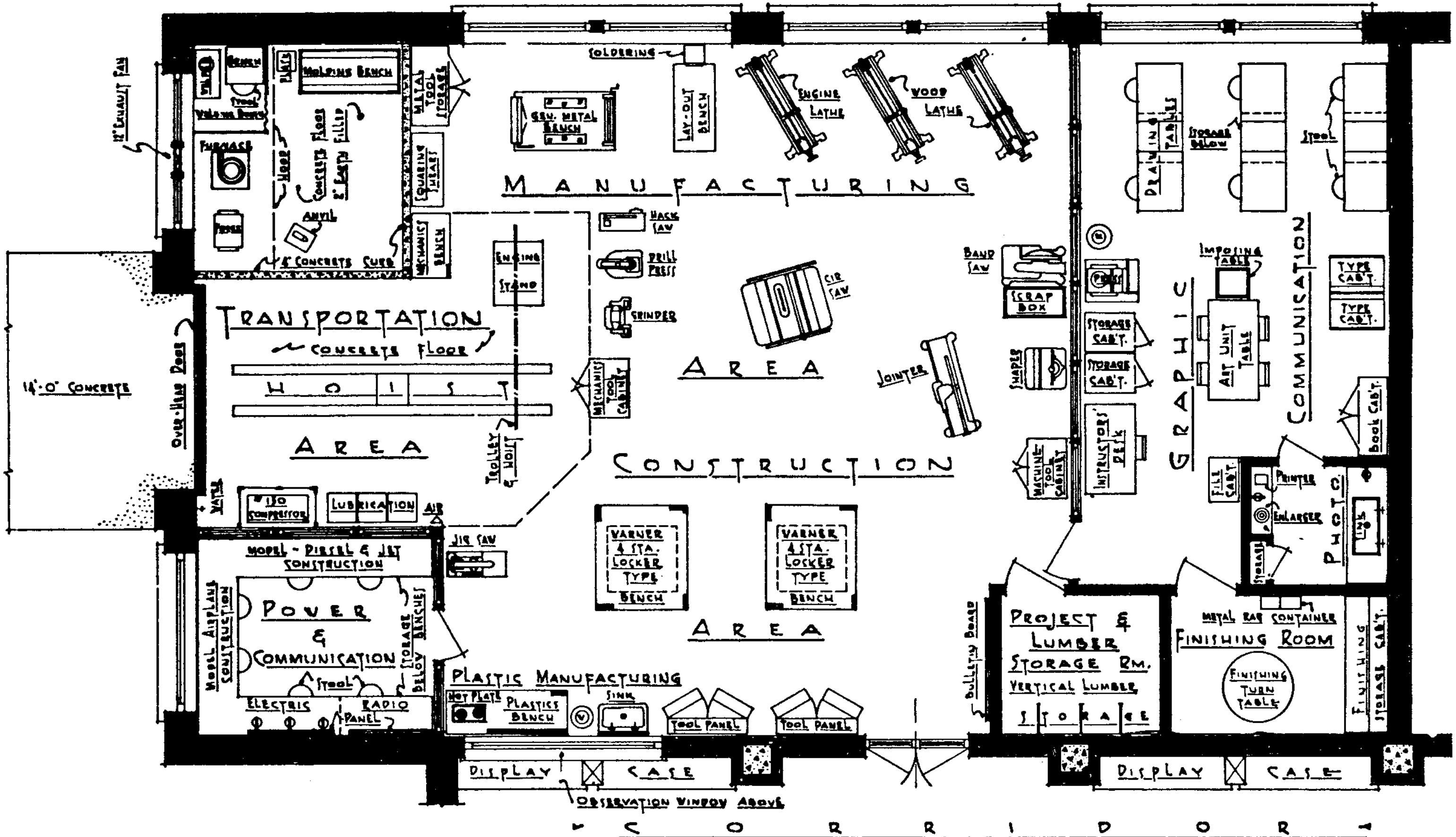


Fig. 5-5. The Vestibule Laboratory of Technology (Warner et al., 1953).

reduced vandalism damage supported the construction of windowless laboratories. Open space facilities without interior partitions were designed to reduce initial construction costs and increase the flexible use of space. Cluster technology laboratory facilities were designed and constructed in response to the development of industrial arts technology clusters such as communications, industrial production, and energy.

Educational facilities in the 1970's have been influenced by declining school enrollments, integrated curriculum planning, career education, competency based instruction, open space concepts, safety and health standards, special needs students, energy conservation, metric conversion, electronic instructional media, and various technological advancements. Currently, facilities for industrial arts are reflecting an emphasis on the study of industry, technology, and future implications of industry and technology on society.

To describe facilities that were constructed or renovated since 1965, a documentary analysis and a questionnaire type survey were conducted. Fifty state or territorial supervisors of industrial arts were asked to identify outstanding facilities and contact persons in their respective geographical areas. A compilation of the data obtained from the survey is reported in the following paragraphs.

Elementary school facilities. Three types of facility arrangements in vogue for elementary school industrial arts are intra-classroom technology areas, separate activity rooms, and mobile laboratories. Each facility is equipped so that industrial arts activities permit career awareness and integration of the general, elementary school curriculum. Frequent use is made of visual and audiovisual teaching materials. Equipment, tools, and materials are often selected and arranged with consideration given to the physical sizes of elementary students, program flexibility, and student safety and health. Typical characteristics of representative facilities include a portable laboratory cart, low benches, a large sink, color coded tools, production equipment, and student accessible storage racks and cabinets.

While intra-classroom and separate room industrial arts facilities serve a single elementary school, mobile laboratories permit economical and flexible industrial arts activities for several schools within one locale. For example, the Mobile Industrial Technology Laboratory (Siegel & Krane, 1971) serves five schools in District 27 of New York City, and the Industrial Arts Travelab aids the Nelson County Schools in Lovingston, Virginia. Boys and girls in grades one through six in New York City and in grades four through six in Lovingston obtain experiences in mass production and project activities in such areas as woods, metals, plastics, graphic arts, and electricity. Figure 5-6 shows the layout of the mobile unit employed in New York City. This comprehensive laboratory is located in a 10′ × 30′ trailer on which a generator is attached to provide electrical power to operate the portable tools and machines.

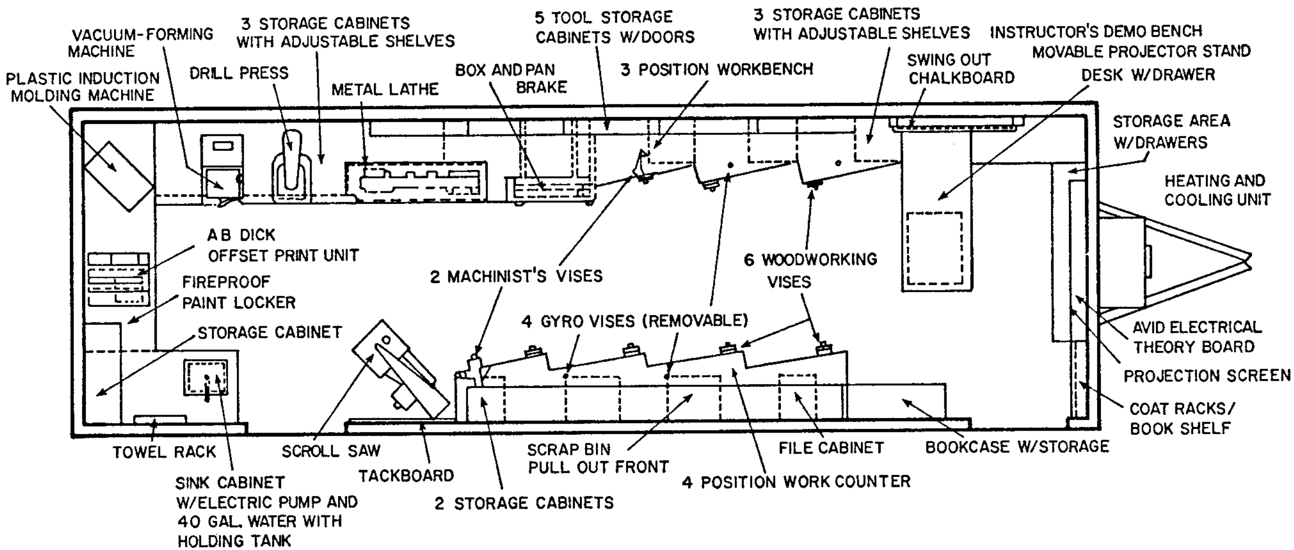


Fig. 5-6. The Mobile Industrial Technology Laboratory (Siegel & Krane, 1971).

Secondary school facilities. At the secondary, as well as higher education levels, the three major types of industrial arts laboratories (i.e., unit, general unit, and comprehensive general) are incorporated. Auxiliary areas such as instructional resource centers, seminar rooms, darkrooms, storage rooms, finishing rooms, and teachers' offices are an integral part of these laboratories. Laboratory sizes vary with the type and quantity of equipment to be utilized, the necessary activity spaces to be incorporated, and the size of current and future anticipated enrollments. Consideration is given to the shape of the laboratory, its location and accessibility to other school areas, the supervision required to manage the laboratory, security requirements, acoustical control, and color conditioning. Plans for secondary industrial arts facilities emphasize flexibility, utility access and control, and instructional aids capability. Furniture and equipment are provided for specific student instructional activities, for the preparation of instructional supplies, and for the maintenance and repair of equipment.

The internal arrangement of the industrial arts laboratory depends on the type of laboratory and the content taught in that laboratory. Related tools, equipment, storage, and instructional resources are arranged for a natural sequence of operations, and the aisles of travel allow the free movement of materials and people through the laboratory. Sufficient space is provided around machines for the safety of the operators and the free passage of others. A nearby service drive and outside entrance permit easy accessibility to and from the laboratory (Schmitt & Taylor, 1968).

Industrial arts facilities for middle and junior high schools are designed to provide for individual development, career exploration, a unified or integrated curriculum, cluster technologies, and/or the traditional industrial materials and processes. Several selected industrial arts facilities that meet many of these goals are described below.

Three comprehensive general laboratories were constructed in 1965 at the Earle B. Wood Junior High School, Rockville, Maryland for developing students through industrial arts activities. The Maryland Plan provided guidelines for designing a learning environment suitable for exploring technology and industry. The laboratories permitted effective implementation of the curriculum plan by having woods, metals, graphic arts, and electricity instructional areas; a research and testing center; and a seminar room; and, they were located within the school in close proximity to science laboratories and an instructional materials center.

In Keithley Junior High, Tacoma, Washington; Kehmore Junior High, Bothell, Washington; and Lefler Junior High, Lincoln, Nebraska; the Occupational Versatility curriculum assists students in learning their identities and preparing for future living. The program

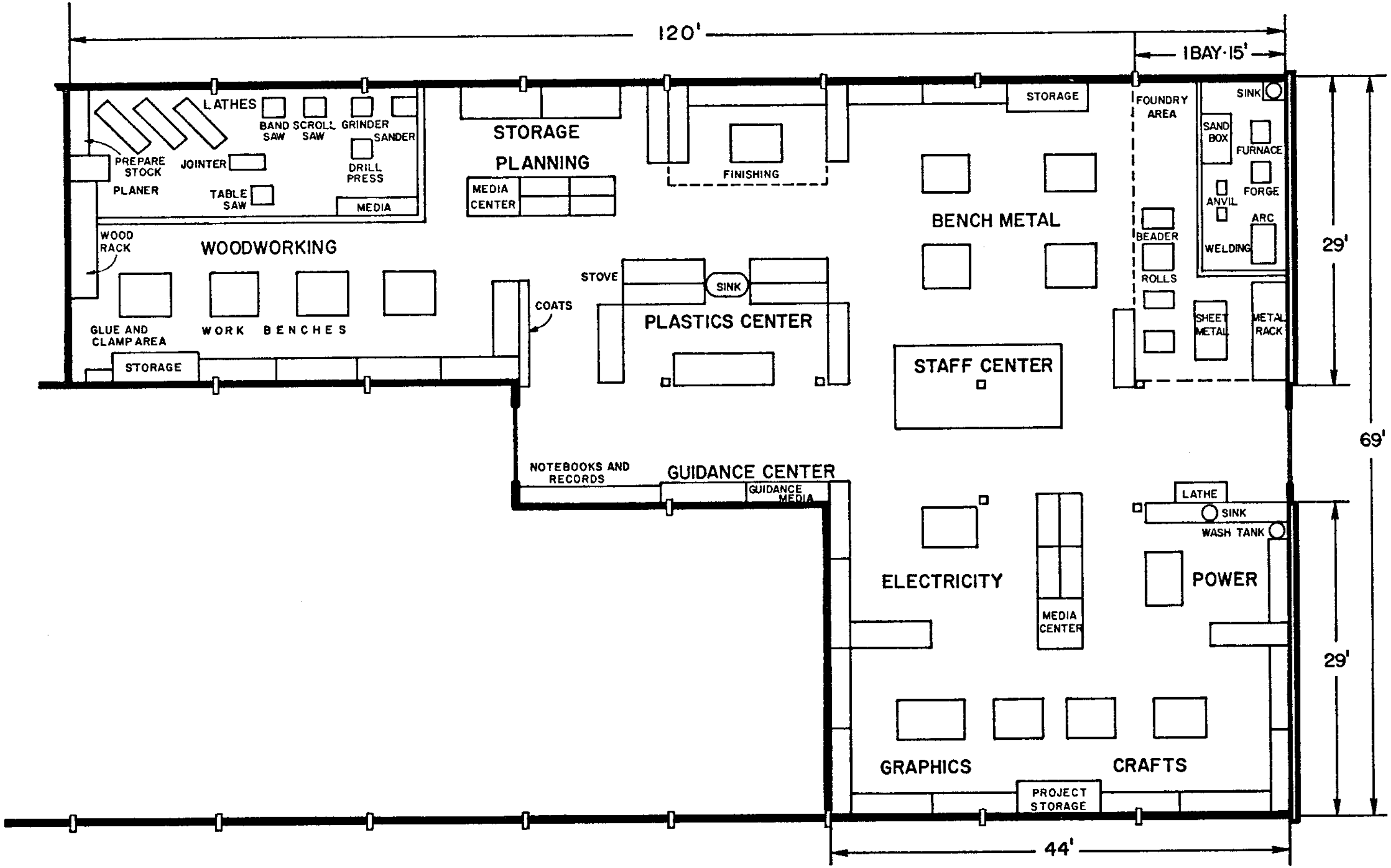


Fig. 5-7. The Occupational Versatility Comprehensive General Laboratory.

encourages student management, self-instruction, and career exploration so that the students will become occupationally versatile. At Keithley Junior High, a team of three teachers work together to facilitate the learning of 60 to 90 boys and girls in the same multi-grade level class. Figure 5-7 shows the large, open concept, general shop having self-contained and organized activity areas in planning, graphics, woods, metals, plastics, crafts, electricity, power mechanics, finishing, and career guidance.

A unified or integrated curriculum requires facilities suitable for offering intercurriculum activities. The middle school constructed in 1977 in Chippewa Falls, Wisconsin offers a unified arts department in which agriculture, industrial arts, home economics, office education, art, and distributive education are grouped into a single area. This facility has employed the open space concept, demountable walls, and portable equipment. Another example of an integrated curriculum is at North Harford Middle School, Pylesville, Maryland, where intercurriculum general education facility clusters are arranged within the school with a separate industrial arts laboratory in each cluster.

When the industrial arts curriculum is divided into industrial-technology areas to permit a broad, conceptual approach, a cluster organized facility provides the learning environment. For example, Fig. 5-8 shows the four clusters of manufacturing, building construction, graphic communications, and power and transportation in the Wood River Junior High industrial arts laboratory in Hailey, Idaho. Boys and girls in grades seven through nine are provided numerous experiences with industrial processes, materials, media, and careers.

Another cluster laboratory is the Power/Transportation Laboratory in Webb Junior High School, Tampa, Florida. Eighth and ninth grade students in this prevocational laboratory experiment with equipment such as an electrical system test and analysis unit; a fluid power demonstration bench; various small, outboard and automotive engines; an AC ignition simulator; and a rocketry package. Auxiliary rooms that are easily accessible from the main laboratory include a resource room, storage room, small parts room, and a teacher planning area.

At the senior high school level, industrial arts facilities have been planned in view of cluster technologies, product development, research and testing, and the traditional industrial materials and processes. Selected examples of incorporating these factors are described below.

The Eleanor Roosevelt Senior High School Center for Science and Technology located near Greenbelt, Maryland, has been planned so adolescents can develop skills, habits, and knowledge relative to contemporary technology and industry. Eight laboratories, representing the technology areas of construction, energy, industrial fabrication, and visual communications, permit students to experience research

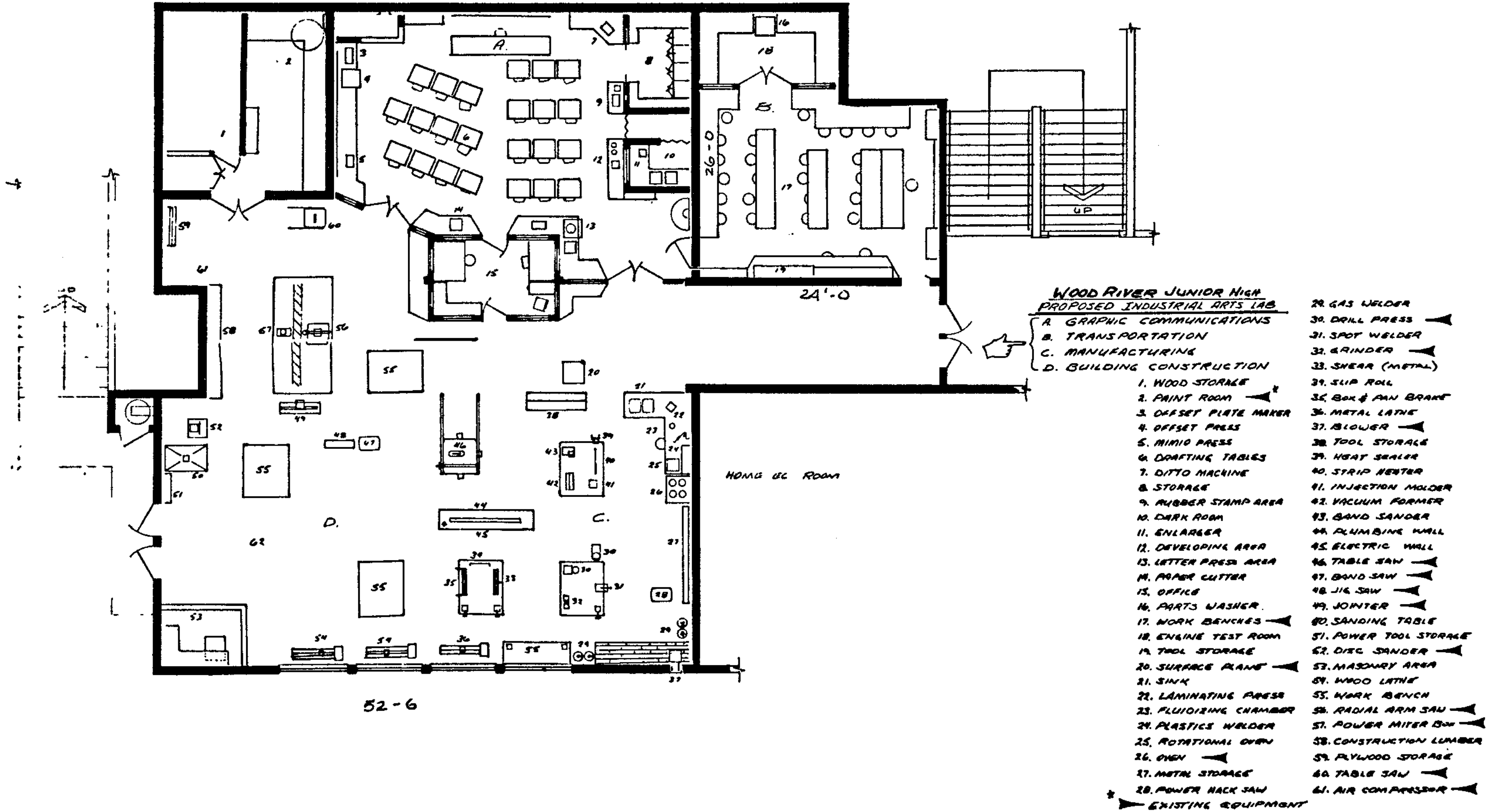


Fig. 5-8. The Cluster Laboratory in Wood River Junior High School, Hailey, Idaho.

projects, learning activity packages, construction projects, mass production, and technology seminars.

At Woodbridge Senior High School, Woodbridge, Virginia, the Manufacturing/Construction Laboratory provides the environment for general industrial arts experiences, career exploration, and safety. Students study plumbing, electrical wiring, house design, manufacturing, wood frame construction, group industry projects, line production, and maintenance and repair. Team teaching and the flexible arrangement of instructional areas permit manufacturing and construction activities to be taught simultaneously. Most of the laboratory is equipped for basic woodworking, while auxiliary areas include foundry, welding, sheet metal, finishing, testing, storage, and a teachers' work room.

An industrial arts facility suitable for product development is the Engineering Processes and Materials Laboratory along with the auxiliary mechanical drawing room in Red Bank Regional High School, Little Silver, New Jersey. Teams of students select a product, design it, and manufacture the prototype. Activity centers within the laboratory are hot and machine metals, plastics, machine woods, finishing, media presentation, and lecture/demonstration.

Research and testing occurs in the Engineering Technology Laboratory in Los Alamos High School, Los Alamos, New Mexico. Students experiment, test, construct, evaluate, and report on changing technology. Exemplary equipment includes solar heating test instruments, lasers, an optical comparator, instrumentation bench, Wankel engine test unit, and a tensile tester.

Higher education facilities. In higher education, facilities have been specifically designed for industrial arts teacher preparation programs, while others have also served the needs of other industrial/technical career related areas. Three selected facilities suitable for industrial arts instruction are described below.

The Research and Experimentation (R & E) Laboratory and a nearby seminar room in the Industrial Education Department at the University of Maryland has been designed so students can learn the scientific approach of problem solving, learn to conduct R & E programs in public schools, and learn skills employed in research and testing environments. This 44′ × 40′ × 12′ facility is equipped with a wind tunnel, flow tank concrete tester, rolling mill, freezer, furnaces, universal testers, data recording instruments, and other specialized items.

At the University of Wisconsin-Stout in Menomonie, Wisconsin, the American Industry Laboratory was designed to teach the production enterprise approaches and processes concepts. Typical problem solving activities include organizing, planning, producing, finishing, and distributing products. The 100′ × 50′ × 14′ facility permits flexible arrangements by having entirely movable equipment capable of processing a wide variety of materials.

Facilities in the Department of Industrial Technology at the University of Northern Iowa include basic core laboratories for production technology, power technology, and communication technology. Movable walls, a utility grid system, and audio visual capabilities permit both large open space laboratories for the comprehensive conceptual approach, and specialized area laboratories for in-depth specializations (Rudisill, 1974).

FACILITY PLANNING ORGANIZATION

Principles of Facility Planning

Planning today's industrial arts facilities occurs in view of present and future anticipated enrollments, industrial and technological trends, program philosophy and goals, the instructional delivery system, and the availability of monetary resources. Concern must be given to relevant, effective, and efficient instructional strategies.

Facilities need to be designed for a broad range of student developmental levels and learning styles. These facilities should also permit an environment conducive to the fulfillment of faculty/staff duties and work habits.

The types of laboratories and their spatial relationships are influenced by the industrial arts curriculum. Unit laboratories are planned for specialized content areas, while general laboratories have exploratory value. To be more functional in providing inter-curricular activities, industrial arts laboratories should be located in close proximity to the facilities of other related school subjects.

The industrial arts pedagogical methods and learning activities usually require well-designed spaces and equipment that permit flexible arrangements within the laboratory. Facility design should allow a gradual progression from existing instructional strategies to proposed ones, as well as reversibility if the educational practices become ineffective or inappropriate.

Both the external and internal educational environments should be well planned. The external environment should be of sufficient size and in a desirable location for present and future anticipated instructional needs, and the design of the industrial arts facility should enable the architect to integrate it into the overall building plans. The internal environment should include adequate and properly controlled illumination levels, thermal levels, acoustics, ventilation, air quality, surface coatings, and colors. Flexible utility systems such as plumbing, electricity, and communications should be installed and the facility layout should permit visibility and safety. The equipment should be instructional, flexible, safe, durable, accurate, versatile, and economical.

Facility Planners

The two basic groups responsible for planning today's industrial arts facilities are the *executive team* and the *advisory team*. Major responsibility for planning a functional facility rests with the former, while reactions and recommendations are provided by the latter. The final approval of facility plans must be given by such higher authorities as the board of education, board of trustees, state building commission, or school building committee.

The executive planning team usually consists of the chief facility administrator, an administrative assistant, an architect, an educational consultant, and an industrial arts teacher who also serves on the advisory team. Members of the advisory planning team should include representatives of the faculty, staff, student, and community groups.

Facility Planning Process

A systematic, functional planning process is necessary for the development of effective industrial arts learning environments. This planning approach involves an analysis of present and future anticipated student and faculty needs, the establishment of the industrial arts program, the development of a resulting facility, and an on-going evaluation of all educational components.

The community is analyzed to determine the current and projected future school enrollment, socio-economic characteristics, employment outlook, and industrial arts curriculum needs. Educational specifications are then written to describe the human, curriculum, instructional, and technical elements of the program. From these specifications, preliminary building plans are generated, and upon their approval, a complete set of architectural and engineering plans and specifications are produced. When the final plans have been approved, funding appropriated, and a contract awarded, construction and/or remodeling begins. Then, equipment is ordered, delivered, and installed, and the facility is accepted upon satisfactorily meeting the contract terms. Continual evaluation and modification should follow to provide a learning environment that meets the needs and expectations of education.

COMPARISON AND ANALYSIS

Unit and General Laboratories

The *unit laboratory* is equipped to teach a specific instructional area, and it usually contains duplicate tools and equipment for the teaching of specialized knowledge and skills. The teacher is a content area expert. Students learn tool and process skills through the imitation of the teacher's demonstrations, the performance of teacher-directed exercises, and the construction of teacher- or student-selected projects. This type of laboratory is often designed for schools having large teaching staffs and four or more prevocational laboratories.

The *general laboratory* includes the general unit and comprehensive general laboratories described earlier in this chapter. It consists of several industrial-technical areas through which students are periodically rotated or progress as determined by the instructional activities. The facility may be equipped for broad study in general traditional subject areas (e.g., drawing, woodworking, electricity), or in technologically similar cluster areas (e.g., electricity, electronics, power mechanics). The general laboratory can usually accommodate both broad and specialized industrial arts experiences.

Numerous advantages and disadvantages have been cited for the general laboratory (Howell, 1922; Newkirk, 1947; Silvius & Curry, 1956; Warner, 1928). This type of laboratory permits (a) career exploration and guidance, (b) broad experiences in both similar and dissimilar industrial-technological areas, (c) economically feasible industrial arts facilities for small cities and rural schools, (d) interface with individual interests, capabilities, and developmental levels, and (e) the development of cognitive, affective, and psychomotor behaviors with various tools, materials, and equipment. Disadvantages include difficulty in the (a) preparation and instruction of multiple activities for various groups by a single teacher, (b) employment of adequately qualified beginning teachers of multiple activities, (c) recordkeeping of the progress of each student, (d) availability of sufficient time for desired specialized skill development, and (e) determination of maximum class sizes.

Closed Space and Open Space Plans

The *closed space* plan is the traditional layout of laboratories and auxiliary areas with fixed partition walls. Within these self-contained facilities, a single teacher instructs each class in a separate industrial arts content area and laboratory. Instruction is structured and commonly provided in drawing, woods, metals, ceramics, plastics, graphic arts, electricity-electronics, and power.

The *open space* industrial arts facility is characterized with large open areas having movable or no interior walls. Instruction frequently occurs in cluster activity areas such as production, power and transportation, and communications. Adaptable to school enrollment growth and change, this layout can be readily rearranged for different space layouts, equipment installations, and environmental systems. In addition, this facility provides a conducive environment for team teaching.

Various advantages and disadvantages have been noted for open space educational facilities (Castaldi, 1977; Educational Facilities Laboratories, 1966; Storm, 1976). Advantages include student freedom to move and solve problems, reduction in building and operating expenses, easily controlled uniform temperatures, an informal learning process, flexible arrangements, and encouragement of innovation and creativity. Disadvantages often cited are the presence of confusion and laissez-faire attitudes among students, audible and visual interference, difficulty in the mastery of subjects requiring deep concentration, the presence of safety hazards due to student freedom, and a lack of wall space for storage.

FUTURE DIRECTIONS AND EXPECTATIONS

Industrial arts facilities in the immediate future need to be planned for anticipated changing enrollments. The space and equipment selections and arrangements should meet the developmental, emotional, psychological, sociological, and physical needs of *all* students. Instructional materials and specially adapted industrial arts facilities are specifically needed for exceptional students such as the disadvantaged, handicapped, and gifted. Consideration must also be given to continuing education students of both sexes including the drop-outs, displaced workers, hobbyists, and retired.

Large quantities of information place increased emphasis on the availability of facilities for efficient inquiry and problem solving activities. Auxiliary areas to facilitate these activities are learning resource centers, libraries, educational technology centers, computer learning laboratories, planning centers, comprehensive cluster laboratories, curriculum centers, and rehabilitation centers.

Numerous electronic teaching devices are readily available today and hold promise for the future. Examples include the overhead projector, tape recorder, sound-slide unit, sound-filmstrip unit, simulator, computer, closed circuit television, videotape, and multi-media systems. The sophistication of these devices allows them to be programmable, completely automated, and holds promise to individualize instruction.

Technological advancements in materials, processes, and equipment continue to provide additional and potential replacement content areas. Typical future oriented equipment and processes are computer assisted production, photographic and electronic composition, powdered metallurgy, integrated circuits, new energy utilization resources, metrically calibrated instruments, and improved safety and health devices.

Emphasis continues to be placed on the organization of major industries and the social aspects of industrialization. Flexible facilities are needed for curriculum approaches such as building construction, mass production, group project, and research and experimentation. Existing facilities will need to be remodeled and new laboratories will need to be constructed for the conceptual study of cluster technology areas such as production, communications, and energy.

Employment growth areas should create greater emphasis and attention within certain industrial arts laboratories. Above average growth in employment for the next 10 years is projected for auto mechanics, auto body repair, carpentry, and welding. A 60% increase in employment opportunities should occur in air conditioning, refrigeration, and heating. In addition, greater need will be expressed for construction, small gas engine repair, business machines, computers, and industrial equipment occupations (Feirer, 1977).

Energy conservation has recently become and will continue to be an issue in planning industrial arts facilities. Self-contained solar, wind, or thermal power generators hold promise for operating the laboratory equipment efficiently and economically. Energy-saving techniques and materials should be employed as part of the facility design and use. Equipment should be selected in view of energy consumption and its long term operating costs. However, the most valuable change is the development of energy conservation attitudes (Educational Facilities Laboratories, 1973).

Industrial arts facilities should allow for various current and futuristic educational concepts. These concepts include, but are not limited to, competency-based instruction, team teaching, differentiated staffing, variable group-size teaching, programmed large group responding, radio-telephone-television, self-instruction, computer instruction, modular scheduling, multi-structured scheduling, interdisciplinary programs, and open laboratories.

Functional facilities provide the answer for effective and up-to-date instruction. Industrial arts facilities for the future should be planned for the program goals and objectives, industrial-technological content, pedagogical methods, instructional activities, educational resources, program evaluation, and most of all, people.

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ACKNOWLEDGMENTS

Acknowledgment is given to the persons who responded to the "Exemplary Industrial Arts Facilities Questionnaire" and the state industrial arts supervisors who provided the names of outstanding industrial arts facilities and persons to contact. Special recognition is extended to the following individuals who contributed descriptions of industrial arts facilities that were selected for inclusion in the chapter.

Herbert Siegel	District 27, New York City Elementary
William N. Patterson	Nelson County, Virginia Elementary
George M. Haney	Earle B. Wood Junior High
Edward C. Pedersen	Keithley Junior High
James V. Frederick	Kehmore Junior High
Robert E. Law	Lefler Junior High
Gerald L. Smith	Chippewa Falls Area Middle
Joseph M. Devilbiss	North Harford Middle
Brad R. Thode and Lee Carter	Wood River Junior High
Marvin D. Skinner	Webb Junior High
James H. Bruns	Eleanor Roosevelt Senior High
John E. Bonfadini	Woodbridge Senior High
Robert M. Nogueira	Red Bank Regional High
Horace W. Gambell	Los Alamos High
Donald Maley	University of Maryland
Douglas D. Stallsmith	University of Wisconsin-Stout

unit ii

Curriculum Theory and Practice in Industrial Arts

chapter 6

Curriculum Movements of the 1960's

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A fundamental re-examination of the functions, purposes, and content of industrial arts education took place during the 1960's. The orderly, sequential growth that had characterized earlier development outlined in Chapter 1 was set aside because of changing circumstances. Industrial arts had existed relatively unchanged by on-going circumstances throughout the first half of the century. It was a generally accepted subject with relatively well-defined content, clear-cut methodologies, and a secure status in the school curriculum. Why, then, did the field begin to move toward change?

Doctrine and dogma faced crucial tests in many areas during the 1960's. The dissonance that characterized industrial arts was also found in other school subjects and in many aspects of society. Fundamental values were being re-examined in many areas of contemporary life. Unanimity no longer seemed essential to existence, whether in the political sphere, the economic sphere, or the social and educational setting.

Technological change accelerated during the period under examination, but this seems to have had a relatively minor influence upon most industrial arts programs of the time. Whatever the cause, the profession found it possible, for the first time, to encourage diversity in program and purpose. Industrial arts could be considered to be any one of many programs that were proposed and made operational. Within the profession, a receptive climate evolved in which individuals worked effectively to create new proposals.

Simultaneous innovation occurred in several settings, with investigators searching for basic improvements in each. It is true that other subjects were re-examining their programs during the same period. It is also true that funding was available for industrial arts curriculum development for the first time. Research funds in industrial arts education were almost unknown prior to the late 1950's and early 1960's. When funding became available, it was difficult for a field that had no experience with funded activities to move effectively to utilize sources of funding and bring curriculum development efforts to fruition. Much of the history of the curriculum movements of the 1960's is reflected in the grappling with grantsmanship that occurred across the country.

As individuals and groups of industrial arts educators undertook to make revisions in existing programs, four major directions were pursued: (a) Industry as a source of content had been the acceptable model for decades; it seemed logical to extrapolate from the past and move to update existing industry-centered programs. (b) As an expanded structure was sought to include the industrial sphere, technology became a logical base; technology could be ordered into a taxonometric matrix and studied as a discipline. (c) The individual assumed a high level of priority during the 1960's; as education focused upon individualized instruction and upon the importance of individual development for social progress, the individual became a logical focal point for efforts in industrial arts program revision. (d) Perhaps the most obvious approach in curriculum improvement is to build directly upon existing programs, modifying them to meet the needs of the times. This approach made it possible to achieve gradual growth within existing situations, required only minor modifications in existing facilities, fit in well with the expectations of students, parents, and administrators, and became an effective pattern in certain settings. In industrial arts education, redirection of existing programs has been the predominant pattern of operation throughout the century. During the decade under review, this approach also took recognizable shape in funded projects, in addition to the large number of local program innovations that utilized an evolutionary approach.

This chapter reviews selected samples from among the four types of industrial arts curriculum development efforts that characterized the decade. Since two of the approaches are developed in some detail in this Yearbook, no attempt is made to provide complete, detailed information about any specific project. An earlier publication (Householder, 1972) reviewed the efforts in more detail than may be included in this chapter. The reader is referred to the earlier review for a synopsis of the activities of the respective projects and to the comprehensive bibliography in that work for reference to the source materials relating to each project. The serious student of industrial arts curriculum development will want to become well-acquainted with the source materials published at the time, in addition to the subsequent analyses available in this Yearbook and other sources.

INDUSTRY-CENTERED CURRICULUM DEVELOPMENT EFFORTS

Industrial arts educators have implicitly accepted industry as the source of their content virtually throughout the history of the field. While a precise definition of industry is not given here, the author preferring to permit each curriculum developer to postulate his or her own parameters, the emphasis in industrial arts has been upon those industries that produce consumer goods. During the 1960's, this definition was expanded in several ways.

Industrial Arts Curriculum Project

Foremost among industrial arts curriculum projects of the 1960's was the Industrial Arts Curriculum Project (IACP). The analysis of the economic institution conducted by the IACP staff is unique in the history of industrial arts education. Following their initial analysis, the IACP investigators redefined industrial arts to mean an "organized study of the knowledge of practice within the subcategory of the economic institution which is known as industry" (Towers, Lux, & Ray, 1966, p. 43). Industry was defined by the IACP group as that portion of the economic institution (manufacturing and construction) responsible for changing the form of materials to satisfy man's wants (Towers, Lux, & Ray, 1966).

In the process of identifying content and developing course materials, a detailed analysis of the body of knowledge dealing with industry was conducted by the IACP staff. Two courses were developed from the body of knowledge identified as industrial praxiology. The World of Construction and The World of Manufacturing were field tested throughout the country, modified, and field tested again prior to the time commercial materials were made available to the profession. The IACP was able, during the decade, to analyze content, develop materials, field test them, revise them, make curriculum materials commercially available, and conduct a significant number of teacher education workshops for experienced industrial arts teachers. The IACP attained a new standard in industrial arts: an integrated system of curriculum; materials and procedures suitable for the complete junior high school industrial arts program.

American Industry Project

The American Industry Project was conducted at the University of Wisconsin-Stout during the early 1960's, paralleling the early development of the IACP at The Ohio State University and the University of Illinois. The early analytical work of the American Industry Project sought to identify a conceptual framework that would encompass the totality of American industry (Face & Flug, 1965). The 13 basic concepts – communication, energy, processes, materials, production, management, marketing, transportation, finance, property, research, procurement, and relationships – provided the conceptual structure for the development of a group of materials beginning with Level I for the eighth grade (Gebhart, 1968). Three levels of course work were developed by the American Industry Project: Level I, grade eight, was intended to provide a broad view of the concepts of industry as outlined above; Level II was intended to provide an in-depth study of the concepts and their interrelationships, while Level III was devoted to independent study in self-selected areas (Anderson & Olstad, 1971).

A teacher education program was included as an integral part of the American Industry Project. This evolved to include inservice programs, in addition to the preservice programs at the University of Wisconsin-Stout. The American Industry Project developed a useful conceptual model, produced a significant body of instructional materials, developed a new major field of study for teacher education students and the public schools, and successfully implemented the American Industry approach in a wide variety of school settings.

In addition to the two widely known industry-centered industrial arts curriculum projects discussed above, other efforts emerged during the 1960's. These were not as well funded, in most instances; they tended to utilize a more closely circumscribed sample of schools for implementation and field testing; and they did not attain the same high level of national visibility achieved by the IACP and the American Industry Project. Features of their development, however, are worthy of note, for they influenced subsequent modifications in industrial arts programs, including other, more dominant curriculum efforts.

Functions of Industry

During the early 1960's, Bateson and Stern (1962, 1963) were among the first to seek to identify the generalizable characteristics of industry. Focusing upon the goods-producing industries, they identified four production functions: research, product development, planning for production, and manufacturing. Goods-servicing activities were considered to consist of diagnostic, corrective, and testing functions. These seven functions, then, served as the foundational ideas upon which an entire program could be developed. In addition to the validation of the functions by Stern (1964), the emphasis upon the functional analysis of industry served as the basis for subsequent activities in several settings. Individual faculty groups have adapted the Functions of Industry approach and implemented it in their classes, organized the classes as companies or corporations, stimulated students to design products for a local market, produced the products with student labor during the regularly-scheduled classes, sold the items in the marketplace, and distributed the profits among the stockholders. This approach is now so commonplace that the reader may need to recall that it was a new idea in the 1960's, that it is a procedure that requires substantial planning prior to implementation, and that considerable opposition was sometimes met when the individual project was set aside for a study of the functions of industry and the line production of consumer goods. The Functions of Industry approach was instrumental in bringing about this significant change, though it cannot be assigned all the credit since many groups suggested similar emphases.

Alberta Plan

The United States had no monopoly on curriculum innovation during the 1960's. Under the leadership of faculty members at the University of Alberta, striking changes were made in the industrial arts program of the secondary schools in the Province of Alberta. This comprehensive program included a seventh grade course covering electricity, graphic arts, ceramics, plastics, metals, and woods (Gallagher, 1964). The second phase of the program, for students in grades eight and nine, involved a comprehensive array of courses: power transmission, electronic technology, mechanical technology, testing technology, graphic communications, power technology, and computer technology.

Students who enrolled in a tenth grade program studied organizational structures, decision-making processes, communications, and authority configurations in industrial organizations (Gallagher et al., 1968). Research and development activities characterized the study in grades eleven and twelve.

It is unfortunate that the border between the United States and Canada restricts the communication of information about innovation. One undesirable consequence of this barrier is the fact that information about the Alberta Plan has not been widely available in the United States. LeBlanc, Shykora, and Day (1972) have, however, provided a helpful description of implementation procedures in the unique setting of the Edmonton School Systems, where the Alberta Plan was successfully implemented both in the public schools and in the Separate School System (Catholic).

Orchestrated Systems Approach

The manufacturing activity was conceptualized as an "Orchestrated System" suitable for adaptation to industrial arts programs in a model developed by Yoho (1969). The primary area of the industrial enterprise, the "game in play" area, was comprised of the areas where product planning occurs, parts are manufactured, products are assembled, packaged, stored, and shipped. Beginning students could be expected to participate in this area during the early parts of their industrial arts experiences.

Advanced students could be expected to participate in the activity areas surrounding the "game in play." In these "bull-pens," students learn about and practice such areas as work measurement, methods study, packaging, maintenance, communication, scheduling, jig and fixture design, research and development, plant layout, materials handling, instrumentation, quality control, and automation.

The unique analytical approach characterizing the Orchestrated Systems Approach has not been widely understood. However, many of its organizational characteristics have been utilized in a variety of settings where it has made significant contributions to the development of innovative programs in industrial arts.

Enterprise: Man and Technology

The Enterprise system was proposed as an alternative to industrial arts rather than as a new industrial arts program (Stadt et al., 1969a, 1969b). Initial experiences in the Enterprise setting were designed to provide broad, exploratory occupational experiences. Instruction in electronics and instrumentation, visual communications, materials and processes, and energy conversion and power transmission completed the introductory Enterprise course. Later experiences were increasingly devoted to pre-entry occupational education, either as part of the Enterprise program or in existing occupational programs.

The model presented by Nystrom (1969) included the entire American enterprise system, from production to upper management, and provided for such areas as programming, labor relations, economics, maintenance, scheduling, distribution, sales, operations management, and automation to be included as part of the instructional program in the Enterprise system. Sullivan (1971) described gaming techniques for instruction in finance, manufacturing, and marketing as a part of the first level of instruction in the Enterprise program.

This provocative proposal has had its greatest impact upon the development of somewhat less revolutionary revisions. As this review is prepared, the influence of the Enterprise system appears to have been substantial, though rarely directly visible on the surface.

Summary

As one considers the variety of approaches that were involved in attempts to organize the study of industry in such a way as to provide effective industrial arts programs, one cannot help being impressed with the magnitude of the task and the diversity of approaches that could be utilized. Each individual or small group of investigators sought to deal with the totality of the industrial system, working from the unique vantage point of their location in time and space. Communication between groups seeking to develop industrial arts curriculums based upon industry was restricted, perhaps artificially, as each sought to be "first" and "most correct" in the competitive atmosphere of the time. On the other hand, most of the groups made numerous presentations at conferences and conventions, and informal discussion groups shared many ideas and approaches.

The approaches reviewed in this section focused upon the goods-producing industries, sought to minimize involvement with individualized crafts-oriented project production, and most of them sought substantial broadening of the coverage of content from industry. Specific aspects of these characteristics vary from one approach to another; however, they seem to have much more in common than in differentiation when viewed from the vantage point of the late 1970's. It may be noted that their influence has continued and expanded, though at a much slower rate and with far fewer devotees than their initial proponents must have anticipated. Nevertheless, this group of industrial arts curriculum developers of the 1960's made significant and long-term contributions to the evolution of the industrial arts program.

STUDY OF TECHNOLOGY

The influence of technology upon people was used as the central theme in industrial arts curriculum development in a few instances. Lauda (1969) pointed out that industrial arts should interpret society from a technological point of view, emphasizing the effects of technology upon people. Technology would therefore become the core of the industrial arts program, that would need to be revised in order to enable individuals to control technology and use it for society's purposes. Concentration upon instruction in technology, science, and the humanities, was recommended by DeVore (1970).

Industrial Arts as the Study of Technology

Delmar W. Olson was an early advocate of the analysis of technology to identify content for industrial arts. His six functions for industrial arts: technical competence, occupational orientation, consumer competence, recreational liberation, cultural appreciation, and social competence (Olson, 1963), required a thorough understanding of technology. Olson defined technology as the material culture, including all aspects of the human-made world.

Olson's proposals for subject matter coverage encompassed a wide range of industries, including manufacturing, construction, power, transportation, electronics, research, the service industries, and industrial management. In each instance, he was concerned with the technological aspects of the subject matter.

The major contribution of the Olson proposal has been in its influence upon eclectic curriculum development in industrial arts. His ideas have been incorporated in many local developments of industrial arts curriculums, as well as serving as basic foundational premises for aspects of major projects.

Technology as a Discipline

Paul W. DeVore proposed the establishment of a technological taxonomy that would serve as a content reservoir for the development of industrial arts programs. From the reservoir, basic concepts and principles could be identified, instruction could be developed, and courses could be organized by grouping related units. Major areas of technology identified by DeVore (1967) were production, communication, and transportation.

In the analytical approach used by DeVore, it is possible to identify an organized body of knowledge that can be structured in a coherent way to enable the learner to acquire a structured understanding of technology. This organizational pattern, that has characterized such disciplines as mathematics and the sciences, offers industrial arts education an opportunity to organize cognitive content, design instructional programs, and evaluate student progress. The taxonomy provides a comprehensible framework for learning.

Within the approach advocated by DeVore and his colleagues, the research process plays a central role. Identifying, organizing, and categorizing content encompassed by technology is a major task. This group has made significant efforts toward the development of an organized structure from which technologically-based courses may be developed.

INDIVIDUAL DEVELOPMENT AS A CENTRAL THEME

It seems strange that so few curriculum developers in industrial arts have given primacy to the role of the individual. Schools exist for learners; industrial arts courses should, it would appear, be primarily interested in fostering the development of the individual learner. Nevertheless, most curriculum development activities have been devoted to organizing content and structuring experiences. Two examples reviewed here represent efforts of the 1960's to focus upon the individual, not to the exclusion of content, but to assert the primacy of the individual learner.

Maryland Plan

The Maryland Plan, as it is commonly known, has evolved from the work at the University of Maryland under the leadership of Donald Maley (1973). The Maryland Plan is not exclusively a product of the

1960's; it has evolved over a long period of time as Maley and his colleagues have sought to structure a program that would assist in the development of individuals at all developmental levels.

Content plays a relatively secondary role in the Maryland Plan of organization. Students at the seventh grade level begin their study of industrial arts by utilizing the unit method as a primary instructional approach and studying such topics as tools and machines, power and energy, and communication. This approach differs from many others in that the curriculum builder is not concerned that there may be some "gaps" in content coverage. Rather, the educator is concerned that the overall unit coverage is organized to offer all individuals an opportunity for exploration and learning within the framework of the unit.

Active student involvement is a central theme in the Maryland Plan. Individuals work separately and collectively in group projects, research and experimentation, line production, and various technical development projects. Emphasis upon problem solving, interaction with the industrial world outside the school, reporting to the entire group upon the results of one's investigation, and reliance upon the learner as a productive person are unique features of the Maryland Plan. Teachers who have utilized the plan report a high level of satisfaction with its classroom effectiveness; it has been successfully implemented in a variety of settings.

Technology for Children Project

The child's intrinsic interest in learning provides the central theme for the Technology for Children Project initiated by Hunt (1967). This project, while centered upon the individual, studied technology as the result of a human's ability to think about and solve material problems. Four areas were involved in Technology for Children activities: design, properties of materials, use of tools, and instrumentation. The creation of an enriched classroom environment was a fundamental priority, with tool panels, work benches, sawhorses, and tool sets provided in the elementary classroom, if possible.

Elementary teachers were involved in summer programs where they developed their technological capabilities and became acquainted with potential activities for their students (Stunard, 1968). Consultants were made available to assist the teachers in implementing Technology for Children activities in their elementary classrooms the following school year. This assistance in planning and conducting classroom activities was important in attaining a high level of implementation. The experience indicated that at least two cycles of institutes followed by classroom applications were required before a teacher could feel fully comfortable with the Technology for Children approach.

Individualized experience in a rich technological environment characterized the activities of the project. This has been one of the most effective innovations implemented at the elementary school level. It has continued to enjoy increasing acceptance in subsequent years.

CAREER-CENTERED CURRICULUM DEVELOPMENT EFFORTS

During the 1960's, a group of curriculum developers worked with the creation of industrial arts programs that would contribute significantly to career exploration and provide a measure of career preparation. Some similarities may be noted between these emphases and those of the manual training of a much earlier era, when educators sought to use manual activities to serve general education purposes in addition to the provision of some prevocational or vocational preparation. The philosophical argument concerning the appropriate degree of vocational emphasis for industrial arts education has raged since that time, and was fueled during the 1960's.

Partnership Project

Secondary schools, community colleges, and universities were cooperatively involved in the Partnership Project (Minelli, 1965). The project's industrial arts activities began with a course in "The Study of American Industry" with units in industry and civilization; industrial organization; research, design, and development; planning for production and manufacturing operations; manufacturing; distribution; and service (Cochran, 1970). A two-year sequence in grades eleven and twelve correlated the industrial-technical content with courses in English, mathematics, and science. Programs were included for college-bound students, likely high school graduates, and individuals unlikely to complete high school. Teacher education programs were also involved, both as suppliers of professionals to operate the courses included in the Partnership and as the purveyors of the last phase of the Partnership package: a teacher education program for students transferring from the technical programs in the community colleges.

The Partnership Project is especially noteworthy for the vertical integration of educational institutions that it accomplished. This integration is all the more remarkable when the large geographic segment of the State of Michigan, which it encompassed, is considered. Institutional cooperation and integration of industrial education programs, an elusive goal before, was attained, at least for a time, by the Partnership Project.

Galaxy Plan

Four major content areas were included in the Galaxy Plan as it was developed in Detroit; materials and processes, visual communications, energy and propulsion, and personal services (Cochran, 1970). Junior high school instruction included exploration in all occupational clusters (not all of which were a part of traditional industrial arts), while the high school program was increasingly specialized. The Galaxy Plan was successfully implemented in inner-city high schools (McLea, 1969) and in rural settings (Davison, 1969).

The basic concept of the Galaxy Plan built upon the cluster approach, which has characterized much of occupational and career education, and was to provide general education experiences in addition to vocationally-oriented activities. Flexibility was an intrinsic part of the Galaxy Plan, which could encompass several vocational areas within its umbrella, while also utilizing more than one scheduling pattern, depending upon the needs of the learners.

Pre-Technical Programs

The Richmond Plan (Smith, 1966) was the first of a group of programs intended to serve technically-oriented students during their last two years in senior high school. This program sought to integrate instruction in mathematics, science, industrial arts, and English to lend increased meaning to the high school experience. The capable, average or above-average student, seriously interested in pursuing a community college program in a technical field was well served by the Richmond Plan. However, it required that the teachers work closely together for their instruction to be unified and meaningful to the learners.

A similar series of pre-technical courses, Correlated and Pre-Technical Programs (1967), was developed in New York City. This program included a four-year program for general students and a series of pre-technical courses for prospective engineering technicians. Unfortunately, the number of school systems undertaking this sort of program was severely restricted during the 1960's, perhaps because society had not yet fully understood the role industrial arts could play in the general and pre-specialized education of technicians, technologists, and engineers.

Introduction to Vocations

North Carolina's contribution to the family of curriculum development efforts centered on careers was known as the "Introduction to Vocations" course (Beam & Clary, 1968). This course was intended to assist in student planning and decision-making with regard to vocational plans. It also sought to help students develop a realistic self-concept, increase their knowledge of occupational oportunities, help them understand the American economy, acquaint them with major occupational fields, and assist them in the development of desirable attitudes toward work. The course covered units on relating the self to occupations; the economic system; manual and mechanical occupations; clerical, sales, and service occupations; professional, technical, and managerial occupations; and evaluating and planning ahead. By 1968-1969, this program was serving approximately 18,000 students in 250 North Carolina schools (Robinson, 1968).

While a number of states developed projects similar to the Introduction to Vocations course, the North Carolina effort serves to illustrate the role that industrial arts experiences can fulfill in assisting individuals to acquaint themselves with opportunities in vocational and career education.

Career Development for Children Project

One of the early projects seeking to incorporate industrial arts activities within career education was developed by Bailey (1970). His model of career education (Bailey, 1971) outlined the need of the individual to understand oneself and to understand the world of work. Four stages of vocational development were recognized: awareness, grades K through three; accommodation, grades four through six; exploration, grades seven through nine; and preparation, grades ten through twelve. The focus of the Career Development for Children Project at its inception was in the early stages of the career education model.

The Career Development for Children Project is an excellent example of the work that can be done to integrate industrial arts and career education. Other states have followed somewhat similar examples; many have ignored the potential link between the two fields.

EVOLUTIONARY APPROACHES TO CURRICULUM DEVELOPMENT

A major approach to curriculum improvement was built directly upon the existing program. In this oldest of all methods, the curriculum developer seeks to improve the existing program by modifying it, updating it, deleting out-dated material, introducing new concepts, and providing for newly-introduced technologies. Industrial arts has drawn upon this method throughout its history. During the 1960's, major efforts were devoted to evolutionary approaches. Two projects are reviewed here: the Georgia Plan and the Industriology Project.

Georgia Plan

The Georgia Plan developed from recommendations by Hackett (1964) and his colleagues in Georgia. Working within the multiple functions of the secondary school, the Georgia Plan provided for a general industrial arts program for grades seven, eight, and nine; prevocational units in industrial arts in grades ten, eleven, and twelve; and a college preparatory track of senior high school courses.

In addition, technologically-oriented courses in "Man and Manufacturing" and "Man and Transportation" (Hackett, 1970) were developed to accommodate technological developments. In the manufacturing course, product development, production planning, tooling, producing, evaluating, packaging, financing, and marketing were studied.

The Georgia Plan was outstanding in its ability to transcend the gap between contemporary thought in industrial arts and existing practices in the public schools. It was possible in Georgia to implement considerable innovation within the public school industrial arts programs without major outside funding and without significant disruption of the on-going educational process. Consequently, the Georgia Plan became a model for national attention during the late 1960's.

Industriology Project

A second evolutionary curriculum development effort was the Industriology Project (Kirby, 1968). This project organized a sequence of four phases of courses. The first phase sought to introduce the development and structure of industry in grades seven, eight, and nine. Content for grades nine, ten, and eleven was chosen from phase two, basic elements and processes of industry, or from phase three, modern industries. Phase four, vocational and occupational guidance, was suggested for students in grades eleven and twelve.

Detailed teaching plans, study guides, information and job sheets, and instructional aids were developed for phase one of the Industriology program. Successful pilot projects using the Industriology approach with elementary age students were reported by Jackman (1970).

Practicing industrial arts teachers found the Industriology Project approach workable and understandable as they adapted their instruction to its broadened emphasis. Its long-range influence was somewhat limited by the short-term funding it received and by the fact that other curriculum projects were working in closely similar frames of reference.

OTHER CONTRIBUTORS TO CURRICULUM DEVELOPMENT

State Departments of Education

State departments of education have a high potential for contributing to curriculum development in industrial arts education. Prior to the decade of the 1960's, the state departments of education tended to neglect their responsibilities in this area; Mahoney (1956) found that a majority of the states did not produce materials for industrial arts teachers. The materials that were available tended to be quite uniform in content and presentation.

Near the end of the decade, Johnson (1969) analyzed 78 handbooks produced by the states. He noted that the handbooks emphasized traditional subject matter courses – drawing, woods, and metals – while his validation jury recommended such courses as manufacturing, communications, and power and transportation.

Perhaps because of their primary functions as standards-enforcers, state departments of education tend to maintain the status quo more often than they exert significant effort to move the profession toward curriculum innovation. However, the 1960's generated exceptions to this generalization, as state department personnel collaborated with their colleagues in the public schools and in the teacher education institutions to develop and implement substantial modifications in industrial arts programs. The Texas Industrial Arts Curriculum Study, for example, operated with strong support from the Texas Education Agency. Many of the developments described earlier in this chapter could not have occurred without the support of the respective state departments of education, even though such support was often not visible to the outside observer. State department personnel called crucial meetings, provided essential services, opened the door for variations in standards, encouraged field testing, and suggested implementation strategies.

Textbook Authors and Publishers

Textbooks cannot be the harbingers of change in a profession, they can only reflect and provide for the innovation that has already occurred or that is at least underway in the schools. Since the publishing industry presumably operates with the intention of earning a profit for its investors, it cannot be expected to take chances of major magnitude. During the 1960's, however, publishers were more daring than ever before, choosing to participate in the development of some materials, following the field testing of other materials closely in order to be a part of the implementation of the ideas at an early stage, and publishing new and innovative materials before large segments of the profession were ready to order them and utilize them in the classroom.

Authors of instructional materials for innovative programs face a dual dilemma: the lack of an adequate model for innovative instruction in industrial arts, and the difficulty of publishing and marketing trend-setting materials. During the 1960's, traditionally-based textbooks continued to dominate the marketplace; innovative materials, when they appeared, tended to be directed toward a small corner of the marketplace and to remain on active publication lists for a short span of years. The major tendency that could be noted during the decade was some increased activity in the revision of traditional texts, which were therefore more marketable; this may have been due to competition among the media and publishers rather than to any tendency to revise texts to reflect innovative curricula.

Commercially available materials for the Industrial Arts Curriculum Project contributed significantly to the widespread adoption of that program; the lack of published materials for other programs made it impossible for them to attain a similar share of the "market."

Professional Organizations

Throughout the decade of the 1960's, the professional organizations concerned with industrial arts were active in modernizing and organizing programs. Industrial arts affiliated organizations did not, however, play a leading role in any significant curriculum development project. They tended to work in an evolutionary mode, with committees of professionals devoting their efforts to up-grading standards for programs and rewriting rationales and objectives.

A significant revision of the *Guide to Improving Instruction in Industrial Arts* (American Vocational Association, 1968) made a noteworthy contribution to up-dating industrial arts program expectations. Yearbooks of the American Council on Industrial Arts Teacher Education dealt with relevant topics during several years; the American Council of Industrial Arts Supervisors (1963, 1969) also provided helpful suggestions to the profession. *Innovative Programs in Industrial Arts* (AVA, 1970) served to disseminate information about a number of viable innovations.

SUMMARY

The decade of the 1960's witnessed the first concerted efforts at the development of curriculum innovation in industrial arts education. The ten-year period was not long enough for the diverse curriculum development activities to attain a cohesive position. As the profession moved into the 1970's, however, it did so with the confidence that it could work effectively at self-improvement, that it was possible to accomplish considerable modification within the roles traditionally available to industrial arts, and with a new enthusiasm for the search for better ways.

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Chapter 7

The Development of Selected Contemporary Industrial Arts Programs:

The Maryland Plan

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Editor's note: *In the preceding chapter, Daniel L. Householder classified the curriculum movements of the 1960's into four categories and then selected and briefly described several programs within each category. Realizing the impossibility of a detailed explanation of each program within the categories, the editor selected two prominent, successful programs within two of the categories for a detailed explanation of "why" the programs were developed. The two categories selected were programs with emphasis on individual development and programs with industry as a source of content. That selection, however, should not be interpreted to mean that other programs developed during this period were not just as prominent and successful. Professors Donald Maley and Donald G. Lux consented to write this chapter and explain to the profession the "why" underlining their respective programs. The reader may only assume that other curriculum movements (programs) followed somewhat similar developmental routes.*

THE MARYLAND PLAN

The development of The Maryland Plan for industrial arts spanned the years 1947 through 1955. The program had many beginnings that in the earliest years (1947-1949) germinated from the challenges and insights provided by graduate studies under the direction of dedicated professors. Graduate studies provided the author a new and vastly different perspective on the roles of industrial arts as an important, contributing component of the American public schools. The interfacing of graduate studies in philosophy, educational sociology, economics, learning theory, human development, and curriculum provided the germ of a personal challenge that eventually culminated in what became The Maryland Plan. That personal challenge was a burning desire to test the theories of learning in the cauldron of public education. It was the challenge to take the theories of education and integrate them with the components of sociology, psychology, economics, and curriculum development in an effort to satisfy that curiosity of "Is it possible to make the theories of education work in that most dynamic of all fields of study – industrial arts?"

A second influence was like a two-edged sword. On one side there was a growing awareness of the enormous potential for educational productivity that existed within the field of industrial arts. And, on the other side there was the growing awareness that the programs in industrial arts were stifled by tradition and numerous educational as well as cultural antecedents. This latter concern persisted as a matter characterized as a "wholesome discontent" with what was happening in industrial arts. This wholesome discontent was not manifested in the usual barbs, accusations, fault finding, and finger-pointing. Instead, a firm resolve developed to see what could be changed.

Personal Philosophy

The Maryland Plan in its structure, content, processes, and goals is a physical manifestation of a multi-faceted philosophy of education and its role in the contemporary society, with special inferences for industrial arts. The Maryland Plan as a completely nonfunded, nonsponsored, noncoerced, nonassigned endeavor grew out of hopes, ideals, and aspirations the author held for industrial arts. Broad beliefs underlie the philosophical framework of The Maryland Plan.

1. The schools have as a primary function the development of people. The starting point is the individual, and the resultant is an enlargement of that person. The goals of self realization and self fulfillment for each individual are part of this philosophical point regarding the school's role in the development of people.
2. Correlated to the previous point is the issue that the presence of individual differences (ambitions, interests, talents, motivations,

growth and development) must be recognized and that the cultivation of such differences is a major responsibility of the school.
3. A third and related philosphical point is that the school should be for every "kid." If the law dictates that each individual must attend school to a specified age, it should also be a matter of moral obligation to see that the school is in fact "for the kid." It should provide opportunities to enhance the student's self concept and enable that student to become a somebody within the school setting.
4. Every area of the school has a direct responsibility for the broader dimensions of education that contribute to one's ability to read, write, communicate, and calculate. Learning experiences that provide for meaningful and realistic opportunities to read, write, communicate, and calculate are a necessary, vital part of the educational design for industrial arts.
5. Industrial arts should devote a greater degree of attention to the processes of education. The actual process of learning to learn needs emphasis and study. The early literature on The Maryland Plan repeatedly promoted the idea that the processes of getting the answer may be more important than the answer.
6. Educational designs, strategies, and decisions about instructional practices should be based upon tested principles, research findings, or some form of valid documentation meriting the user the title of a professional. Decision-making in educational practice must assume the dimensions of validity that can be supported by the disciplines of child development, psychology, sociology, and physiology.
7. Education is at its best when it results from firsthand experiences that have meaning and value to the learner.

Professional Influence

Humans are a product of all their experiences. This is a sensitive statement for the author because since his early years of undergraduate and graduate study he has had a continuous and varied involvement in the industrial arts profession.

Signals from the profession took on many forms during the early years of 1947-1955. There were those who were searching for new directions and whose principal contributions were largely related to developing an outlook receptive to change. Others were spending their time looking for "tested projects" and locating the "tried and true" so that some stability (and perhaps some rigidity) and some predictability could be established.

Still others were persistently waging the battle on the vocational and general education values of industrial arts. Another group in the profession always seemed to interject the issue that industrial arts was the "dumping grounds" for the slow learner.

Additional signals from the profession came from a group of articulate leaders who engineered the breakaway from the trade and job analysis approach towards a greater concern for the student and towards the contemporary industrial technological society.

Each of these groups played a part in the formulation of ideas and concerns that would contribute to the concepts undergirding The Maryland Plan. Such groups in their signals provided a backdrop of questions to be answered, challenges to be met, and, in some degree, a sense of urgency for change.

The professional literature in the late 1940's and early 1950's reflected the mood of the previously identified groups. The textbooks, dominated by projects and project making, sold fairly well. The demonstration as a teaching method dominated the delivery system.

The profession also had considerable difficulty in defining industrial arts. This lack of an accepted definition permitted varied interpretations in programs, emphases, goals, and levels of activity. However, new ideas and different forms of teaching industrial arts were permitted a hearing at the national meetings. National meetings provided, too, a springboard for words of encouragement and an urging to move ahead with developments. On the other hand, there were always those that would be quick to indicate that "it will not work" or "it will not work in my school."

However, the development of the elements of The Maryland Plan was achieved through an additional form of professional influence. It was a technique used by the author in "checking out the system" in the early stages of development.

Essentially this system involved identifying a number of leaders in selected educational areas and using these people as sounding boards for ideas and proposals related to industrial arts.

The selected group included outstanding people from industrial arts (R. Lee Hornbake and James J. Hammond), human growth and development (Walter Waetjen), curriculum development (Vernon E. Anderson), and elementary education (Alvin Schindler). These leaders were selected for their deep insights into education and the objectivity of their commentary. All contacts and discussions with them were on an informal basis, but there was a great deal of sensitivity regarding what these experts said about the proposals and projected ideas for change presented by the author.

Another important element of professional influence was the development of a number of other plans generated in the 1960's. This influence grew out of the enthusiasm of the members in the American Industrial Arts Association (AIAA) and the programming for the national meetings. The period of the 1960's was a renaissance era for the profession with considerable enthusiasm for innovation and experimentation with program models. Credit must also be extended to the leadership in the AIAA national office for aggressiveness and enthusiasm during that period.

The 1960's was a period of many ideas, many different programs, and considerable ferment in the profession. The excitement at the AIAA national conventions was indicative that something was happening. Journal articles and national convention proceedings gave testimony to this generation of ideas. This same era witnessed the industrial arts profession involved in the National Defense Education Act (NDEA) Institutes that have had a lasting impact.

IDENTIFICATION OF CONCERNS AND LIMITATIONS

The concerns and, to some extent, the limitations regarding the nature of industrial arts programs stemmed from the interactions with the profession and the challenge of thought-provoking graduate studies. Another very important source of concerns and limitations was the heavy involvement that the author maintained with the junior and senior high school teachers and the close working relations developed with them.

Concerns about the Profession

A number of concerns stimulated action and a sense of urgency in the author to move out in what might have been termed some new directions in industrial arts. These concerns were generated during the period prior to and during the early stages of incubation for The Maryland Plan.

There was an over-emphasis on the materialistic elements – projects, processes, and materials – with a very minor concern for the individual. Teaching processes were dominated by the teacher, and what was learned was limited largely to what the teacher knew or could demonstrate. Instruction was centered for the most part around the individual project, with little or no evidence of group projects, research and experimentation, or group processes.

The interpretation of industry was related to that typical of the pre-industrial revolution period when the individual craftsman (cabinetmaker, silversmith, weaver, or blacksmith) worked alone in the confines of his home or private workshop. Little attention was given to the statement of goals in either the program design, program operation, or the evaluations associated with the program.

There was a dramatic drop in enrollment at the ninth grade level in those schools where industrial arts was no longer a required subject. There was little or no evidence that the teachers or program developers were sensitive to or knowledgeable of the developmental growth characteristics of the early adolescent or the adolescent student.

The program for the most part was centered around individual craft activities with an emphasis on squared surfaces, precise measurements, spotless finishes, and good joints.

Although it was obvious that new materials and processes were beginning to assume major roles in the manufacturing and processing industries, the program continued to be dominated by woods, limited metals, printing, drawing, and electricity, with relatively conservative applications. America was moving into a post-industrial era and into a period of greatly accelerated change (social, technological, economic, political), yet there was no evidence to indicate that the profession had taken cognizance of that change in concern for the student's ability to learn how to learn, solve problems, adapt to change, search for new solutions, and strengthen his/her resourcefulness. The nature of industrial and business organizations was undergoing change, and the emphasis on automation was widespread. The movement towards large organizations of people and the increase in team efforts in both research and manufacturing, as well as construction, was quite obvious. These elements were not prevalent in the programs of that period.

Another vital area of concern was that of teacher education and how it too had failed to reflect a sensitivity to many of the previously stated concerns.

There were many other concerns that called for action and heightened the sense of urgency to do something that would more nearly reflect the world and make greater and more effective use of what was known about human growth and development, learning theory, industrial and social organization, and technological change.

Limitations as Related to Program Changes

There were a few limitations that seemed to impose themselves on the profession in its efforts to contemporize its programs and its directions. Industrial arts was striving hard to find some means for achieving acceptance in the larger educational fraternity dominated by social studies, mathematics, science, and literature. There was very little financial support for industrial arts program development until it became a part of the NDEA program.

Limitations were posed by the location of the industrial arts facilities in a remote part of the school structure, or even detached from it. A severe limitation was the lack of total school cooperative efforts in program building. This was perpetuated by a highly departmentalized form of school organization. Perhaps the most severe of all limitations was that of foresight. The industrial arts profession had not grasped the scope and dimensions of its potential for assisting young people in their growth and development towards productive, effective citizenship in a society so abundantly influenced by industry and technology.

IDENTIFICATION OF PROBLEMS ENCOUNTERED

The problems associated with the development of The Maryland Plan were in some degree related to how the plan was developed. The early phases of what was to be called The Maryland Plan began as a series of program innovations that were to win early acclaim. The first was the *group project* approach to the study of basic industries in 1948. This approach to industrial arts grew out of a close examination of the nature of contemporary industry and its many organizational dimensions. Also, the author's interest in the group project approach was sharpened by observing a highly successful group project in an elementary school at Fitchburg, Massachusetts.

The *research and experimentation* (R & E) component was developed with a group of graduate students during the summer of 1952. This was followed within a year (1953) by the *anthropological unit* study of selected areas of technological developments and their contribution to the growth of civilization. The *contemporary units of study* component and the *line production* component were initiated and given broad-based field testing two years later (1955).

The development of an innovative component was first carried out in the teacher education classes taught by the author. This initiation at the teacher education level provided insights into such problems as class organization, instructional program interface, management requirements, student and teacher involvement, resources, and teaching strategies. Initiation at the teacher education level also permitted the author a certain level of experience with the innovation so that guidelines for the public school teachers could be developed.

The next phase in the process of developing each of the components was to try them out with a selected public school teacher who could and would handle the new or different thrust in industrial arts. A major problem centered around the introduction of the R & E component into the public schools program. It took seven years (1952-1959) before the author was able to get a teacher to attempt the R & E program on a trial venture. The reluctance on the part of teachers to attempt such a program was attributed to the vast difference in concept and the changed role of the teacher. However, once the great teacher Alan Keeny at Montgomery Hills Junior High School (Silver Spring, Maryland) decided to take on the program, a major battle was won, and the program was established as a very successful venture.

The unit, group project, and line production components posed only minor obstacles in getting teachers to try them since some of the teachers out in the field had already experienced them in their laboratory classes at the University of Maryland.

The Maryland Plan resulted when a total junior high school program was structured for grades 7, 8, and 9. This was a program design that took into account the content of industry and technology. The structure was evolutionary in nature, moving from the early developments in technology at the seventh grade level into the study of contemporary industry in grades eight and nine. A later development at the senior high school level was a futuristic program dealing with the application of technology in the solution of human problems. The principal thrust of the senior high school program centered around a number of problem areas facing mankind. These included energy development, transportation, housing, trash and waste disposal, communications, and resource utilization. The program is intended to enable the student to examine and evaluate alternative technological solutions to each of the problem areas. The methodology involved in this program includes the unit, group project, research and experimentation, and a school-community interface.

Curricular

The curricular problems involved in the development of The Maryland Plan were the following:

1. There was a need for a different kind of literature, textbooks, and reading material.
2. There were new roles to be played by both the students and the teacher.
3. It became evident that a laboratory was necessary to operate the program. Later, it was determined the program was most effective in a general laboratory setting.
4. There was a need to make greater use of the community and a wide variety of new resources.
5. The teacher had to develop skills in different instructional strategies such as the seminar, role-playing, independent study, conferences, group projects, problem solving, and inquiry.
6. The teacher had to develop a better knowledge of the organization, management, and the financial structure of industry.

Administrative

The administrative problems appeared in two different categories – those related to the school administration, and those associated with the teacher's administration of the program.

The school administration problems were the following:

1. The students needed the use of the school phones to make contacts in the community for information and assistance.
2. Release from school was requested on certain occasions for particular areas of study.
3. New instructional resources were required.
4. Developing an understanding of the new program was a problem with some administrators.
5. A few problems resulted from equipment needs, especially with the R & E program.

The teacher administration problems were related to the management of the program and included the following:

1. The requisition of supplies and materials became a problem since there were no standard projects for all students.
2. The teacher's having to shift in his role from a dispenser of information to that of a manager of education created a problem for some.
3. The fact that in most instances each student would be working on something different created an instructional management problem.
4. The program required a greater degree of coordination with other subject fields in the school.
5. The program dictated that school and community librarians needed to play a more prominent role in the industrial arts program.
6. Some rearrangement of laboratories to provide the necessary kinds of environment was needed in certain types of facilities.

Philosophical

The philosophical problems were related to perceptions regarding the role and function of industrial arts, underestimating the abilities of youngsters, skill-training versus a broad general education, and varying concepts of the role of the teacher. Some specific problems were identified:

1. The program required a departure from previous professional training and background on the part of many teachers.
2. There was a tendency on the part of teachers to underestimate the capabilities of the students.
3. There was a shift from a concentration on limited skill development to a broad general education approach to the study of industry and technology.
4. The changed role of the teacher was a philosophical issue for some.
5. A component like research and experimentation as a part of industrial arts raised certain philosophical problems with respect to one's perception of contemporary industry and the extent to which industrial arts should depart from the mere "making" function.
6. Perhaps the greatest philosophical problem was that of putting the emphasis on the student with all other activities (including the making of projects) being subservient to the "building of people" concept.
7. Another philosophical problem centered around the issue of strengthening the students' social and communication skills as well as their ability to calculate.

Most of the problems were rather easily resolved once the teacher completed a planned practicum workshop or inservice class. The problems with the principal or administrator were the easiest to resolve and required just an opportunity to communicate the idea. They became one of the most receptive groups in addition to the parents.

PARTICIPANTS IN THE DEVELOPMENT OF THE MARYLAND PLAN

The development of the program involved a number of people or groups of people functioning at different stages in the program's evolution. As previously stated, The Maryland Plan evolved from a successive series of innovative thrusts that extended over a period of seven years (1948-1955) for the junior high school program and another twelve years (1967) for the inclusion of the senior high school program. At no time was there a project director and/or a formal group of professional persons pursuing the development of The Maryland Plan. It was always an informal arrangement with colleagues, associates, teachers, and supervisors in the field in addition to a cadre of experts that the author would call upon for a sounding of ideas.

In order to be more specific about the participants and their responsibilities the following listing is presented.

1. The *author* was identifying, exploring, designing, and projecting program elements or components, and at times designing methods of dealing with the content and purposes to be achieved. This role also was one of a communicator, persuader, encourager, facilitator, and guide when dealing with students, teachers, supervisors, and administrators. His role was also that of a listener and evaluator when dealing with the cadre of experts.
2. The *students* in the author's classes at the University of Maryland served as the original test group on all components of the plan. They contributed enormously by their performance as well as by their criticisms and suggestions.
3. The author's *colleagues* on the faculty and staff at the University of Maryland assisted in many ways, such as helpers, advisors, facilitators, and, at times, comforters.
4. The *cadre of experts* was a group of recognized leaders in such fields as industrial arts, curriculum, human growth and development, elementary education, and the national education picture. They were interested in the work being done by the author, and they felt free to discuss the merit or lack of merit in various proposals.
5. The *teachers* in the public schools, and particularly those involved in the initial tryout periods, made significant contributions in the development of the program.
6. The local *supervisors* of industrial arts helped locate teachers and schools in which the new elements or components could be field tested. This group was frequently the one that "opened the doors" in enabling the author to gain entry in a school. The supervisors also were very helpful in providing advice, suggestions, and feedback on the operation of a particular component. They also were extremely helpful in arranging for inservice workshops to promote the spread of the program in their counties.

DESCRIPTION OF DEVELOPMENTAL SESSIONS

There were no formal developmental sessions for The Maryland Plan. This was the case because of the evolutionary nature of the development and, secondly, because it was not a project that had to meet a deadline set with or by a funding agent.

There were frequent discussions on an informal basis with the author's advisor at the University of Maryland, as well as with colleagues, teachers, and supervisors in the field. The informal contacts with the cadre of experts was also on an informal basis.

Some informal conferences with a colleague, a teacher, or a supervisor might last the time of a brief telephone call, or they could run into hours. More formal conferences were usually held with teachers in the field who were about to pilot a particular component. Also, formal conferences were held with the teachers and at times with the principal and supervisor when a component was in the process of being tested in the public school setting.

FUNDING

The development of The Maryland Plan was initiated out of a personal challenge to put educational theory and philosophy into reality. At no point along the way was there any effort to get funds for developmental purposes. The author, as a member of a large university, took seriously the charge of leadership that is normally required of such an institution.

All of the developmental work by the author and any assistance from his university colleagues was done above and beyond the normal load of teaching and advising assigned to such persons. However, it is fair to say that the resources of the university (people, libraries, and laboratories) were available for use and assistance. Also, considerable encouragement was given by those in leadership positions as they became more and more informed of the work.

Influence on Decision Making Process

The advantages of a nonfunded curriculum development effort are very important and have a significant impact on the outcomes. The values of this nonfunded position in a curriculum and/or program development effort were identified as the following:

1. The goals, objectives, and processes remained the prerogative of the developer without any outside intervention.
2. The philosophical direction and content involvement were not subject to approval by an outside funding agency or organization.
3. There were no deadlines to be met or obligations to a funding agent to come up with a program to meet with expectations of that agent.

4. The freedom to move in and out of a program development effort made work a self-controlled activity and permitted one the opportunity to work at a rate and pace related to those periods and occasions of most productive effort.
5. The unhurried nature of the work permitted weeks, months, or even years to deal with those elements that needed time, prolonged observation, and careful study.
6. The pursuit of a program development effort without the interjection of an external bias was a luxury to one who values the great privilege of freedom to pursue his own aspirations, philosophical bent, and challenges.

END PRODUCT — THE MARYLAND PLAN

The end product of an extensive program development effort such as that involved in The Maryland Plan is at best a *suggested framework* for structuring learning experiences in relation to a dynamic content and, more importantly, towards the accomplishing of goals contributing to the growth and development of people. It is a *program guide* with many opportunities for the students and the teachers to make decisions and use their creative talents in embellishing the framework established for the three grade levels. As a guide it provided suggested direction and areas of involvement for each grade level without specifically telling the teacher or the students the precise activities in which they are to engage, the specific skills to develop, or the information to learn.

An important element in The Maryland Plan is the incorporation of selected teaching strategies that are interfaced with the rich and dynamic content. However, the principal outcome has been the persistent effort to arrive at an educational design that would reach all students and maintain their development and fulfillment as the center of all activity.

Rationale

The original effort was directed towards the development of program elements or components, such as the group project approach to the study of basic industries, research and experimentation, anthropological units, line production, contemporary units, and futuristic elements. The actual structuring of these components into a junior or senior high school program was a second phase development with its own logic or rationale.

The rationale for the early developments and innovations that have been identified as components took on many forms. It was an attempt to develop learning activities and experiences that would be consistent with widely accepted theories of learning. The program components were designed to facilitate the growth and development of youth in relation to the specific tasks facing each in the maturation process.

The content and experiential elements of the program grew out of a thorough examination of the contemporary society and the needs of people living in it. The content, activities, and instructional strategies were integrated into a working plan with a strong concern for individual differences in abilities, interests, motivations, goals, and ambitions of the students to be served. The program has a place in it at each grade level for students of all levels of ability.

The program in its study of industry and technology extends over the periods of past, present, and future in the scope of its content. It makes effective use of a variety of instructional strategies geared to the nature of the learner as well as to the content and the goals to be achieved. The program was based upon recognized curriculum trends as indicated by national studies. Finally, the program components were designed and implemented with a faith in the intelligence of students and teachers and in the acceptance of the idea that the teachers and students were capable of making decisions related to the pursuit of a rich educational experience.

The total program which involved the formulation of a three-year sequence at the junior high level was based on the following points of rationale. The Maryland Plan provided an orderly experience in the study of industry and technology as it moved through the anthropological, the present, and the futuristic elements. It was an attempt to sequence the educational experiences of youth on the basis of human needs, the evolution of the content base, and a sequence of broad skill and information reinforcement. The Maryland Plan provided a rich opportunity to integrate the industrial arts program with the other studies in which the student was involved.

Years before the national emphasis, The Maryland Plan provided a strong emphasis on career education and the exploration of self (student), and the plan was designed to function in the comprehensive general laboratory.

Objectives

The Maryland Plan, with its built-in flexibility and the freedom the teacher has to modify its operation, may have many different sets of objectives depending upon schedules, policies in the system, the teachers, and the students. These are some common objectives that the author has established for the program.

General objectives of a personal development nature include developing an understanding of self on the part of each student; developing skills in the areas of social interaction, leadership, followership, and group dynamics; developing skills in the areas of learning to learn, problem solving, inquiring, creating, communicating, and the effective utilization of informational resources; developing basic skills in the areas of communicating and calculating; and developing manual-mental skills related to the planning, designing, and constructing of items with tools, materials, and processes.

General objectives related to industry and technology include developing an understanding of the contributions of industry and technology to the growth and development of civilization; developing an understanding of the organization, products, and processes of industry; and developing understandings regarding the problems and contributions of industry and technology.

General objectives related to the quality of living include developing understandings in the broad area of career education; developing understandings in the area of consumer literacy and consumer effectiveness; developing habits and understandings in the broad area of safety; developing an appreciation of American industry, its financing, productivity, environmental impact, and contributions to the standard of living; and developing an understanding of the growth, function, and significance of labor on contemporary industry.

Outcomes

The outcomes of this program development effort are very much related to the individual and what each may see in the program. The following statements describe what the author views as outcomes.

1. It provides a logical sequence of study over grades 7, 8, and 9.
2. It allows for a great deal of student and teacher initiative, decision making, and flexibility.
3. It places primary emphasis on the developing of people.
4. It provides for a wide range of student abilities, interests, motivations, and involvement at each of the grade levels.
5. It provides the student with considerable freedom of choice in activities, content involvement, roles to play, and things to do.
6. It is based upon the developmental tasks of youth.
7. It provides firsthand experiences in learning to learn, leading, following, decision-making, role involvement, communicating, and relating to others.
8. It moves the teacher away from the role of dispenser of information to that of a manager of educational processes.
9. It centers around the individuality of each student.
10. It makes extensive use of the total school as well as the immediate and expanded community.
11. It deals with rich and relevant content.
12. It permits the individual student to enter at any of the three levels without having to experience any earlier level.

13. It requires a teacher with an understanding of a broad range of teaching procedures: seminar, conference, problem solving, inquiry, discovery, as well as the unit approach and group process strategies.
14. It requires teachers with faith in the intelligence of youth.
15. It has no set content for every student.
16. It encourages the integration of subject matter.
17. It promotes the development of communicating and calculating.
18. It requires teachers who are willing and able to provide the student with opportunities to lead, solve problems, and make decisions.

PRESENT STATUS

The Maryland Plan continues to undergo refinement and development. A number of important activities are presented to illustrate what has been happening over the past five years. The challenge of developing a program that would take the best that was known about learning theory, curriculum trends, developmental psychology, societal needs of people, and the rich content of industry and technology was a challenge that was met and, by practically every measure, fulfilled. In this regard, the author has provided the profession with another viable program that it may choose to use in carrying on its business. There is no expectation that this program be used by every teacher. It is one more from which a teacher may select, and if that selection is another program of a different design, all that can be asked is that the different selection be in the direction of a better program.

Continuing activities associated with The Maryland Plan include conducting workshops for teachers in and out of the State of Maryland, and meeting requests for information from teachers and students in all parts of the country.

A major effort is currently underway to provide a variety of resource publications that have proven useful to the teacher in the field. Such publications include the following items.

1. *All You Wanted to Know About the Anthropological Unit Approach to Teaching Industrial Arts,* a product of teachers involved in "The Maryland Plan." Edited by Karl E. Gettle.
2. *A Resource Guide for The Maryland Plan's Group Project and Line Production,* by Gerald F. Day.
3. *The Maryland Plan — Purposes, Objectives, and Observable Behaviors.* Edited by Thomas Winters from material developed by Thomas Regimbal, Edward Roberts, and Jack Wescott.
4. *Resource Guide for Teachers Using The Maryland Plan's Anthropological Unit,* by William C. Bomely. (Specifically useful in the greater Baltimore-Washington area).

Five sound motion picture films have been developed on components of The Maryland Plan. These include the following:

1. *Research and Experimentation,* 16 mm, sound, black and white, 26 minutes
2. *The Seminar,* 16mm, sound, black and white, 28 minutes
3. *The Group Project,* 16mm, sound, color, 28 minutes
4. *Tomorrow Begins Yesterday,* 16mm, sound, color, 29 minutes
5. *Gift of the Future,* 16mm, sound, color, 28.5 minutes

There are a number of other items such as articles, pamphlets, speeches, that are used to describe elements of the program. The book *The Maryland Plan—The Study of Industry and Technology in the Junior High School* (Benzinger, Bruce & Glencoe, Inc., 1973) is a complete description of the junior high school program. A significant addition (1968) has been the extension of the program into the senior high school with the emphasis on "The Application of Technology in the Solution of Major Problems Facing Man in the Future."

A very important research and evaluation effort has been accomplished through three doctoral dissertations that examined certain aspects and qualities of The Maryland Plan. These three dissertations are as follows: Karl E. Gettle, "The Determination and Comparison of the Teacher's Verbal Behavior Involved in the Traditional and Maryland Plan Approaches of Teaching Industrial Arts in Selected Eighth Grade Classes of Montgomery County, Maryland During the School Year 1969-70;" Carroll Smith, "An Application of the Aschner-Gallagher Classification System to the Behavior of Selected Seventh Grade "Maryland Plan" Industrial Arts Classes;" Thomas Wright, "A Description of the Patterned Processes of Verbal Interaction that Characterized Selected Seventh Grade "Maryland Plan" Industrial Arts Classrooms."

FUTURE DIRECTIONS AND EXPECTATIONS

The present plans call for a continuation of the workshops for teachers and the development of additional items that will be useful to teachers in the field. The production of teacher materials will be done through the cooperative efforts of practitioners in the field. Appropriate doctoral studies dealing with evaluation and theory relationships are strong possibilities for the future.

Currently a great deal of effort is being extended in the development of an effective publication for the senior high school program. This is being planned in cooperation with Kendall Starkweather who has made good contributions to the literature on industrial arts and the future.

There are several other publications planned as support materials for The Maryland Plan, and they include one that will present the strengths of the plan with respect to the career education movement. Another important publication would provide an overview of the part that The Maryland Plan can play in the area of education for the "special needs" students. A third addition to the present materials will be an up-dated and expanded bibliography of books, pamphlets, and resource materials for the program.

Further study, investigation, and analysis will be conducted in the very sensitive area of developmental tasks and growth characteristics of the students in relation to the kinds of activities that may be most effective in such personal development. It also is anticipated that a greater use will be made of video cassettes and educational media in association with the independent study elements of the program.

One would be remiss not to recognize several persons for the significant role they played in the development of The Maryland Plan. These persons include Karl E. Gettle, James Rokusek, Alan Brown, George Haney, Lane Knox, Otis C. White, William Feddeman, Paul Skellchock, Kendall Starkweather, Harley Smith, John Maley, Donald Wilson, George Hitchkock, Hal Mehrens, Donald Smith, Thomas Wright, Carroll Smith, R. Lee Hornbake, James J. Hammond, Vernon E. Anderson, Alvin Schindler, Kenneth Hovet, Walter Waetjen, and Wayne O. Reid.

THE DEVELOPMENT OF THE INDUSTRIAL ARTS CURRICULUM PROJECT

The origins of the Industrial Arts Curriculum Project (IACP) would be difficult to determine. Certainly there was no one dramatic, germinative action that can be cited. The need for a major curriculum research and development project was felt by many individuals in the industrial arts profession for some years, perhaps for decades.

In the early 1960's, personnel from the University of Illinois (U of I) flew to an informal, day-long meeting with The Ohio State University (OSU) personnel in Columbus. An IACP-like effort was discussed. Even before this, however, a number of informal discussions were conducted at various meetings. Roy Anderson, then associate superintendent for the Cincinnati Public Schools, also figured in early discussions. He had clearly communicated his interest in improving industrial arts instruction to OSU personnel. His interest helped cause the early discussions and meetings. Also, he followed and assisted the project throughout its development. In the years 1962-1964 two of the principals in these early meetings were outside the U.S.A., and further meetings were not held.

In 1963, a revolutionary vocational education act was passed, the Vocational Education Act, and it had in it a provision (section 4-C) to promote the development of exemplary programs. While industrial arts was unmentioned by name, the language was broad enough not to specifically eliminate it from inclusion within the provisions.

This availability of a potential funding source, along with another meeting in Columbus in the fall of 1964, led to the delineation of the general dimensions of a proposed project and the assignment of specific writing responsibilities for a research and development proposal. Drafts were reviewed and integrated in Chicago, in November of 1964, and the original proposal was completed the following month. The proposal was drafted by Donald G. Lux, Willis E. Ray, Jacob Stern, and Edward R. Towers while Rupert Evans and David Clark provided advice and encouragement. The proposed project was funded and work began in June, 1965.

The IACP evolved from the need to provide more relevant educational experiences with the technological practices used by people to satisfy their material needs and desires. The project was headquartered at OSU, funded by the United States Office of Education (USOE), and administered by the OSU Research Foundation (OSURF). Staff from the U of I and numerous public school systems assisted with the research, development, evaluation, and dissemination of the instructional system. Representatives from business, industry, and substantive specialists from the academic community also provided professional assistance.

The major product of the first 18-month segment of the IACP was the formulation and refinement of "A Rationale and Structure for Industrial Arts Subject Matter" by Edward R. Towers, Donald G. Lux, and Willis E. Ray (available through ERIC). The Generalized Model of Industrial Technology presented in that volume was not construed as the ultimate or definitive structure for the body of knowledge from which industrial arts subject matter could be selected. It did, however, represent the most advanced and most promising construct that the project staff was able to conceive.

The ultimate products were two comprehensive instructional systems. Each supported a year-long course of instruction in industrial technology. *The World of Construction* was the name given to the first course while the second course was named *The World of Manufacturing*. Both instructional systems are available from McKnight Publishing Company.

STAFF PHILOSOPHY

The previously-mentioned persons, who wrote the project proposal, became the initial principal investigators. Each had previously been active in curriculum innovation, and three of the four came from different philosophical backgrounds, by way of their advanced graduate study. All were dissatisfied with current industrial arts, and all felt a growing uneasiness within the broader profession as well.

There were marked differences in how the investigators viewed the problem and its solution. It was apparent from the outset that some new, powerful, logical basis for program must be sought. The rationale must be strong enough to overwhelm long-standing individual biases and differences and to unify and direct the staff.

Industrial arts education, by its very name, is a study of industry. With this accepted as a postulate, it followed that the fundamental question to be answered was, "What is industry?" In addition, it was necessary to answer another question: "Does industry have a body of knowledge?" This latter question led the IACP staff to the most fundamental question of all: "Into what divisions might total knowledge be categorized?"

Attempts to classify or categorize the vast body of accumulated and recorded knowledge are difficult, since there is controversy as to the nature of knowledge and because knowledge is always in a state of development. Knowledge may be conceptualized and ordered into four domains or classes as shown in Fig. 7-1.

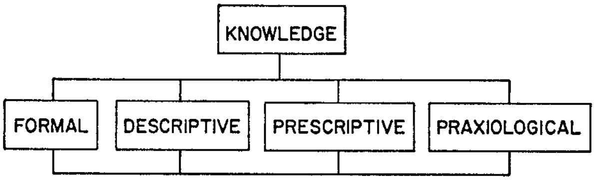

Fig. 7-1. The Four Domains of Knowledge

The first domain is *formal knowledge.* The established disciplines within formal knowledge serve as tools used to order all knowledge and, therefore, could be abstracted out as form or arrangement (syntactics). Logic, mathematics, and linguistics are examples of such fundamental disciplines.

The second domain is *descriptive knowledge.* The key term that may be used to identify descriptive knowledge is "sciences." The sciences seek and establish facts about phenomena and events and describe their interrelationships. All of the disciplines that comprise the physical sciences, the biological sciences, and the social sciences represent descriptive knowledge.

The third domain of knowledge may be termed *prescriptive knowledge.* Disciplines within the humanities and fine arts seek to provide a system (or systems) of values – judgments as to whether phenomena or events ought to be – whether true and/or good and/or beautiful.

The fourth domain of knowledge, rarely recognized, is *praxiological knowledge.* In the secondary school, courses in the practical arts and vocational education attempt to organize such knowledge. This domain is represented in higher education by the various professional schools and departments. Among them are medicine, law, engineering, management, marketing, education, dentistry, dairy technology, and pharmacy. These so-called applied or derived fields of knowledge draw upon the formal, descriptive, and prescriptive domains as necessary, but these traditional domains provide insufficient background for full status in the practicing professions. Practice (or internship), *per se,* is necessary also for proper training; but, as with formal, descriptive, and prescriptive knowledge, it also is not sufficient. These disciplines demand a clinical or professional body of subject matter. This body of knowledge is termed *theory of practice, knowledge of practice,* or *praxiology* – ways of doing which bring about what is valued or what ought to be, through action.

The term "praxiology" comes from the Greek "praxis" meaning *to do,* or the practice of an art, science, or technical occupation. The suffix "ology," connoting a science or branch of knowledge, completes the full meaning: the knowledge of practices.

Praxiology may be equated with technology only if one of the least common of several meanings of the latter word is used. Technology may be taken to mean "hardware," technics of operating hardware, a combination of the preceding, or "the science of the application of knowledge to practical purposes." Only in the latter instance is technology synonymous with praxiology. Thus, it may be necessary to use the term praxiology rather than technology if the goal is to communicate precisely. Because technology has many meanings, the term "praxiology" serves better to convey a single meaning.

However, because the term "technology" has gained significant acceptance in industrial arts and in general literature, and because there is common usage of it, technology as it may be equated with praxiology was used by IACP.

Within the economic institution *industry* may be conceived as being the institutional element that substantially changes the form of materials to satisfy human material wants. Industry essentially includes construction and manufacturing. While agriculture and mining also are engaged in material production, they do not essentially change the form of the materials produced. For this reason, they may be designated genetic or extractive material production.

In order to conceptualize the body of knowledge contained in industrial technology, a matrix approach was devised. The first order matrix of industrial technology indicated that industrial management practices combined with industrial production practices yield industrial material goods and affect humans and materials. Subsequently, more specific matrixes separately categorized those practices primarily affecting humans and those primarily affecting materials.

The IACP is often cited (and sometimes indicted) as a subject-centered program. More informed students have investigated beyond some brief descriptions of the early efforts to identify the subject matter referent. Thorough investigators have found that IACP was as much or even more concerned with the other curriculum referents of society and the learner as with technology.

If students were interested in learning about industrial technology, it was thought to be essential that both they and the teacher be in general agreement on what it is. Having settled that, authoritatively, the whole developmental process became student centered. What could motivate students, what learning did society think to be of worth, what would challenge students, and what could be most efficiently and effectively taught and learned became controlling concerns. As one reads on, it might be well to note how the *several* curriculum referents had their impact on IACP.

PROFESSIONAL INFLUENCE

Quite obviously, since the IACP philosophy provided a new basis for program, little existing literature had relevance. Most particularly, the centrality of construction technology was a new departure. Its significance can be checked by looking at the environment. But it remained for IACP to move the study of construction into a program position appropriate to its socio-economic significance.

A task force with members drawn from such substantive areas of industry as industrial design, industrial engineering, civil engineering, mechanical engineering, electrical engineering, aeronautical engineering, metallurgical engineering, industrial psychology, labor economics, and industrial organization and management was assembled to review the rationale and structure draft document. Then, the project staff prepared a revised draft of the paper entitled, "A Rationale and Structure for Industrial Arts Subject Matter." This draft, together with a detailed opinionnaire, was sent to approximately 100 leaders in education, e.g., state and local supervisors, school administrators, teacher educators, and selected teachers. Revised according to suggestions from the review, the paper was duplicated and distributed more broadly. Dissemination lectures were held at about 20 selected colleges and universities. Written audience evaluation forms were obtained at the close of each lecture. Feedback from these lectures and evaluation sessions assisted the project staff in assessing the acceptability of the rationale and structure. In summary, it can be stated that there was widespread, strongly favorable acceptance of the IACP rationale and structured body of knowledge.

IDENTIFICATION OF CONCERNS AND LIMITATIONS

The development of any new program naturally causes a number of apprehensions for the principal investigators. The development of the IACP was no exception. While there were numerous small and at times inconsequential ones, the paragraphs below identify the major concerns and limitations that the IACP staff addressed.

The staff first developed a comprehensive rationale and then tested its professional acceptance. Once they were reassured of a good foundation, the staff moved to program development.

The next staff concern was where to focus its attention, elementary or secondary levels. This was resolved in favor of the lower secondary level because most of the industrial arts enrollments could be found at that level.

Other concerns were with regard to how to amass adequate expertise to staff a major project, how to assure acceptability of project products, how to get the industrial arts profession to accept change, and how to assure project completion.

Because a project of such scope required much human energy, the developers decided to make it a joint OSU/U of I effort. While the coordination was never adequately worked out, the joint effort did help in the first and second years to quickly assemble adequate numbers of people.

In order to promote acceptability, efforts were made to disassociate the project from an individual, an institution, or even a state. Especially with regard to widespread evaluation and demonstration center participation, this was successful.

The fact that major school systems in a representative sampling of states assigned eight faculty per system to the venture suggests that the profession indeed was ready for change. Much later, after the tested materials were made commercially available, the fact that more than 100 colleges and universities cooperated in preparing teachers to use the instructional systems also supports the conclusion that the profession was ready for change.

The most serious concern was how to reassure all parties that continuation to completion could be assured. When annual funding was a condition all had to accept, some would inevitably reject participation simply because they could not justify changing over to a program without knowing with some certainty that it could continue. This is an inevitable and unsolvable problem with long-term, annually-funded projects.

Major limitations were: annual funding, the lack of adequate funding to support such necessities as single concept movies and alternate activities, the inability to use small schools and school systems because they could not produce a significant volume of feedback within the cost limitations, the inability to focus on foundational programs for elementary grades and continuation programs for the senior high school, and the rush mandated by working a complete revision for the following year, year by year, thereby leaving little time for experimentation and development with regard to needed revisions.

IDENTIFICATION OF PROBLEMS ENCOUNTERED

There were several problems encountered during the development of the IACP. These may be classified as curricular, administrative, and philosophical. Each provided great challenges to the project staff.

Curricular

The obstacles to developing a new program of industrial arts were identified as:

1. Failure of the profession to develop a fundamental structure of the field. (In one system industrial arts was drafting, metalworking, and woodworking. In another it was crafts, photography, and auto mechanics. This continued *ad nauseam.* No contemporary core structure was discernible.)
2. Absence of textbooks and other instructional materials. (Almost all texts were trade-oriented. Instructional systems were unavailable.)
3. Lack of appropriate laboratory facilities and equipment. (Laboratories were filled with workbenches and trade-related tools and equipment. Flexible, industry-like laboratories were the exception.)
4. Scarcity of research and demonstration projects. (Probably because of the lack of funding sources, curriculum development was mostly an off-duty, individually-undertaken task.)
5. Outmoded teacher education programs. (Teacher education then as now largely prepared tradesmen-teachers. These teachers possessed inadequate backgrounds in industrial technology.)

These obstacles to curriculum improvement called for a comprehensive project that would rigorously define content, develop a package of teaching materials, and organize improved teacher education programs.

As the project staff proceeded, they encountered a number of problems. Prominent among them were:

1. Many industrial arts teachers like a relaxed, informal instructional organization. Many provide a little organized instruction in the opening months of school and complete the year with project construction assignments. Systematic, organized, integrated, yearlong study of cognitive materials via regular textbook reading was a foreign, and therefore difficult to promote, innovation.
2. While industrial activities in the real world are mainly group-based and highly interdependent, most industrial arts activities still are almost wholly individualized or patterned after the handicraft or pre-industrial era. In the face of this, group based instruction and curriculum design often were difficult to promote.
3. Many school personnel do not deem industrial arts to be essential liberal education worthy of significant program time. And, perhaps, it often is not. Adequately structured and taught, it can be, but this was difficult to promote, especially where there was little notion of what "comprehensive industrial arts" means.

Administrative

While there was some trauma created by personnel turnover and delays in getting annual funding approvals, the project administration encountered few problems. Much of this can be attributed to a strong and experienced OSURF staff that rendered continued and adequate administrative support in fiscal and contract matters, copyright counsel, report preparation and duplication, etc.

Government contracting procedures, in the era of the project, left much to be desired. In no instance were funds in hand at the beginning of a fiscal year. Often, the research foundation expended tens of thousands of dollars on an informal promise of agreements to come. If the project staff had had to wait for formal approvals, schools sometimes would have opened in evaluation centers without the complete instructional materials needed to teach.

Most of the project staff shared a common and strong professional dedication. Without this, the intense work load and tight, inflexible schedules could have stalled and/or terminated the project.

In the field, school administrators, on the average, were more interested in change, than were teachers. This prevented potential liaison problems with field evaluation center schools. In most instances, strong administrative support was found in city and individual school administrative offices.

Philosophical

Given the initial group of four principal investigators, with backgrounds from three quite different schools of thought, either an impasse or an eclectic philosophy might have been predicted as a possible outcome. In view of the preceding description of the project philosophy, it is clear that the impasse was avoided. Each investigator contributed in unique ways, and each compromised personal values and/or biases.

The IACP philosophy cannot be claimed as a personal one by any one person. This may account for its having been as widely accepted as it has. The project staff accepted logical argument, in the positive meaning of the term, as the test of truth. In the process, a new and persuasive program rationale evolved.

PARTICIPANTS IN THE DEVELOPMENT OF THE IACP

Headquarters Staff

The project was headed by Edward R. Towers from its inception in 1965 through June 30, 1969. Donald G. Lux and Willis E. Ray served as the associate directors during that period. Also, during 1965-66, Jacob Stern was a principal investigator and a member of the project administrative staff from the University of Illinois. He left the project when he moved to Michigan State University in 1966.

An administrative change was made in 1969 to allow Towers to pursue interests outside the university community. On February 14, 1969, a proposal for extension of the IACP was submitted to the USOE under the co-directorship of Lux and Ray. The proposed continuation and extension of the IACP curriculum development activities were approved through August 31, 1971.

The IACP administrative staff included Lux and Ray as co-directors and James J. Buffer, A. Dean Hauenstein, and Henry J. Sredl as associate directors.

Robert E. Blum (Evaluation Specialist, 1967-69) and John D. Jenkins (Dissemination Specialist, 1969-70) also served for relatively short periods of time on the administrative staff. Both were members of the OSU faculty.

Professors Lux and Ray assumed the leadership for managing the general operation of the project. In order to divide project responsibilities, Lux was primarily responsible for the development of "The World of Construction," and Ray for "The World of Manufacturing." Professor Buffer was responsible for the evaluation of the project and its related activities, and Professor Hauenstein coordinated the development of the curriculum materials. Professor Sredl was a director of the Chicago-Evanston Field Evaluation Center and also served as the project liaison at the University of Illinois.

A fair assessment of the project suggests that the management efforts of the project were truly a team effort. Each member of the project administrative staff provided assistance in a wide variety of professional endeavors to help make the IACP instructional system a reality.

National Advisory Committee

A group of leaders from education, business, industry, and labor served as members of the IACP National Advisory Committee to provide guidance and direction regarding policy affecting the project's activities. The members of this committee, at the conclusion of the project, were listed in the project textbooks.

The Advisory Committee had seven formal two-day meetings to consider project problems and strategy. The impact of the committee members was such that it can be fairly said that IACP would have been significantly different without their assistance. To attempt to cite specific examples of their work would slight their role. They were a sounding board for policy, and in many subtle ways they did affect it. They also helped identify consultants, secure funding, and maintain quality and face validity.

Evaluation Advisory Committee

Three nationally known educators agreed to function as advisors for the final evaluation of the IACP. They were: Walter J. Foley of the University of Iowa, J. Thomas Hastings of the University of Illinois, and Daniel L. Stufflebeam of The Ohio State University.

Additional Project Staff (1967-71)

One would be remiss not to mention that 50 graduate students were employed as research associates from 1965 to 1971 to assist with the development and evaluation of the IACP instructional materials. A complete list of these research associates is provided in the acknowledgment sections of the construction and manufacturing textbooks, together with a list of over 100 consultants who served as writers and reviewers of the instructional materials.

Field evaluation of the instructional program was an integral part of product development. It was necessary to select local school systems in various geographical sections of the country and through them recruit industrial arts teachers willing to teach the IACP program as members of the field test center evaluation team. A complete listing of the 50 teachers and the six directors who coordinated evaluation activities in the regional Evaluation Centers is also listed in the textbooks.

Additional headquarters staff included four experienced editors of educational material, three professional artists and designers, a secretarial staff, and numerous undergraduate industrial arts students who produced educational hardware and teaching aids and prepared materials for shipment to Evaluation Centers.

DESCRIPTION OF DEVELOPMENTAL ACTIVITIES

Although the development of course materials for both construction and manufacturing followed a similar process, the development of those for construction only are detailed here.

Instructional Framework Generated for Construction

How to present the body of knowledge was a major question. Various alternatives were examined. Courses could be developed which systematically studied each group of concepts. However, such a study was rejected because it was devoid of particular construction and manufacturing contexts and would not appeal to student interests. Thus, it was decided to develop "a story" of "what leads to what" so that the technologies would emerge in relation to the basic steps or processes of construction and manufacturing. Research of the literature revealed the lack of a comprehensive, generalized story of how construction takes place, from start to finish; instead, it revealed highly specific and detailed elements. It was not known at the time whether or not a common body of practice of construction processes could be identified.

In 1966, three researchers were employed to research and develop a story of construction. One was a doctoral candidate in industrial technology education, and the other two were masters' students in architecture. These researchers analyzed the processes used to construct houses, buildings, roads, dams, bridges, towers, and tunnels. The analysis revealed a pattern of construction practices common to all structures. Care was taken during the analysis to list only concepts of practice (common actions) rather than tools and materials. The concept outline was submitted to a panel of construction experts for a check on validity. Minor modifications were made in the sequence and terminology. A more detailed analysis of the construction process was made, and the results were compiled. This document was presented to the IACP Advisory Committee for review during September, 1966. The document was approved.

Generation of Instructional Materials

A curriculum materials specialist was charged with the supervisory responsibility for (a) establishing a means of controlling production, (b) the design of curriculum materials, (c) the generation of textbook outlines, (d) the generation of workbook questions, (e) creation of laboratory activities and manual, (f) establishment of the teacher's guide, and (g) the coordination of all developmental work, in cooperation with the associate directors of the project.

The first semester software was printed while the hardware was being produced. All software and hardware materials then were packaged according to the requirements of each field evaluation school and shipped for distribution. The plan was to prepare teachers in the use of the first semester materials as soon as they were received from the printer. While the teachers were utilizing the first semester materials in the fall, the project staff was developing and producing the second semester materials to be used in January. Teachers were introduced to second semester materials at a mid-year conference.

These mid-year conferences were held out of necessity, since the teachers had to be oriented to the materials before teaching them. A serendipitous effect was that here, in the revised material, could be seen the results of their evaluation and recommendations for change. The meetings offered positive proof that they were not just going through the motions. Probably no other thing so strengthened the support of these teachers.

Textbook reading outlines. Even though the major conceptual elements of the textbook had been identified at this point, a topical outline had to be generated to conform to the general conditions of the textbook format. Research associates, the curriculum materials specialist, and other staff members generated basic outlines. These outlines were reviewed by the staff and modified in relation to reading length and content overlap. Minor adjustments were made in the story; some readings were combined and others were divided into two readings.

Creation of laboratory activities. Working from the textbook reading outlines, research associates and the curriculum materials specialist generated ideas for activities representative of the technological concepts. All activities were guided by the concepts to be learned. For example, concepts such as surveying and mapping, scheduling, or earthmoving dictated the required activity. Preferably, students would do surveying and mapping, scheduling, and earthmoving in a situation representative of the activity in the field. Preliminary ideas for activities were generated by individual researchers and by group efforts. Ideas for activities were discussed and selected in relation to a number of factors: (a) classroom and laboratory facilities, (b) student interest, (c) student ability, (d) class organization and procedures, (e) time requirements, (f) materials, (g) tools, (h) equipment, and (i) cost. Brief descriptions of alternate activities were recorded for further review and development as necessary.

Generation of the teacher's guide outlines. Using the text outline and the laboratory activity as a guide, outlines for the teacher's guide were created. Estimates were made as to the amount of time consumed by each activity. The difference between the activity time and 45-minutes identified how much time could be allowed for teacher presentations, discussions, and reviews. Suggestions were made for that lecture content necessary to clarify the concept and relate it to the activity.

Also contained in the year's outline were 10 days designated for administering achievement tests and 10 days for preview and/or review of the tests. In addition, a total of 20 optional days were specified to provide program flexibility for schools operating between 165 and 185 school days. Optional days were designed as extensions of previous activities that were desirable but not essential to the minimum understanding of the concepts under study. Thus, 40 of the 185 instructional periods were marked as review, test, or optional periods. These assignments were also outlined for further review and development.

Identification of Authors

The first problem encountered in finding authors was the question: Who are the experts in construction? Contractors? Architects? Civil engineers? Tradesmen? A secondary question was: If experts can be identified, can they, and are they willing to write for the project for token remuneration? To answer the first question, researchers compiled a list of current authors and books on various construction topics. These authors (engineers, educators, contractors, representatives of trade organizations) were contacted, contracts were developed, assignments were made, an outline of responsibilities was assigned, and a set of instructions was mailed to each of those participating. When the project staff received a manuscript, they read, edited, and typed it, and then sent it out to other experts in the field for review, modification, or rewriting. This double, sometimes triple, exposure of the material provided a check on its accuracy and authenticity.

Many hours were consumed in tracing addresses of potential writers, corresponding by mail and phone, travel for personal contracts, and conferences with the writers at IACP headquarters. Many writers contributed their time free of charge. Others were paid token remuneration.

Writing schedules, assignments, and deadlines were established for the textbook rough manuscripts. Where voids existed in the assignment schedule, the staff generated the manuscripts. Readings on Man and Technology, Management Technology, Personnel Technology, Production Technology, and a few others were written by the staff and submitted for review to experts in the field.

Readings were written by personnel in various positions and fields of endeavor. Examples were: an engineer from the Office of Chief Engineer, United States Department of Interior; a civil engineer, Bureau of Engineering and Construction, Commonwealth of Pennsylvania; contractors; a civil engineer and surveyor; the director, Center of Science and Industry; a magazine editorial consultant, Information Research Group; personnel from the Ohio State Employment Service; an Assistant Vice President, J. A. Jones Construction Company; a coordinator, United Brotherhood of Carpenters and Joiners of America; a landscape architect; construction engineers; and professors of construction and engineering at various universities. A more substantial listing appears in the textbook, (page ix, of the commercial edition of "The World of Construction"). Both the laboratory manual and teacher's guide were assigned to research associates and headquarters staff for writing "in-house."

Camera-Ready Copy

As the various units proceeded through typing, editing, and retyping, they were pasted-up for photo copy. The units were not done in sequential order. The formats, which required an even number of pages for each unit, provided the flexibility needed for continuous work on the materials without regard to sequence. When all units were complete, they were paginated. Final corrections were made on the first semester materials, and the materials were packaged and sent to the printer.

Hardware Production

The special instructional hardware was fabricated in the industrial arts laboratories at The Ohio State University by a group of research associates. Enough materials were produced for the classes of the field center teachers. Specialized hardware and materials were also ordered for each school. These included such items as surveying simulators, specially designed jenny winch booms, and specially-sawed sheet plastic for modeling.

Shipping

When the software was received from the printer, and as the hardware was produced and received at headquarters, the materials were counted out and packaged for each teacher. All materials were then sent to the Field Evaluation Center teachers prior to the first day of school.

Certain quantities of materials also were produced and stored for use in the summer teacher education workshops.

Continued Development and Production of Materials

According to plan, while the first semester materials were being taught, the project staff was inventing, developing, and producing the initial second semester materials. The same basic production system was used to produce the second semester materials as was used for the first semester materials.

During the invention of second semester materials for construction, personnel were reorganized, and work was started on the invention of "The World of Manufacturing." Basically the same system was used to invent, design, engineer, develop, and produce the manufacturing materials. The same format for instructional materials was used for manufacturing as was used in construction. Writers with expertise in manufacturing were identified and contracted. Outlines were generated, activities and demonstrations created and worked out, illustrations and visuals obtained, hardware designed and produced, materials tried out, manuscripts typed, edited, corrected, and produced as photocopy, to be ready for printing.

Revising the Instructional Program

The first summer revision conference for construction materials was held in 1969 to rewrite and improve the materials for the construction course. It involved the employment of construction teachers from the Field Evaluation Centers in addition to headquarters staff. Also, during the summer of 1968, workshops were held to prepare 12 additional construction teachers, in order to expand the field testing of the second edition construction materials, and 24 manufacturing teachers who would field test the first edition manufacturing materials. During the three-year developmental cycle, and as a result of feedback from the Field Evaluation Centers, major additions and changes were made.

FUNDING

At the termination of the project, August 31, 1971, the total appropriations through USOE support exceeded $2 million. Of this amount, approximately one-fourth was expended in the direct operation of the field centers. In addition to the financial support by USOE, several interested individuals and groups aided the project's efforts. A number of industrial and professional organizations provided the following:

1. The Ohio Joint Industry Council of Contractors and Building Trades Union contributed $15,000 to provide the services of an audio-visual consultant.
2. The International Brotherhood of Electrical Workers contributed $15,000 to the development of audio-visual materials.
3. The American Society of Civil Engineers provided, at their full expense, a resident consultant for six weeks to assist in the substantive review of "The World of Construction."
4. The Associated General Contractors of America and the American Institute of Architects appointed educational committees specifically to contribute time to the substantive review of materials.
5. The officers and staff of the Society of Manufacturing Engineers, the Ohio Manufacturers' Association, and the National Association of Manufacturers contributed time for identifying consultants, for writing materials, and for substantive reviews.
6. Each of the AFL-CIO Building Trades International Unions of the Bricklayers, Carpenters, Electrical Workers, and Sheet Metal Workers sponsored and funded thirty-minute colored motion picture films to project specifications.
7. The Ohio Bureau of Employment Services contributed, at no cost, four writers and reviewers who contributed substantially to the authenticity of the occupational information in the courses.
8. The International Brotherhood of Electrical Workers and the National Electrical Contractors Association jointly contributed $40,000 in scholarships to support the preparation of teachers of construction technology.
9. The Society of Manufacturing Engineers contributed $25,000 to pay half the total cost for printing student texts and laboratory manuals for 1969-1970 because the cutback in USOE funds would not cover that cost. This donation prevented closing half of the field testing program that school year.

These are only representative examples of the volunteer, private support that was obtained. Support for the project and the IACP-developed instructional system also was overwhelming on the part of the participating school systems. Teachers, local supervisors, principals, and other administrators in each field evaluation and demonstration center were unanimous in their support of IACP activities. In many ways they provided indirect financial assistance by diverting monies normally used to purchase supplies and materials for traditional programs in order to support the experimental program.

Without all this support, IACP could not have been. One could clearly surmise that all that was accomplished could not have been done without massive funding.

END PRODUCT — PROGRAM

In the end, a project is evaluated not on its clever organization but on how well its output achieves its mission. IACP has been successful, measured in those terms.

Rationale

A major difficulty plaguing industrial arts education is the fragmented approach for determining instructional content. Students typically are offered courses based on selected trades or occupations representing only a small part of the complex segment of contemporary society called industry. In these courses, emphasis is placed on the development of specific skills (with some "related information") which may or may not reflect current industrial practices. Too often the skills and uncoordinated bits of information are forgotten as students grow older. They are left with a vague and unrealistic image of industry.

What educators had failed to identify in the past was an organized body of knowledge, a system of concepts and unifying themes applicable to all of industry. They also lacked organized instructional systems for communicating the knowledge. The IACP staff assumed that the successful development of a system that would efficiently transmit and extend such a body of knowledge could revolutionize the teaching of industrial arts.

The most difficult and unprofitable subject matter to learn is that in which no pattern is recognizable. Through the efforts of the IACP, industrial arts as a curriculum area has a cohesive, comprehensive, and internally consistent framework from which pupils can draw insights into that complex and productive societal enterprise – modern industry. The benefits of such insights for enlightened citizenship, educational-occupational guidance, and integration with general culture and the world of work are indeed substantial.

The materials developed by IACP enable pupils to organize and systematize their thinking about industry. The structure of industry that was developed during the first phase of the project provides the means to simplify, analyze, and synthesize the "big ideas" related to "efficient practices" in industry.

Objectives

The general purpose of the IACP was to effect curriculum change in industrial arts education. To accomplish this, six tasks were undertaken by the project staff. These were:

1. Conceptualization of a structure of the body of knowledge in the field of industrial arts.
2. Development of a syllabus for industrial arts.
3. Production of a package of teaching materials.
4. Field testing and revision of teaching materials.
5. Dissemination and field promotion of teaching materials.
6. Development of teacher education programs.

For administrative and funding purposes, the project was divided into three major time segments. Phase I of the project covered the period from June 1, 1965 to November 30, 1966. The objectives of Phase I were:

1. To conceptualize a structure of industry as a basis for content in industrial arts; and
2. To translate this structure into a syllabus outlining a junior high school program of industrial arts education.

The procedures followed in achieving the above objectives were:

1. The project staff reviewed the literature and developed a morphology of industry, in consultation with experts from industry and supportive disciplines;
2. Task force conferences of experts revised the morphology and derived a taxonomy of the concepts, principles, and unifying themes;
3. The structure was reviewed and evaluated by an opinionnaire study and by lectures and seminars at selected universities; and
4. Syllabus conferences of experts were conducted in which both valuational and praxiological criteria were applied to the structure in order to develop a syllabus for a junior high school industrial arts program.

The second phase of the project covered the period from December 1, 1966 through June 30, 1969. The major objectives of Phase II were:

1. To design an effective two-year articulated program of study for industrial arts in grades 7, 8, and 9;
2. To develop teaching materials that could be used successfully in existing schools, with representative industrial arts teachers, and with pupils of all ability levels; and
3. To install and evaluate the effectiveness of the program and materials in three field centers and 12 schools in FY '68 and six field centers and 24 schools in FY '69.

The procedures followed in achieving the above objectives were:

1. Development of a two-year sequence of course materials that included for each year: a textbook, student laboratory manual, teacher's guide, achievement tests, laboratory equipment, and other teaching aids;

2. Establishment of Field Evaluation Centers through which the above curriculum materials could be tested and evaluated;
3. Collection of evidence from the field trials so that the materials as developed and revised could be used successfully in existing schools, with representative industrial arts teachers, and with pupils of all ability levels; and
4. Preparation of cooperating field center teachers through orientation and inservice programs to successfully adapt to the new course content, materials, and procedures.

The third and final phase of the project was from July 1, 1969 through August 31, 1971. The major objectives of Phase III were:

1. To complete the partially completed development cycle of a two-year articulated program of industrial technology for the junior high school; and
2. To design and implement a dissemination program that would insure maximum impact on school practice.

The procedures to achieve the above objectives were:

1. To continue to field test and revise the teaching-learning materials and instructional system that were partially developed in FY '68 and FY '69 ("The World of Construction" through FY '70 and "The World of Manufacturing" through FY '71);
2. To continue to evaluate the effectiveness of the materials and instructional system in six field centers and 24 schools in FY '70 and FY '71; and
3. To establish a dissemination program that would extend program viability through demonstration centers and provide for the optimum distribution and use of materials.

Outcomes

By following the above procedures and accomplishing the objectives, the IACP has been successful in effecting desirable curriculum change in industrial arts, a change from the fragmented and amorphous activities of present-day industrial arts to an articulated program of study based on a structured body of knowledge and on meaningful patterns of experience. As a result, students now have an opportunity to develop an understanding of their man-made world and to enjoy the benefits of their insights and knowledge in enlightened citizenship, educational-occupational guidance, and personal integration with their technological culture and the world of work.

The major accomplishment of the project was an instructional system based on a logically derived rationale and body of knowledge that was field tested, revised, and disseminated to qualified industrial arts teachers for adoption, or adaptation, throughout the United States. The two-year sequence of "The World of Construction" and "The

World of Manufacturing", together with related professional programs, e.g., teacher preparation, were the result of this research, development, evaluation, and dissemination effort. The entire program is thought to have the potential for improving the junior high school industrial arts curriculum by providing relevant and exciting learning experiences of the man-made world much as science provides knowledge of the natural world. Sample materials may be purchased from McKnight Publishing Company, Bloomington, Illinois.

PRESENT STATUS

About 8,000 industrial arts teachers have enrolled in IACP workshops since the summer of 1970, in about 125 colleges and universities. It would be difficult, if not impossible, to identify a comparable cooperative effort in industrial arts teacher education.

About 350,000 children studied IACP courses in 1975-1976. This is a very conservative estimate. The numbers have increased, year by year. About 2,700-3,000 junior high buildings are involved in using the IACP materials.

Strong points as stated by users:

1. broad coverage of industrial technology
2. systematic, organized
3. stated objectives—accountability
4. increased student interest and enrollments
5. goals of industrial arts met
6. good career education courses
7. contributes to basic skill development, such as reading

Major difficulties as stated by users:

1. too much reading
2. courses each are 36 weeks long
3. installation costs high
4. too great a variety of supplies needed
5. program hard on teacher, throughout first year!

FUTURE DIRECTIONS AND EXPECTANCIES

In addition to the impact described above, through adoption of the instructional systems as they were designed, there is widespread evidence that individual teachers have selected parts of the program and incorporated them into existing courses. This probably will continue for some time, impacting in a modest way upon tradition.

Other publishers already have marketed competing but similar materials that have contributed to the total impact of IACP. Also, shortened versions of the materials have been marketed.

Industrial organizations, desiring to promote similarly conceived and developed senior high school courses, have funded feasibility studies completed in 1974 and 1975. These studies project a senior high school continuation program that would require nearly 10 million dollars to develop. Efforts have been made to secure initial funding and to begin development.

It is expected that IACP-related programs will continue to be developed, that the existing materials will be revised and continued, and that IACP will leave a lasting impact upon industrial arts education.

chapter 8

Industrial Arts Curriculum Development Efforts of the 1970's

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A PROLOGUE TO THE DECADE

Pausing on the threshold of the 1970's, those who were concerned with industrial arts curriculum had a unique perspective. Histories of industrial arts curriculum, such as Bennett's (1937) and Barlow's (1967), formed a basis for the synthesis of previous industrial arts curriculum practices (Brown, 1973; Ritz et al., 1976; Towers, Lux, & Ray, 1966). Further, prior to 1970, industrial arts had been active in one of the most important curriculum development eras in the history of education (Goodlad, 1968). The resultant combination of historical precedents and innovative practices combined to provide direction for future curriculum efforts in industrial arts. Even so, the arena for curriculum was changing.

The 1970's traditional beginning was no indication of the unconventional decade to evolve. The euphoria of the 1950's merged with the turbulence of the 1960's to yield the unique decade of the 1970's. The evolving 1970's witnessed world-wide emergence of new economic, social, and psychological perspectives that challenged nations and provided different goals for societies and their educational systems. The initial years of the 1970's were indicative of the changes that would affect education. One such change was school curriculum.

Curriculum

One of the most plentiful definitions in education is that of curriculum. While one would assume a consistency of thought on this point, definitions of curriculum fall into two classes – classes that follow the theme of this yearbook: perspective definitions and retrospective definitions. Representative perspective views, those describing what curriculum should be, define curriculum as prescribed supervised experiences (Good, 1945), as a plan of carefully organized activities and experiences (Spears, 1948), a structured series of intended learning outcomes (Johnson, 1967), and a planned composite directed toward predetermined outcomes (Inlow, 1973). However, for several decades, there have been retrospective views of curriculum – those defining what curriculum is. French (1957) has suggested that "the measure of the curriculum is the total effort of the school on the pupil" (p. 162). Later, Doll (1970a) defined curriculum as "all of the experiences which are offered to learners under the auspices or direction of the school" (p. 21). Shane (1970) went even further by defining curriculum as "learnings which are encouraged through schooling" (p. 326). The perspective and retrospective division is intended not as a classification but as a description. In the 1970's, educators at all levels would continue to identify, collect, and analyze the variables associated with the complex nature of education. At the minimum, curriculum is more than definitions, more than curriculum guides, textbooks, and course outlines, and more than a simple perspective in the process of education.

Curriculum, whether defined retrospectively or perspectively, is the essence of education. Curriculum can be viewed as evolutionary, sedimentary, or stationary. However, curriculum does involve a process. *Curriculum development* initiates the curriculum process. The developmental stages of curriculum include the selection and specification of a philosophic base, rationale, function, assumptions, and procedures. Further, the curriculum developer must consider all phases of curriculum – the purposes, content, organization, evaluation, environment, objectives, time, and instructional procedures. McNeil (1977) provided a review of the various models for curriculum development; however, Purves (1975) argued that models do little to aid the development of curriculum. Curriculum must be developed from the perspective of the institution or institutions in which the curriculum will be practiced. *Curriculum practices* are the actual application of curriculum. Observation of educational activities and processes is one common method of determining curriculum practices. It is important to note that curriculum practices are not stagnant activities.

Arena for Curriculum

Observers of the two decades prior to the 1970's noted several prominent features of curriculum. Walker (1971), in a study of curriculum programs and materials used during the 1960's, revealed that there were few exceptions to the pressures for innovation and reform in the total school curriculum. The results of those pressures, however, were disappointing. Brown et al. (1973) reported that the quality of teaching and learning had not been improved during the period of innovation. Additionally, the effects of innovation on the total content of school programs had been minimal and of short duration. Passow (1975) reported that most innovative changes were abandoned after a change in leadership or external funding. Did the innovative efforts spawn the numerous commissions and task forces that provided the public with diverse thought on the future of curriculum in the schools? Did the results of the innovative movement create interest in popular controversial literature such as *How to Survive in Your Native Land* (Herndon, 1971), *Crisis in the Classroom* (Silberman, 1970), and *Learning for Tomorrow* (Tofler, 1974)? Or, had those concerned with curriculum innovation chosen an operational spectrum too narrow for success?

Goodlad (1968), a long-time scholar of curriculum practices, provided an interesting contrast between two eras of curriculum development. Goodlad found that curriculum practices of the 1930's to 1950's used a strong ideological base that attempted to change the thinking of a variety of people concerned with education – the public, superintendents, principals, and teachers. Goodlad characterized this era as progressive, child-centered, and apolitical while emphasizing the importance of the diverse discussion and strong rationale. In contrast, the curriculum of the 1950's and 1960's became discipline-centered with curriculum development becoming more political as the total educational spectrum was circumvented to form curriculum at the instructional level. Teacher-free instructional materials and specific curriculum training became the norm. The curriculum practices of the 1950's and 1960's held the explicit assumption that educational progress could be accelerated if certain political considerations were employed. Yet, the decade of the 1970's would be concerned with political considerations for curriculum – from a broad rather than a narrow perspective.

The initial years of the 1970's yielded a number of significant issues for education. Brown et al. (1973) were some of many who suggested that financial limitations would be placed upon education. The concept of accountability has been well documented and has developed several avenues. The roles of organizations (Combs, 1976) and people (Gibbons, 1976) were becoming more clearly defined. Education was the recipient of new and strong challenges. Within this context, industrial arts continued – aware of the challenges, aware of history, and aware of the needs of the discipline.

The Context of Industrial Arts

The decade prior to the 1970's was characterized by several attempts to capture the essence of industrial arts curriculum practices. Swanson (1965) found that industrial arts curriculum practices reflected four content sources. One content source centered around a study of the crafts, trades, tools, processes, and products found in an industrial society. A second content source was based upon the relationship of the individual to industry and technology. In a third content source, Swanson found many practices proported to center upon the application of science and mathematics. A fourth content source was the study of technology. Dudley (1968), without identification of specific programs, noted five basic practices in industrial arts curriculum. One practice, stated as being one of the most common, centered on the production of articles – an approach that has limited concern for organized related learnings. Dudley's second practice covered those curriculums centered upon the production and application of materials with full consideration given to cognitive information associated with these materials.

Dudley found another curriculum practice to represent a highly technical orientation centered upon the processes of problem solving, research and development, and experimentation. The fourth practice described by Dudley consisted of interdisciplinary programs designed to broaden the scope of industrial arts. The last practice identified by Dudley was those curriculums that were designed to place less emphasis on the material aspects, and that were based upon many structures - historical, organizational, sociological, etc. It is interesting to note that Dudley offered demographic evidence as to the location of these curriculum practices.

Cochran (1970) provided another schema of four classifications for the description of 20 curriculum practices. The classifications were integrative, interpretation of industry, occupational families, and technology-oriented. Cochran posited that the integrative practices emphasize the interrelationship between two or more subjects. This was contrasted with a second classification, interpretation of industry, placing emphasis on "interpreting the totality of industry by including such factors as marketing, production, materials, research and design, serving, and the organizational patterns of industry" (Cochran, 1970, p. 38). Cochran placed programs that were specifically occupationally oriented into a third classification. The fourth classification used by Cochran provided descriptions of programs that were technology-oriented – those that are directed toward the effect of technology on the broad expanse of human endeavors. Cochran further examined seven of the 20 programs to compare curriculum characteristics.

Householder (1972) incorporated a different approach in his examination of curriculum practices of the 1960's. Householder admits that the classification schema he uses "is somewhat arbitrary and artificial, if not capricious" (Householder, 1972, p. 11). Three of those classifications are similar to those of Cochran – industry-centered, technology-centered, and career-occupation. Householder's other classifications are the Individual Development Emphasis and the Evolutionary Approaches. The reasons for similarities and differences between the Cochran and Householder description may be due to the fact that Householder used a broader resource base for his review.

While descriptions provide a basis for the stimulation of new directions, commonalities of descriptions may provide a perspective for the trend of industrial arts curriculum. An examination of the functions, purposes, and methods used in various curriculums described by Cochran and Householder, and others (American Vocational Association, 1970; Ginther, 1971) provides an interesting set of program characteristics.

Externally, industrial arts was not perceived as possessing classifications. Several writers offered a perspective of industrial arts.

> Industrial arts is that portion of general education concerned with the cognitive and manipulative study of tools, materials, processes, products, occupations, and problems of industry. (Rice & Morgan, 1971, p. 339)

Van Til (1961) offered a broader perspective by stating that the goal of industrial arts was directed toward an understanding of the total industrial civilization. Doll (1970b) held a similar opinion. However, most would agree with the notion that industrial arts is perceived as being similar to vocational education – a perception that time reinforces.

The industrial arts curriculum practices prior to the 1970's provided a rich source of discussion issues. However, given the intense societal pressures – cost effectiveness, accountability, justification, the pressure within the total field of industrial education – vocational versus industrial arts, career education versus industrial arts, and the precedents set by the past, the 1970's emerged as an era for clarification and survival. The challenge to industrial arts was explicit.

INDUSTRIAL ARTS CURRICULUM — STATUS IN THE 1970's

Curriculum development has four major emphases: the learner, content, instructional materials and methods, and evaluation (Tyler, 1950; Gibbons, 1976). Curriculum concerns of the *learner* incorporate the capabilities of the learner from a temporal and developmental perspective. The *content* of curriculum is the specification of the types and areas of knowledge to be considered by a particular field of study.

The *instructional materials and methods* are the means by which the content is delivered. *Evaluation* is a continuous process directed toward a measurement of the status of the elements of curriculum and subsequent improvement. Within the four elements – the learner, content, instructional materials and methods, and evaluation – is the basis for a systematic method of determining the status of curriculum. The method begins with a major assumption – all curriculum is concerned with the learner. McCrory (1978) would challenge this assumption, but McNeil (1977), in a study of the conception of curriculum, would counter that the assumption is a valid generalization. Given this assumption, the elements of content, instructional materials and methods, and evaluation form a progression that, when considered exclusively and inclusively, provides a basis for the judgment of the status of curriculum within any one discipline. Further, consideration of these elements can be a direct indication of the stability of a particular curriculum.

Fundamental in any curriculum is the selection of a particular domain of knowledge that is to become the focus of the curriculum. Generally, the content for a curriculum would be the knowledge, skills, attitudes, values, goals, and purposes necessary for the maintenance and/or improvement of an existing societal order. The status of curriculum, at any point in time, is directly related to the level of activity associated with the content. At one end of a spectrum there may be a high level of activity associated with the *derivation* of the content. Derivation would be a selection process based upon philosophical and objective considerations. Derivational activity would indicate a low level of stability for the curriculum. A higher level of curriculum stability would be indicated by activities directed toward the sequencing of the content. Sequencing of content would be dependent upon the selection of the content that is based upon philosophy and assumptions. Finally, a low-order of activity with the content would indicate a relatively solid content base. The selection of the content of a curriculum involves several processes and levels of activity that are a direct indication of the level of stability for the curriculum.

An instructional emphasis in a curriculum area is represented by major efforts and activities to improve the instructional methods and materials. By the very nature of the activity, it is possible to infer stability of the content base to which the instructional emphasis is projected. As an example, an investigation of the mathematics program of many elementary schools indicated established content composed of child-centered, multilevel programs. The mathematics educators are not concentrating on content; they are concentrating on instructional materials and methods. Another example is the *Physics of Technology* series (American Institute of Physics, 1975) that places a classical field into a contemporary framework.

The emphasis on evaluation indicates a concern for the total curriculum process. Doll (1976), among others, provided evidence of the value of evaluation processes as a means of continual and total improvement of curriculum. A high level of activity in evaluation would indicate that a subject field has a well defined content, with appropriate instructional methods and materials.

The evolution of any social order is marked by periods of stability and periods of rapid progress. Industrial arts curriculum and practices is one such social order – an order of events that is less than a century in duration. In the 1970's, the evolution of industrial arts curriculum continued.

CONTENT EMPHASIS

The highlight of the 1970's was a focus of attention toward two content derivations. Two strong movements, neither unique to the 1970's, have been the focus of the discussion in industrial arts curriculum in the 1970's. The literature abounds with references to both these movements – technology-based industrial arts and the cluster concept.

The Technology-based Industrial Arts

The antecedents of a technology-based industrial arts curriculum lay in the work of Warner (1958) as the basis for the content of industrial arts (Brown, 1973). As the 1970's evolved, so did the support for technology-based industrial arts curriculum. The 1970 conference of the American Industrial Arts Association (AIAA) featured a half-dozen presentations on technology and industrial arts. Two of these presentations were by a long-time proponent of a technology-based curriculum – Paul W. Devore (1970a, 1970b). As a contrast, the 1976 AIAA conference featured more than a dozen presentations on the need and operation of a technology-based curriculum. The advantages of this base have been enumerated by many. Towers, Lux, and Ray (1966) found that technology is a rational basis for industrial arts curriculum. Brown (1973) argued that technology provided an emphasis for most of the dominent practices of industrial arts. DeVore (1973) and Maley (1973) stated that the technology base provided the mechanism for industrial arts to be relevant for both society and the individual. The technology-based curriculum continued to grow in the 1970's as several states began to adopt the concept for the state-wide consideration. An example is the Virginia State Department of Education *Industrial Arts Curriculum Guide* (1972). The initial pages of the guide contain the definition, purposes, and rationale for industrial arts content to be technology-based.

The influences of the development of the technology-based curriculum are very positive. While the original technology proposal was based upon production quantities, the place of education in a modern society requires that the technology base be justified from several aspects. Psychological justification has been offered by many educators (Wolansky and DuVall, 1975; Maley, 1973). Psychologically, the technology-based curriculum can offer new and active roles for students, more attention to individual needs, and less emphasis in skill development. Sociological justification, offered by Lauda (1969) and Maley (1973), suggests that greater interaction is required in the technology-based curriculum. Coping, cooperation, and realization are central to, rather than auxiliary to, the technology-based curriculum. The development of the technology-based curriculum, summarized by Householder (1972) and Ritz et al. (1976) continues to gather momentum. However, the technology-based curriculum faces many problems before total acceptance is gained. The proponents of the technology-based curriculum must limit, operationalize, and qualify the curriculum.

While arguments can be made that the technology-based curriculum is without bounds and limitless, political restraints require a different perspective. These restraints were considered by Towers, Lux, and Ray (1966) in their search for a distinctive content for industrial arts. If transportation is a generic component of the technology-based curriculum, what are the specifics? What criteria can be used to establish the boundaries of the information, processes, and activities associated with transportation? Perhaps these questions can be answered by full-scale attempts to operationalize the curriculum.

Just as pilot programs have answered many problems in the past, so might similar programs define the limits of the information and activities in a technology-based curriculum. However, there must be a constant vigil to avoid the classical mistakes that occurred at various points in previous projects. The exclusive use of a needs-based (content defined by needs of students) or an objectives-based (content defined by behavioral objectives) is not appropriate for such a venture. Operational considerations must include both needs-based and objectives-based content included within a research-based model. Householder (1972) and Rice and Morgan (1971) have identified the necessity of research for any curriculum venture.

A third need is to qualify the roles of people involved with the technology-based curriculum. What is the role of the student, teacher, principal, etc? Further, the qualification must be detailed rather than general. The teacher as a facilitator is no longer adequate – the methods of being a facilitator must be documented and imparted. Each problem area must be addressed, not by a few individuals, but by the practitioners of industrial arts curriculum.

Cluster Concept

A second major content emphasis of the 1970's was the use of content clusters. Originally an organizational method, the use of content clusters has grown rapidly during the decade of the 1970's. Maley (1975) provided a definitive work on the use of the content cluster. Wolansky and DuVall (1975) provided further insight into the logic of the use of clusters for curriculum. Additionally, Betts (1974), investigating curriculum changes in teacher education departments, found that 87% of the 32 departments studied had reorganized curriculum into content clusters. Schmitt (1976) provided additional evidence of the increase in the use of cluster organization.

The clusters found their beginning at the very source of industrial arts (Bonser & Mossman, 1923). The *Teachers College Record* contains numerous references and suggestions for the implementation of instruction based upon the clusters of food, clothing, and shelter. McPherson (1978), provided an excellent synthesis of the clusters utilized in the early phases of industrial arts curriculum. Additionally, the proposals of Warner (1958) and Olsen (1963) used content clusters. The Industrial Arts Curriculum Project, after a taxonomical investigation, resulted with the clusters of construction and manufacturing. Further use of the clusters continued with the development of such programs as the *Secondary Exploration of Technology Project* (1973) and the adoption of content clusters by such states as Virginia, Kentucky, and Louisiana.

The status of the use of the clusters during the decade was characterized by a dilemma. There was an increasing acceptance of the practice of cluster organization of content, yet the titles and content of these clusters formed an inconsistent pattern. What clusters would provide points of agreement for further development? Again, problems of limiting the expanse of content plagued curriculum development. A historical perspective of content clusters provided a distinct pattern. Bonser and Mossman (1923) offered three clusters – food, clothing, and shelter. Warner (1958) identified power, transportation, manufacturing, construction, communication, and personnel management. Olsen (1963) added electronics, research, and services to those of Warner and eliminated communication. In the 1970's the clusters were addressed specifically with such titles as those provided by the *Secondary Exploration of Technology Project* (1973) – materials analysis and processing, power conversion and transmission systems, and industrial communication systems. Within these examples is an obvious attempt to reduce the complexity of a cluster. Additionally, the examples indicate the problems with the clusters being inclusive or exclusive.

A *cluster* is a classification system intended to arrange objects, information and processes into classes or groups by a systematic process according to similarities on specified variables. The key issue is the identification and measurement of the specified variables. The historical perspective indicated attempts to limit the classes (clusters), yet critical questions were raised about the exclusiveness or order of the clusters. Again, the definite need for a strong research base is evident to provide clarification of the issue of the elements and functions of the content.

One dominant cluster that has emerged can serve as a model for other clusters – the manufacturing cluster. Nelson and Selvidge (1972), in a perspective of the development of the manufacturing cluster, stated the following:

> "Manufacturing" as a part of the industrial arts curriculum has reached a degree of acceptance as evidenced by the examples of its inclusion in classes, courses, programs, curriculum guides and innovative curriculum projects throughout the nation. (p. 21)

The definitive efforts of Towers, Lux, and Ray (1966) in *A Rationale and Structure for Industrial Arts Subject Matter,* Lux, Ray, and Umstattd (1975) in *A Rationale and Structure for Manufacturing Education in the Senior High School,* and Wright and Jensen (1976) in *Manufacturing: Material Processing, Management Careers* serve as partial evidence of the high level of development of the content of this particular cluster. Additionally, Schmitt (1976) noted the increase of manufacturing content in existing programs.

The content emphases of the 1970's were summarized early in the decade by Brown (1973) as three concepts of the content universe of industrial arts – the mechanical trades, American industry, and the technology. Brown identified the central theme of *the mechanical trades* as tool skills and job performance, while *American industry* concentrated on the understanding of the organization and operation of industry. Brown qualified *technology* as a concentration on the concepts and principles in transforming materials and energy. These identified content sources summarize the efforts of the 1970's. While literature of the decade indicated growing support for a technology-based content, the majority of the literature was supportive of an instructional emphasis.

INSTRUCTIONAL EMPHASES OF THE 1970'S

In 1972, Householder noted that "the literature abounds in articles on the improvement of various phases of instruction in the traditional industrial arts subjects, from new plastic projects and processes to variations on ancient teaching aids" (p. 3). With qualification, this statement continues to be valid. A review of *School Shop* and *Industrial*

Education revealed no significant difference in the amount of space devoted to project ideas and instructional aids at any time during the 1970's. This evidence suggests that one portion of the content base of industrial arts has reached a level of stability.

Brown (1973) and Ritz et al. (1976), among others, have derived three distinct branches for the practices of industrial arts curriculum. One of the branches Brown traces to a "vocational linkage," giving a description of the process of curriculum development that is associated with this linkage. The central theme of the vocational linkage is the tool skills and job performance. This strong content area, tool skills and job performance, has been supported by an equally strong instructional development. Miller (1974) described the significance of the project as both instructional method and material. Existing descriptive data provide additional strength for an argument of the stability of the "vocational linkage."

Schmitt (1976) reported that shifts in enrollment patterns in industrial arts courses are occurring. The Schmitt data, using the 1962-1963 school year as a base, records a dramatic increase in industrial arts enrollment over a ten-year period. Schmitt pointed out that no single area had a decline in enrollment; several areas had dramatic increases. Power mechanics, general industrial arts, plastics, electricity/electronics, and crafts recorded the largest gains. While trends are inferred, the actual status must be noted. The increase in popularity of power mechanics and electricity/electronics must be tempered with the fact that during the 1972-1973 school year, 32% of the secondary school students were enrolled in "General Industrial Arts," 17% in "General Woods," and 14% in "Drafting." Despite the increases in enrollment, 7% of students were enrolled in power mechanics and 5% in electricity/electronics. The traditional areas remain as a solid foundation for present industrial arts practices, with the predominant curriculum activity being concerned with improvement in instructional methods and materials. The degree for future change is still a subject of conjecture.

Feirer (1970) initiated this decade by reporting on a survey concerned with the status of the project as an instructional method. The respondents agreed (reported as frequency) that "the project, as an activity is not on the way out" (Feirer, 1970, p. 23). However, the respondents did predict that a change on project emphasis would occur:

> It must be used differently as one method in an activity to represent a total concept of industry using problem solving, mass production, research and development, group activity, etc. (Feirer, 1970, p. 23)

As the decade of the 1970's nears an end, did this change occur? Or, did Miller (1974) summarize the feelings and practices of the majority of the teachers of industrial arts by concluding with the question: "Why not let the project be your tool to successful teaching?" (Miller, 1974, p. 27).

There is a strong reluctance to conclude, on the basis of the instructional emphasis, that "tool skills and job performance" (Brown, 1973) form the basis for content and instruction in industrial arts. Yet industrial arts continues to give a higher priority to instructional considerations. An example is in order.

Industrial Arts and Career Education

In the initial moments of the 1970's, Sidney Marland offered a suggestion to a group of school leaders. This suggestion was to become the basis of one of the strongest educational movements since the waning moments of the 1950's. The emergence of career education had a profound effect on the nature of industrial arts curriculum. With an emphasis on the individual, and an inference for total school commitment, career education became a central theme for many industrial arts curriculums.

In January of 1971, Sidney Marland, then United States Commissioner of Education, used a conference of the National Association of Secondary School Principals to propose a new focus for the curriculum in education. The Commissioner proposed that curriculum be used to (a) expose students to occupations and economic enterprises, (b) inform students of the multitude of career options, and (c) better meet the manpower needs of the nation (Marland, 1971).

Marland became a personification of Goodlad's (1968) descriptions of political curriculum development as 18 million developmental dollars were placed before the chief state school officers in the spring of 1971. The results became obvious. By 1974, 25 states had included career education in state budgets, 42 states or jurisdictions had a state-level officer responsible for career education, and 25 states had included career education in the state plan.

However, it wasn't until four years after Marland's proposal that the United States Office of Education (USOE) issued its first comprehensive statement on career education.

> "Career education" is the totality of experiences through which one learns about and prepares to engage in work as part of her or his way of living. (Hoyt, 1975, p. 4)

The publication, *An Introduction to Career Education: A Policy Paper of the U.S. Office of Education* (Hoyt, 1975) continued to provide assumptions and learner outcomes for career education. However, prior to the policy paper on career education, 29 states had adopted formal policy statements on career education, of which 22 had included specified student outcomes (McLaughlin, 1976). McLaughlin (1976) provided a perspective of the status of career education at the midpoint of the decade.

The initial phases of career education involved the funding and study of a number of exemplary projects. Based upon a survey of these projects, McLaughlin found that the success and problems of the implementation of career education were similar to or the same as those associated with innovative programs in other areas of education. Career education was being adopted at the high school level rather than the comprehensive K-12 goal. Career education was found to be closely associated with traditional elements of schools, such as vocational education and counseling. Career education received the majority of financial support from local funds, a perceived weakness in the effort. The complexities of career education were beginning to form.

Career education opened to mixed reviews in industrial arts. To many associated with industrial arts, the stated outcomes looked very similar to those that had been stated for industrial arts. To others, the relation of career education objectives to industrial arts objectives were envisioned as a Pandora's box. Herr (1972) provided an excellent summary of the development of career education. A review of the historical and philosophical bases defines a close parallel between the development of industrial arts and career education (Herr, 1972). The emphasis on career education in the curriculum of industrial arts was not unusual. The 1970 conferences proceedings of the AIAA listed only one report of a career education program. In contrast, the 1975 proceedings included several sections of programs and proposals using the career education basis. Further investigation of those programs reported in 1975 indicated another trend of funding several industrial arts programs (Buchleiter, Smith, & Williamson, 1975; Dugger & Ressler, 1975) with vocational education monies to serve the purpose of providing exploration experiences for potential vocational education students.

Career education provided a mechanism for a movement toward relevance for industrial arts. The implication that industrial arts has a career education component was not new to many educators. However, the influences toward this movement were quite clear. Career education was most closely related to vocational education (Herr, 1972). The rapid allocation of monies to vocational education for career education was seen by many as an avenue for access to additional funding for industrial arts. Such a prophecy is now a reality as vocational education monies are being used to supplement industrial arts where industrial arts serves as the exploration phases of vocational-career education. Additionally, career education received a supplement from the rush of society toward the concept of individual rights and individual development. The debate continues as to the value of career education, just as similar debates continue in industrial arts as to the emphasis needed for career education.

The actual extent of the participation of industrial arts in career education is difficult to establish. There are obvious efforts in Ohio, Virginia, and Kentucky, to name a few, to use industrial arts for the exploratory phases of career education. Cochran (1970) and Householder (1972) are a sample of those who describe industrial arts curriculums that are associated with career education. Yet, the most descriptive study (McLaughlin, 1976) confounds the problem of identifying the extent of the role of industrial arts in career education. McLaughlin (1976) reported that the greatest amount of career education occurs under the direction of vocational education. An examination of the survey procedure indicated that the industrial arts curriculums for career education were systematically classified as vocational. One notable exception is the use of industrial arts in the elementary curriculum.

Beginning with the laboratory schools of the University of Chicago and Columbia University, a number of prominent educators had recognized the developmental worth of industrial arts in the elementary schools. Reports by Gallagher and Rumble (1975), Heasley (1975), and Swanson (1975) are indicative of the expansion of industrial arts into elementary education. The review of 20 elementary programs provided by Miller and O'Bannon (1975) noted a high level of activity in the instructional phases of curriculum – namely, an emphasis on tools and materials, and an alignment with the tenets of career education. What is the contribution of career education to the distinctiveness of industrial arts? The very fact that one of the original characteristics of industrial arts was career related (Bonser & Mossman, 1923), and the obvious alignment of career education with vocational education may create confounding problems for the distinctiveness of industrial arts.

The heavy emphasis of industrial arts curriculum on instructional phases of the curriculum continued through the 1970's. The literature continues to provide a predominance of information on instructional activities. The inclusion of the concept of career education into the complexity of the school curriculum may have provided an increase in instructional activities with a minimum of emphasis on content issues. Additionally, as the 1970's evolved, the emphasis on evaluation of educational programs was neglected by industrial arts.

EVALUATION EMPHASES OF THE 1970's

Program evaluation serves many purposes: decisions on program initiation and continuation, decisions on program modification, program support, and understanding of processes (Anderson & Ball, 1978). With few exceptions, the Industrial Arts Curriculum Project being one, the basic issues associated with evaluation were ignored by industrial arts curriculum innovators in the 1970's. Issues associated with the validity of content and activities have yet to be explored and dealt with. Reliability issues have enjoyed a similar level of emphasis. The decade of the 1970's provided a minimum of activity on evaluation when it is obvious that evaluation will become the rule rather than the exception in all phases of education. Evaluation demands attention!

PROSPECT OF INDUSTRIAL ARTS CURRICULUM DEVELOPMENT

As the decade of the 1970's draws to a close, it is apparent that Brown (1973) has accurately identified the three major thrusts of curriculum efforts by providing the classes of the *mechanical trades, American industry,* and the *technology* (p. 211). Evidence indicates continued activity in the content, instructional, and evaluation phases of curriculum if the social, political, and economic conditions remain stable. However, the potential exists for dramatic changes in the forces that have an influence on curriculum.

As the 1970's developed, the forces on curriculum became more complex. While Goodlad (1968) was contrasting the influences and procedures for curriculum development, new forces emerged to affect curriculum. Teachers, while always having the potential to control curriculum, emerged as a viable force in the processes of education. Beane (1975), in a national survey, found that local schools had more influence over curriculum than did teacher education institutions and state departments of education. Wallace (1976) provided a description of the direct involvement of teachers in state educational practices. Walker (1976) also made note of the growing influence of local teacher units.

Financial realities will continue to dominate curriculum development in the future. Ample evidence is presented daily of the effect of the presence or absence of adequate finances on curriculum. The multitude of curriculum development efforts of the 1960's – financed by federal, state, and local governments; industry, unions, and foundations – had decreased to a minimum in the 1970's. The financial influence of vocational education is the only exception.

The relationship between vocational education and industrial arts continues to confound the industrial arts curriculum. Bjorkquist (1977) has noted that industrial arts and vocational-industrial education use the same content source – the technology, organizations, and occupations of industry. Federal funding patterns now include industrial arts, and the revision of industrial arts curriculum has been designated a priority item for vocational education (*Commerce Business Daily,* 1977). This relationship between industrial arts and vocational education must receive serious attention in the immediate future.

RETROSPECT AND PROSPECT

This chapter has attempted to capture the essence of the industrial arts curriculum efforts of the 1970's. In retrospect, the decade has been disappointing. The excitement generated by the curriculum efforts of the 1960's did not continue in the 1970's. Curriculum is obviously a complex element of education and the processes associated with curriculum cannot be ignored. Curriculum requires a philosophy, objectives, content, instructional methods, and evaluation. Curriculum requires the collective efforts and support of many, rather than a few. Curriculum requires an open forum for involved discussion and political strategies for acceptance. All phases of the curriculum for industrial arts must receive full and renewed attention.

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chapter 9

Influence of Technology on Industrial Arts Subject Matter

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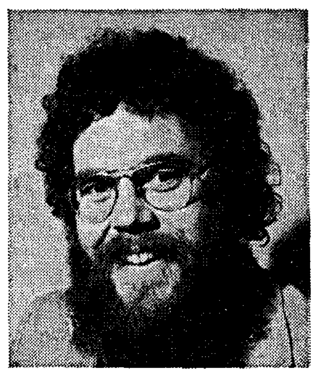

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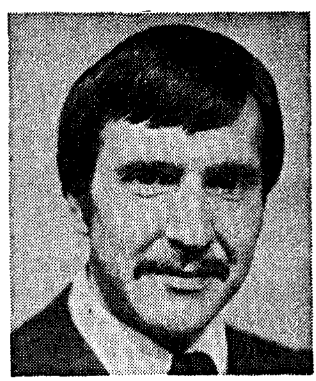

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For several decades many industrial arts educators have proposed that the central mission of industrial arts in the public schools was to educate citizens about technological systems and their relation to the civilization process.

A review of the courses classified as industrial arts and offered in formal public school programs at the elementary, middle, and senior high levels indicated considerable confusion of purpose, mission, and means of implementation. A minimum of four structures for the organization of content for industrial arts programs have evolved, each based on a stated or oftentimes unstated central theme. These include:

Occupations	*Systems*[1]
Cabinetmaker	Communication
Woodworker	Production
Welder	Power and Transportation
Products	*Skills*
Radio	Drafting
Television	Leatherworking
Automobile	Forging

Information reported in this chapter attempts to determine relationships or discrepancies between technological systems extant in society at a given time and the curricula of public school and teacher education industrial arts programs during the same time period. Several approaches to the chapter were proposed including an analysis of each of the four curricula categories listed above: occupations, products, systems, skills.

It was decided that the problem was the comparison of the curricula offerings to technological systems and not technological elements or components to curricula. A review of literature concerned with the study of technology indicated that the predominant organizational theme used by authors such as Kranzberg, Pursell, McHale, Fuller, Derry and Williams, Toffler, Ferkiss, Goldschmidt, Forbes, Brady, and Helman, among others, was systems. An examination of the technological systems generally cited found that all the other categories (occupations, products, materials, energy, resources, environment, skills) were logical components of each of the three basic adaptive or technological systems extant in any civilization at all levels of development. Additionally, the use of systems provided a more efficient and meaningful means of analysis. Occupations, skills, and products change, and many times are eliminated entirely, leaving no

[1]Focus on basic needs of society – food, clothing, shelter, information, energy, power, material goods, transportation, and the problems and issues associated with the design of society and technology in meeting these needs.

possibility of a continuous comparison, whereas systems of production including manufacturing, constructing, processing, extracting, and growing, and systems of communication and transportation continue although the elements or components of the system are altered. Therefore, the investigation of the influence of technology on industrial arts subject matter will be based on an analysis of three systems: communication systems, production systems, and power and transportation systems. The chapter covers the years from 1900 to 1978.

An analysis of critical events in each of the technological systems and trends in industrial arts curricula was performed. Additional data were collected through a representative sample of course offerings taught in industrial arts teacher education programs in the United States from 1900 to 1978. Also, a modified citation analysis procedure was used to identify trends in the field through articles published in professional journals.

These procedures, together with analysis by the authors, led to the identification of discrepencies existing between what was taught in industrial arts programs during a given time period and the technology extant in the society at that time.

TECHNOLOGICAL SYSTEMS

Communication

Nineteenth century printing techniques such as the Linotype, the high-speed, power-driven rotary press, and the typewriter played a significant role in the unprecedented proliferation of print in the 20th century. This proliferation has been sustained by the subsequent addition of electricity and electronics to existing equipment, together with numerous other refinements. Technical developments in the 20th century have also been instrumental in sustaining the ability to produce and reproduce printed materials. Xerography, an electrostatic process, and developments in phototypesetting in which a photographic image is substituted for metal type, have revolutionized information processing.

Photography matured in the 20th century. Equipment, processing, and film underwent drastic modification. Color became an established process. New lenses were developed that provided the medium with greater flexibility. The relatively recent development of holography, which provides three-dimensional photographs, has the potential for revolutionizing photography in the coming decades.

Cinematography, like photography, with roots in the 19th century, became common in the 20th century. Following World War I movies became popular, reaching their peak in the late 1940's and early 1950's.

The addition of sound, color, Cinema Scope, and Cinerama all contributed to the growth of movies. Decline in movie attendance in the 1960's and 1970's has been attributed to television, which represents a different lineage of communication media development.

The most striking developments in 20th century technology occurred in electrical communication. Within a few decades communication was transformed from limited point to point systems of the telegraph and telephone to the ubiquitious, immediate, flexible, and personal communication systems of today.

By 1900 the theoretical and experimental foundations of communication via electromagnetic waves had been established by Maxwell and Hertz. In 1901 Marconi demonstrated the practical significance of radio by transmitting over a distance of 1700 miles. The diode (rectification) and triode (amplification) made voice broadcasting a reality by the 1920's. The transistor and the integrated circuit, by permitting a reduction in power, size, and cost, further enhanced radio's popularity and potential in many fields of endeavor, although its social role has shifted since the 1920's.

The diode and triode vacuum tubes were manifestations of increasing control over electron flow. As this control potential increased and was refined, so did the application to more and more modes of communication. Television progressed from an awkward device based on mechanical scanning to a practical working system based on electronic scanning. The development of magnetic recording of both sight and sound added greater flexibility to television. Radar, sonar, television, and the electron microscope all grew out of the same basic technology. Innovations such as the transistor and electronic digital computer revolutionized control systems and affected most aspects of communication. Communication satellites facilitated instantaneous worldwide communication and in conjunction with lasers and computers opened vast new possibilities for communication and information systems in the future.

Power and Transportation

The major developments in power were the transition from water, wind, and the external combustion steam engine to the internal combustion engine and electric motors. Early developments of the internal combustion engine centered on stationary power plants. Later they were refined and applied to providing power for transportation where relatively light and compact propulsion systems were required. As efficiency increased, with the development of the diesel engine, railroads converted from steam to diesel and electric power. Marine transportation continued to be powered primarily by steam in the form of the steam turbine. The diesel engine replaced the reciprocating steam engine in moderate and small capacity marine transport. The diesel was also applied in land transportation to tractors and heavy duty on- and off-road equipment such as trucks and construction machinery. The reciprocating engine is still the dominant form of internal combustion. However, the turbine and rotary piston engine offer advantages in size, weight, and performance characteristics for some applications.

The gas turbine with a higher power-to-weight ratio was ideal for aviation. The gas turbine was developed for use primarily in marine and aviation transportation. It is the predominant power source for medium and large aircraft.

There has been an exponential growth in the generation and transmission of electricity. The small direct current generators of the late 1800's have been replaced by huge steam turbines that generate alternating current. While steam turbines constitute the primary form of electrical generation, hydroelectric generators are used where feasible. Nuclear power represents the greatest innovation in electrical energy generation since the advent of coal and oil steam generators. The heat generated from nuclear fission is being used to create steam to power turbines that generate electricity. The number of nuclear fission power plants increased rapidly during the 1960's. At the same time a great deal of research was directed to the refinement and the development of atomic fusion.

Increased production and refinement of the automobile was a major characteristic of transportation in the 20th century. Henry Ford's mass production techniques provided high quality and a low cost supply of cars for a quickly expanding market. Shock absorbers, electric headlights, self starters, power steering, automatic transmissions, and air conditioning were some of the developments that contributed to the continued growth and popularity of the automobile.

The 20th century witnessed the birth and growth of aviation. World War I stimulated the aviation industry, transforming it from small isolated enterprises into a major industry. Following the war transcontinental air routes were established and the commercial viability of air transport demonstrated. By the end of World War II the airplane was a metal framed, metal skinned monoplane. Planes were large, comfortable, safe, and well suited to the growing market of commercial transport. Since the 1950's the gas turbine has dominated propulsion systems on all large aircraft. Airlines have grown and the size of planes has increased, primarily because of the development of the gas turbine as the primary power source.

Like the airplane the helicopter is a 20th century development, obtaining lift and propulsion from overhead horizontally turning rotors. It has evolved from using conventional piston type internal combustion engines for propulsion to using the gas turbine. The vertical takeoff and landing characteristics offered obvious advantages over conventional airplanes for many applications. As helicopters increased in size, power, and speed, their range of application expanded from very limited personal transport to short range passenger service, troop transport, and as sky cranes for construction projects.

While pipelines can be traced back to ancient China, their use as a practical means of transporting mass is a contemporary development. The diameters, pumping pressures, and length of pipelines have been increasing steadily. Solids in the form of a slurry are being transported on a modest scale at present, and experiments are well advanced on capsule pipelines for the near future.

Possibly the most dramatic transportation development of this century has been that of the liquid fueled rocket. Following the experimental models of Robert Goddard and the V-2s of Germany, rocket development has moved toward greater thrust and improved guidance and control. New and improved fuels, more accurate mixing, larger engines, inertial guidance, and complex computer systems have combined to produce rockets that develop 7½ million pounds of thrust for launching large payloads into space.

Limited fossil fuels, congestion, pollution, and other factors have led to a number of novel transportation developments such as ground effect vehicles, linear induction motors, electric cars, and personal rapid transit systems. These developments and others hold promise for the future although of limited personal or commercial application to date.

Production

Twentieth century production systems bear little resemblance to production systems of the past. The primary factor in this evolution lies in extensive changes in the tools, machines, materials, and organization. Rationalization of production and the systematic organization of the manufacturing procedures were operationalized in mass production by the application of concepts such as precision measurement, standardization of parts, synchronization, continuity, and complete mechanization. Mass production, automation, and the space and energy programs all represent a new view of production systems, systems where all activities and processes are parts of a larger, integrated whole. Complementing the above changes was the birth and development of "scientific" management or the rationalization of labor. Frederick Taylor applied analysis of work sequences and the principles of efficiency and specialization in work design and the training of workers with astounding results in terms of increased productivity.

Changes in industrial organization brought about changes from small workshops of the 19th century to vast industrial organizations in the 20th century. In addition to changes in industrial organization numerous other changes occurred that affected production capability. Among these was the development of the industrial research laboratory.

While iron and steel remain the major industrial materials of contemporary society, they have undergone extensive changes in composition. Metallurgical research brought about a myriad of alloys such as stainless, silicon, and nickel-chromium steels. Other metals such as aluminum also came into prominence. Improved production and new construction techniques stimulated the use of concrete and glass as building materials. Materials such as plastics and synthetic rubber found numerous applications. Materials technology reached a stage of development in the 20th century when it became possible to list the characteristics for a particular material required by a given application and then develop the material to meet the specifications required.

In construction, larger buildings with more open space were made possible by the use of steel frames, glass, and elevators. The development of reinforced and prestressed concrete opened a whole new range of architectural forms and led to the development of prefabrication techniques. Substantial gains were also achieved in the design of large span bridges and arch dams. While wood-framed, custom-fabricated structures still account for the largest portion of residential housing, there is a growing trend toward mobile and modular homes. This trend represents one of the possibilities for solving a continuing housing shortage. The manufacture of mobile homes represents the application of mass production techniques to an industry that has stubbornly remained in the craft era.

Agricultural advances enabled the United States to move from a basically agrarian economy to an industrial urban society. The wholehearted acceptance of scientific agriculture since the 1940's has been responsible for what might be termed a second agricultural revolution. The successful application of genetics to livestock and plants was the pivot upon which this revolution turned. The development and use of synthetic fertilizers, insecticides, and herbicides contributed greatly to quantitative and qualitative gains. Increased mechanization, symbolized by the tractor, reduced manpower and speeded production. Fast freezing, dehydration, and freeze drying added new dimensions to food preservation. For the future, improvements along conventional lines seem most feasible. However, continued population growth will require improved efficiencies in agriculture. Soilless farming techniques such as aquaculture and hydroponics, among others, have been explored and may offer solutions.

THE INDUSTRIAL ARTS CURRICULUM SINCE 1900

As the technological environment became increasingly complex with developments in power and transportation, production, and communication systems, the need for relevant educational experiences was realized. However, not all efforts designed to meet the needs of citizens for living in an increasingly complex society identified the real problem. Consequently, various programs were proposed, developed, and promoted for various reasons. One of the first efforts to provide an educational program that recognized the need for change in the public schools was manual training. Manual training evolved to what became known as manual arts, and by 1900 had become a significant educational program that enabled students to become familiar with the craft processes of the time.

Educational leaders promoted the importance of manual arts as part of the curriculum for general education. In the process of the curriculum evolution a new name was proposed – industrial arts. The new name began to find acceptance after about 1910. Along with the new name came a broadening of philosophical viewpoint that suggested industrial arts programs should include the study of industrial materials and processes in addition to the development of manipulative and craft skills that were stressed in manual arts programs.

Industrial arts course offerings in the 10 years from 1910 to 1919 reflected little of the changing technological and political climate in America. Most programs were very limited in scope. The three courses commonly found in industrial arts programs at both the college and public school level were woodworking, metalworking, and drawing. Occasionally other courses were included with the traditional "benchwork" courses. Courses in ceramics, basketry and weaving, for instance, were taught at the Florida College for Women, circa 1917, for those planning to teach in elementary schools.

Mobilization for World War I and increased demand for consumer goods put emphasis on technical and industrial skills. Workers often found backgrounds in mathematics and science helpful in their new employment (Cunningham, 1969, p. 27). High schools were called upon to provide special training for students approaching military age. Government and curriculum planners suggested emphasis be placed on training in the areas of automotive, machining, metal fabrication, forging, electrical, building, and drafting (Barlow, 1967, p. 241).

However, a review of the data collected for this chapter indicates that courses in graphics, electricity, and automotives were not available until the 1920's, and then only at the college level in a few schools in the Eastern and Central regions of the United States. The acceptance of industrial arts as a valuable part in the curriculum occurred during the prosperous 1920's despite almost constant internal problems within the industrial arts profession on the clarification of goals and objectives. It is highly probable that the dynamics of the profession at this time broadened the curriculum base to include courses that would not otherwise have been developed for some time. However, political, economic, and social influences were more primary in the consideration of changes in industrial arts curricula than technology.

Surprisingly, industrial arts curricula remained reasonably stable through the economic depression of the 1930's. Pennsylvania and New York suggested courses in electricity and automotives in addition to the basic courses in woodworking, metalworking, drawing, and printing offered in some public school programs.

The study of industry from other than a manufacturing process or material perspective became available during this decade. At least one teacher preparation institution, Stout State College, 1930-1936, offered courses in industrial technology and the history of labor organizations.

The era of mechanization in industrial plants in the United States was at its height during the 1940's. Increased war production and research created many innovations in industrial technology. New demands were made on educational institutions for courses in aeronautics, electronics, and power. Between 1940 and 1950 courses in electricity, automotive, or electronics were either offered at the college level or suggested for public schools. Courses in aviation were not mentioned until the 1950 era when a school guide of an Eastern public school region for the state of New York, and a Southwest Texas State Teachers College catalog listed courses. Others were undoubtedly offered earlier and in other locations. However, this field of transportation never received any wide or sustained interest by the industrial arts profession. Traditional courses in wood, metal, and drafting were the mainstay of the industrial arts curriculum during the period 1940-1950, supplemented with new techniques for processing materials that developed during that period.

Typically, the end of World War II brought readjustments for the manufacturing industry. Aside from inventories of raw materials being at a minimum, American industry had to retool operations from war-time to normal production, develop new materials, and invest in research and development programs (Cunningham, 1969, p. 29). These factors, along with increased demand for consumer products and technical innovation, stimulated the age of automation.

The post-war period brought renewed interest to the development of industrial arts programs. One unique curriculum during this period was proposed in a guide to teaching industrial arts in the secondary school prepared by the Florida State Department of Education (1948). The purpose of this guide was "to present a number of the major educational needs in an age of technology, during which the science of industry has become a dominant element in our national life" (Preface). The "new" proposed curriculum structure for industrial arts was based on the study of technology with manufacture, construction, transportation, power, and communication as major components. It would be difficult to determine what courses were actually taught in the public schools of Florida based on the guide. The guide suggested learning experiences intended to enable students to develop insights into the technological complexity of the world community.

It was during the 1950's that industrial arts curriculum leaders became aware of increased educational requirements for (a) the technological literacy of citizens, and (b) employment skills in an advanced industrialized world of work. According to the survey, the beginnings of a trend for a broader, more uniform curricula across the country became apparent. Courses in electricity, automotive, and power mechanics became established offerings in some programs at both the public school and college level. New courses in plastics, photography, aviation, electronics, and transportation were created along with courses related to industrial production. The late 1950's and early 1960's, however, ushered in nationwide activity in curriculum assessment and development.

The metamorphosis of industrial arts curriculum during the 1960's was as monumental as that of any other discipline in public education. This era was marked by the development of programs to study all elements of modern American industry. Course offerings in public schools and state curriculum guides reflected an effort to make industrial arts education relevant to the needs of modern society. Along with technically related courses, various sequences or groupings of courses became available in teacher preparation institutions as evidenced by those offered in the Division of Industrial Arts and Technology, State University College, Oswego, New York. New elective courses and an increasing breadth of general offerings enabled sequences such as (a) general education, (b) professional, and (c) technical specialization to be developed. During this expansive trend in curriculum development more and more courses focusing on the study of technology and society became available.

A significant survey of industrial arts education programs, teachers, students, and curricula was conducted during the 1962-1963 school years by Marshall L. Schmitt and Albert L. Pelley. Although much of the information contained in their study is important, perhaps the data most relevant to this chapter were the 76 course titles submitted by the respondents. These titles were grouped into 16 classifications as shown in Table 1 (Schmitt & Pelley, 1966, pp. 21-22).

Of the 16 course classifications identified, four courses enrolled 82.5% of all students taking industrial arts in the 202,000 classes reported for the 1962-1963 school year. Enrollment in the four classes was as follows: 27.7% general industrial arts, 21% woods, 19.5% drafting, and 14.3% metals (Schmitt & Pelley, 1966, p. 22).

Throughout the 1960's the implementation of new curricula plans across the United States occurred with varying degrees of success. By the end of the decade an inquiry into the further broadening of the curriculum began with the recommendation that technology, including its effects on society, be adopted as a discipline base for industrial arts.

Table 1
Type of Industrial Arts Courses in Public Secondary Schools: United States 1962-1963

1. General Industrial Arts	10. Photography
2. General Woods	11. Ceramics
3. Drafting	12. Industrial Arts Mathematics and Science
4. General Metals	
5. Graphic Arts	
6. Electricity/Electronics	13. Plastics
7. Crafts	14. Textiles
8. Power Mechanics	15. Transportation
9. Home Mechanics	16. Other

Analysis of the data for this chapter indicates that a full range of technical courses in materials and processing, visual communication, and the mechanical and electrical areas existed in the early 1970's at most teacher preparation institutions. An increase in programs studying industrial technology and related courses was evident, as was the development of programs for the study of technology exemplified by the program initiated at West Virginia University in 1970.

By 1977, continued refinement in materials and processing courses was the major emphasis of industrial arts courses at the junior high and middle school. Advanced technical courses with some courses offered in what was termed industrial technology were part of the developments taking place in industrial arts curricula at the senior high level. A slight increase in the number of courses in the area of technology and society at the undergraduate teacher preparation level (Eastern Illinois University, Southwest Texas State College, Western Washington State, among others) was noted, signifying an interest and concern about the interrelated issues of technological development and social change.

SELECTED ILLUSTRATIONS

The comparison of industrial arts curricula to levels and types of technological developments to determine relationships and/or discrepancies between school programs and the real world of technology was based upon selected illustrations of developments in transportation, production, and communication systems during specific periods of time. In addition, the analysis includes a synopsis of the thinking of industrial arts educators about industrial arts curricula represented by articles that appeared in professional journals.

Table 2
Selected Technological Developments from 1900 to Present

	Transportation	Production	Communication
1900-1910	Airplane	Plastics	Intaglio Printing
1911-1920	Diesel Engine	Stainless Steel	Sonar
1921-1930	Power Steering	Antiknock Fuels	Micro-recording
1931-1940	Jet Engine	Prestressed Concrete	Coaxial Cable
1941-1950	Helicopter	Electronic Process Control	Transistor
1951-1960	Hovercraft	Float Glass Process	Electronic Computer
1961-1970	Containerization	Electronic Automation of Machine Tools	Liquid Crystals
1971-Present	Personal Rapid Transit	Electrochemical Machining	Microcomputers

Ten year time periods were used in the analysis. Influences and/or discrepancies existing between what was being taught at a given time, the technology existing in society at the same time, and the perception of industrial arts educators can be ascertained from the following data.

Table 2 illustrates the major technological developments selected as representative of the time period for each of the three technical systems from 1900 to the decade of the 1970's.

The following format has been used to present the analysis of relationships and/or discrepancies between technology and curricula at a given time. For each decade a selected development is described for each of the systems: Communication, Production, and Power and Transportation. This description is followed by a summary of the types of articles appearing in professional industrial arts education journals.

1900-1910 Decade

Communication. Photo-engraved intaglio printing is printing from a depressed surface created by photo-engraving. This process provides high quality over long printing runs. It is generally employed when exact duplication is required (postage stamps, currency) or in runs of one-half million or more at which time it becomes economically feasible (large catalogs, newspaper supplements).

Production. Plastics are a polymeric material (usually organic) of large molecular weight that can be shaped by flow (*Dictionary of Scientific and Technical Terms,* 1974, p. 1132). On the basis of cubic inch production more plastics are produced than all non-ferrous metals put together. The increasing use of plastics is due to their wide range of properties. For example, they can be made to provide specified strengths and resistances; molded into products and parts, extruded, used for coatings, foamed, laminated, cast, and formed (*Cowles Encyclopedia of Science, Industry and Technology,* 1967, p. 419).

Power and transportation. An airplane is a heavier-than-air engine powered craft that obtains lift from the action of air against fixed wings. Airplanes are the fastest means of atmospheric transportation and have significantly altered today's concept of distance. Airplanes are a major element in any transportation system, accounting for 10% of the passenger miles traveled in the United States. Business depends on air-mail service, and many industries ship products by air. Airplanes are also employed for agricultural spraying, fighting forest fires, emergency air rescue, and as a major weapon of war (*World Book Encyclopedia,* 1977, p. 201).

Professional journal analysis. An analysis of articles that appeared in the *Manual Training Magazine* during this decade illustrates what was considered relevant by the profession and met the publication standards of the time. In the present analysis an attempt is made to match articles to one of the three systems of technology. Obvious discrepancies occur. For instance, the only articles that related to production systems of industry and technology were "Book Racks with Metal Attachments," "Rating of Constructive Work," and titles such as "A College Credit Course in Machine Shop Work." Curricular considerations in production included "Methods and Arrangement of Subject Matter in Grammar School Woodworking" and "Industrial Training in the Grade Workshop." "The Construction and Flying of Kites" could be an article with implications for transportation as well as for production, depending on emphasis. The more common articles were related to production. Examples are "A Problem in Wood Turning Equipment," "Adaptability of Work in Cold Metal to Educational Needs" and "Cooper Work as a Recent Development in the Manual Arts."

Articles related to communication systems were "Mechanical Drawing in the Public Schools," "Simplified Mechanical Perspective" and "Outline of a One-year Course in Mechanical Drawing for High Schools." Articles that dealt with other areas of visual communication were "Design in the Manual Training High School," "Pencil Sketching from Nature" and "A School Print Shop."

1911-1920 Decade

Communication. Sonar is "a system that uses underwater sound, at sonic or ultrasonic frequencies, to detect and locate objects in the water or for communication" (*Dictionary of Scientific and Technical*

Terms, 1974, p. 1380). Originally developed for locating submerged submarines, it has been extensively used in peacetime for locating fish, determining water and ice depth, and plotting the ocean floor.

Production. Stainless steel is a steel alloy containing chromium and nickel. Stainless steel has a marked resistance to corrosion and stress at high temperatures. It has been applied to almost every area of metallurgical need. The first applications were in the chemical industry – followed by high cryogenic temperature applications. The significance of stainless steel is also reflected by its wide range of applications such as structural members, cutlery, surgical instruments, spring and nonmagnetic equipment, and ornamental decoration in modern architecture.

Power and transportation. An internal-combustion engine that burns a light oil by means of compression ignition is called a diesel engine and was named after Rudolf Diesel, the inventor. Compared to the gasoline engine, the diesel is more efficient, sturdier, longer lasting, and uses a slightly less expensive fuel. The diesel engine has found widespread use in marine, locomotive, truck, and stationary applications.

Professional journal analysis. The *Manual Training and Vocational Education* magazine of 1913 through 1917, responded to the perceived needs of the profession by publishing the following articles.

Cement and concrete were highlighted as the new material for educational focus by articles such as "An Investigation of Cement and Concrete," "Relationship Between Content and Manipulation Illustrated by Work in Concrete," "Brick and Their Joints," and "Practical Concrete Work in the Grammar Grades." Woodworking and wood-related articles grew in popularity with as many as 19 represented in four years of publication. Titles such as "Furniture Design and High School Furniture," "Construction of a Guitar," "The Place of the Abstract Exercise in Woodworking," "Woodwork in Rural Schools," "Carpentry and Construction," "High School Woodworking," "Coping Saw Work with an Added Interest," and "Cutting Tapers on a Jointer" filled the magazine pages. In addition to woodworking there were articles on metalworking, weaving, and needlepoint that could be classified in the category of production. Examples include "Metalwork with Inexpensive Equipment for the Grammar Grades and High Schools," "Cane Weaving," "Simple Upholstery," "Reed Weaving," "Sheet Metalwork in Spokane, Washington," and "Presenting Machine Shop Work to Students."

Mechanical drawing, architectural drawing, and design dominated the themes of articles that could be classified in the category of communication. The titles of articles included "Design Applied to Needlework," "Method of Presenting Mechanical Drawing," "Presentation of the Working Drawing to the Grammar Grade Pupils," "Keeping up

Interest in Drawing," "Lettering," "A Study of the Relative Values of the Factors Involved in Mechanical Drawing," and "Introductory Problems in Architectural Drawing." The topic of printing was becoming popular as an industrial arts subject as shown by these titles: "Possibilities of the Printing Department in the School," "Course in Typography, Proofreading and Copy-Editing," "Printing as a Manual Training Subject," "Commercial Conditions in a School Print Shop," and "The Teaching of Printing."

Beyond farm mechanics, the area of power and transportation included a variety of topics. A few articles on electricity and electrical applicances appeared during the 1913-1914 school year followed by titles more related to the area of transportation. "A Study of Gas Engines in High School," "New Automobile Course," and "A School Gas Engine" are representative.

1921-1930 Decade

Communication. Microreading is "the process of producing a transparent photocopy at a reduction sufficient that optical enlargement is required for normal reading and with resolving power sufficient for accurate recording of textural and tonal detail" (*Encyclopedia of Science and Technology,* 1977a, pp. 161-162). The primary assets of microrecording are light weight and compactness providing a great economy of space, which has proven critical in light of the information explosion.

Production. The addition of antiknock compounds (tetraethyl lead) to gasoline eliminated premature and uneven ignition. Antiknock fuels permitted higher compression ratios yielding more efficient engines when evaluated on the basis of power and fuel economy.

Power and transportation. "Power steering is the descriptor used for a steering control system for a propelled vehicle in which an auxiliary power source assists the driver by providing the major force required to direct the road wheels" (*Encyclopedia of Science and Technology,* 1977b, p. 110). Although first developed for military vehicles, power steering was quickly applied to commercial and, later, personal vehicles. It has been estimated that power steering has increased the productivity of commercial vehicles by 20%. Power steering is a necessity on heavy equipment such as dump trucks, loaders, and graders. When applied to passenger cars, it has reduced driver fatigue and improved vehicle safety (*Encyclopedia of Science and Technology,* 1977b, p. 111).

Professional journal analysis. The *Manual Training Magazine* of 1920 and the same publication known as the *Industrial Education Magazine* (1923 and 1928) revealed some of the thinking of the time. The reorganization of the magazine offers readers articles by departmental categories (1923 and 1928).

Articles related to the area of production were represented by the following: "Wood Engraving in a Boston School," "Farm Blacksmithing," "The Cabinet Makers," and "Instruction and Production in Machine Shop Classes." Additional titles appropriate for this category were found under the "departmental article index" that consisted of the following 10 departments: art crafts, auto mechanics, electrical work, farm mechanics, mechanical drawing, metalworking, plans and equipment, printing and bookbinding, wood and metal finishing, and woodworking. The 1923-1924 index contained the following titles. There were 17 metalworking titles of which the following are representative: "A Miniature House as an Aid in Teaching Sheet Metal Work," and "A Line Machine Shop Project." A variety of metal project ideas were also published. Seven articles on wood and metal finishing complemented 41 articles listed under woodworking. Most of these articles were project ideas while others implied related interests. These were "How Many Planes Should We Have in the Shop?," "Solving the Glue-Heating Problem," and "Learning to Recognize Specimens of Wood."

The 1928-1929 index excluded departmental classifications of art crafts, plans and equipment, farm mechanics, printing, shop departments, and toys. The area of woodworking contained by far the greatest interest with 39 articles and project ideas.

The area of communication technology was typically represented by articles of mechanical drawing and printing. However, the 1920-1921 index listed the following: "Suggestive Course in Photographs from Everywhere" and "Lettering." Also included were "Linoleum Block Printing," "Changes in the Teaching of Mechanical Drawing," and "Modeling Clay in the Mechanical Drawing Room." The trend for interest in mechanical drawing continued with "Architectural Drawing in a Junior High School" and "Facts of Possible Interest to Instructors in Architectural Drawing."

The printing and bookbinding department articles of the 1923-1924 magazines consisted of 17 articles, some of which were "A Printing Course of Study," "A Co-operative Project in Printing," "Bookbinding, A Fine Art," and "The High School Print Shop." The 1928-1929 departmental article index listed 14 titles under mechanical drawing and 11 titles under printing.

Power and transportation technology were represented during this decade under the subject areas of electrical work and auto mechanics. The 1923-1924 index listed 11 titles under the auto mechanics classification, three of which were "A Course in the Care and Repair of the Modern Automobile," "A Method of Teaching Generator Repair," and "Planning the Work in a School Service Garage." In the same year there were 11 articles about electricity. These were represented by "The Test Lamp Points," "How to Make an Electrical Soldering Iron," and "An Inexpensive Motor as a High School Project." Proceeding to the 1928-1929 publication of *Industrial Education Magazine,* seven articles were concerned with auto mechanics and eight articles with electrical work. Typical of the titles of the auto mechanics articles were "A Demonstration of Radiation for Automobile Class" and "Outline of Nine-Week 'Try Out' Course in Automobile Mechanics." Under the electrical work classification articles were published on "Symbols for Use in Electrical Shops" and "The Inside Wireman Electrician." The remaining titles under these two classifications referred to projects and instructional aid ideas.

1931-1940 Decade

Communication. Coaxial cable is a two-conductor transmission line with an outer metal tubes or braided shield concentric with and enclosing the center conductor (*Encyclopedia of Science and Technology,* 1977a, p. 259). Coaxial cable provides a broad band communication path much more efficient and compact than conventional land and undersea lines.

Production. Prestressed concrete is concrete that has been compressed while setting by means of tautly drawn steel rods or wires that extend through it; when sufficiently bonded to the concrete, the wires are cut, releasing their tension and compressing the concrete longitudinally (*Encyclopedia Britannica,* 1974, p. 65). The purpose of prestressing is to reduce or eliminate cracking and tensile forces. The process represents the most important innovation in structural materials for masonry construction after reinforced concrete. The major advantages include increased strength and resulting economy by lighter designs. The technique has been especially used in bridge building.

Power and transportation. The jet engine is a result of the application of direct thermal thrust by means of turbine-driven jets. When applied to aircraft, the jet engine eliminated the inherent speed limitations of prop-driven aircraft (approximately 550 mph) and facilitated the breaking of the sound barrier. The jet engine doubled aircraft speeds within a decade and constantly increased the altitudes at which planes could fly.

Professional journal analysis. The decade of the 1930's provided an interesting collection of articles in the *Industrial Education Magazine.* A review of the indices of the 1935 and 1939 issues provided an overview of the trends in professional education at the time.

The production category contained titles represented by "Bookstand for the Drawing Board," "Metals of Construction," "Shop for Sheet Metalwork," "Woodworking Terms Every Boy Should Know," and "Metalcraft as an Educational Medium in the Industrial Arts Program." Other titles in this area provided additional project and method hints.

Typical articles in the communication area were "A Corrected Drawing-Fan Pulley," "Teaching Mechanical Drawing in the Junior High School," "Automatic Tee-Square," and "Lettering Must be Taught." The content area of printing and graphic arts was represented by the following articles: "The Linotype in the School Print Shop" and "General Shop Printing." The title "Industrial Arts Radio Broadcast" also appeared.

Auto mechanics and electricity were the focus of articles in both the 1935 and 1939 issues relating to transportation and power. Titles such as "The Future for Automobile Mechanics," "Automotive Electrical Troubles," "Overhauling the Generator," and "Aviation Education and American Youth" were listed. Topics on electricity consisted of "Contract Plan Applied to the Teaching of Elementary Electricity," "Teaching the Use of Electrical Appliances," and "Radio as Part of a Teaching Training Program."

A number of articles were addressed to the issue of industrial arts and the role of public education.

1941-1950 Decade

Communication. A transistor is "an active component of an electronic circuit consisting of a small block of semiconducting material to which at least three electrical contacts are made" (*Dictionary of Scientific and Technical Terms,* 1974, p. 1527.). A transistor can perform most of the functions of a vacuum tube and many others not possible with the older device. Transistors have revolutionized the construction of electronic devices. Among their advantages are small size, light weight, mechanical ruggedness, long life, and operation at low voltage with relatively high efficiency. A transistor requires no filament current, resulting in higher efficiencies and less heat generation than the vacuum tube.

Production. Process control is the use of an electronic apparatus to control a process involving a number of separate operations continuing in sequence, each for different time periods (Baker, 1976, p. 100). Process control has been instrumental in the switch from batch to continuous processing. It has permitted more complex processing in greater quantities with considerable gains in quality and safety.

Power and transportation. A helicopter is a wingless aircraft that obtains lift and propulsion from overhead horizontally turning rotors. Helicopters can take off and land vertically; they can hover and move in any direction (*Encyclopedia of Transportation,* 1976, p. 122). Helicopters are widely used for short range passenger transport (100 miles or less). They are also valuable for agricultural spraying, observation, survey, police, ambulance and rescue work, carrying supplies and transporting heavy mining or other gear to remote areas inaccessible by road.

Professional journal analysis. The *Industrial Arts and Vocational Education* magazine began publication prior to this decade. This title change represents one of the many shifts in publication philosophy shown dramatically by Edward White in another chapter in this yearbook.

The departmental classification of articles was broadened by the 1945 edition of the magazine. Along with the addition of several "methods" classifications, the content areas included articles on aeronautics and radio in addition to the previous woodworking, printing, metalwork, machine shop, electricity, design and drafting, and auto mechanics. Typical articles were "Aluminum Handled Screw Driver and Mold," "Eye Troubles of Machinists," "Heat Treating in the School Shop," and "Low Temperature Welding." Other machine shop and metalworking project ideas were represented. Some of the 55 articles classified in woodworking in the 1945 edition of the magazine included "Combination Planning of a Work Station for Industrial Arts," "Nail and Screw Cabinet," "Wood-carving Scraper," and many other projects and activities.

By 1949, the area of ceramics and plastics was included as a major departmental classification with 15 articles. Project ideas dominated, but some curricular implications existed and are illustrated by articles titled "Expanding Curricula with Industrial Arts Plastic Course" and "Plastic in the Industrial Arts Shop." A total of five leatherworking articles were represented in both the 1945 and 1949 editions.

The category of communication changed slightly with the addition of a few new departmental areas. However, architectural and mechanical design and drawing retained the most exposure. The 1945 editions contained 23 articles in the category including "The Designer of Today," "Orthographic Projection," "Tracing Made Easy," and "The School Handbook and Mechanical Drawing." Project ideas and teaching aids completed the area. The 1949 editions carried titles such as "Drawing Board Support for the Woodshop" and "Two Dimension Plate Centering." Printing related articles gained in number with "Photographic Duplication Without a Camera," "Relationship of Skills to Projects," "School Newspaper Production," and "Silk Screen Stencil Printing." These were representative of the 24 articles on printing appearing in the 1945 editions. Two articles appeared in the same year on the topic of radio, with two more in the 1949 editions. One article entitled "Photography" appeared in the May 1949 issue of the *Industrial Arts and Vocational Education* magazine.

Power and transportation areas grew in diversity with articles in the categories of aeronautics, auto mechanics, and electricity. The 1945 and 1949 editions listed a total of 14 articles on these topics. Some of these articles were "Airplane Sheet-metal Shop," "Glider Training and Its Place in the Public Schools," "Propeller Construction," "Aircraft Starters and Motors Test," and "Syllabus in Aircraft Drafting." The 1945 and 1949 editions included only four articles on auto mechanics, two of which were "The Vacuum Gauge" and "Elementary Auto Mechanics." A surprisingly large number of articles on electricity were printed in the publications of 1945 and 1949, 11 and 14, respectively. Some titles were "Combination Power Supply," "Electrical Test Board," "Two Tests on DC Machines," "Economy Plug-in Devices," and "Gold Electroplating Displaced by New Rolling Process."

1951-1960 Decade

Communication. An electronic digital computer is a device that receives and processes discrete data by performing arithmetic and logic processes of these data. This development has revolutionized the field of information processing and has had a significant impact on numerous areas such as accounting, engineering design, computation, modeling, navigation, automation, telephone switching, and typesetting.

Production. The float glass process produces a transparent glass, the two surfaces of which are flat, parallel, and fire polished so they give clear, undistorted vision and reflection. The process consists of floating a ribbon of hot glass on a heated liquid of greater density than the glass (Collocott, 1971, p. 468). The process produces glass of thicknesses greater than that possible by the Continuous Vertical Draw process. Its optical properties are equivalent to glass that formerly required expensive grinding and polishing. This results in economy of space as well as of manufacturing.

Power and transportation. A hovercraft is a machine supported by a layer or "cushion" of air in contact with the ground. The craft is completely amphibious and very versatile. It can operate from small coves and beaches and does not require deep water ports or anchorages. Hovercraft are extremely fast. They are immune to torpedoes and mines and undetectable by sonar. Hovercraft have found commerical success as a means of rapid ferry transport (*Encyclopedia of Transportation,* 1976, p. 14).

Professional journal analysis. The *Industrial Arts and Vocational Education* journal articles of the decade of the 1950's reflected a renewed interest in the popular areas of the 1941-1950 era. Mechanical drawing, metalworking, and woodworking articles increased in number while the appearance of a few new areas of content was reflected in articles classified as radio, television, electronics, and graphic arts.

More specifically, the production area reflected the new professional awareness of the industrial material and process capability of plastics. Articles on the topic included "Design in Plastics" and "Polyester Cold-Setting Plastics in the School Shop," along with numerous project ideas. Machine shop project ideas were presented in a few articles while 37 articles in 1955, and 29 in 1959 displayed interest in metalworking. The majority of articles were project ideas such as "Aluminum Tie Clip," "Picturesque Night Lamp," and "Camping Icebox." A few methods and curricula related articles were published. Included were "How to Pour Off Molds," "General Metals Course," and "Mathematical Method for Laying Out Sheet Metal Pipes." The few weaving articles published in 1955 and 1959 were overshadowed by the 102 articles on woodworking, 54 of which were published in 1955. Many project ideas were presented in these articles. "Book and Letter Rack," "Television Lamp," and "Modern Bedside Table" were representative. Some of the shop hints and method articles included "Basic Woodwork Tool Kit" and "Mass Production in the Small Shop."

The communication system category was again dominated by architectural and mechanical design and drafting articles along with articles on printing. In the 1955 editions these categories contained about 10 fewer articles than published a decade earlier. Some of the titles were "Chalkboard Compass," "Drafting Machine," "Let's Make Drafting Realistic," and "Shop Layouts." In 1959 the following articles appeared: "Instructional Units in Highway and Topographical Drafting," "Method of the Industrial Designer," and "Ways to Teach I. A. Design." Printing articles in 1955 conveyed information on the topics of "Color Block Prints from One Block," "How to Monotype with Lithographic Crayons," and "Lithography Demonstration." Only two articles on printing appeared in 1959. They were "Basic Terminology of the Printing Industry" and "Name Card and Personalized Napkin."

The 1955 edition contained two articles on photography, one article on radio, one article on television and one article on electronics. The classification of graphic arts appeared in the index of 1959 editions with only one article for that year.

Auto mechanics, aviation, and electricity were the classifications categorized as power and transportation content areas. Considering both the 1955 and 1959 editions, there were only six auto mechanics, one aviation, and 23 electricity articles for the two years. Some of the titles were "Gear Shift Instructor," "Car Top Carrier," and "General Auto Shop for the High School." The single aviation article was "Aviation Projects for Industrial Arts." Many of the electricity articles were project ideas. However, others concerned topics such as "A Circuit Comprehension Test," "Development of Electronics," "The Volt," "Electrical Test Panel," and "Radio Frequency Measurements of Capacity and Inductance."

1961-1970 Decade

Communication. Liquid crystals are defined as "organic compounds that within a limited temperature range or given concentration range of a solvent, possess a metamorphic phase between solid and liquid in which their molecules arrange themselves in an ordered pattern" (Baker, 1976, p. 80). The unique properties of liquid crystals offer great potential for applications in the field of electronics. When produced in films, they are inexpensive and may be operated with small amounts of power. Research is being conducted in a number of applications such as television screens, readouts, computer storage, optical character recognition, crack detection, and light amplification.

Production. Automation was a development that enabled the operation or control of machinery by automatic apparatus using digital data. This development significantly increased the rate and quality of production. It has also had the effect of reducing the number of skilled production workers.

Power and transportation. Containerization is a cargo-moving technique in which cargo is placed in large standardized containers, such as truck trailers, to facilitate handling. Containerization has become a major factor in ocean shipping because of its reduction in transfer time and cost. For example, a container may leave a factory by truck and be transferred to a barge, then to a railroad, next to a truck, and finally to a ship. The cost and time expenditure of the above transfer for uncontainerized cargo would be significantly higher than that of containerized cargo (*Encyclopedia Britannica,* 1974, p. 109).

Professional journal analysis. The 1965 annual index to *Industrial Arts and Vocational Education* displayed a shift in article classification. Sub-groups of related topics were established as independent classifications. For example, furniture making and foundry were created as independent interest areas apart from wood and metalworking. The area of graphic arts contained the once separate categories of printing and photography.

Woodworking, by far, still retained the highest number of articles in the publication, with 52 titles in the 1969 index. Many of the woodworking articles were project ideas such as: "Danish Modern Footstool," "Colonial Nut Bowl," and "File Case." Some method articles were "Finishing Philippine Mahogany," "Man-made Materials: Laminated Wood," "Matching Plastic Wood," and "What's Happening in Wood Construction." Also, a few research articles appeared in the 1969 annual index entitled "Studying Moisture's Effect on Woods" and "Testing Protective Coatings." The area of ceramics and plastics had 10 and 6 articles listed, respectively, in the 1965 and 1969 annual indices. Production related articles found an additional category in mass production, with articles such as "Mass-Produced Lamp" and "Six Hundred Clothespin Note Holders" representative of the six articles that appeared in the two years analyzed. Thirty metalwork articles appeared in 1965, some with the following titles: "Antique Effects on Metal Tooled Work," "Die-Cut a Bank," "Improved Sheet-Metal Drilling," and "Welded Lawn Table." Similar articles appeared in the 1969 edition along with machine shop entries entitled: "Chucking Threaded Component" and "A Torque Driver," along with a few others. The two years also contained six articles relating to welding.

Topics considered to be related to communication systems appeared under the categories of design and drafting and graphic arts during the two years reviewed. Some of the titles listed under design and drafting were "Children's Play Furniture: A Versatile Design Problem," "Is a Nationwide Drafting Test Possible?," "Orthographic Projection," and "Computer Application and the Super Ellipse." Additional topics covered were "An Integrated Design Activity" and "Making Descriptive Geometry Practical." The 1965 graphic arts category contained 17 titles. Four of these titles were "Control and Testing of Papers and Inks in the Print Shop," "Printing Containers With Screen Process," "Seventh Grade Students Research the Technology of the Printing Industry," and "Teach Electrotyping by Demonstrating Electroplating." "The Disposition of Printing Production" and "How to Print an Envelope on the Platen Press" were two of the nine articles pertaining to graphic arts in the 1969 editions of the *Industrial Arts and Vocational Education* magazine.

The technical area of power and transportation included the index classifications of auto mechanics (1965) and auto service (1969), aerospace education (1969), electricity-electronics and power mechanics (1969). The single aerospace article listed in 1969 was "Spin-Off from Space," listed under this category because of the relationship of the previous aviation classification. The auto mechanics/service area contained nine articles represented by these titles: "Inexpensive Surfacing Plate," "Paint Cart," "Transparent Working Carburetor," and "Diesel Programs for Industrial Arts." Of the two years sampled for this decade, there were 26 articles related to electricity-electronics. Some of those articles were "Electricity Test Problems," "FM Transistor Phone Oscillator," "Winding of Helical Springs," "Working with Microwaves," "A List of Electronics Periodicals," and "Which Battery to Choose." The 1969 power mechanics area contained three articles. They were "Applied Power Does Things Faster: A Rationale for Power Instruction," "Teaching Industrial Arts Power: What is it Today and What Tomorrow?" and "Power and Plastics at Morehead."

Various curricula ideas and content area related articles were listed under the title classifications of industrial arts, industrial education, industry studies, technical education, and vocational education.

1971-1978

Communication. A microcomputer is an extremely small computer (smaller than a minicomputer) whose subsystems are composed of large scale integrated chips. A microcomputer permits previously unknown flexibility because of the interchangeability of its systems.

Microcomputers are growing rapidly in popularity. At present they can be found in digital wrist watches, portable calculators, controls in microwave ovens, electronic games, traffic lights, and all types of scientific and medical instruments. They measure the flow of fuel through gas station pumps, control telephone switching devices, and prepare bank statements. Electric typewriters, refrigerators, and washing machines are only a few examples of planned applications for the immediate future (Bylinsky, 1976, p. 140).

Production. Electrochemical machining is a process of controlled corrosion in which machining is achieved by the removal of metal by anodic dissolution. The piece of metal to be shaped is made the anode, and the metal tool is made the cathode. They are connected to a source of low voltage direct current and a strong electrolyte is pumped between the two electrodes. Without any contact, metal is removed from the workpiece in a pattern established by the shape of the tool (Hoare & LaBoda, 1974, p. 30). Electrochemical machining can be used on high strength alloys where conventional machining is impossible. The process is not affected by the hardness of the material and it can yield complex shapes impractical to obtain by grinding. In addition, electrochemical machining does not produce work hardening or induce stresses.

Power and transportation. Personal rapid transit (PRT) is a completely automatic system consisting of a combination of small, low speed vehicles that operate on protected guideways and respond to traveler demand. PRTs are feasible for medium-density areas where it is not economical to build, maintain, and run a complex, large-scale transit system. This type of system eliminates the problem of low patronage on the off-hours, and escapes wage escalation. A PRT also places about 10 times as much of an urban area within walking distance of stations as a rapid-rail system for the same number of dollars (Hellman, 1974, p. 109). The service-on-demand mode of operation makes the system more competitive with the automobile than with other forms of public transportation in terms of commuter appeal.

Professional journal analysis. The *Industrial Education* journal of 1975 contains an interesting series of nine issues. The first five issues carried articles on careers and on the future as well as on a collection of other topics. However, beginning with the September 1975 issue, the table of contents was divided into four general classifications: (a) general interest, (b) materials and processing, (c) power and energy, and (d) visual communication, and excluded the series of future and career articles.

The technical area of communication was dominated by articles on drawing and graphic arts. Four of the 10 titles were concerned with drawing. They were "How to Make a Perspective Drawing an Easier Way," "Models Add Realism to Your Drafting Class," "Scales on

Drafting Machines," and "Simplify Math for Oblique Projections." Some of the graphic arts titles included "Build a Cylinder Silkscreen Unit," "Where Are We Today in Graphic Communications?," "Simplified Color Separations," and "Color Slides for Beginning Graphic Arts Students." Also, "The Decibel" and "Update a Time-Tested Project to Introduce Optoelectronics" were articles related to the category of communication.

The production area was represented by titles with the familiar topics of wood and metal: "The Turned Platter," "Build a Metal and Glass Table," "A Device for Pouring Hot Metals," "Wood Science is the Name and Learning is the Game," and "A Coffee Table from Recycled Wood." Other materials and process ideas were presented in titles such as "Matched Molding for Fiberglass Products," "A Watering Pot Made of Acrylic Plastic," "NC or Not NC?," and "Metallurgy – Heart of Modern Metalworking."

Transportation and power related articles consisted basically of the following: "A Low Cost PC Board Fabricating System," "Build a Digital IC Demo/Tester," "Electronic Siren – A Howling Success," and "DC Power Supply Built with Space-Age Electronics." Along with those articles on electricity/electronics were a number of power mechanics represented by "A Flow Bench for Power Mechanics," "Mobile Instruction Unit for Automotive Training," "To Help You Test Cylinder Compression," and "Build Small Engines – and Do It Fast." The area of aviation was represented by an article entitled "Up, Up and Away – A Lighter Than Air Project."

TECHNOLOGY AND INDUSTRIAL ARTS SUBJECT MATTER

A number of observations can be made from an analysis of the time period from 1900 through 1978 with regard to the evolution of technological systems and industrial arts curricula.

1. There has always been a technological lag in industrial arts curricula and, sometimes, depending on perspective, a complete misrepresentation of the content by esoteric methodology and purpose.
2. The professional journals written for the industrial arts teacher have been less than appropriate if the criteria for judgment is to maintain some relationship between evolving technological systems and industrial arts curricula. The profession would be far better served to promote among its membership the reading of *Technology Review, Scientific American, Technology and Culture, Appropriate Technology* and various trade journals such as *Transportation USA,* among others, as a more valid means of

maintaining some semblance of relationship between on-going systems of technology and public school and teacher education programs in industrial arts.

3. Throughout the history of industrial arts in the public schools, it is apparent that the focus has been on operational and manipulative skills in a few rather limited crafts or trades, particularly woodworking, metalworking, drafting, and printing or what is now called graphic arts. Little attention has been given to social, cultural, or human factors except in methodology for the classroom. The content of the journals and the technological developments of the periods studied seldom, if ever, were closely related.
4. The only relation between industrial arts curricula and tecnological systems is with the general category of production that reflects an industrial manufacturing orientation. Even so, the relationship is distorted with a focus on project rather than product and on manipulative skills and materials working rather than on the critical intellectual and informational processes of technological systems.
5. The over-emphasis on manipulative skills and projects has distorted potential relationships between industrial arts curricula and technological systems to the extent that the profession is made up of individuals better prepared to function in the 19th century than the 20th century.
6. Numerous new courses have been added to the offerings in the industrial arts curricula during the past 75 years. The pattern of development has been random and with few, if any, true guidelines for content selection or structural design. The result has been a fragmented curricula evidencing little relationship to technology or technological systems.
7. Curricula development efforts in industrial arts seem to have pursued a different course than that followed by the evolution of technological systems. There was little or no evidence in the journals examined of an awareness of systems of technology or a concern for the study and understanding of technological systems.

CONCLUSION

Any casual analysis of the data reveals discrepancies between the content of industrial arts curricula at all levels in the United States and the content and processes of technological systems at any given time. During the first three decades of this century when major changes had taken place in manufacturing, construction, and processing systems, as well as in communication and transportation systems, the predominant offerings in industrial arts were woodworking and metalworking.

Articles in journals serving the field focused on the design and construction of custom made projects from wood or metal, generally for personal use, the home, or the shop.

Even though there were revolutionary changes occurring (radio, television, synthetic fabrics, coast to coast air transportation; the beginning of automation and rocketry) the profession seems to have, over the years, operated on an "omission by choice" process of curricula design. This process of curricula selection brought about and perpetuated an industrial arts curricula that functioned primarily as an interpreter of hand processes in manufacturing industries to the exclusion of the study of all other technological systems.

The treatment of the content of industrial arts curricula also reveals an interesting phenomenon. By focusing on specific skilled operator techniques within an educational framework, rather than technological systems and associated problems and developments, oftentimes the skill being taught remained within the curricula long after the skill or procedure became obsolete in reality. As the industrial arts curricula advanced throughout this century, it became obvious that it was being by-passed by advances in technological systems. Whether the data is obtained from the literature of the industrial arts profession or the literature of technological history, in retrospect, it becomes quite obvious that the industrial arts profession has been slow to respond to change and generally has offered too little, too late, to meet the real needs of students as citizens in a highly complex technological society.

Some industrial arts educators have attempted to rectify the situation. However, the perpetuation of manipulative skill training in teacher education programs to the exclusion of the study of technology, technological systems, and other related disciplines that contribute to the understanding of the behavior of sociological, idealogical, and ecological systems and their interrelationships, produces an educator incapable of rising to the challenge. They know practically nothing about the humankind, technology, society, environment matrix, and the importance of citizens knowing about the behavior of systems so they can control them for the benefit of humankind. Instead, industrial arts educators have insisted on pursuing the limited goals of careers and jobs to the exclusion of the critical goals of preparing citizens who can function effectively in deciding, creating, and maintaining a humane society for all people.

There is evidence from the analysis of the literature concerning industrial arts subject matter that curricular development in the past has been a reactionary and fragmented response, producing a core of offerings based on manual skill and technical processes rather than on a planned response incorporating elements that would produce conceptual understanding of technological systems and their behavior. The latter would be required if an understanding of technology is to be attained. To date, the discrepancies are numerous and the prognosis based on an analysis of the past less than encouraging.

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chapter 10

Industrial Arts as a Discipline for Studying the Future

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The contemporary view of the study of the future is generally associated with an article that appeared fourteen years ago in the publication *Horizon.* This article, by Alvin Toffler (1964), described "future shock" which subsequently became the title of his widely read book. In those 14 years since the article was published, the study of the future has magnified in breadth and depth as individuals, universities, corporations, governments, among other groups, have begun a conscious effort to study the future. These efforts are predicated on the assumption that the future can be designed and directed to meet human needs.

The study of the future within educational institutions throughout the world is also generally associated with the 1960's. Since that period many schools have initiated courses and learning activities with emphasis on the study of the future. Futurized courses, however, are difficult to identify since "futurizing" a course, or a curriculum, is different from updating it. Articles appearing in professional journals; presentations made at local, state, and national meetings; and the courses being implemented in many schools evidence the industrial arts profession's entry into this area of study. At the same time the American Council on Industrial Arts Teacher Education (ACIATE) is actively involved in fostering the study of the future.

What impact has the futurism movement had on industrial arts education? Just as the preceding chapters help us to appreciate our rich heritage in industrial arts, one must look to the past to appreciate the study of the future. In both instances one begins to appreciate the involvement of people, organizations, and the social circumstances fostering or hindering their growth. This chapter, therefore, begins with a definition of the term "future" and then presents the historical development of future studies.

Throughout the history of future studies one can recognize many central themes meriting consideration by educators. Two of these are rapid technical and social change forces people to move into the future with quantum jumps. This fact causes the now over-used term "future shock." The second is the fact that one of the primary determinants of rapid change is the exponential growth of technology. Both of these people's lives. Expressed here is the position that the discipline of industrial arts occupies an opportune position to help students understand their technology and their future. Included in this effort is a rationale for studying the future, a description of efforts toward that study within the industrial arts profession, and an introduction to resources for those who desire to address the era in which their students must live – the future.

DEFINITION

The literature is replete with references to the future. As a result, countless terms are being used to identify this new area of study. Futures research, future studies, futurology, fustory, prognostics, among others, are titles currently in vogue. Since they have been coined by writers in the study of the future, the reader will not find these terms in the dictionary. In order to keep these terms in perspective the World Future Society (1976) published a dictionary of futurism that defined each term. As a result of this activity, many people ask, "Is the study of the future a science, an art, a philosophy, or a combination of ideas?"

Ironic as it may seem, the future does not exist since it refers to a period of time that has not yet arrived. Therefore, when it becomes the present it automatically ceases to be the future. According to the World Future Society (1977a) "Ordinarily the future is simply a shorthand way of referring to human civilization (or some portion of it) at a later point in time. Recognizing the non-existence of the future is, paradoxically, an essential preliminary to understanding why it is so important" (p. 126). Consequently people cannot study the future; people can study only what may happen. In turn, blueprints resulting from the study of the future can assist with the decision-making process for creating a better world.

Prompted by early writers such as Sir Francis Bacon, whose *New Atlantis* imagined a research institute devoted to solving human prolems, the first person to suggest a name for studying the future was sociologist S. C. Gilfillan (1920). He suggested the term *mellontology*, a term derived from the Greek word for future events. This term gained little acceptance although it remained in the literature until the 1940's. In 1943, political scientist Ossip K. Flechtheim from the Free University of Berlin, introduced the term *futurology* in his writings. This term is from the Latin *futurum* and the Greek word *logos*, or science. In 1966 he presented this definition:

> Since futurology encompasses the destiny of man, the future of his society and the tomorrow of his culture, it must deal not only with his prospective biological and psychological evolution, but also with the entire range of his future cultural activities.
>
> Futurology tries to answer, as objectively as possible,the problem of the destiny of our civilization within the next centuries. (p. 76)

To clarify the use of the many terms that currently exist, Edward Cornish, serving as president of the World Future Society, proposed the term *futuristics*. This proposal was based upon a survey made of members of the World Future Society. Cornish (1977) defined futuristics as "A field of activity that seeks to identify, analyze, and evaluate possible future changes in human life and the world. The work implies a rational (rather than mystical) approach to the future but also accepts artistic, imaginative, and experiential approaches as often useful and valid contributions" (p. 50). For the purpose of this chapter, the author has elected to utilize the term futuristics as promoted by Cornish.

HISTORICAL DEVELOPMENT[1]

The study of the future has a long history. In ancient times futurists relied heavily on mysticism as they consulted oracles or other mystics. Few, if any, rational methods were utilized as compared with the data collections, social theories, computer simulations, etc. used by today's futurists. Yet the ancient world contributed many ideas that have influenced the human's thinking about the future. The Hebrew prophets envisioned the future in order to get people to change their behavior. This was done because they believed the future was not predetermined and that humans could shape it. The reader is encouraged to refer to

[1]The writer is indebted to the World Future Society for use of the material in *The Study of the Future*. This reference is available from the World Future Society, 4916 St. Elmo Avenue, Washington, D. C. 20014, ($8.50).

the writings of theologian Harvey Cox for an elaboration of futurism in Christian doctrine.

Advent of Modern Day Futurism

The beginning of the 16th century witnessed a complex movement labeled by Herman Kahn and his associates at the Hudson Institute as a "basic, long-term multi-fold trend." This movement was characterized by an accumulation of scientific knowledge, worldwide industrialization, increasing population, more communication systems, faster change – all of which characterize contemporary society.

Sir Francis Bacon's *New Atlantis* was written to describe a science-based community. In this utopian effort, Bacon sought the improvement of human life through the utilization of science and technological development. The importance of Bacon's viewpoint was that he offered a model of "what could be" developed through the application of science. Bacon influenced the writing of the renowned French *Encyclopedie*, a dictionary of the arts, sciences, trades, and manufacturers. Although Bacon did not address the negative side of science and technology, he did promote confidence in the human's ability to improve life through the use of science and technology.

Bacon strongly influenced Maquis de Condorcet who wrote one of the classics in futuristics. His book, *Sketch for a Historical Picture of the Progress of the Human Mind* (1795/1955), correctly foretold many of the developments of the 19th and 20th centuries. Contemporary futurists believe that many of his predictions for the 21st century may also come to pass. Like a modern day futurist, Condorcet attempted to forecast direction and determine goals. Utilizing knowledge as the principal factor influencing the momentum of human development, he made predictions that have been verified in three-fourths of the cases. This early effort in futuristics was probably the first attempt with extrapolative predictions and one of the first to make conditional predictions (i.e., If such and such occurs, then. . .).

The 19th century witnessed a surge of speculation as science and technology began to mushroom. Science fiction surfaced as a means to look to the future. The 60 classics of Jules Verne established him as the great prophet of the time. His work was based on fact. For example, his writing about aluminum encouraged research into its use. His mechanical ideas were based on the latest scientific truths, and he used his imagination to project them into the future. Other writers turned their attention to the future during this period. Edward Bellamy's *Looking Backward 2000-1887*, a description of a utopia, was purchased by a quarter of a million Americans and was translated into most European languages. Charles Richet studied world population trends in his classic work *Dans cent ans (In 100 Years)*. At the same time Charles Darwin's *The Origin of Species* made its entrance into the literary world.

By the 20th century many writers were turning their attention to the future as science and technology continued tp spread worldwide and to become more sophisticated. In 1900 *Harper's Weekly* published an article by Cramp entitled "The Future of Shipbuilding." In 1901 George Sutherland wrote *20th Century Inventions*. Of the many writers who made contributions during this period, one made a lasting impression. This futurist, H. G. Wells (1902), felt that very few people could predict the future. Disagreeing with this mindset, he actually called for a science of the future in a lecture given to the Royal Institution in 1902. It was his impression that the accumulation of data by specialists could portray an ordered picture that is accurate since it is based on science. He emphasized that the essential thing in science is not the collection of facts by themselves, but their analysis. H. G. Wells taught the world to see the present as the first stage of the future and called for the creation of futuristics as an organized discipline.

World War I and the depression brought about considerable pessimism in people around the world. As a result, the study of the future moved to a new area – government. In the early 1920's, the Soviet Union began operating under a series of Five Year Plans. The United States also began intervening in economic affairs in spite of misgivings that government by the people would be lost. Herbert Hoover was an advocate of long-range planning, and in 1929 he formed the President's Research Committee on Social Trends. The committee's director, William F. Ogburn, called for a predictive science as the committee recommended widespread economic and social planning for America's future. Following this lead Franklin Roosevelt ran for the presidency on a planning platform, and history shows the changes that were made in public policy during the 1930's.

Science fiction continued to make an impact in the 1930's. The publication *Tomorrow: The Magazine of the Future* made its debut in England with science fiction articles and forecasts in such areas as transportation. At that time it was suggested that science and technology had significantly advanced to warrant a Minister for the Future in England. Unfortunately, World War II cancelled many of these efforts. However, following World War II, the growth of technology became even more pronounced because of the perfection of landmark inventions (e.g., nuclear power, computers, and synthetics). With the resultant exponential growth of technology, the study of the future became necessary to insure human survival. As a result the futuristics movement began to have its most influential impact and surfaced as a new discipline in the 1960's.

Futuristics in the United States

National security prompted the rapid developments in futuristics following World War II. H. H. Arnold, Commanding General of the Army Air Force, made two key contributions to the movement:

(a) He ordered what was perhaps the first major forecast of future technological capabilities. This report, *Toward New Horizons* (1947), was prepared by Theodore von Karman (cited in World Future Society, The Study of the Future, 1977b) and began a tradition of technological forecasts, and

(b) He created the first "think factory" with the establishment of Project RAND in 1946.

An outgrowth of these efforts, and those of a mathematician named Olaf Helmer, was the origin of the Delphi technique as a viable tool for forecasting and the establishment of the Institute for the Future. Since its opening in 1968, the Institute for the Future has completed over 30 major studies covering a wide range of topics.

As the technology continued to grow and social conditions changed, new organizations were formed to cope with the resultant complexity. As the effects of rapid growth became common knowledge, special groups were formed as governmental control groups and advocate groups. Today we recognize these with names such as the Environmental Protection Agency, Atomic Energy Commission, National Science Foundation, Common Cause, and many others.

Publications concerned with the future began to appear with greater frequency. In 1961 a book entitled *1975 and Change to Come* was published by the *Changing Times* magazine. A journal called *The New Utopian* reported in the 1960's on utopian environments. The federal government also published reports dealing with the future. President Eisenhower formed the Commission on National Goals for the purpose of formulating a single set of goals for America. The commission's 1960 report appeared under the title *Goals for America: Towards Balanced Growth.* One decade later President Nixon formed the White House National Goals Research Staff which published *Toward Balanced Growth: Quantity With Quality* (1970). This publication described current developments and the choices Americans had to face in such areas as population, environment, education, science, technology assessment, and balanced growth. Although this research group disbanded after its first report, it made a vital contribution to the futuristics movement. Rather than providing the nation with a single set of goals, it attempted to make clear what possible goals might be. It was a goal -setting effort, showing Americans that they could make rational choices concerning their future.

Of all the publications that appeared during this period, *Future Shock*, by Alvin Toffler (1970), probably had the greatest impact on people since it interpreted very clearly the consequences of rapid change. Selling over six million copies, this book became a primer in futuristics. Focusing on the consequences of rapid change, readers were introduced to the concepts of future shock, anticipatory democracy, transcience, and temporariness. Today this book remains one of the most widely read books by futurists. Since its publication, virtually hundreds of books have appeared on the market dealing with the future, its prediction, control, and consequences.

Institutions for Studying the Future

The World Future Society (1977a) reported that "The institutionalism of futurism and its incorporation into governmental processes is perhaps the most significant development in the field since 1955" (p. 58). One would be remiss not to recognize the French influence in this process, especially the influence of Gaston Berger. Beginning a career as a philosophy professor at the Faculty of Letters in Aix, Berger later became director general of higher education in the French Ministry of National Education. This experience led him to create in 1957 a Centre for International de Prospective. He coined the term "prospective" to denote an attitude toward the future. In 1958 the Centre published the first issue of a journal called *Prospective*. The activities of Berger and the Centre had a tremendous impact upon the French government. Formed were interdisciplinary teams that made a vital contribution to the generation of "national" plans for France. Individuals like Bertrand de Jouvenel, and groups like the Association Futuribles, have continued the futurist tradition in that country.

Other groups appeared in the 1950's and 1960's, such as the Mankind 2000 organization in London and the Commission on the Year 2000, formed by the American Academy of Arts and Sciences and headed by Daniel Bell. However, one organization that has made the greatest global impact is the World Future Society. Founded in 1966 as a nonprofit scientific and educational organization, this group expanded to over 26,000 members by 1977. The organization continues to grow at approximately 30% per year. Once developed, the World Future Society published a journal called *The Futurist* that today is considered one of the leading journals in the futuristics movement. Of significant interest to educators is the society's special studies division that publishes 14 different newsletters. Areas included within this group of newsletters are education, technology, human values, all of which have relevance for industrial arts education. The World Future Society has sponsored international conferences on the future and many seminars through its state and local chapters.

Today one can find hundreds of organizations devoting efforts to examining the future consequences of rapid technological growth. Among these are governmental agencies, trade associations, the military, and profitmaking groups. Some of these restrict their study to isolated topics (e.g., consumerism) while others examine the total society. The United States Congress is very active in the futuristics movement through the Office of Technology Assessment and the Congressional Clearinghouse. The Congressional Clearinghouse is designed to assist Congress in gathering long-term impacts of proposed legislation. The monthly newsletter, *What's Next*, alerts the Congressional community to future-oriented publications, meetings, and other activities.[2]

State and local governments, as well as corporations, are also studying the future. Extensive citizen participation has gone into such studies as *California Tomorrow, Iowa 2000, Alternatives for Washington, Hawaii 2000,* and *Atlanta 2000.* Corporations such as Uniroyal, Bethlehem Steel, Prudential Insurance, RAND, Volvo, General Mills are very active in projecting technical, political, social, and economic environments of the future. It is anticipated that more organizations consciously studying the future will appear as the process of innovation and invention continues to grow. Most organizations now realize the necessity for anticipating possible future developments and recognize the inherent dangers of neglecting this new field of study.

Conclusions

The development of the futuristics movement has had a long history resulting in a discipline designed to identify, analyze, and evaluate possible changes in human life. This development continues to have a positive impact upon the decision-making process in our basic institutions. Through the study of this new field, the author has reached the following conclusions:

1. The study of the future has been part of the human mental process since the beginning of human life on earth.
2. The study of the future has increased in depth and breadth in order to keep pace with the growth of science and technology.
3. The study of the future is not restricted to any one country, organization, or political group but is, rather, an international effort being carried out by persons from every walk of life.
4. The study of the future is not intended to provide finite answers but rather to identify probable events.
5. The study of the future has matured to the point where it can be classified as a discipline.
6. The study of the future will become more intense worldwide because of the finiteness of global resources.
7. If the process of education is to prepare humans for the inevitable future, it has no alternative but to turn its attention to the study of the future for its content and instructional strategies.

[2] The Congressional Clearinghouse newsletter *What's Next* is a vital resource for educators. It may be ordered free of charge from: Congressional Clearinghouse, 722 House Annex 1, Washington, D.C. 20515.

TECHNOLOGY — A PRIMARY DETERMINANT

Never before has any society been so intoxicated with change. Of those factors that foster cultural change, technology most assuredly exists at the top of the list. Heilbroner (1961) stated that our technology is altering life to its existential roots before our very eyes. The Centre for Educational Research and Innovation (1972) supports this view by stating "But like the focus on a single alternative future, one critical variable of change, the technological, is assumed as paramount, with all other factors, educational and non-educational related in a dependent fashion" (p. 96). The ultimate conclusion from such analysis is that technology is no longer separate and outside culture, but an integral part of it.

Stanley Lesse (1976), editor of the *American Journal of Psychotherapy,* considered technology as the primary determinant in changing human needs, which he defined as "those factors which, when satisfied, permit and aid an individual to function either alone or in a group, in a given milieu, with optimum ability to adapt or to modify the human environmental equilibrium, in order to guarantee survival with pride and pleasure" (p. 531). In an earlier publication (1974) Lesse stated:

> Whether or not technologic determinants should be included under environmental determinants is a moot question. Until the post-World War II era, strictly speaking, technology in itself would not have been classified as a prime determinant but rather as being secondary to those outlined, since it arose from the need for compensation for the more primary determinants. However, in view of the development of enormously powerful technologic advancements in terms of energy, communication, and transportation, technologic forces have assumed a primary role in many instances. (p. 173)

In the pre-industrial era the human failed to utilize a continuum of increasing knowledge and artifacts. The concept of inventory was virtually unknown for millions of years. Hominids were too busy struggling against a hostile, but natural, environment to have time for scientific inquiry. Glasser (1972) made an interesting distinction between primitive societies and today's human:

> Both civilized survival man and primitive survival man were hard pressed to survive the stresses of their environment. Both groups worked to survive, but with one major difference. Primitive survival man struggled against a hostile, natural environment not of his own making; civilized survival man struggled and struggles against a hostile environment of his own making. (p. 237)

Sociologists refer to the process of "accumulation" associated with the growth of a culture. And, it is for this reason, that writers such as

Lesse (1974, 1976) refer to the vast accumulation in the technologies since 1945. Many of the landmark inventions and innovations (e.g., computer, synthetics, and nuclear power) that revolutionized our communication, production, and transportation systems appeared in the past decade. Innovation breeds innovation causing the march of technological growth to move forward. This is not to deny the fact that perhaps the accumulation of material goods has outraced the accumulation of nonmaterial values. The important point is to internalize the fact that technology, as a product of humans, is an integral part of our culture. To argue with this is to quarrel with the nature of the human, and leaves one with a paleolithic mentality.

There have been many analyses of our technological culture (e.g., Bell, 1973; Ellul, 1965; McLuhan, 1964; Mumford, 1934) that provide valuable input to the study of technology as a primary determinant. Of direct relevance for the industrial arts profession were the analyses provided by Daniel Bell and other post-industrial prophets. These futurists indicated that it is this revolution that is altering our present and our future. The information provided by Bell (1973) in Table 1 presents the shift from an industrial society to a post-industrial era. The five components of this shift as presented by Bell, are:

1. Economic Sector: the change from a goods-producing to a services-producing economy.
2. Occupational Distribution: the pre-eminence of the professional and technical class.
3. Axial Principle: the centrality of theoretical knowledge as the source of innovation and of policy formulation for the society.
4. Future Orientation: the control of technology and technological assessment.
5. Decision-making: the creation of a new "intellectual" technology. (pp. 14-31)

In spite of the vast accumulation of knowledge and material, global society faces many problems. Harmon (1977) and his research group at the Stanford Research Institute identified four major dilemmas inherent in an advanced society. In his opinion these are not resolvable without major systematic transformation. These dilemmas are the inability to cope with the environmental and social costs of continued economic growth, the inability to guide technological innovation, the inability of industrialized nations to share finite resources, and the inability to supply meaningful social roles to a growing population. These dilemmas are fostered by the fact that perfectly reasonable microproblems are adding up to unsatisfactory macroproblems. The macroproblems have been brought about by a combination of large-scale industrial development and high population levels. This is especially crucial when the human has the capacity to alter virtually all com-

Table 1

From Industrial to Post-Industrial Society
General Schema Of Social Change

	Pre-Industrial	Industrial	Post-Industrial
Regions:	Asia Africa Latin America	Western Europe Soviet Union Japan	United States
Economic sector:	Primary Extractive: Agriculture Mining Fishing Timber	Secondary Goods producing: Manufacturing Processing	Tertiary Transport Recreation Quaternary Trade Finance Insurance Real estate Quinary Health Education Research Government
Occupational slope:	Farmer Miner Fisherman Unskilled worker	Semi-skilled worker Engineer	Professional and technical Scientists
Technology:	Raw materials	Energy	Information
Design:	Game against nature	Game against fabricated nature	Game between persons
Methodology:	Common sense experience	Empiricism Experimentation	Abstract theory: models, simulation, decision theory, systems analysis
Time perspective:	Orientation to the past Ad hoc responses	Ad hoc adaptiveness Projections	Future orientation Forecasting
Axial principle:	Traditionalism: Land/resource limitation	Economic growth: State or private control of investment decisions	Centrality of and codification of theoretical knowledge

Table 1 from THE COMING OF POST-INDUSTRIAL SOCIETY: A Venture in Social Forecasting, by Daniel Bell, (c) 1973 by Daniel Bell, Basic Books, Inc., Publishers, New York.

ponents while seemingly lacking a guiding ethic for making momentous choices.

Harmon and his associates indicated that there is a confluence of indications that society may be undergoing a transformation in its character that will allow it to deal with this era referred to as the post-industrial revolution. This will involve among other things a reconsideration of accepted conceptions of useful production, work and leisure, socially acceptable interdependence, use of human and natural resources, and the application of science and technology. This transformation of our society is the greatest challenge humankind has ever faced since the future of planet earth and its inhabitants is at stake. What is needed is an outlook encompassing an awareness of, and a responsibility for, the future. Future responsiveness occurs when both present and past events are considered in the decision-making process for the future. This process places the human in a responsive and responsible role as agent and doer. This commitment means that the human must be prepared to be an anticipator and to be responsible for the resultant outcomes.

COPING WITH THE FUTURE

What does it mean to cope? What does it mean to say that one can or cannot handle the exigencies generated by rapid change? What does it mean to say that one suffers from "future shock"? What can the educational system do to help alleviate the problems of stress, anxiety, and future shock?

Alvin Toffler coined the phrase "future shock" in 1965 to describe the shattering stress and disorientation induced in individuals when they are subjected to too much change in too short a time. His five years of researching the future resulted in his well-known book *Future Shock*. It is in Toffler's (1970) thesis that:

> This concerned ability to look ahead plays a key role in adaption. Indeed, one of the hidden clues to successful coping may well lie in the individual's sense of the future. The people among us who keep up with change, who manage to adapt well, seem to have a richer, better developed sense of what lies ahead than those who cope poorly. (p. 419)

Lauda (1976) defined the term "coping" when discussing the ability of industrial arts to cope with change. He stated:

> Commonly, coping refers to dealing with things as they come, or keeping equilibrium. Encounters require strategies for working out modes of adaptation. These require conscious consideration of needs and demands of the situation. Coping behavior can best be defined as purposive action designed to assist in adjusting to environmental circumstances. It does not

consist of withdrawal from reality. Coping behavior thrives on informed understanding of the environment and the ability to distinquish between the possible and impossible. (pp. 104-105)

Stress, Anxiety, and Change

Since World War II over 80,000 studies have been published on the topic of stress and anxiety. One study conducted by the Center for the Study of Social Policy (1977) revealed that millions of Americans are affected by the consequences of stress. For those affected, symptoms may appear in such diverse forms as loss of sleep, backaches, or heart attacks. The indirect effects such as alcoholism, poor job performance, and mental illness probably cost the nation more than $100 billion per year. The study stated:

> In modern societies, stress has become more and more a subtle product of interaction, not with the physical environment, but with the man-made environment. . . . Related to this process is the inherent rate of change associated with a technologically advanced society. A great deal of evidence suggests that there is a strong correlation between stress-related pathologies and rates of change. There is little evidence to suggest that the pace of change will slow down. If anything, change seems to be proceding at an even faster rate. This implies that we can expect even higher levels of stress. (pp. 47-48)

George Gallup (1964) stated:

> In the whole history of man, no generation has been taught to expect change, to be prepared for change, or to seek change. . . . One of the most cogent reasons for accepting change concerns the mental health of the individual. In a highly complex society with its many anxiety-inducing factors, mental illness often results from the inability to adapt readily to new situations. On the other hand, proof that acceptance of change contributes to mental health – and to long life – has already been offered. (p. 23)

Time

The concept of time is an individual and culturally influenced dimension. Every human is conditioned about the length of events, processes, or relationships. Toffler (1970) refers to these as "durational expectancies" (p. 42). We refer to tomorrow, next week, retirement, or other culturally recognized expectancies and make decisions with reference to these. Some of these decisions are fully rational in one situation and irrational in another. Toffler and his associates feel that the person who understands the concept of rapid change can make conscious and unconscious compensations in order to help cope. The Education Development Center (1977) supported this view:

> One of the functions of mental models is to provide a frame of reference for our thinking about the present, and such a frame of reference must incorporate the flow of time in which all systems interact. Often time and our experience of the continuous flow of change are left out of our mental

> models, and we think of life as a succession of separate snapshots, each of a different "now." But it is more accurate to think of ourselves as always living where past and present intersect, where heritage and horizon meet, for our present choices grow out of past paradigms, and out of the decisions and the options they have created. (p. 28)

Shostrom (1967), a gestalt psychologist, defined an actualized person as an individual who is primarily time competent. This person is concerned with living in the present though the past and future make the present more meaningful. Therefore, the focus is on the present with the past and future as background. This concept is shown in Fig. 10-1. A white chalice appears on a black background, or if the white area is taken as ground, then the figure becomes two heads in profile silhouette. As one continues to study this ambiguous picture, one can switch from one way of looking at it to the other but never can look at it both ways at once. If the chalice in the center becomes the primary focus representing the present, the faces of the past and future become meaningfully related as background to the chalice. This conceptualization symbolizes the way the actualizing person relates the three dimensions of time.

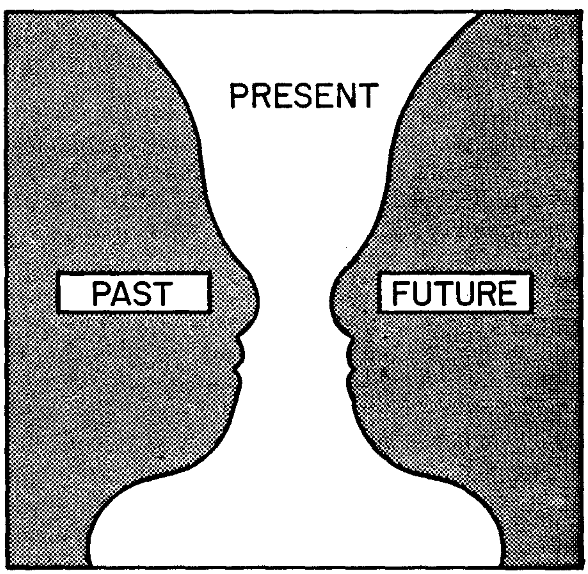

Fig. 10-1. Shows symbolically the way the actualizing person relates the three dimensions of time.

Future-Focused Role Image

Benjamin D. Singer (1974), a Canadian sociologist, believed that the future plays an important part of behavior patterns exhibited in the present. He believed that the "self" in the child is in part feedback from what he or she is becoming. Singer provided the phrase "future focused role image" (FFRI) to refer to the organization and meaning of the pattern of life one expects to take. Therefore the human not only has a concept of self in the present but in the future as well. This concept provides a focus for activities leading to rational decision making, and it is the educational system that is in a position to provide assistance.

Today's adolescents are the product of the determinant we call technology. In the article "Adolescence in the Year 2000" Hill et at (1976) reinforced this theory by stating:

> Adolescence as we know it in modern societies is a creature of the industrial revolution and it continues to be shaped by the forces which defined the revolution: industrialization, specialization, urbanization, the rationalization and bureaucratization of human organizations and institutions, and continuing technological development. (p. 244)

Because of earlier physical maturation and cultural expectations, adolescence has been prolonged significantly. No longer do teenagers develop economic independence as they did following World War II. Throughout this period it is the role of the basic institutions of our society to prepare youth for their future. This is seemingly an insurmountable task when one considers the rapid growth of science and technology, uncertainties about the economic future, and more importantly, the fact that our basic institutions are conservative due to their need for survival. It is during this period, while the adolescent is trying to "become" in his or her own historical and socio-cultural context, that the FFRI must be developed. The good life for these young people will require more than technological progress. It will require a reversal of thinking and acting. Keniston (1968) in his study of the radical student movement stated:

> Put differently, identity itself is tied to a changing world and to the process of psychological change. For post-modern youth, psychological change, flux, and mobility continue long past the time when, in earlier eras, they "should" have stopped. Psychological closure – shutting doors and burning bridges – becomes impossible. Just as the concept of the "lifework" recedes before the unpredictability of the future, so the effort to change oneself, redefine oneself, and reform oneself continues long past adolescence. (p. 275)

The adolescent is well aware of physical maturation and the fact that adulthood is inevitable (at least chronologically). It is, therefore, natural to desire to want to do what adults do while measuring up to adult expectations. In the past this was easy since most people prepared for one vocation. However, the adolescents of today are faced with the reality that they may be preparing for adult roles that do not even exist today. Therefore, one of the differences between the adolescents of today and their parents is that today's youth require introduction to more opportunities including the luxury of practice and feedback. The dilemma lies in the fact that it is contrary to customary thinking to prepare people for a world that does not yet exist. Keniston (1968) stated:

> They seek a new orientation to the future, one that avoids the fixed tasks and defined lifeworks of the past in favor of an openness and acceptance of flux and uncertainty. In their openness they stress not ends but means, not goals but style, not program but process, not the attainment of utopia but a way of doing things. (p. 287)

If we assume it is necessary to have a FFRI, we can also assume that without it the adolescent will have definite symptoms. Behavioral scientists have identified such symptoms. Chester Pierce (1972), a professor of psychiatry at Harvard University, calls to our attention an axiom accepted by both mental health workers and futurists:

> Roughly stated, the axiom maintains that what causes someone to be mentally ill is the discrepancy he finds between childhood expectations and adult reality. . . . Therefore, it is the responsibility of the teacher to let the child know as early as possible what life will be like – or could be like – when the child becomes an adult. (p. 14)

Normalcy manifests itself in creativeness, in courage to face new and changing conditions, and the ability to evaluate reality objectively. A characteristic of mental health is the ability to test reality rather than deny it. An avoidance of choices on the part of any human results in an inability to see oneself in acceptable and accessible roles. Pierce (1972) reminds us that all humans need a sense of security, identity, and optimism about the future. It is pathological not to have these.

Maslow (1968) referred to the conflict between the values of adults who were born prior to the rapid technological growth their children are experiencing. The uncertainty of adults about their own values disturbs many children and adolescents. As a consequence, they live not by adult values, but by adolescent values that are immature and determined by adolescent needs. He indicated that most children will not protest under this regimen but will go through their pre-adulthood making compromises to cope with the system. Such behavior can manifest itself in "avoidance behavior," that is, avoiding situations that are new or strange. Such behavior, of course, is always rewarding, but in a negative form, since it limits new learning.

Today's students provide input to this attempt at developing a FFRI. Shane (1976) reported the conclusions of a study undertaken by the National Education Association Bicentennial Committee. Ninety-six high school students were interviewed as part of this study. One revealing conclusion from 18 hours of dialogue with this group was the expressed need for coping skills and techniques in a sometimes frustrating and frightening world. The group also expressed the need for good guidance and better preparation in human relations, in dealing with uncertainties, and in learning to choose wisely among alternatives. This same study reported on the questioning of 50 distinguished futurists about the needed changes in education for today's students. In summary, the results indicated that an education should help young learners acquire a knowledge of the realities of the present, an awareness of alternative solutions, an understanding of consequences that might accompany these options, insights as to wise choices, and help youth to develop the skills and to acquire the information prerequisite to the implementation of examined ideas, policies, and programs. In short, five terms to remember in developing new curricula are: realities, alternatives, consequences, choices, and implementation.

A study conducted in Italy by Pelizzoli et al (1977) indicated that future-oriented students who feel that the future is predictable are normally those dissatisfied with the present. Their dissatisfaction is linked with the will for action to achieve a better future. Those students who do not believe in the foreseeability of the future are usually motivated by the uncertainty of the present. However, it should be noted that this is not linked with a will to act. These students find it difficult to escape the lure of the present when confronted with the future, especially when confronted with crises.

Research has also been conducted to determine the types of questions children ask about their future, including the type of student prone to such questioning. Landau (1976) found when working with 9 to 15 year olds that: (a) The younger children, ages 9-12, ask more general questions (e.g., Will there be an oil shortage?) while the 12-15 year old group asks more personal questions (e.g., What will be the role of the family?). It is also at the 12-15 year level that accusations against adults begin to appear; (b) Those students who are advanced culturally show more anxiety about the future and depart from reality with far-reaching future projections, while the less culturally advanced group are more cut off from reality with a wilder, less responsible imagination; and (c) Children with a high I.Q. exhibit a high degree of anxiety about the future, have long-range views, and are somewhat pessimistic. Questions are very pointed (e.g., How will WW III end?). Questions from students with high I.Q.'s also contain hints as to the responsibility of present day society for the human condition. Average students are optimistic, less anxious, and ask questions that are quite down-to-earth (e.g., Will a money machine be invented to use as one wishes and needs?).

Landau reached the following conclusions from this project:

1. Children do think about the future.
2. Children desire challenge and experimentation.
3. By encouraging adventurous thoughts that stimulate the imagination with possible futures, we involve youth with today and tomorrow.
4. Children need to acquire emotional skills in order to stand up to ambivalent, unclear and insecure situations, and overcoming anxiety.
5. Children need to develop a responsibility towards self and society. (pp. 154-162)

IMPLICATIONS FOR INDUSTRIAL ARTS EDUCATION

If one accepts the idea of creating a learning environment that will prepare students for *their* future, it follows that one believes that education is an agent of cultural change. Such thinking raises a host of questions pertinent to educational planning. For example, how much uniformity is needed to maintain stability within the system? And, at the same time, how much diversity is needed for progress? These questions are pertinent for teacher educators and their products because students are the beneficiaries of these efforts. Keppel (1966), in his book *The Necessary Revolution in American Education,* identified changes that have taken place in education. The first revolution in American education was a revolution of *quantity*. The second revolution, now underway, is one of *equal opportunity*. The next turn of the wheel must be a revolution in *quality*. The remainder of this chapter is based on the assumption that if the educational system fails to prepare people for the future, it will have failed in its purpose to achieve quality.

Contributions of the Profession

The futuristic movement in education mushroomed in the 1970's as a result of conscious efforts to study the future described in the first part of this chapter. Shane's (1973) study, *The Educational Significance of the Future,* was one of the first to synthesize the relationship of futuristic thinking and education. This study, conducted for the United States Office of Education, has direct implications for industrial arts education since Shane refers to the study of technology as one of seven areas under the heading of "Subject Matter for the Next Decade." This study was followed by many books, articles, conferences, and speeches. The reader is encouraged to review several that remain as classics in the field. Among these are the writings of Frymier (1973), Hostrop (1973), Rubin (1975), and Toffler (1974). These references contain articles by many of the writers mentioned in this chapter. The reader will also find material from persons who have been general session speakers at the national conferences of the American Industrial Arts Association (AIAA).

1974 Conference Theme: **Industrial Arts and a Humane Technology for the Future**
*"Education or Training: Alternative Futures for the Teacher" (Theobald)
*"Technology and Institutional Change" (Michaelis)
*"An Introduction to Studying the Future" (Joseph)
*"The Future State of the Union" (Helmer)
"Designing Educational Facilities for the Future" (Bro, Rudisill)
"Teaching Future Technology Through Industrial Arts" (Rosser)
"Scenario Building: A Method of Studying the Future of Industrial Arts" (Gelina, DuVall, McPherson, Pytlik, Tomazic)
"The Future: A Humane Technology — Implications for Teacher Education (Fecik, Hahn, Lauda)

1975 Conference Theme: **Essential Development Through Industrial Arts**
"An Interpretation of a Total Recycle Society of the Future with Implications for Industrial Arts" (Pinder)
"A Peek at the Future" (Smalley)

1976 Conference Theme: **Crossroads 76**
*"Technological Society at a Crossroads" (Henderson)
"Toward the Year 2000 — Futuristics (Hales, Snyder, Thompson)
"Technology — Past, Present and Future" (Rosser)
"Industrial Arts in the Industrial and Post-Industrial Society" (Starkweather)
"Materials Technology: 200 Years and the Future" (Yadon, Steeb)

1977 Conference Theme: **Industrial Arts: Which Way Now**
*"Industrial Arts: Which Way Now" (Aguirre)
"Toward the Year 2000 — Revisited" (Hales, Snyder, Thompson)
"The Environment and Technology: Implications for the Future" (Guise, Lauda, Loyd, Householder)
"Implications of Production Technology for the Future" (Pinder, Ritz)
"Developing Relevance in Industrial Arts Education with an Emphasis on the Technological Future" (Maley, Starkweather)

1978 Conference Theme: **Industrial Arts: Youth's Gateway to the Future**
"Perspectives on the Future: Industrial Arts Plays a Key Role in Future Education" (Maley, Starkweather)
"Designing New Facilities for the Future" (Bender)
"Materials: A Program of Study for Future Industrial Arts" (Carpenter)
"Futures Workshop" (Lintereur, Pershing, Smalley)
"How to Become a Futurist" (Lintereur, Smalley)

*General Session Presentations

Fig. 10-2. Selected futuristic presentations/publications and presenters at AIAA conferences from 1974 to 1978.

Kenneke, L. J., & Stadt, R. W. **Teacher competencies for the cybernated age** (Monograph 3). Washington: D. C.: American Council on Industrial Arts Teacher Education, 1970.
Lauda, D. P. (Ed.). **Growing together to insure the future** (AIAA Monograph). Washington, D. C.: American Industrial Arts Association, 1973.
Lauda, D. P., & Smalley, L. H. **The future: A challenge to industrial arts** (Monograph 5). Washington, D. C.: American Council on Industrial Arts Teacher Education, 1975.
Martin, G. E. (Ed.). **Industrial arts education: Retrospect, prospect** (Yearbook 28). Bloomington: McKnight, 1979.
Smalley, L. H. (Ed.). **Future alternatives for industrial arts** (Yearbook 25). Bloomington: McKnight, 1976.

Fig. 10-3. Selected futuristic monographs/yearbooks and authors of AIAA-ACIATE publications.

A review of the literature in the discipline of industrial arts revealed that since 1970 the profession has become very much involved in the study of the future.[3] Figure 10-2 presents selected futuristic presentations made at AIAA conferences. It is important to note that three of the last four conferences had reference to the future in their conference theme. Figure 10-3 presents monographs and yearbooks written by the profession reflecting the futuristic movement.

The ACIATE was challenged by Hahn and Lauda in 1971 to form a committee to study the future. In the spring of 1972 such a committee was formally sanctioned by the ACIATE and continues to exist today. With a membership of over 90 teacher educators, the goal of this committee is to foster futuristic activities in the industrial arts profession. In addition to sponsoring AIAA and ACIATE presentations, the committee is actively generating an inventory of futuristic materials that can be utilized by classroom teachers (e.g., futuristic games, simulations, and films). Information is communicated to the profession via a semi-annual bulletin called the *Futures Bulletin.* Membership on this committee is open to any teacher educator in the field of industrial arts who is a member of the ACIATE.

Two references completed by industrial arts teacher educators that have made a major contribution to the discipline must be cited at this point. The first to appear was *A Study of Potential Directions for*

[3]Reference is made to "selected" presentations and writings. The reader will find many other references to the future in our profession. The point being made here is the intensity of the effort since 1970.

Industrial Arts Toward the Year 2000 A.D. This dissertation, conducted by Kendall N. Starkweather (1975), utilized 10 experts from the industrial arts profession in a delphi exercise to project industrial arts into the future. Among the study's findings were:

1. A new name should be created for the discipline appropriate for a profession seeking to interpret technology and industry in a post-industrial society.
2. Programs will move in the direction of applying technology to solve the major problems facing humankind.
3. Technology will begin to be studied from an international base.
4. New areas of content will begin to emerge (e.g., plastics, ceramics).
5. Traditional areas (e.g., wood, metal, drawing) will be grouped into broader areas of study such as materials and processes.
6. Industrial arts will become more interdisciplinary and systems oriented.
7. Course content will have an emphasis on environmental considerations.
8. Post-industrial development will influence content with emphasis on technical knowledge, research, data retrieval, design, and technological change.
9. The affective domain and value systems will receive more attention.

The 1976 ACIATE Yearbook, *Future Alternatives for Industrial Arts,* edited by Lee H. Smalley, also stands as a major contribution to the profession in the area of futuristics. The six chapters describe the futuristic movement in considerable depth with implications presented for education and specifically for the discipline of industrial arts. DeVore and Lauda (1976) working with the assumption that today's students do not possess a FFRI, identified conclusions very similar to those in the Starkweather study. Their conclusions were:

1. Accept technology as the discipline base and the study of technology as the base for curriculum and instructional design.
2. The name of the discipline must be changed to reflect cultural reality, therefore the name "technology education" is suggested.
3. The content of the discipline must move from the interpretation of American industry to a study of technology and society and the content apparent in this context.
4. New learning environments must be designed to provide for authenticity in the study of technology.
5. New instructional strategies must be designed to provide for authenticity in the study of technology.
6. Teacher education institutions must alter their programs and take the lead in preparing new teachers and providing inservice education for current teachers.

7. Professional organizations must provide leadership to advance the study of technology. (p. 160)

In addition, DeVore and Lauda stressed the need for the introduction of futuristics into the curriculum. Since technology is future-oriented and the profession professes to interpret modern technology, the field of industrial arts is in a unique position to help adolescents generate a FFRI.

Another Look at Recommendations

Although our discipline is steeped in tradition, like all other disciplines, the fact is that it has had a great deal of success. The industrial arts profession does not have to apologize for its contribution to American education. The benefits to date far outweigh the criticisms levied against it. However, as society changes as a result of technological innovation and the concomitant social change, the profession must not fear deviating from its current "park."

Those who criticize most profusely seem to be those who claim that industrial educators teach about American industry in retrospect, leaving the content continually in the past. They see innovation within the discipline as mere piecemeal effort and assume this is fact since small incremental changes come easier than radical changes. The trouble with many who criticize is that they seem to feel that Huxleian forecasts should be our barometer for change, making science fiction our new reality. Traditionalists neglect the realities of the post-industrial revolution while many futurists go overboard in their predictions while in some cases, disregarding the present.

Thinking about alternative educational futures requires an extension of our minds and institutional behavior. Such thinking requires looking at endogenous and exogenous variables, all of which could cause a shift in basic assumptions about industrial arts. Realizing that the alternatives sought and implemented produce their own consequences, the profession needs to examine proposed changes very carefully. At the same time those in the profession cannot cling to the stable, traditional educational system of the past while totally neglecting contemporary technology and the future prospects. In essence, industrial arts education must not reach its own Peter Principle. Not at a time when the country is characterized as the most advanced in the history of the world. Not at a time when present actions involve the lives of approximately 40 million children who were under the age of 12 in 1975 and who will be 37 or younger in 2000 A.D. The challenge is to provide an education for this, the first generation to be born and reared in the post-industrial revolution.

So what conclusions can be drawn from the debate among our colleagues and the futuristic movement? At the risk of over-simplifying, the following conclusion/recommendation is presented: *Industrial arts* *teacher educators must prepare teachers who can teach about the future and in the future.*

In order to accomplish this, teacher educators must turn to the futuristic materials for content and instructional strategies. A common error, however, is to accept Huxleian forecasts when they may never materialize. And, of course, many that do materialize will remain beyond the purview of curriculum developers. Hellman (1976) and Rubin (1975) presented cogent arguments for working with the realities of the future. Those in the profession would be prudent to constrain themselves to those evolutions already in process. Although many intriguing possibilities lurk in the future, it is probable that many are not significant for educational planning since they may have little substantive meaning.

More specifically, the industrial arts profession must direct its attention to the following:

1. *The acceptance of the technological/post-industrial revolution as the primary sources of content and modes of instruction.* Bell (1975), one of the primary proponents of this concept, has addressed the implications for education. In summary he stated that our educational system must:

   (a) Accept the centrality of conceptual inquiry as the grounds of knowledge. This means teaching the child to inquire into phenomena and to analyze problems with a view toward identifying similar and dissimilar attributes. From this exposure come the prerequisites for sound decision-making and choice.

   (b) Advocate programs that are intermeshed with societal difficulties.

   (c) Inherit a compelling obligation to (a) provide learning experiences that teach youth the art of negotiation, compromise, and similar tactics for conflict resolution, and (b) provide learning experiences that foster a kind of national mindedness in future generations.

   (d) Constantly be able to replace old content with new, while updating teachers and instructional strategies.

   (e) Provide new curricular improvements in the area of value formation. The goal is to enlarge the capacity of students to deal with new realities as they unfold. The fact remains, that youth will find it necessary to make treacherous decisions on societal goals and priorities; therefore, it is far more sensible to teach them about the problems they likely will inherit than about those their ancestors encountered (pp. 45-48).

2. *Concepts that are crucial to the understanding and survival of planet earth.* Among those that repeatedly appear in the literature are interdependence, global systems, finite resources – infinite demands.

3. *The inclusion of futuristic content into all courses.* The question of whether to teach a course on futuristics or to include such content in all courses must be resolved. Stirewalt (1977) estimates that there are approximately 2,000 courses being taught in education, business, industry, and the government. Of this number close to 400 are taught at the university level. Although these figures are impressive, it seems much more logical to include futuristics into every course taught. Such inclusion allows each student to project all concepts into new time dimensions rather than experience esoteric concepts on a one-time basis.
4. *The inclusion of multi-disciplinary activities in the study of the past, present, and future of technology and the post-industrial revolution.* Because of the breadth of the study of technology and the future, logic dictates that the consequences of various human actions are better considered in multi-disciplinary activities than in single subject areas or new course conglomerates. The Education Development Center (1977), when studying 143 curricula most likely to develop a comprehensive approach to issues of growth and the earth's future, found that 16% had a multi-disciplinary focus. At the same time most of the materials utilized failed to deal with systems analysis and global connections. This study also revealed that rarely were connections made between course issues and students' lives, on either conceptual or affective levels.
5. *The inclusion of futuristic materials in all references utilized in the curriculum.* The research cited in item four above also revealed that most materials do not include reference to the future. Of those that do, many sacrifice the student's need to understand the past and the present.
6. *The inclusion of futuristic instructional strategies in "methods" courses.* In times of certainty, the decision-making process is very simple. Decision makers merely maximize whatever they want. However in the post-industrial revolution, the period of uncertainty, it is totally rational to be flexible, adaptable, fluid, while leaving options open that appear to be uncommitted. Teachers need assistance in dealing with the emotional effects of growth and survival issues; with problem-solving techniques other than mere data gathering (e.g., designing alternatives, choosing among solutions, advocacy, making projections); and the ability to handle self-preparation once they leave the university.
7. *The use of professional organizations, specifically the AIAA and ACIATE for providing direction in the futuristics movement.* Professional organizations, through their committee structure, can provide leadership in exploring alternative futures for the profession. This can be reflected in professional journals, conferences, student clubs, resolutions, etc. No committee can turn its back on

the future if it intends to remain viable. At the same time, committees must work in an interdependent mode with each other in order to draw logical conclusions about the future.

Above all, it is time that our conferences at all levels provide workshops that assist educators in developing content and instructional strategies for the future. Our profession has done enough to alert its members to the need for futuristics. It is now time for our professional organizations to assume leadership at the implementation stage.

SUMMARY

The literature revealed human concern with the future has existed for millions of years. Moving from mysticism to contemporary futuristic methodologies, futuristics is now recognized as a viable discipline. Today, decision-makers utilize elaborate modeling systems and innovative techniques for projecting future life. Institutions have appeared throughout the world for enhancing this process. The most well known is the World Future Society designed to foster the study of alternative futures.

This movement has been fostered by the rapid growth of technology now heralded as a primary determinant for social change. Moving from an agrarian economy to an industrial society called for radical adjustments in human lifestyles. However, the advancement to the post-industrial society has made new and unexpected demands on our society and culture. As theoretical knowledge fosters more innovation and invention, people must anticipate consequences of their contrivances and cultural modifications.

In the midst of this revolution/evolution, people must learn to cope with radical change. The generation of a future-focused role image (FFRI) that is a rational picture of the pattern of life one expects to take, is conducive to and a prerequisite for mental, physical, and social health. Today's adolescents comprise the first generation to be born into the post-industrial revolution and are busy working with untested models that will exist in the coping process. At the same time those adolescents are generating a picture of the future, the past, and present must be held in perspective.

Since the industrial arts profession is intrinsically involved in the study of industry and technology, it stands in an opportune position to assist with the development of the FFRI in each student. This requires a conscious effort on the part of the profession in order to alter content sources and instructional strategies. The profession, primarily through the efforts of the ACIATE, has begun to foster such growth. It is time, however, for the entire discipline to consciously address this concept. It must recognize that one of the most crucial functions of the mind is prediction and the ability to anticipate the future. This function alone permits successful planning and actions based on those plans. Success can come only from commitment by the 246 teacher education programs and their products. Our youth cannot remain uncommitted to the future because, unlike previous periods, the future will not allow identification with one vision, one form, or any one static reality. If given the chance by the educational system, students will become effective thinkers and learners, while developing inquiry skills and emotional awareness, as well as self-identity. Only through the process of future-oriented education can we expect our products to survive their future.

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chapter 11

Industrial Arts Teaching Methods

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To meet the challenge posed by new, rapidly advancing technology, schools must offer students opportunities to develop an appreciation and understanding of today's complex society as well as skills for survival in that society. Industrial arts, although not the only means, is the best means of educating students to meet the demands of this rapidly advancing technology. Kranzberg (1973) addressed this very point:

> Industrial arts is perhaps better adaptable than any other educational area to provide youngsters with orientation for the modern world. It can give them a broad understanding of industrial society, tell them of the opportunities for employment, provide them with basic skills useful for a wide area of job possibilities, and make them cognizant of the possible contributions which they can make to the society by constructive participation in the world of work. (p. 32)

Such claims have not been made without foundation. Only industrial arts provides for the study of our technology, including industrial tools, materials, processes, products, occupations, and related problems. Industrial arts teaching methods provide for an assortment of educational experiences and activities that make possible a concrete, understandable approach to educating students about the technological world. Maley (1957) stated:

> The industrial arts laboratory through its unique facilities and environment has found itself abundantly rich in potential for the use and application of a wide variety of methods; perhaps more so than any other area in the school. It is at once an activity area, a classroom, a haven for problem solving, an ideal situation for experimentation, and its potential for individual, group, or class projects is unlimited. (p. 154)

This chapter addresses industrial arts teaching methods that result in optimum learning. An initial examination of the nature of teaching methods is followed by an account of the growth and development of those methods in reference to industrial arts. Next, both traditional and emerging new methods are examined with emphasis on research findings and applications in the teaching and learning process. The chapter closes with a projection of the future directions in industrial arts teaching methods with implications for present practices.

NATURE OF TEACHING METHODS

Industrial arts teaching brings the learner into active, productive interaction with a wide variety of technological experiences. The first and most important concern of the industrial arts teacher is achieving the desired outcomes of student learning. To meet this responsibility, the teacher selects effective teaching methods. There is a wide variety of teaching methods – individual or composite – that the teacher can employ. There is no one best teaching method or one that will suit all occasions. The effective teacher selects and then employs those methods that will result in optimum learning, aware that the success of teaching methods depends on a number of factors. Among them, the following five interrelated dimensions appear to be most important:

1. The objectives of the learning experiences determine what teaching methods are to be employed.
2. Teaching methods are selected on the basis of the subject matter to be taught.
3. The keys to effective teaching methods are based upon the psychological principles of learning.
4. The teacher's attributes affect teaching methods.
5. Teaching methods are influenced by all aspects of the educational environment.

Educational Objectives

Successful teaching attempts to translate into active learning educational objectives. Teaching methods are meaningful only to the extent they implement the objectives of the educational experience. Thus, the most relevant consideration in selecting the appropriate teaching method(s) involves the identification of educational objectives. The psychology of learning reveals that the kind of objectives dictates the most effective learning procedures (Woodruff, 1962, pp. 43-45). When the objective of the learning experience is the development of competence in a given motor skill, teaching methods effective in motor skill development should be used; teaching methods appropriate to the development of a conceptual objective would be inappropriate. Thus, teaching methods that promote the achievement of one type of objective may retard the attainment of other objectives. It is, therefore, important that in any teaching situation the teacher identify the objectives and then select the methods that will obtain them most efficiently (Maley, 1978, pp. 32-33).

General objectives do not serve as definite guides regarding what is to be done; they do, however, serve as general guides by which more definite, desirable, attainable objectives may be determined. Industrial arts teachers in increasing numbers are using curriculum objectives, course objectives, or unit objectives as the basis for the organization of the classroom work.

For at least two reasons teachers should follow a classification of educational objectives to establish their own objectives. First, it helps the teacher analyze the teaching methods in use. Second, it helps the teacher become more thorough and consistent. One such classification is the taxonomy of educational objectives devised by Krathwohl, Bloom, and Masia (1964). They classified educational objectives into three domains: cognitive, affective, and psychomotor. Other classifications serve similar purposes, but this classification is designed to place special emphasis upon desired behavioral changes in the development of the learner.

Subject Matter

Subject matter or content is defined as the substance of a curriculum. It can be classified as (a) cognitive, (b) affective, or (c) psychomotor, and it can be (a) knowledge to be attained, (b) attitudes to be developed, or (c) skills to be achieved (Inlow, 1970, p. 45). Subject matter, like objectives, influences the selection and application of teaching methods. However, since subject matter is not all the same, all subjects should not be taught in the same way. Thus, the teaching methods used in each of the three classifications of objectives could be considerably different. The teacher must make a conscious effort to select and evaluate teaching methods according to the content of the disciplines concerned. In addition, instruction must be directed at the knowledge, attitude, or skill to be learned.

Psychological Principles of Learning

Effective teaching methods are based upon sound psychology. Teachers often feel frustrated as they examine various theories.

Recognizing a lack of agreement among psychologists in their theoretical orientation of the learning process, Frandsen (1961) has summarized conditions essential for effective learning:

1. Readiness, including sufficient mental maturity for the level of learning undertaken, suitable abilities, and an appropriate background of experience.
2. Motivation, which arouses, sustains, directs, determines the intensity of learning effort and which, in conjunction with perception of the effects, defines and reinforces (as drive reduction) goal-achieving provisional trials.
3. Opportunities for structuring effective approaches to problems, in which the student, by generalizing from his past experience, by self-discovery or invention, and with teacher guidance finds response-guiding cues and a mode of attack.
4. Repeated trials, consisting of goal-directed, provisional trials oriented toward discovery, differentiation, and integration of more effective patterns of behavior.
5. Prompt perception of the effects of each tentative trial, with provision for confirming correct solutions and for revising errors in subsequent goal-directed efforts.
6. Provisions for transfer, by organizing, generalizing, applying, and extending solutions.
7. Associated conditions favoring confidence and mental health and preventing anxiety and distorting self-attitudes which otherwise impair learning efficiency. (pp. 53-54)

Inlow (1970, p. 68) advises teachers to combine this body of learning theory with common sense when applying it to an actual teaching situation, viewing it as approximate and emergent, not as absolute and final. He synthesizes the different learning viewpoints and identifies four principles of learning in a common-sense frame as follows:

1. Learning needs to be pupil-centered.
2. Learning authenticates life.
3. Learning gives trust when organized and structured.
4. Learning does not have to be painful. (pp. 78-82)

Teacher Attributes

The teacher determines the successful implementation of teaching methods. In effect, teaching methods are more a natural extension of a teacher's personal attributes than an abstract essence detached from human personality (Inlow, 1970, p. 59). The teacher's personal characteristics, general and specialized interests, ability, and background constitute a governing influence on the choice and application of teaching methods. Therefore, it is not surprising to note numerous articles in professional journals attempting to define or describe the personal attributes leading to success in teaching. One such example is Steeves (1962, p. 42), who identified eight personal characteristics of successful teachers that recur in professional articles: discipline, scholarship, health, teaching ability, community relationships, faculty relationships, personality, and evidence of growth.

Teaching Environment

It is generally agreed that the teaching environment should reflect the educational programs and student needs; it is also often true that educational programs should bear evidence of the environmental influences. Therefore, the teaching environment should be a major concern of the teacher. The total teaching environment of industrial arts education includes not only the school facilities but also the industrial, social, and technological aspects of the human environment involving community resources, school organization, school plant, school shops and laboratories, classrooms, and equipment.

Undoubtedly, industrial arts teaching methods are influenced by community resources such as opportunities for field trips and work experience present in large industrial communities but lacking in others. Laboratory designs also can affect teaching methods. But regardless of the community size or school laboratory designs, industrial arts teaching methods can provide learning experiences that encourage problem-solving, discovery, and skill development. Teaching methods in industrial arts should always attempt to make the student an active participant rather than a passive spectator (American Vocational Association, 1968, p. 16).

GROWTH AND DEVELOPMENT OF TEACHING METHODS

In this age of new educational theories and innovative educational practices, people are apt to think of contemporary teaching methods as having no ancestry, no history. Actually, the teaching methods employed today are not necessarily completely original methods but the outgrowth of many centuries of educational progress.

Some methods employed by industrial arts teachers are the same as those used by teachers in other disciplines. There are, however, some teaching methods utilized primarily by industrial arts teachers. This section of the chapter traces the growth and development of the teaching methods that have a direct bearing upon contemporary industrial arts. To trace and explain satisfactorily in a few pages the historical development of such a multitude of teaching methods is presumptuous. But a perspective may be gained, perhaps, by examining a few of the more prominent educational leaders and their significant contributions in the development of teaching methods.

Early Development

When civilization was yet in its intellectual infancy, society was simple. There was no recognition of social ties except that of blood and the family. Through the *trial and error* method, learners imitated, with little or no consciousness, the acts of older members of the family or tribe until they met with some degree of success (Graves, 1915, pp. 16-18).

History evidences ancient Egypt's progression from the stages of savagery to the beginnings of early civilization. Not much is known about Egyptian teaching methods, but considerable time must have been spent in learning the hieroglyphs. Teaching seems to have been largely conducted through *memorization* and *imitation* (Graves, 1915, p. 37).

As the Jewish, Greek, and Roman civilizations developed, the beginnings of *individualism* in education were for the first time revealed in the history of education. It was the Greeks, through their philosophy and educational practice, who made the greatest contributions to educational progress. While the teaching method of early Greece was merely imitation, it became more elaborate as time passed, making clear the reason underlying each concrete act and habit. One person who contributed most significantly to the concept of individualism in education was the Greek philosopher Socrates (495-399 B.C.). Realizing that the "pouring-in" process of the Sophists in their lectures could never be effective, Socrates adopted the plan of individual development through informal conversation. This teaching method was called the *dialectic method* (Mayer, 1973, p. 96). In this method, Socrates asked his pupils a series of leading questions that encouraged them to analyze the problems and to draw their own conclusions. This *question-and-answer method* of teaching as originated by Socrates is known today as the *Socratic Method* (Clark & Starr, 1967, p. 223).

Other contributions followed those of the Greeks. The Romans sought to provide a general education with an emphasis on logic, debate, oratory, rhetoric, and legal training. Cicero viewed rhetoric style as important in education and professed that "the educated man is an orator."

Education in the Middle Ages was mostly religious in nature. Monastic schools were devoted to the laws of the church, music, vocational subjects, and physical fitness.

The Renaissance (1420-1700) marked the beginning of modern educatonal organization into elementary, secondary, and higher schools. Vittorina De Feltre stressed individual differences in teaching and sought the all-round development of student personality. Guarino Da Verona used a seminar-type of teaching that emphasized mental, physical, and moral development (Means, 1968, pp. 3-4).

Emerging Educational Ideas and Methods

Owing to the humanistic revival and to other factors, the 16th century witnessed a series of Protestant revolts against the Catholic church in a movement known as the "Reformation." The actions of Martin Luther (1483-1546), the earliest and most prominent reformer, deserve attention because of his educational innovations and teaching methods. Luther's most significant innovation was the desire to establish schools where the common people could be prepared for their occupation in life. His proposed teaching method utilized the *natural activity* of children and made use of concrete examples that appealed to the children's interest and rationality (Graves, 1915, p. 186).

While the Renaissance and the Reformation were hardening into formalism, a new means of expression appeared in "realism" in the 17th century. This movement searched for a method where real things could be known and held that real knowledge came through the reasons and the senses rather than through memory and reliance on tradition (Graves, 1915, pp. 240-241).

The following philosophers of realism had significant impacts upon the development of teaching methods in education as well as in industrial arts.

Francis Bacon (1561-1626) was one of the earliest sense realists. Since the use of the scientific method in the various discoveries of the 16th century had been largely unconscious, it remained for Bacon to formulate what he called the method of *induction* to point out a new way to study nature (Graves, 1915, p. 263). This method was contrary to the traditional method of *deduction* generally attributed to the Greek philosopher Aristotle and his followers (Hillway, 1964, pp. 9-10). Bacon's method of induction was not simply to learn what others had written but to go straight to nature and learn through the senses. He believed that all knowledge must be obtained through a careful and unprejudiced induction from facts (Bennett, 1926, p. 35).

John A. Comenius (1592-1670) is considered one of the greatest pioneers in modern education. He insisted that children be taught the order of nature. Thus, the imitation of nature became his central theme. He was the first educator who tried to apply the method of *analysis* to teaching in his exposition of the "methods of the arts" (Bennett, 1926, p. 39). Comenius is also best known today for his book, *Orbis Sensualium Pictus* (The World of Sense Objects Pictured), published in 1637, the first illustrated textbook for children. As a result of this work and his belief in the art of sense impression, Comenius is generally regarded as the first proponent of modern audio-visual education (Steeves, 1962, p. 51).

In England, John Locke (1632-1704) became the chief exponent of the idea that education should fit a student for practical life (Bennett, 1926, p. 61). Locke (1889) noted:

> This method of teaching children by a repeated practice, and the same action done over and over again, under the eye and direction of the tutor, 'till they have got the habit of doing it well, and not by relying on Rules trusted to their memories, has so many advantages, which way soever we consider it, that I cannot but wonder (if ill custom could be wonder'd at in any thing) how it could possibly be so much neglected. (p. 39)

Thus, Locke's method of teaching in habit formation is a matter of *repetition* or *drill* (Bayles & Hood, 1966, p. 53).

The educational ideas and philosophies of various European leaders of the 18th century were introduced into the United States early in the 19th century. The influence of these leaders on American educational practice was most significant. Among them were Rousseau, Pestalozzi, Herbart, and Froebel.

Jean J. Rousseau (1712-1778) developed a theory of learning emphasizing the necessity for each child to be free to develop according to individual natural impulses. At the heart of this "naturalism" lays the foundation of Rousseau's teaching methods corresponding with the child's natural stages of development (Bayles & Hood, 1966, p. 82). Rousseau emphasized the use of *games, motor activities,* and "real" things in teaching the child. He recommended the study of such sciences of nature as geography, physical sciences, and of manual arts and crafts. He proposed that all children should construct their own materials for use in their study and work with their hands to assist the growth of their body, organs, senses, and other natural powers. Rousseau is generally regarded as the father of modern child psychology and his impact on contemporary education, especially in the United States, is immense (Mayer, 1973, pp. 248-249).

Johann Pestalozzi (1746-1827) is regarded as the greatest mediator through whom European theories of education were transmitted to American education (Good & Teller, 1973, p. 334). His ideas were similar to those of Comenius. He believed that in teaching one must begin with the experiences of the child, using real objects whenever possible. He emphasized the use of models, tools, plants and animals, and other devices to appeal to the senses of the child. His teaching methods directed the child to touch, to feel, and to look at the materials used in teaching. Several versions of his theories were combined with native American ideas that changed schoolkeeping in the United States to teaching (Good & Teller, 1973, p. 334).

Writers of educational history usually attribute the earliest serious concern for teaching methods to Johann Herbart (1776-1841). His two main contributions to American education are still evident today – the emphasis upon social and moral characteristics of education and the systematic formulation of teaching method (Butts, 1947, p. 438). In his original proposal, Herbart divided his teaching method into four steps:

(a) clearness, (b) association, (c) system, and (d) method. However, these steps are not clearly in line with the principle of apperception. Tuislon Ziller, a Herbart follower, made a significant contribution in this connection by dividing "clearness" into two steps – preparation and presentation. Wilhelm Rein, also a Herbartian, later described the method as consisting of five steps: (a) preparation, (b) presentation, (c) association, (d) generalization, and (e) application, which became Herbart's five-step teaching method (Bayles & Hood, 1966, pp. 149-150).

The Herbartian movement was introduced into American educational thought and practice at the close of the 19th century through such people as Charles DeGarmo, Charles A. McMurry, and Frank M. McMurry. As a result, teacher education institutions in this country became interested in teaching methods based upon Herbart's teaching steps. The Herbartian movement exerted considerable influence on the course of American education that is still visible today (Bayles & Hood, 1966, p. 143).

Friedrich Froebel (1782-1852), the father of the kindergarten, introduced into schools many activities (he called occupations) using tools and materials (he called gifts) (Bennett, 1926, pp. 165-166). His influence on American educational methodology may be characterized by such terms as "self-activity," "motor-learning," "self-expression," and "creativeness," a wide departure from the disciplinary training pupils were receiving in the lesson-learning schools of the 19th century (Risk, 1947, p. 412).

Manual Training Teaching Methods

The manual training movement found its way into the American educational scheme during the late 1870's. It was influenced by the work of the various European educational leaders and particularly by the *Russian system* of manual training, developed by Victor Della Vos at the Moscow Imperial Technical School in 1868. The Russian system was designed to teach the fundamentals of the mechanic arts to a large group of students through a graded series of exercises using various tools. Its distinctive emphasis was upon its clear-cut teaching method of tool instruction (Bonser & Mossman, 1923, p. 468). As a result of the Russian system exhibit at the Centennial Exposition in 1876, manual training found its way into the United States. The Russian system has been applied in the development of many industrial arts curriculums, where the content is based on elements of skilled industrial trades such as wood, metals, and drawing (Towers et al., 1966, p. 91).

The Scandinavian *sloyd system* of educational handwork also exerted great influence on the teaching of manual training in this country. The sloyd system required that instruction go from the simple to the complex and that exercises be taught in such a way as to result in the making of useful articles. The sloyd system advocated *individualiz-*

ed instruction as opposed to the class instruction of the Russian system (Bennett, 1937, pp. 53-97).

The introduction of the Russian and the sloyd systems in the United Stated resulted in the clashing of the two manual training teaching methods in the late 19th century. As a result, there developed an American method of manual training that was essentially different from either the Russian or the sloyd system but included elements gained from both. This method, developed by Charles A. Bennett (1917, pp. 68-83), was called the *group method*. It combined the economy and stimulus of class instruction with the best consideration of the needs of individual pupils. In the group method, a class moved forward together group by group, yet each member of the class grew within each group as an individual. While the group method did not incorporate any new principles of teaching, it was essentially a new method in teaching manual training at the time when conflicts between the methods of the Russian system and the sloyd system arose.

Contributions of Psychological Research to Teaching Methods

Toward the end of the 19th century another new influence on teaching methods – experimental psychology – appeared. James Cattell and Stanley Hall established psychological laboratories in this country, and psychology began its course as an experimental science. From it emerged a new view of child development and learning theories. The old faculty psychology was challenged by such people as J. M. Rice, editor of the *Forum* magazine and an ardent educational reformer. Rice presented his research study on spelling tests at the National Education Association (NEA) meeting in 1897 producing ample evidence to throw serious doubt upon the value of drill in achieving the purposes intended. Rice continued his work for a span of several years, examining the teaching methods used in various subject matters. He succeeded in pointing out serious weaknesses in the educational methods of the 19th century (Hillway, 1964, pp. 55-61). Further experimental studies by other psychologists and educators at the turn of the 20th century resulted in the rejection of faculty psychology and opened the door to new methods in the determination of how learning occurs. Foremost among the researchers was Edward L. Thorndike (1874-1949), noted for his influence on learning theory and teaching methods (Risk, 1947, p. 414). His studies of learning theory resulted in the formulation of the Stimulus-Response or S-R Bond theory as an explanation of learning according to the laws of readiness, exercise, and effect. This S-R Bond theory has since been widely embraced by classroom teachers and textbook writers alike (Good & Teller, 1973, p. 404). Thorndike also made important contributions to the field of educational methodology. He developed objective tests as a means of measuring academic, physical, mental, and emotional development. He emphasized the importance of the individual as a learner and brought about increased attention and provisions for individual differences in school organization and classroom teaching.

Contributions of John Dewey

The educational views and proposals of John Dewey (1859-1952) and his followers were instrumental in developing the progressive education movement that became widespread in American schools during the first half of the 20th century (Good & Teller, 1973, pp. 350-379). His influence upon industrial arts content and teaching methods is far-reaching and profound. It was in 1899 that Dewey published his book, *The School and Society,* which, according to Bennett (1930), marked a new era of industrial arts education. In this book, Dewey took into account the great influence of industry as a social institution from which the child would discover and apply the principles that govern individual and social development. He placed at the center of the elementary school curriculum the study of industrial occupations through which the skills of reading, spelling, and arithmetic were to be learned and then used as needed in occupations. He advocated the invention and use of hand tools and preferred the use of the hands in grasping and manipulating to the use of the eyes in learning.

Thus, Dewey emphasized a radically new approach to the development of schooling in manual and industrial education. There remained the large task of interpretation and adaption to the school curriculum and teaching methods. The group recognized as doing the most to assume this task and further Dewey's ideas included Charles R. Richards, James E. Russell, Frederick G. Bonser, and Lois C. Mossman. Their efforts resulted in an industrial arts ideology that was referred to as the social-industrial theory by Snedden and Warner (1927, p. 7). This theory still affects the content and teaching methods of industrial arts.

The Influence of the Vocational Education Movement

During the first decade of the 20th century, progress in the teaching of manual and industrial education reached a new milestone. In 1906 the vocational education movement took shape as a result of the report of Douglas Commission in Massachusetts. Vocational education received its greatest impetus with the passage of the Smith-Hughes Act in 1917. Under the influence of the vocational education movement and the leaders in vocational education, industrial arts content and the teaching methods realizing this content were arrived at by the process of *job analysis.* This is a technique where operations and information within the scope of a specified occupation, or any part of an occupation, are identified and listed for instructional purposes. Two leaders prominent in this field were Charles R. Allen (1919) and Robert W. Selvidge (1923). Later Verne C. Fryklund (1965) also made significant contributions.

The Influence of William E. Warner

Parallel to the vocational orientation of industrial arts by the process of job analysis, a different approach was taken by proponents of industrial arts as general education. The most progressive leader in the development of curriculum content and teaching methods during the first half of the 20th century was William E. Warner of The Ohio State University. Underlying Warner's proposal, the content and teaching methods of industrial arts were directly implied by the physical facility termed the laboratory of industries (Towers et al., 1966, p. 107). The teaching methods employed in the laboratory involved research, planning, work experience, field study, personnel and physical organization, illustrative aids, conferences, and creative expression (Warner, 1947, p. 42).

Technology and Teaching Methods

With technology's increasing influence on 20th century life, the educational enterprise has responded to the resultant demands for change. The 20th century has produced more curricular changes and methodological innovations with wider implications than have any of the preceding centuries. Technological developments have provided the impetus and know-how for educators at all levels to create a wide range of learning experiences and teaching methods to meet the needs of students. Industrial arts, like other academic areas of education, has responded, however slowly, to the demands for change by incorporating a number of innovative curriculum projects and teaching methods.

One of the concommitant benefits of the technological developments in the area of educational methodology has been the development of media and techniques to improve the teaching-learning process. A representative sample of the recent innovative practices that incorporate media and teaching methodology to achieve specified behavioral goals was reported by Buffer (1971). However, a note of caution has been sounded by Susskind (1973, p. 74), who fears that education may prove to be one of the fields where technology has been oversold. He advised educators to take advantage of technology in every field of human endeavor and, at the same time, to recognize its limitations.

CONVENTIONAL TEACHING METHODS

Seeking to transmit the accumulated knowledge and skills of one generation to another, cultures (or people) have developed a great variety of teaching methods. Some methods have remained unchanged for years; others have been either modified or discontinued. As the type of information to be transmitted has changed, demands for new, more effective methods have arisen. This discussion of teaching methods will be confined to a number of traditionally accepted teaching practices that are employed by industrial arts teachers. These methods are grouped under headings of large group instruction, small group instruction, diversified instructional components, and individualized instruction. The new and emerging teaching methods are discussed later in the chapter.

Large Group Instruction

Lecture method. In early societies, people relied on the lecture method of education. As civilizations advanced, scholars such as Socrates, Aristotle, and others employed this as the primary method of teaching. The lecture method of teaching can be divided into two categories: (a) The *formal lecture* is a straight-forward method of telling with content being carefully selected and sequentially organized (Inlow, 1970, pp. 127-128). This teaching method is one of the most popular and extensively employed today, yet it has been grossly abused by some teachers. When properly utilized, the formal lecture can be very functional. It can be used for introducing activities, for motivating students, for summarizing at the end of units, and for explaining difficult points. It is particularly useful for bridging gaps between topics to be studied in depth and for presenting information that in no other way is accessible to students (Clark & Starr, 1967, p. 210). The formal lecture method has identifiable limitations. It is a one-way medium — teacher centered. It is primarily an instrument of cognitive learning and factual transmission, making only incidental contributions to problem-solving and creativity. While generally employed only with large groups, the formal lecture relates ineffectively to differences among individual learners (Inlow, 1970, p. 131). (b) The *informal lecture* method is generally not so highly structured as the formal lecture, and it is used for shorter time periods. It is usually interwoven into other teaching methods and serves different kinds of curriculum purposes. Introducing various instructional media, many industrial arts teachers have employed the informal lecture to make their "shop talks" more effective. Demonstrations are frequently combined with an informal lecture to improve student comprehension. The most commonly used modification of the informal lecture is the *lecture-discussion* method. It involves the encouragement of student questions and reactions as the teacher proceeds with the lecture. This teaching method has the advantage of promoting consistent student attention while averting the potential monotony of the formal lecture (Callahan, 1966, pp. 197-198).

Research results on the lecture method are inconsistent. Some researchers (Beach, 1960; Husband, 1951; Lancaster & Erskine, 1962) reported the formal lecture method to be notably effective, especially with older students, while other investigators (Hill, 1960; Montean, 1959; Warren, 1954) reported the *discussion method* of greater value. Amidon and Flanders' study (1963) on verbal teaching operations concluded that students learn more from working with the indirect teachers than with the direct teachers. The indirect teachers are those who not only explain but also turn many of their lectures into indirect teaching by asking questions, posing problems, seeking comments, and entertaining questions. However, the most successful teachers are those who "shift their behavior as necessary. That is, they could be just as direct as any teacher in certain situations, but they could be far more indirect in other situations" (Amidon & Flanders, 1963, p. 57). McKeachie (1967) concluded that the lecture method is satisfactory in attaining the objective of teaching knowledge and transferring information, but when the objective is developing concepts and problem-solving skills, other teaching methods are preferable.

Discussion method. The application of the discussion method in industrial arts teaching has been meager. Yet, as Struck (1938, p. 276) indicated, industrial arts education must be concerned also with the social and economic problems of contemporary life. Even though the major portion of the time devoted to industrial arts education is spent in manipulative, constructive, problem-solving, and creative activities, there is still need for discussion in the teaching and learning process.

A good discussion is a purposeful conversation proceeding toward some well defined educational goal. It is concerned primarily with alternatives, contrasts, comparisons, and the application of facts and generalizations previously acquired (Steeves, 1962, pp. 183-184).

Research studies related to the discussion method have rendered support to the desired outcomes of this teaching method. Stoval (1958) summarized research findings with respect to the lecture and the discussion methods as follows:

> The lecture is equal or superior to group discussion if the criterion is acquisition of information, but discussion produces better results in terms of retention of this type of learning. Discussion has been found to be more effective than lecture as a means of stimulating critical thinking and in aiding students to attain a deeper understanding of subject matter, which is reflected in the ability to make application of knowledge newly acquired, to interpret, and to draw inferences. Likewise, discussion has a greater effect on attitudes and is more conducive to the development of desirable interpersonal relationships in the classroom. (p. 256)

McKeachie and Kulik (1975) reviewed 31 research studies conducted between 1949 to 1972 for the purpose of comparing the student-centered discussion method and the teacher-centered discussion method. They concluded that the student-centered discussion was superior for higher level cognitive learning and for motivational and attitudinal changes.

Questioning method. Since the time of Socrates, the questioning method of teaching has been recognized as a common and necessary medium of teaching and learning. It continues to be so in spite of changes in contemporary educational theory. It is a useful tool and, in the hands of a skilled teacher, serves numerous learning purposes in the teaching and learning process. The questioning method can motivate students and stimulate their analytical thought. In addition, it can clarify and encourage the application of concepts.

Research results indicated that the questioning method facilitates learning. Boyd (1973) and McGraw and Groteluschen (1972) found that questions facilitated performance through stimulating review of material preceding the question and through increasing attention to the material following the question. However, the effectiveness of questioning probably depends upon the learner. Berliner (1971) reported that questions inserted into a lecture helped students low in memory ability but impaired performance of students high in memory ability.

Demonstration method. A teaching demonstration is defined as a visual presentation of things, processes, facts, or ideas to be learned (Grambs et al., 1958, p. 160). Accordingly, the demonstration is more than a simple act of showing a process or a skill of employing concrete materials. It also presents facts, ideas, and principles. The use of the demonstration as a means of transmitting skills, processes, ideas, and facts is probably as old as education itself. People have always learned by a process called conscious imitation. Today, conscious imitation is aided by the teacher demonstration in the teaching and learning process (Wilber & Pendered, 1973, p. 224). The demonstration is probably the teacher's greatest aid in training students in fundamental skills and practices in the shortest possible time (Andrews, 1976, p. 152). Although the class demonstration is usually considered to be the most important because it is designed to do the most good for the largest number of students at any one time, the demonstration may be presented to a small student group or to an individual in the laboratory as the need arises (Wilber & Pendered, 1973, p. 227).

The demonstration is an effective teaching method because it is based upon established principles of learning. In combination with other teaching methods, the demonstration is probably the best and most frequently used procedure in teaching industrial arts laboratory course work. The most frequently used of these combined methods is the *lecture-demonstration method.* This method has the psychological advantage of giving recognition to some of the most essential concepts of teaching and learning (Callahan, 1966. p. 209).

Instructional materials. In the last few decades interest has increased in teaching methods involving instructional materials and their related technologies. A visit to most modern industrial arts laboratories clearly demonstrates that teachers utilize a variety of instructional materials including models, mock-ups, charts, diagrams, as well as projection equipment, slides, and films. The discussion of instructional materials as part of teaching methods will focus primarily on the printed materials and the conventional audio-visual materials. Although these materials have been used successfully with small groups, and even with individuals, they assume their most useful role in communicating with large groups. The newer instructional materials that generally refer to educational television, programmed instruction, computer-assisted instruction, etc., are treated later in the chapter.

Although industrial arts teachers utilize a multitude of instructional materials, the *textbook* is still the primary tool for a vast majority of teachers. A textbook can be a blessing or an evil depending on its quality and the manner in which a given teacher uses it (Inlow, 1970, p. 139). Cronbach (1955, p. 3) reported heavy dependence on textbooks in teaching by school teachers. When the textbook dominates teaching, a teacher loses much of the professionalism and imaginativeness. As Wiggins (1958, p. 157) stated, "Much of the criticism of textbook teaching is attributable to unimagination and ineffective use of the text rather than to the text as used properly."

In some industrial arts content areas such as drafting, electricity and electronics, and automotives, the *workbook* supplements the text as another important instructional material. Workbooks generally exist in the form of a manual, with problems to be solved, questions to be answered, experiments to be performed, and projects to be completed. A review of research studies provided no clear-cut evaluation of the educational value of workbooks. Teachers in some content areas have obtained good results with them; in other areas, the use of those materials has degenerated into busy work without due regard for originality of thought.

The modern industrial arts laboratory is replete with *reference* and *supplementary materials* such as project books, handbooks, manufacturers' manuals, blueprints of projects and designs, pamphlets, and magazines (Silvius & Curry, 1967, pp. 147-149). Teachers are challenged to find ways to encourage discriminating reading, to promote regular study habits, and to use such materials as sources of ideas about contemporary technological development.

Practically every elementary and secondary school is equipped to use most types of *projected materials*. Teacher use of movies, filmstrips, slides, and transparencies has become firmly established. The volume of research on the use of projected materials is second only to that on the use of educational television. By and large, research results are overwhelmingly favorable (Alcorn et al., 1966, p. 235). Jacobsen (1966) reported research results on the use of the overhead projector:

> The validity for continued use of the overhead projector is strongly supported by findings that included demonstration time reduced, practical laboratory time increased and test scores improved. (p. 70)

Kruppa (1968) compared the effectiveness of three teaching methods related to the demonstration in an introductory college woodworking class. The students received three teaching methods: (a) class demonstration, (b) overview-film demonstrations followed by class demonstration, and (c) overview-film demonstrations followed by concept films. Kruppa concluded that all three teaching methods were equally effective in teaching technical knowledge and in student performance of constructed products. Cushing (1971) compared the teaching of machine operations using supper 8-mm silent film loops presentations with live presentations. He concluded that film presentations were as effective for teaching machine operations as live presentations. The professional literature abounds in research that illustrates the benefits of projected materials in teaching. Other investigators also report that students learn best in their regularly accustomed learning environment. It is, therefore, important that projected materials should be shown in the regular classroom or laboratory if possible (Kinder, 1959, p. 18).

Two- and three-dimensional materials have application for many content areas in industrial arts. These materials are essential tools for supplementing the verbal presentation. *Two-dimensional materials* include charts, diagrams, tables, pictures, graphs, maps, safety cartoons, and related materials, while *three-dimensional materials* include models, mock-ups, prototypes, objects, specimens, artifacts, samples, and exhibits. Jacobsen (1966) verified the valuable use of three-dimensional objects and models in classroom instruction.

Community resources. A community resource is defined by Wilber and Pendered (1973) as "any resource, either human or material, used to further the objectives of industrial arts and available in the community where the school is located" (p. 377). This provides another learning activity for students to obtain knowledge and information first-hand about people, places, industries, materials, and processes in the community and enrich, validate, or vitalize information from printed or other sources. The two general classifications of community resources are (a) field trips offering students visits to industries, libraries, business concerns, and museums, and (b) resource persons who are brought to the classroom (Wilber & Pendered, 1973, p. 382).

The *field trip* is a learning activity that requires students to leave the school and go into the community for sources of information. It is an effective teaching method because the student has direct contact with the subject of the study (Pendered, 1975, p. 14). However, there are a number of limitations: (a) administrative problems, (b) scheduling problems, (c) cost, (d) transportation problems, and (e) school and personal liability problems (Alcorn et al., 1966, p. 253).

The educational values of a field trip have long been recognized by educators, but there is no objective evidence to support or refute this viewpoint (Pendered, 1975, p. 14). A study conducted by Goldsbury (1969) compared three different groups of learning activity involving the field trip. One group took an actual field trip; the second group experienced the same field trip via a slide-tape presentation; the third group saw the slide-tape presentation and then took the field trip. Goldsbury's findings revealed that the third method was the most effective. The second approach was found more effective than the first. Results of this study led Pendered (1975) to recommend vicarious field trips via slide-type presentation as substitutes for actual trips.

Resource persons come to the school, usually without pay, to share experiences, knowledge, and skills with students. They often contribute new and practical ideas that enrich, vitalize, and motivate learning (Alcorn et al., 1966, p. 255). Resource persons help students develop a keen appreciation of the community, and, at the same time, carry a new understanding of the school back to the community. The effective use of resource persons is an excellent means of establishing two-way communications between the school and the community.

Small Group Instruction

Buzz session. When a group is too large for effective discussion, the teacher may subdivide the class into smaller groups with as few as three or as many as 10 students in each group as a means of widening the base of discussion opportunity. Such buzz groups are frequently so small and discussion time so short that they have been referred to as Discussion 66, meaning "six people in each group carrying on an exploratory discussion for only six minutes" (Revlin, 1961, p. 196). Numerical limits with regard to the number of students in a group and time alloted for a buzz session can be adapted to each particular situation and issue.

Round table or panel. The origin of this method dates to the 6th century when King Arthur of the Britons feasted his knights around a "round table" (Struck, 1938, p. 261). Basically, the round table or panel is a method wherein three, four, and rarely more than five individuals develop a topic informally, relying on the larger listening audience for participation. In recent years the round table or panel has been employed extensively in business and industry. In its more selective employment in the schools, it has a somewhat narrow range of learning applicability. Yet, when properly employed, the method makes a significant contribution to the development of social-emotional and cognitive behavior (Inlow, 1970, pp. 154-155).

Symposium. Symposiums and panels serve similar purposes in the teaching and learning process. A symposium, however, is slightly different from a round table or panel because it is more formal in structure. In addition, each participant presents a prepared topical speech that may be followed by discussion from the floor.

Debate. Debate has been recognized as a desirable means of learning. The main purpose of using debate in the school is to instruct the students on how to deal with controversial issues and to recognize that differences can be brought into the open and discussed (Borough et al., 1964, p. 218).

Role playing. Role playing is an unrehearsed dramatization where several members of a group enact a situation or a problem in the presence of other group members (Clark & Starr, 1967, p. 238). The value of role playing in learning has long been recognized. Role playing is fun, interesting, and motivating. It encourages student creativity, self-confidence, cooperation, and courtesy (Means, 1968, pp. 30-31). Role playing can be applied as an instructional technique in many different instances. The student personnel organization in an industrial arts laboratory, for example, often provides for the role playing activities. It provides opportunities for students to role-play administrative and supervisory posts in their world of industrial organization. Certain cognitive behavioral changes related to the organization of industry and the development of desirable social relationships can be attained through the role playing activities in the student personnel organization (Wilber & Pendered, 1973, p. 271).

Diversified Instructional Components

Project method. Throughout the evolution of industrial arts education, the project method of teaching has been the main instructional technique. According to Struck (1929, p. 47), the term "project" was first used by such vocational educators as David Snedden, Rufus W. Stimson, and Charles A. Prosser around 1908. Since then, the use of the project method has spread from teachers in practical arts and vocational education to teachers in other academic areas.

The project method received impetus from the progressive education movement of the 1920's. A leading proponent of the project method in education was William H. Kilpatrick (1918), who was also the first person to present a thorough discussion of that method in 1918. In that presentation he stressed that the project method should represent hearty, purposeful activity on the part of the student. Basic to the method was a sequence of steps that Kilpatrick (1925, pp. 344-355) referred to as the complete act of a purposeful activity. He suggested the following four steps for a project: (a) purposing, (b) planning, (c) executing, and (d) judging. These steps were to be carried out as fully as possible by the learner. The subject matter was to be studied through projects that involved the four desirable steps.

In recent years, the project method has come under attack by some industrial arts educators who view it as being an outdated learning experience and campaign vigorously for its elimination. Others believe that the project method still is a worthwhile educational activity and that it is here to stay in industrial arts (Andrews, 1976, p. 82).

A symposium consisting of five distinguished college professors was held in 1960 to discuss the future role of the project method in industrial arts. Although no definite concensus of opinion was reached, the general conclusion was that the project method is here to stay – not de-emphasized or eliminated, but re-emphasized and changed (Glazener et al., 1963, pp. 220-229). After touring this country and observing the work of industrial arts and technical teachers, Miller (1974) reported that "the project is still alive and doing well." He continued, "It's doing so well, in fact, that most teachers are enjoying teaching with this method. The project has been so successful that teachers in *all* subjects have 'borrowed' it" (p. 26).

The project method of teaching is well suited to both individual and group cooperative efforts. There are three basic approaches to the project method.

1. The *drill project* method, often called the exercise method, is still a valuable technique in introductory laboratory experiences as well as advanced technical training. Its primary purpose is to provide students with experiences to develop manipulative skills and habits in the use of tools and machines (Andrews, 1976, p. 83).
2. The great majority of industrial arts projects in the school are constructed on an individual basis. Yet, *individual projects* receive most of the criticism (Miller, 1974, p. 27). Regardless, the emphasis on individualized instruction is a salient feature of industrial arts education. The individual project is a useful technique not only with superior students but also with slower learners. Experience has shown that successfully completed projects develop confidence and bring students a feeling of accomplishment. The individual project is a valuable learning medium fulfilling many of the prime objectives of industrial arts education.
3. *Line production projects* are group endeavors for manufacturing or constructing a large number of a single product through the formation of an industry-like organization with various divisions of responsibility. A production line or assembly line is usually established for the class production activities. Simulation and role playing are important features where the students participate in an active model of an industry-like manufacturing firm. Andrews (1976) summarized the advantages of line production projects as follows:

1. It is the method of industry.
2. It puts incentive into the work.
3. It raises standards of workmanship.
4. It develops cooperation.
5. It discovers and develops managerial ability.
6. It gives an opportunity to less-talented students. (p. 85)

A number of research studies have been conducted comparing the relative effectiveness of the three basic approaches to the project method. Ilot (1969) compared the individual project method and the line production method. No significant difference was found between the two teaching methods in developing an understanding of industry. Another research study by Gebhart (1971) reported similar conclusions.

Problem-solving method. The roots of problem-solving as a teaching method dates to antiquity. Socrates practiced it; Bacon, Comenius, Locke, Rousseau, and Pestalozzi developed advanced procedures; and Dewey, Kilpatrick and many others employed it (Struck, 1938, p. 337). The problem-solving method in industrial arts is currently on the ascent as attested by its role in searching for solutions of the complicated problems of contemporary technology. The problem-solving method when related to learning was defined by Risk (1947, p. 451) as "a planned attack upon a difficulty or perplexity for the purpose of finding a satisfactory solution." This involves the process of reflective thinking, or critical thinking that, according to Dewey (1933, p. 12), has two definite operations or steps: "(a) a state of doubt, hesitation, perplexity, mental difficulty, in which thinking originates, and (b) an act of searching, hunting, inquiring, to find material that will resolve the doubts, settle and dispose of the perplexity." This point of view sets forth the importance of reflective thinking, discovery, or problem-solving as a learning procedure characterized by a process of conscious consideration of facts and beliefs for the purpose of arriving at rational conclusions about some problem or perplexity.

In his book *The Manual Arts,* Bennett (1917, p. 107) advocated three methods of teaching industrial arts: (a) the imitative, (b) the discover y, and (c) the inventive. For many years the discovery, or problem-solving, method has been followed in varying degrees by many industrial arts teachers. Since Russia's launching of Sputnik in 1957 and the increased effort to improve all educational programs, increased emphasis has been placed upon "problem-solving" as a significant approach to teaching industrial arts (Miller, 1965, p. 13).

There are two types of learning activities in industrial arts that may be used effectively in problem-solving; namely, (a) problem-solving by an individual, and (b) problem-solving by a group.

Problem-solving by an individual offers the learner the opportunity to solve a problem chosen by the teacher or the student. Each individual learner concentrates on the solution of the problem, with the teacher supervising the efforts of the student in arriving at a satisfactory solution. This approach is comparable to the *problem project* or *open-ended project* in the laboratory because it sets forth the essential criteria, limitations, and results to be achieved for a given project. It differs from the conventional project method in that the teacher allows for individual interests and provides for individual problem-solving at the learner's ability level. Dutton (1976) reported that the individualized problem-solving method can result in the development of both problem-solving skills and more self-direction by students. Phillips (1961) compared the project method and the problem-solving method in industrial arts and suggested a merger of the advantages of these two methods in order to establish a sound educational approach. The contemporary *research and experimentation method* in industrial arts as proposed by Maley (1959) appears to represent such a viable approach to studying industry and technology. Maley (1964) described this method as "an individual-centered approach, with the scientific method of problem solving being the principal element" (p. 3). Maley's research and experimentation approach is consistent with the educational program developed by Dewey where the problem-solving approach is the key element (Luetkemeyer, 1966, p. 50). Many teachers have adopted the research and experimentation method since its inception as a regular part of the industrial arts program. Earl (1960) believed it would improve the offerings in industrial arts and contribute to the advancement of general education. Martin (1975) observed a number of desirable outcomes as the result of such a program on the college level. Junior high school industrial arts programs in Mississippi have adopted a unit on research and experimentation in the on-going curriculum since 1975 (Allen & Hinrichs, 1975).

The research and experimentation method is not without criticisms. Luetkemeyer (1966) noted that there are generally two main streams of criticism. The primary criticism concerns the problem or project. Broudy (1961) stated:

> The problem approach to the curriculum is therefore faced with a dilemma. If the problems used do not require the knowledge of the organized disciplines, then the school is superfluous. If such knowledge is required, it cannot be secured except by systematically studying the subject. (p. 291)

The second criticism deals with the teaching of the scientific method as a separate educational objective and with the validity of the logical step-by-step approach as developed by Dewey and others. This step-by-step procedure is, as Easley (1958) indicated, "a gross oversimplification of the available methodological principles" (p. 178).

When a problem is solved by a group, the general technique is the same as when it is solved by an individual. Instead of an individual learner's own efforts, however, several individuals working as a group learn how to attack, learn how to gather information and data, and, finally, learn how to arrive at solutions. By such a group problem-solving procedure, students also acquire attitudes of cooperation, open-mindedness, and tolerance.

Drill and practice. The difference in these two words as a part of teaching method is largely that of connotation. Drill connotes emphasis on unthinking, unquestioning repetition, whereas practice suggests meaningful, purposeful repetition (Steeves, 1962, p. 169). Although modern educational theories tend to decry drill and practice, they are still among the basic teaching methods of many teachers. The history of drill and practice dates to the 16th century Puritan automatons. Those early schoolmasters made learning a thing of repetitive responses, and pupils cooperated or they experienced the wrath of the master (Inlow, 1970, p. 175).

Educational concepts concerning drill and practice have changed. Research studies indicated that meaningful, purposeful, and motivated drill and practice can be valuable instruction. Clark and Starr (1967, pp. 262-263) noted that drill and practice are necessary to (a) reinforce retention of what has been learned, (b) develop skills, and (c) increase understanding.

Curriculum content areas most suitable to drill and practice are those that encompass the essential academic and motor skills, such as arithmetic, music, language fundamentals, and vocational and practical arts subjects. These subjects lend themselves more profitably to drill and practice than do subjects that relate to conceptual content. All subjects, however, lend themselves more or less to drill and practice. The difference is a matter of degree. Research findings to date support the need for drill and practice as a part of the teaching and learning process. Drill and practice, to be successful, must be meaningful and well motivated and must serve a purpose that students understand and accept (Inlow, 1970, pp. 175-177).

Review. Review and drill are not the same, although the connotations are similar. Review does not emphasize repetition, but re-views. It is a new look at the material that has been studied (Alcorn et al., 1966, p. 152). Review provides an opportunity for the teacher and learners to evaluate what has been accomplished. It provides new horizons, new applications, and new ways of thinking (Borough et al., 1964, pp. 237-238).

Individualized Instruction

The significance of individual differences in teaching and learning has long been recognized by educators. By the turn of the 20th century, the Italian educator Maria Montessori (1870-1952) had developed a system of education in which very gradual sequences of tasks matched the pace of each student. These features of the Montessori method are considered the first real example of an individualized instructional system (McKeachie & Kulik, 1975, p. 166).

In the 1920's a number of educators developed individualized plans for teaching at the elementary school level. Three of these plans were most influential. Carleton Washburne developed the Winnetka Plan for the public schools of Winnetka, Illinois. Henry C. Morrison utilized an individualized approach, called the Morrison Plan, at the University of Chicago's Laboratory School. Helen Parkhurst, a Montessori disciple, developed the Dalton Plan in the schools of Dalton, Massachusetts. The Dalton Plan gained prominence not only in the United States but also in England and Russia (Good & Teller, 1973, pp. 422-425).

In the 1960's individualized instruction was rediscovered at all levels of education. Flanagan (1967) developed Project PLAN, Lindvall and Bolvin (1967) produced Individually Prescribed Instruction, Bloom (1968) wrote on Mastery Learning, Postlethwait and others (1969) contributed the Audio-Tutorial Teaching, and Keller (1968) devised the Keller Plan or the Personalized System of Instruction (PSI), which is probably the best known today of all individualized approaches to instruction.

In recent years there has been an increasing interest in individualized instruction by industrial arts educators. Jelden's (1972) Learning Activity Packets and Groth's (1972) Individualized Curriculum Learning Packages were available for use in the electronics laboratory. Bro (1974) developed a modified group-individualized instruction plan for drafting and design courses. Numerous other individualized instructional plans have been tried, and their applications and merits vary widely. The discussion that follows centers on some of the most commonly used methods of individualized instruction especially applicable to industrial arts.

Differential assignments. The industrial arts teacher can often meet the needs, interests, and abilities of individual students through differential assignments, problems, or projects. Inlow (1970) indicated that this goal becomes attainable only under three conditions: "when a teacher views a curriculum not as fixed but as flexible, when he is close enough to students to understand them as individuals, and when he takes the time to relate the curriculum to them as individuals" (p. 169). When employing differential assignments, a teacher has a choice of designating alternatives for students or allowing them the freedom of selecting their own problems.

Unit method. The unit teaching method emerged during the 1920's as a result of the "named" plans such as the Winnetka Plan, Morrison Plan, and Dalton Plan. Today, the unit teaching method applies to group instruction as well as to individualized instruction. It is defined by Yabu (1974) as "a carefully-developed series of experiences related to a particular topic and designed to contribute to the development of the purpose of the course" (p. 108). Thus, the unit teaching method is organized around a particular topic that constitutes a wholeness in itself. Teachers who engage in the unit teaching method should relate each unit to one another and, at the end of the course, put all the units together into an organized whole. Planning for a unit teaching method should include consideration of individual differences among learners. As with other teaching methods, the unit method is a demanding one that makes heavy claims on time and effort of a teacher. It relies for success on careful planning, proper organization, hard work, and, most of all, genuine concern for individual growth.

Supervised study. The concept of supervised study as a teaching method is relatively new. It is defined by Borough, Foster, and Salyer (1964) as "a classroom organizational plan that provides for individual or small-group study of a broad-area assignment under the direct guidance and assistance of the classroom teacher" (p. 240). The supervised study may cover a period of several days or several weeks and may take place in the classroom, in the laboratory, in the library, or in the community.

Supervised study offers many advantages to both teacher and students. It allows the teacher the opportunity to provide individualized instruction based upon each learner's individual differences. The students are allowed to work on their assignments or projects in a more personalized way at their own ability level. However, the lack of group experience for the students in discussion and interaction of ideas and concepts is an important weakness of supervised study (Borough et al., 1964, pp. 241-243).

Self-instructional devices and materials. The availability of self-instructional devices and materials has made individualizing of instruction much easier today than in the past. Examples of such conventional audio-visual devices as tape recorders, self-loading individual-viewing motion picture projectors, and filmstrip projectors can be used effectively for self-instructional purposes. Some of the modern instructional devices such as programmed instruction, television, computer-assisted instruction, to be described later in this chapter, are devised primarily for individualized teaching.

NEW AND INNOVATIVE TEACHING METHODS

The last two decades have witnessed a tremendous growth in the development of innovative teaching devices and materials in an attempt to improve the teaching and learning process. Programmed instruction, for instance, is becoming a frequently used instructional tool for individualized instruction within the framework of a group. The electronic computer, the latest technological advance to challenge the education profession, is on the threshold of entering classrooms and laboratories. In addition, a large number of innovative methods have been in use or are projected for use in the future. As Buffer (1971) noted, "It is an insurmountable task to report on all of the contemporary innovative approaches involving media and technology" (p. 157). Therefore, a representative sample of those new and innovative teaching methods that have a bearing on industrial arts education will be presented.

Programmed instruction. Programmed instruction, programmed learning, automated instruction, and teaching machines are variant terms, all referring to instruction that requires the use of systematically organized materials. The term programmed instruction, however, has become generally accepted and widely used in educational literature (Callahan, 1966, p. 426). Programmed instruction is not only a type of self-instructional material but also a teaching technique. The common purpose of programmed instruction is to guide learners so that a particular set of desired changes occurs in their performance (Stolurow, 1969, p. 1017).

Like most modern developments, the basic idea of programmed instruction is not a recent innovation. As early as 1866 Halcyon Skinner produced and patented a spelling machine. In 1873, a logic machine was produced and, in 1915, a simple teaching machine to teach a serial skill to mentally retarded children was constructed. Sydney L. Pressey (1926) first developed machines around 1915 to automate testing and to supplement regular classroom instruction by self-paced multiple-choice testing. It was not until 1954 that widespread interest in teaching machines developed because of a paper entitled "Science of Learning and the Art of Teaching" by B. F. Skinner (1954).

Two basic styles of programs, bearing the names of their chief proponents, B. F. Skinner and N. A. Crowder, have been used most frequently by educational programmers. The linear or Skinnerian style of programming is a straight-line program in which the steps are in a fixed order of succession. The branching or Crowderian style channels learners through different program paths, with each response determining the direction of the subsequent path. Both styles of programs can be adapted for use in teaching machines. The latest and most sophisticated form of teaching machines is computer-assisted. Current trends suggest that linear teaching machines are being used in decreasing numbers, branching machines are still being used, and computer-assisted instructional systems hold the promise of the future. Programmed texts are still the mainstay of printed programmed devices and will continue to be used in the future (Stolurow, 1969, p. 1020).

There has been considerable research on programmed instruction since 1954. Indeed, 10 years after B. F. Skinner's paper, Schramm (1964) reported that there were approximately 190 reports of original research on programmed instruction in professional literature since 1954. Up to the present time, research on programmed instruction in industrial arts has been conducted mainly by doctoral students. Research studies by Bensen (1967), Bockman (1971), Hofer (1964), Moegenbury (1969), Traum (1970), and Warner (1969) have demonstrated that programmed instruction is as effective as some of the conventional and new teaching techniques such as lecture, demonstration, textbook, and videotape recording in teaching manipulative operations or cognitive information.

McKeachie and Kulik (1975), in an article reviewing effective college teaching techniques, reported a rather negative finding about programmed instruction when they stated, "Probably the most important thing the Skinnerian teaching machines taught educators was that teaching machines are not very effective teachers" (p. 175). However, Stolurow (1969), in a review of programmed instruction, concluded the following:

> Research on PI (programmed instruction) leaves no doubt that students who use it learn. . . . They learn when materials are in book and machine form. Many different kinds of learners have not only learned, but also liked programs. . . . The decision (sic) to use PI in and for education are not simple or easy, but any doubts about its permanence or effectiveness would have to stem from prejudice or ignorance. (p. 1020)

Inlow (1970) attempted to summarize the pros and cons of programmed instruction:

> I state in conclusion that programs and teaching machines are no more fads than they are panaceas. They probably are fixtures, but of exactly what kind only continued study and research will reveal. (p. 214)

Television instruction. The history of television instruction is relatively short. On April 14, 1952, the Federal Communications Commission allocated 242 television channels for education and later extended this number to 273. In 1953, station KUHT at the University of Houston made its appearance as the first educational television station in the nation (Alcorn et al., 1966, p. 270). The Pittsburgh, Pennsylvania, schools became the first of many school districts to utilize television instruction in the mid-1950's. The Hagerstown, Maryland, schools started one of the earliest closed-circuit instructional television projects in 1956 with 5,300 students receiving one full lesson each day by television (Callahan, 1966, p. 458-459). The most extensive single project involving the use of television for instructional purposes was the Midwest Program of Airborne Television Instruction (MPATI) project that operated in the six-state area of Illinois, Indiana, Kentucky, Michigan, Ohio, and Wisconsin during the 1960's. At the present time, educational television is being employed in the nation's elementary and secondary schools, colleges and universities, and adult educational programs. The wide acceptance of television instruction at all levels of education has led industrial arts teachers to adapt it to classroom instruction.

Regardless of its rapid development, the current role of television instruction in the schools is still in a state of flux. Morse (1960), Schramm (1962), and the Ford Foundation (1961) reported that television instruction was as effective as and frequently better than using conventional methods at the primary and secondary levels. However, the validity of these research findings was questioned by Inlow (1970):

> The reason is that those who do the experimenting, or the philanthropic foundations which underwrite the experiments, usually become the evaluators. This state of affairs easily leads to biased research. (p. 207)

A review of research on college teaching by McKeachie and Kulik (1975, pp. 174-175) found that college courses taught by television were not so effective as those taught by conventional methods. The chief reason for television's lack of effectiveness in college was that most college instruction has conceptual rather than visual aims. However, television instruction can be a useful medium in providing students a close-up view when a clear visual image is important for learning. Obvious examples are found in the teaching of industrial arts where television is used to supplement the laboratory demonstrations to permit close-up viewings of hazardous processes or operations (Herbert, 1964; Jacobsen, 1966; Parry, 1960). Arguments pro and con are abundant regarding the effectiveness of television instruction. Teaching by television has its strengths and limitations. The quality of television instruction depends greatly upon the skill and ingenuity of the teacher who utilizes it.

Videotape recording. Videotape recording is utilized in the training of prospective teachers in methods classes as well as in the field (the so-called micro-teaching process) and is reported to be valuable in providing the student teachers with instant feedback of their performance (Armstrong, 1969; Wiehe, 1972; Wilber & Pendered, 1973). Specific use of videotape recording in industrial arts teaching was first reported by Sauer (1967) in an experiment using this equipment for teaching junior high school metal working. Sauer reported that "although this method was time consuming, it was such a good example of effective teaching. . . . We felt it was worthwhile" (p. 49). The results of an experimental study by Baron (1969) also found that videotape recording was as effective as the conventional method of presentation in teaching a psychomotor task in graphic arts to junior high school students.

It would appear that the feedback value of videotape recording assures it an important place in instruction. Unfortunately, the results of other research findings are not so favorable.

> The research on video playback reveals, as we suggest, that feedback may lead to worse, rather than better, performance. One clue to the reason for this outcome is found in the frequent finding that video playback of one's performance is anxiety arousing. Video playback can contribute to improvement, but only under restricted conditions. (McKeachie & Kulik, 1975, p. 175)

Computer-assisted instruction. The role of computers in instruction is of increasing concern and importance to educators. Computer-assisted instruction (CAI) is concerned mainly with the use of a time-sharing, interactive computer system in the human learning situation. It seeks to provide a program of learning adapted to the individual learner by storing instructional programs in a computer. The learner interacts with these programs by means of electronic interface devices (Buffer, 1971, p. 178).

Research findings on computer-assisted instruction as a teaching method at all levels of education are inconsistent. Some researchers (Hammond, 1972; Suppes, 1966; Suppes & Morningstar, 1969) found it effective for supporting contemporary instructional strategies. Instructional programs adapted to individual learners by computer-assisted instruction proved effective in studies by Atkinson (1972), and Atkinson and Paulsen (1972). Other investigators (Bundy, 1968; Silberman & Filep, 1968) found no significant difference between computer-assisted instruction and traditional instructional methods. Long, O'Neal, and Schwartz (1969) found no advantage of computer-assisted instruction over programmed instruction. It is clear, therefore, that while new computer-assisted instruction programs are being developed, additional evaluative studies are still needed.

Whereas computer-assisted instruction remains an area of great potential for industrial arts education, progress in using the computer as an aid to instruction has been growing only in the last few years. The increasing utilization of computers in engineering design makes obvious the value of incorporating some training in computer graphics for students interested in drafting and design. The utilization of numerical-control machines provides students an opportunity to be exposed to the concepts of automatic control machining in the manufacturing laboratory.

Games and simulation. Games and simulation have become a viable teaching and learning activity suitable for most educational levels. Games are simulations of real-life situations and have a specific set of rules and win criteria. However, games are not always pure competitive contests where there is clearly a winner and a loser. Games are both enjoyable and educational, with the emphasis on learning. Simulation, on the other hand, does not have a set of win criteria, but it provides the learners with an opportunity to experiment, operate, or establish a model of some real-world system or problem. As a learning activity, games and simulation cause the students to become active participants in the educational process. They provide the learners with a real-life problem and the experience of solving the problem on a miniature scale of the more complex and difficult problems (Nystrom et al., 1977, p. 151).

The origin and history of games and simulation can be traced to games like checkers or chess that were developed more than 2,000 years ago. Military war games have been used to analyze possible battle situations since the early 18th century. Games and simulation were used extensively during World War II to train combat pilots and naval officers. Since World War II, games and simulation have been applied to other enterprises. They have been developed and used for personnel development, sales, and investments (Nystrom et al., 1977, p. 150). They have also been used with great success in teaching such subject matters as business administration, international trade, and international relations on the college level (Johnson, 1969, pp. 173-174). The practice of utilizing games and simulation in teaching is also widely employed in the field of vocational-technical education and practical arts in such subject matters as auto mechanics, television and radio repairs, aeronautics, engineering drawing, and police training. The "Trouble Shooting Contest," sponsored by the Chrysler Corporation, is an example of games where the students actively engage in repair activities of an automobile. In the drafting laboratory, which simulates a typical industrial drafting department, students work cooperatively as teams on actual problems of design. In the manufacturing laboratory, which simulates a typical manufacturing enterprise, students are assigned roles and work cooperatively toward the production and marketing of mass-produced goods. The "Building Carpentry Simulation Games," developed by Hildebrandt (1973), can be used to provide additional learning in labor, business, legal, and financial considerations related to carpentry. Berger (1972) and Levande (1975) cited numerous other examples of technically-oriented ideas suitable for developing simulation techniques in the industrial arts laboratory.

Games and simulation have some major advantages over other teaching methods. Most games and simulation inject reality into the educational program. They bring about active participation and involvement on the part of the students and they provide the opportunity for learners to explore their talents, interests, and potential. They provide an excellent means of integrating students with diverse abilities and educational levels. Games and simulation represent a different kind of educational experience that is challenging, motivating, and interesting. However, the teacher should also be aware of the limitations of games and simulation when applied to the teaching and learning process. For example, students may not be ready to engage in games and simulated activities and may not see games and simulation as viable educational experiences. The teacher may overwork this teaching method. In addition, the instructor may have insufficient planning or training in using games and simulation as an educational tool (Maley, 1978, pp. 168-169).

Research studies dealing with games and simulation have generally been conducted by doctoral students. Rummell (1971) and Pine (1973) studied the effectiveness of simulation against non-simulation in teaching numerical-control concepts. Altus's (1972) study was concerned with simulation as a feedback mechanism in training draftsmen. Bruntlett's (1972) and Randolph's (1972) studies dealt with computer-assisted simulation. Generally, these studies indicated no significant difference in student learning between the simulated and nonsimulated activities.

Systems approach to instruction. The systems approach to operations has been widely employed in the solution of government, military, business, and industrial problems with varying degrees of success. Originating in a study of human body temperature by Cannon (1939), the systems approach has been developed into a new discipline known as general system theory (Bertalanffy, 1968) and is concerned with the application of scientific principles to achieve specific goals. The primary purpose of the systems approach to business and industrial operations is to obtain the most effective and efficient procedure in achieving the primary objectives or outputs of a program or project. Like business and industry, education is increasingly using a systems approach to the solution of educational problems. When it is applied to the teaching and learning process, the systems approach begins with the formulation of changes desired in student behavior – including cognitive, affective, and psychomotor domains. When behaviorally stated objectives have been defined, a systematic analysis of procedures follows with feedback to achieve the desired results. Razik and Elsie (1973) suggested a six-step systems process model for identifying and integrating current thrusts for the quantitative improvement of instruction: (a) goal determination, (b) task analysis, (c) task prescription, (d) implementation, (e) evaluation, and (f) revision or modification.

The principal advantage of the systems approach is that it offers the educator a method of viewing large problems within a productive perspective. It is a powerful methodology for improving the educational process, especially in instructional development. However, it is far from a fully mature science. It is no magical scientific savior for the complex problems of education implied by contemporary technology.

Mastery learning. Mastery learning is a teaching-learning strategy developed by Bloom (1968). Influenced by Carroll's (1963) "A Model of School Learning," Bloom's mastery learning strategy is predicated upon the assumption that a majority of students, perhaps as many as 90%, could be expected to attain mastery if each student received differential opportunity to learn and differential quality of instruction. He proposes that minimum standards for mastery of subject matter be set and that students be given sufficient time and proper instruction to reach the standards (Bloom, 1974).

The basic elements of a mastery learning strategy are (a) identifying objectives, (b) developing evaluation measures for them, (c) teaching to achieve the objectives, (d) administering diagnostic quizzes based on the objectives as soon as instruction is over, and (e) reteaching and retesting, guided by the results from the diagnostic test. Bloom does not prescribe any particular teaching procedure or methodology in mastery learning; instead he suggests that each teacher use procedures that work for him/her in helping students achieve the objectives.

Research findings bearing on mastery learning as a means of improving learning effectiveness are encouraging (Block, 1974; Smith & Katims, 1977). The consistent finding is that mastery learning strategy increases student achievement. Some studies also show increased achievement accompanied by favorable attitude changes. A study by Burrows and Okey (1975) found that mastery procedures closed learning gaps between students of high and low aptitudes. Industrial arts teachers interested in employing the mastery learning strategy in teaching may want to refer to books by Block and Anderson (1975) and Torshen (1977) for a tryout of the process in their own classrooms.

FUTURE DIRECTIONS AND EXPECTATIONS

In just a little more than two decades clanging bells and festive balloons will herald the year 2000. Experts have predicted the social, cultural, economic, and scientific changes that will have occurred by then, and even the most conservative individual stresses the importance of anticipating such changes and being able to deal with new problems and opportunities. For education the implications of projected changes should be a major concern because the school shapes tomorrow through the children and youth of today. Sociologist Wilbert Moore (as cited in Rubin, 1969, p. 18) asserts, "The school will fulfill its function as an agency of developmental change only if it prepares its graduates for a somewhat uncertain world, where no niche is absolutely secure and few niches even hold their shape well."

Industrial arts education has been in a constant state of change since its early inception in the American schools. The period since 1960 has produced more innovations and changes than any of the preceding decades during the 20th century (Cochran, 1970, p. 110). To meet the critical and almost immediate challenge of education for all in the future, industrial arts education programs should be decidedly improved and the highest quality of instruction achieved. What the nature of industrial arts education in the 21st century will be cannot be fully visualized at this time, for the period of adjustment is just commencing. However, the impact of prospective changes on industrial arts education in general and teaching methods in particular can perhaps be gained in better perspective by considering some of the important assumptions about the nature of the teaching-learning process of the future. It is the implicit as well as the explicit assumptions that provide directions and expectations upon which the future of industrial arts teaching methods is based. The author is in agreement with the assumptions made by Barnes (1972).

1. As it is dedicated to understanding change, the learning system itself will undergo continual change. . . . (T)he system will study the nature of change and prepare individuals to cope with it.
2. The learning system will be based on a continuous life-long approach to learning. With education viewed as a primary need, the system will act as a means to individualize ends – self discovery and the realization of one's potentialities. It will be a full time process . . . for persons of all ages.
3. Learners will participate in the decisions which affect them. They will take responsibility for selecting their own learning goals and defining which experiences will best assist them to meet these goals. In this context, the learning system will provide access to the network of resources.
4. The learning system will be affirmatively human in its orientation, recognizing the uniqueness of the individual as a continuous learner and as a resource person. At all times the system must accept responsibility for being accountable to each learner.
5. The learning system is designed to facilitate learning by using educational technology and all possible sources throughout the community and the world. It will be associated closely to all other systems to enable the entire living environment to be interactive and responsive. (p. 14)

In light of the above assumptions, it appears that the impact of prospective changes on industrial arts education will be great in the future and that their long-term influence on the teaching methods of industrial arts education will be in the following directions:

Teaching and learning will take place in the total social environment. New technological developments will make possible the total social environment as a future learning environment. Teaching and learning will not be limited to what we presently call schools. Instead, learning will take place throughout the entire social environment of the learner – in homes, businesses, industries, public facilities, open areas, learning centers, and beyond the confines of the residential community. These facilities will become more accessible for learning because an increasing number of homes will have terminal access to computers and video networks to receive information about learning activities and resources. In addition, more homes will be equipped with video telephones to provide two-way communication (Barnes, 1972, p. 22).

In the existing community facilities such as the schools, physical changes will take place to serve the needs of the future. Industrial arts laboratories will give way to open-space concepts that allow for flexibility in a variety of learning situations. These new laboratories will be designed to enhance the development of problem-solving skills through the use of individual and group learning activities, all directed toward the study of technology. Learning and instruction will take place through the use of models, prototypes, simulations, games, television cameras and receivers, electronic computers, automated projection equipment, and other technological aids. These laboratories will be supported by a resource center that provides ready access to both print and nonprint materials for individualized learning, a project center for each individual learner to work on real projects as part of the learning process, and interaction centers where group dialogue will take place to facilitate individual growth through formal and informal interaction of people (DeVore & Lauda, 1976, pp. 22-26).

Teaching methods will emphasize the development of life-long learning skills. Drastic social, economic, and technological changes have been reported in the past, and more startling projections for the future have been suggested by many experts. The proliferation of knowledge – sometimes referred to as the "knowledge explosion" – is probably the most important element that produces many of the changes in society. Whaley (1965) described it as follows:

> There is about 100 times as much to know now as was available in 1900. By the year 2000 there will be over a thousand times as much knowledge of all kinds to record, to sift, to store, to search out, to teach about, and, hopefully, to use with some discrimination and effectiveness. (p. 107)

With such an expansion of knowledge, it is no longer possible to give students an adequate command of the information in each area that will serve them throughout the balance of their life. The learning system can only start them on a life-long career of continued learning. Hence, the major emphasis of education in technology for the future will be on the development of learning skills and techniques for students so that they can become actively engaged in life-long learning in coping with rapid technological changes. For this reason, new instructional strategies must be designed to include strong emphasis upon problem-solving, analysis and communication, and upon learning how to meet new situations and challenges (Tyler, 1967, p. 155). The research and experimentation mode of instruction, as suggested by DeVore and Lauda (1976, p. 155), serves this purpose adequately. Students can identify complex technological problems, analyze the problems by utilizing all kinds of learning resources through individual and group activities, and, finally, present solutions and alternatives. The teacher's role in this learning process is one of instructional facilitator in searching for solutions of the problems.

Teaching methods will encompass conventional methods, new media, and advanced technology. The applicaton of new media and advanced technology to educational methods will be developed gradually into a larger scale in the future. The process, however, will be one of evolution controlled by rational decisions. It is not and will not become a revolution in teaching methods. Conventional methods will still be employed to some degree with improved effectiveness of instruction as research findings on teaching and learning become more evident. The emphasis in teaching will probably shift toward individualized instruction and small group instruction as technology for individualized instruction becomes more commonplace. Nevertheless, the end result will not be to displace teachers but to restore them to a position of responsible and creative leadership in the teaching and learning process. The teacher will continue the role of group mentor and devote more time to individual guidance. In light of the recent advances in educational technology, the following developments would appear to be particularly relevant to industrial arts teaching methods in the future.

1. One of the most notable of all technological innovations in teaching, and perhaps the most discussed, is television teaching. Although its potential for education is widely acclaimed, television has thus far made little impact on teaching in the schools and colleges. However, numerous evidences in the literature attest to the growing potential for television teaching including open and closed circuit and videotapes (Steeves, 1962, p. 227; Til, 1977, p. 276; Wilber & Pendered, 1973, p. 340). When fully developed in the future, television systems can be set up for the most varied uses in education: playing back a prerecorded lecture-demonstration from a videotape cartridge; multiple viewing of an otherwise inaccessible experiment or operation; or relaying a lecture-demonstration to many classes simultaneously or to audiences elsewhere (Susskind, 1973, p. 74).
2. There appears to be a continually expanding interest in programmed instruction by American educators, including industrial arts educators. Programmed texts and lessons presented via a teaching machine are already used in a variety of programs and courses today. Some schools already have programmed learning centers and some have developed multimedia programs. Program-

med instruction, with its individually paced approach to learning, can be an important instrument for individualized instruction in industrial arts education. Programmed instruction utilizing multimedia instructional materials and diversified methods of teaching will become an important feature in American education, including industrial arts education, particularly for the following uses: (a) to provide work for the advanced student, (b) to provide work for the slow learner, and (c) to present basic information. In the future, school administrators, curriculum workers, media specialists, and classroom teachers will be expected to assume an increasing role in preparing programs for local use (Steeves, 1962, p. 253).

3. Games and simulation are currently used in industrial arts education to some degree as previously reported. The stimulation of interest and motivation in learning suggests that games and simulation will have important potential values in industrial arts education in the future (Rosser, 1977). The practice of engaging in simulated activities for educational purposes will be found to have great acceptance in teaching the complex technological problems in such areas as mass production, electronic communications, engineering graphics, and power and energy. In addition, games and simulation may have special values for motivating low achieving students as they add a new dimension of reality to teaching. Games and simulation also prove equally effective with superior students and thus will have useful application for all students in the future (Johnson, 1969, p. 318).
4. Computer-assisted instruction (CAI), although frequently discussed, is still seldom used in industrial arts education. However, its potential for individualizing instruction appears to be unbounded, as McKeachie and Kulik (1975, p. 177) stated, "Very likely CAI is in its Wright Brothers era, with its jet age in the future." As advanced techniques are developed and computer costs decline, as the education profession and the public generally become familiar with computers, education will see their use spread as a basic instructional tool (Carter, 1968, p. 33). The schools of the future will probably have an instructional computer center or computers in every classroom, laboratory, or learning center. The advent of the instructional computer will open possibilities for automatic, individualized instruction. It is probable the computer, when it reaches its "jet age," will do some of the following in the learning process of the individual:

> Immense quantities of data can be stored and readily retrieved at millions of terminals – not only catalogs of library books but the contents of the books themselves, as well as pictures, audio and video

> tapes, films, and three-dimensional laser holograms. The retrieved information, heard or seen, transitory or more permanent hard copy, may take the form of instruction, highly individualized and adaptable to the student as to content, progression rate, methodology, and ultimate goals. Teachers freed from the routine, repetitive tasks that go with rote learning and its monitoring can devote themselves to the more humane task of catering to the needs of individual students. The students themselves need no longer be grouped in classes or grades arranged by age – each has what amounts to a private tutor. (Susskind, 1973, pp. 74-75)

Computers promise to play an important part in the learning process of the future. Whether the promise will be fulfilled depends on the degree of acceptance by the teaching profession that elects to make use of this astonishing new medium.

5. Many other new technological aids to learning that are still to be fully developed will have applications in industrial arts education in the future. Some of these new technological aids are audio recorders, dial-access systems, taped audio programs, the telelecture and feedback systems, and multi-response systems. These technological aids can serve not only as vehicles for learning but also as stimuli for innovation. However, the use of technological aids does not relieve the teacher of the responsibility for supplying the necessary human ingenuity, motivation, and compassion to make such instructional aids more effective. Norberg (1963) stated the following:

> There is no need to fear that the machine may displace, degrade, or regiment human teachers – or that it will dehumanize education. On the contrary, a humanized technology can free the teacher from the servitude of mechanical and repetitive chores and amplify the force of his creative and distinctively human efforts. (p. 15)

In facing the pressures of vastly complex educational problems and financial situations of the future, industrial arts education must attain the highest level of quality and efficiency. It must continue as a unique and dynamic unit in American education. Educators dealing with the field of changing technology have a unique opportunity and responsibility in helping students to develop greater understanding of present problems and possibilities of the future. Educators need a concommitant refinement of established methodologies with careful evaluation and experimentation of the new and innovative ones to achieve the highest quality of instruction for students in a changing technological society.

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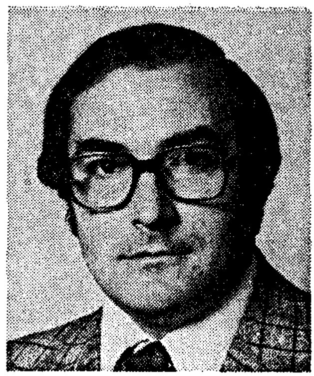
unit iii

Professional Roles and Education in Industrial Arts

chapter 12

Graduate Education in Industrial Arts



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The purposes and social role of graduate education are perceived as (a) developing the innate talents of people preparing for specialized disciplines or professions; (b) contributing to the utilization, expansion, and transmission of knowledge; and (c) improving socio-cultural conditions to ensure the optimal development and functioning of all people. Graduate study in the field of education serves individuals and society by generating new knowledge through research and development, awarding credentials, identifying and preparing talented persons, and improving professional skills. Individuals' purposes are served through graduate programs by providing service to society through involvement in public schools and community agencies, testing and developing abilities and interests as well as knowledge and skills, contributing to the knowledge base, and benefiting economically (Harris, 1977).

One need not be a scholar to recognize the apparent growth and interest in graduate degree programs in the United States. Graduate education, originally the responsibility of comprehensive, mature universities, now assumes a major role in most established and neophyte colleges as well as proprietary institutions. Graduate degree programs enable one to obtain certification and license to practice a profession (e.g., law or education), gain prestigious titles (e.g., doctor or professor), make career changes (e.g., from social worker to attorney), and obtain salary increments or improved employment classification (e.g., from teacher to supervisor or GS Level 7 to 15). Also of paramount importance is the improved knowledge and experience that contributes to the general improvement of self and one's impact on socio-cultural conditions.

The purpose of the chapter is to describe graduate education conducted to prepare industrial arts personnel, i.e., the historical development of programs, their general purposes, and the entrance and exit criteria. Issues and problems regarding graduate studies in industrial education programs as identified from a critical review of the literature are discussed. Data were also obtained from personal discussion with present and emeriti educators and students who have experienced the phenomenal growth of the industrial arts profession during this century.

The professional preparation of industrial arts teachers and teacher trainers has progressed from the janitor-craftsman level, to the formal training certification program (less than baccalaureate) of the normal schools, to the baccalaureate, master's, and the highest available academic degree – the doctorate. Graduate education has played a vital role in the evolution and status of industrial arts education as a developing field of study.

Graduate education in the United States has changed dramatically in the last 100 years. Today, graduate education is universally accepted as the primary means for preparing teachers, scholars, and researchers. Those trained will not only teach others, but hopefully contribute to the knowledge base of their disciplines through continued research, development, and professional practice.

GRADUATE EDUCATION: A HISTORICAL PERSPECTIVE

Formal programs of higher education in the United States began with the founding of Harvard College and the College of William and Mary. Both institutions were patterned after the English universities and emphasized baccalaureate studies. The Master of Arts (M.A.) degree was frequently awarded *in curau* ("as a matter of course") to all Bachelor of Arts (B.A.) recipients whose social behavior was deemed acceptable and who paid the required fee. This pro forma master's degree was gradually abandoned in the United States by 1893, but the practice still exists in some foreign universities today. Formalization of postbaccalaureate education in the United States occurred with the establishment of the "earned" M.A. degree program at the University of Michigan in 1853 (first awarded in 1859) and the "earned" Doctor of Philosophy (Ph.D.) program at Yale in 1860 (first awarded in 1861).

The founding of The John Hopkins University in 1876 (Hawkins, 1960) and the University of Chicago in 1890 (Storr, 1966) as graduate institutions patterned after the German universities provided the impetus for major existing universities to develop formalized master's and doctoral programs (Bean, 1953; Grigg, 1965; Walters, 1965). By the turn of the century, the earned Ph.D. or Doctor of Science (D.Sc.) had become almost mandatory for the professoriate in the leading American universities in most fields other than the humanities (Spurr, 1970).

Graduate Study in Education

At the turn of the century, most public school teachers, as well as teacher educators employed by normal schools, did not hold the baccalaureate degree (Drake, 1960). Graduate study in the field of education was not considered worthy by faculties in established universities. Education or pedagogy was perceived as a trade-like "practice" and not as a scholarly discipline founded in divine wisdom or empirical knowledge.

Rapid progress was made regarding the professionalization of the education discipline and related degree programs during the early 1900's. Columbia University, Clark University, and the University of Chicago are credited with the development of formalized graduate programs in the field of education. John Dewey's laboratory school at the University of Chicago and G. Stanley Hall's psychology laboratory at Clark University provided the impetus for empirical research regarding the educative process, thus lending scholarly credibility to the study of pedagogy as a science of modifying human behavior and functioning (Drake, 1960).

Graduate Study in Industrial Arts

It is generally accepted that practical arts or industrial arts-like subjects were not included as an integral part of American public education until the 1870's (Barlow, 1967; Bennett, 1937). Prior to 1890, some normal schools gave special attention to the preparation of manual training teachers. Formalization of such programs did not evolve until 1891 when Charles A. Bennett established the New York College for the Training of (Manual Training) Teachers. In 1893, the name of the college was changed to Teachers College and a two-year program of study in manual training culminating in a college diploma was established. The diploma set a new standard for the preparation of manual training teachers.

Teachers College became affiliated with Columbia University in July, 1893; thus certain Teachers College courses were applicable for the Columbia A.B., A.M., and Ph.D. degrees. Three years later, a course in the pedagogy of manual training, "Manual Training in Elementary and Secondary Schools," was taught by Professor Charles A. Bennett and is thought to be the first graduate-level course in manual training completed by masters' and doctoral students (Bennett, 1937).

Thus Columbia University was in the unique position to provide graduate instruction to improve the preparation of teachers, supervisors, and administrators, and also help establish professional standards. Bennett and his colleagues and students helped establish teacher education and graduate programs at major universities, e.g., Bradley University, the Universities of Chicago and Wisconsin, Miami University, and Iowa State University, thus expanding the opportunities for professional study in industrial education throughout the country.

In 1920, the University of Wisconsin became one of the first major universities to offer a master's degree with manual arts as a *major* area of study. Groneman (1938) reported that approximately 15,000 master's degrees were conferred upon industrial education teachers by 1920. However, most industrial education teachers who completed a graduate degree in the 1900-1920 era found it necessary to specialize in other program areas since majors in industrial education were not readily available.

Warner (1928, pp. 28-29) surveyed 18 institutions that offered the bachelor's degree and prepared industrial arts teachers to determine the professional preparation of their staff. There was a total of 146 faculty members of whom 72 (49%) held the baccalaureate, 20 (13%) the master's degree, and four (3%) held the doctorate. Fifty (35%) teacher educators had less than a baccalaureate degree as their professional preparation.

The number of industrial education teachers with earned master's degrees tripled (47,000) by 1930, and over 67,000 persons were either enrolled in master's programs or completed them in 1938 (Groneman, 1938). Forty institutions offered a master's program in industrial education in 1938 (Groneman, 1938), whereas approximately 1600 master's degrees with a specialization in industrial education were awarded in 1966-1967 by approximately 120 institutions (Wall, 1967) and 2507 master's degrees in 1976-1977 by 170 institutions (Dennis, 1977).

As early as 1938, Chris Groneman had the insight to suggest that industrial arts teachers would need the master's degree for entry into the profession. He suggested that "in this present period of professional expansion, many schools demand that the applicant have a Master's degree for even a teaching position. Many teachers forget that they are living in an age when the educational requirements of the teachers of the past are no longer looked upon as sufficient" (p. 238). There is no documented evidence to suggest that the master's degree is currently being required for entry into the profession although some state departments of education or local school systems may require that a teacher earn a master's degree (or its equivalent in credit hours) to attain permanent certification and tenure.

William E. Warner, one of the early leaders who helped shape the industrial arts education profession, claimed to have been the first person to earn the doctoral degree with a specialization in industrial arts (Warner, 1968). Warner completed the Ph.D. degree at Columbia University in 1928 under the mentorship of Frederick G. Bonser. His doctoral research was concerned with the development of a philosophical rationale for industrial arts content and resulted in a book entitled, *Reconstruction of Industrial Arts Courses,* coauthored with David Snedden in 1927 (Olson, 1974). After completing his doctoral residency, Warner won a professoriate in 1925 at The Ohio State University, where he served as the major graduate adviser to many industrial arts teachers until his retirement in 1967.

The doctoral degree with a specialization in industrial education was earned by 371 persons between 1930 and 1955 (Doane & London, 1957), whereas approximately 2,500 persons have graduated between 1955-1977, based on abstracts compiled by Jelden (1977). Apparently, the majority of doctoral programs existing before 1960 were in trade and industrial education or combined industrial arts with trade and industrial education to form an industrial education area of specialization. A review of the recent edition of the *Industrial Teacher Education Directory* (Dennis, 1977) suggests that these same patterns of specialization still exist although industrial arts is designated as a major for the Doctor of Education (Ed.D.) or Ph.D. degree at 22 universities.

Program Designates

In 1941, 95 of the 166 institutions listed in the *Industrial Arts Teacher Education Directory* used the term "industrial arts" or "industrial arts education" to describe their programs, and 108 institutions used the description in 1948. The term "industrial education" was used 22 times in 1941 and appeared 29 times in 1948. The term "mechanic arts" and some variation of "trades and industries" each appeared six times, and no other term was reported more than twice (Gerbracht & Phillips, 1948).

The problem with selecting and using terminology to designate undergraduate and graduate programs in 1977-1978 appears to have become more complex with such terms as "career," "occupational," and "technological" being added to catalogue descriptions. The data reported in this chapter deal primarily with those programs that prepare industrial arts specialists. It is recognized that some terms such as industrial education are generic and include industrial arts as a field of interest as well as some variation of trade and industrial education. Also, some universities now offer a comprehensive graduate program in vocational education in which industrial arts teacher educators serve an integral role on the professional staff (Adams, 1978). Thus the term *industrial education* is used in the text of this chapter to describe programs that include industrial arts solely or as an integral part of the undergraduate and/or graduate program. Reported data gleaned from the review of directories, research reports, and publications often combined industrial arts with vocational-industrial education. Whenever possible, the author attempted to separate these data based on his knowledge of institutional practices.

DEGREE STRUCTURES IN INDUSTRIAL ARTS

The Baccalaureate Degree

Generally, the baccalaureate degree remains the credential required for initial employment as an industrial arts teacher. This degree program may lead to the Bachelor of Science (B.S.), Bachelor of Arts (B.A.), Bachelor of Education (B.Ed.), or some other professional designate and can generally be completed during four years of full-time study. A significant portion of the student's time is spent mastering technological concepts and skills in the use of industrial tools, materials, equipment, and processes. Laboratory courses may account for 25-40% of the student's required credits for the baccalaureate degree and generally provide the technical information and skill necessary to teach industrial arts courses. Professional courses in industrial arts are concerned with the history and philosophy of the field, laboratory organization and management, methods of teaching technical subjects, and supervised student teaching experiences.

Less than 10 years ago, a dramatic shortage of industrial arts teachers prompted many state departments of education to provide temporary certification of industrial arts teachers with less than the baccalaureate degree. Specialized short-term teaching programs, often supported by state-controlled federal funds allocated under the Educational Professional Development Act (EPDA), were conducted by collegiate departments of industrial arts to provide minimal teaching competencies. Continuation of the temporary certificates was often contingent upon the completion of regular certification requirements (usually the baccalaureate degree) within a specified period of time (Lucy, 1971). A reduction in the school population and the increase in degree production of certified industrial arts teachers have eliminated the need for such specialized certification programs in most states.

The Master's Degree

The master's degree, as previously mentioned, was intended to provide opportunities for individual scholarship and research in a specialized subject area, thus enabling a person to develop a mastery within an academic discipline. The M.A., Master of Science (M.S.) and Master of Education (M.Ed.) are the most common degree designates awarded with a specialty in industrial education.

The academic program for the master's degree can generally be completed in one year of full-time equivalent study beyond the baccalaureate degree, although some professional degree programs require two years to complete the required coursework, research, related field or internship experiences, and examinations. The master's degree is generally perceived as an interim award for the person preparing to do independent scholarly research and study for the doctorate. Some graduate departments in major universities (e.g., the Universities of Michigan, Chicago, Southern California, Texas, and The Ohio State University) allow capable graduate students to bypass the master's degree to save time and allow promising young scholars to become immediately involved in doctoral study although this is *not* a common practice in education. Often the only difference in their graduate program is the waiving of the master's thesis since course credit requirements for the doctorate are often specified as being earned beyond the bachelor's degree.

Less than 30 years ago, most master's degree candidates needed to submit an acceptable thesis (Doane & London, 1957; Hankammer, 1936; Kohler, 1952) as partial requirement for the masters' degree in industrial education. Most recently, institutions have substituted a professional project, e.g., the development of an instructional unit; special reports, e.g., an extended term paper or essay regarding a professional topic; and/or additional course work in lieu of the conventional thesis requirement.

Miller and Ginther (1965) reported that only 0-10% of the students currently enrolled in the majority of industrial education master's programs actually prepared a thesis. Spurr (1970) suggests that this trend has continued throughout academia, especially in institutions that offer the doctoral degree. Apparently, a thesis or written master's project is still required in those institutions where the master's degree is the highest available degree program.

The master's degree is looked upon with suspicion in some fields other than education since it is often awarded as a consolation prize for those persons who do not meet the rigors of the doctoral program (Berelson, 1960; Spurr, 1970). However, there are many who desire the master's as a terminal degree and not as a step toward the doctorate. For these persons, the attainment of a master's degree, e.g., a Master of Business Administration (M.B.A.), or the Master of Fine Arts (M.F.A.), certifies that the recipients have completed additional study in a specialized area and have improved individual competencies that should be personally and socially beneficial – for self-development as well as economic or career attainment.

The master's degree has become the minimum degree requirement for certification as supervisor or administrator of industrial arts programs. Also, a large number of industrial arts teacher educators and community college instructors and administrators hold the master's as their terminal degree. The master's degree with a specialization in industrial education is now available in 170 institutions in the United States (Dennis, 1977).

Specialist-Level Programs

Many colleges of education offer a post-master's program designed for educators who desire additional formalized graduate study to improve their professional competencies. The Specialist of Education degree (Ed.S.) or Certificate of Advanced Graduate Study (CAGS) appear to be the most prominent listed in the *Industrial Teacher Education Directory* (Dennis, 1977). The first specialist in education degree was awarded by the University of Northern Colorado in 1952 (Boylan, 1964). Fifteen years later, Koenker (1967) estimated that 116 institutions were offering post-master's degree or certificate programs.

Generally, the programs require one or two years of study in a formalized program leading to a certificate, professional diploma, or specialist degree. The programs are open to qualified students with a master's degree and sometime require successful professional experiences in the area of specialization. Qualified students may generally apply for admission to a doctoral program after completing the specialist degree although programs are predominantly terminal in character. Many institutions have attempted to maintain the integrity of the advanced certificate in education and have not used it as a consolation award as some disciplines have used the master's degree. As a result, students who do not perform satisfactorily in doctoral programs cannot transfer into a specialist-level program within the same university.

The advanced program provides additional knowledge and skill in in chosen fields of study and practice. Some may use the formalized program of study to obtain professional certification or license, or to prepare for careeer changes, e.g., a junior high industrial arts teacher preparing to become a supervisor or a vocational rehabilitation counselor. Currently, the specialist-level program in industrial educaton is offered by 24 institutions and 79 specialist-level degrees were granted in 1976-1977 (Dennis, 1977).

While the major purpose of these programs is to prepare administrators, supervisors, counselors, and other highly specialized persons for educational institutions, college teachers, especially those involved in undergraduate teacher education, techincal instituties, and community colleges, could also benefit from these specialized programs. However, the growth and improved access of doctoral programs in education in the United States during the last decade – conventional and external – have probably contributed to the lack of interest on the part of graduate students in specialist-type programs.

The Doctorate

The doctorate with an emphasis in industrial education is rapidly becoming a requirement for industrial arts teacher educators. In the Tenth Yearbook of the American Council on Industrial Arts Teacher Education (ACIATE), entitled *Graduate Study in Industrial Arts,* Karnes and Lux (1961, pp. 111-112) suggested that the doctorate was necessary for those who planned to conduct research and whose major responsibilities were in connection with the professional aspects of industrial arts education. Those persons who primarily teach technical courses in teacher education departments may not feel compelled to pursue graduate study through the doctorate since studies included in doctoral programs do not contribute to the development of required technical competencies. Instructors of laboratory courses should be encouraged to seek training and be rewarded for obtaining additional competencies in their area of technical specialization.

The Ed.D. and Ph.D. are the two most prominent doctoral degrees in industrial education awarded by American universities. The Ed.D. with a specialization in industrial education is currently available from 35 universities, the Ph.D. from 27 universities, and 13 universities offer both doctoral degrees (Dennis, 1977). No institutions have awarded a doctorate of any other title although the Graduate Studies Committee (1974) of the ACIATE reported the existence of two Doctor of Arts (D.A.) programs with three more being planned for the 1972-1976 period (Wright, 1977). A Doctor of Industrial Technology (D.I.T.) degree has been developed by the University of Northern Iowa (1978), and their first doctoral students should be admitted in 1979.

Generally, three years of full-time study beyond the master's degree is needed to complete the course work, comprehension examinations, and dissertation research for the Ed. D. or Ph.D. in education degrees (Grigg, 1965; Robertson & Sistler, 1971). While some institutions will allow partial program requirements to be completed on a part-time basis, almost all demand a specified period of residency on campus devoted to full-time study and research. Normal residency requirements may be fulfilled by one year of full-time study, whereas in practice, graduate students are strongly encouraged to spend an additional second or third year to complete all of the degree requirements before leaving campus.

Patterns of doctoral programs in industrial education are varied. Most do not allow or provide minimal opportunities to earn graduate credit in technical areas of specialization. A majority of the course work is in professional areas of curriculum, philosophy, history, administration and supervision; research methodology and statistics; related education areas; and non-related education areas outside the college of education (Harris & Tomlinson, 1974; Miller & Ginther, 1965). Some doctoral programs are highly prescriptive and do not allow much latitude for the selection of major or minor areas of concentration, whereas other programs are individually designed by the candidates in cooperation with their adviser and graduate studies committee.

Kaufman (1976) completed a national assessment of factors that contribute to job satisfaction of industrial arts teacher educators. The one personal factor that correlated positively with perceived satisfaction was the earned doctorate. Kaufman also reported that only 37% of the assistant professors indicated they held the doctorate, whereas 56% of the associate professors and 74% of the full professors possessed the terminal degree. Although 63% of the assistant professors did not possess the doctorate, over half of this academic rank (54%) had been granted tenure. Apparently, the doctorate has not been required for employment as an industrial arts teacher educator since approximately 48% of those with professorial rank lacked the terminal degree.

A cursory examination of the most recent announcements of industrial arts faculty vacancies received by The Ohio State University from June, 1977 to May, 1978, illustrated that 123 (74%) of the total 166 positions require or prefer that the applicant have a doctorate. The remaining positions were willing to consider persons with a master's degree in industrial education or a related field. Most of the positions also required that applicants be willing to pursue the doctoral degree even though a majority of the advertised announcements were to employ persons for teaching undergraduate laboratory courses. While the earned doctorate has been the union card of the professoriate for most academic disciplines since the turn of the century, nearly 50% of industrial arts teacher educators currently employed have not completed the terminal degree. However, it is apparent that the doctorate is becoming the educational criterion for employment for those whose primary responsibility will involve teaching laboratory as well as professional courses. This trend has continued to evolve even though a review of catalogue offerings of those institutions offering the doctorate in industrial arts suggests that courses designed to improve substantive technical competencies are not readily available.

Two decades ago, the specialist degree program was thought to be the means of preparing laboratory teaching specialists; however, the growth of doctoral programs in industrial education and emphasis placed on the number of permanent faculty with prestigious titles by university administrators and accreditation agencies have made the doctoral program a more viable alternative for those planning to enter industrial arts teacher education. Wright (1977) reported that 229 doctorates in industrial education were conferred in 1973-1974, a growth of 301% over an eight-year period. The growth in the production of doctorates in industrial education, specialized teaching fields, and education fields for this eight-year period (1966-1967 to 1973-1974) clearly illustrates that industrial education doctorates had a higher growth rate than any of the other categories for each year. Thus, while the number of doctorates in education-related fields as well as other academic areas is increasing, the doctorate in industrial education is apparently growing at a much faster rate.

Several new doctoral programs have contributed to this increase. For example, of the 49 institutions now awarding the doctorate in industrial education (Dennis, 1977), 17 (35%) awarded their first doctorate within the past 10 years. One of the largest producers of doctorates in industrial education during the 1966-1976 period, Texas A&M University, granted its first doctoral degree in 1963 (Householder, 1978; Wright, 1977). It is apparent that the doctorate with a specialization in industrial education has become more accessible and possibly more "convenient" than the master's degree.

ISSUES IN GRADUATE STUDY

The preceding information provided a description of the historical development of graduate industrial education programs and the nature and productivity of the four major degree programs – the baccalaureate, master's, specialist-level, and doctorate. The collection and analysis of information identified a number of issues and concerns related to quality graduate programs. For example, the multitude of graduate degree designates, differences in entrance and exit criteria, increase in degree productivity especially among less established institutions, changes in degree attainment required for employment as teacher educators, and the evolvement of new graduate degree programs suggest that the profession does not have full agreement regarding the nature (purposes and characteristics) of quality graduate education. The ACIATE has addressed these questions and has published a yearbook, *Graduate Study in Industrial Arts* (Norman & Bohn, 1961) and two monographs, *An Analysis of Graduate Work in Institutions with Programs in Industrial Arts Educational Personnel* (Miller & Ginther, 1965) and *Graduate Programs in Industrial Education* (Graduate Studies Committee, 1974). Thorough and scholarly analyses of program characteristics, critical issues, and problems regarding graduate studies in industrial education have been described in these publications. The following dialogue synthesizes the author's perceptions and position concerning the issues and problems that obviously exist.

Purpose of Graduate Degree Programs

The rational planning of graduate programs in industrial arts education is dependent upon an accurate understanding of the goals and objectives of graduate education. Basically, there are two major types of graduate programs – one is *research*-oriented and the other is *practice* or *professionally* oriented. The *Joint Statement on Accreditation of Graduate Work* of the Council of Graduate Schools, the Federation of Regional Accrediting Commissions of Higher Education, and the National Commission of Accrediting (Ohio Board of Regents, 1977) offered the following definition of these programs.

The primary objective of *practice*-oriented graduate degree programs is to train graduate students through the master's or doctor's level as preparation for professional practice directed mainly toward the application or transmission of existing knowledge. The completion of the program ordinarily is identified by the awarding of the degree of Master of (Professional Field) or Doctor of (Professional Field), e.g., M.Ed., Master of Library Science (M.L.S.), M.B.A., Master of Social Work (M.S.W.), M.F.A., Ed.D., Doctor of Engineering (D.Eng.), Doctor of Musical Arts (D.M.A.), and Doctor of Business Administration (D.B.A.).

The primary objective of *research*-oriented graduate degree programs is to train graduate students through the master's and doctor's level as preparation for scholarly or research activity directed mainly toward the acquisition of new knowledge. The completion of the program ordinarily is identified by awarding the degree of M.A., M.S., or Ph.D.

In practice, there may be more similarities between research- and practice-oriented programs than differences. Given their distinct program purposes, however, it appears reasonable that they be treated separately and titled appropriately. Unfortunately, most universities have not given much consideration to the labeling of their graduate degree programs nor to the actual differentiation of degree requirements when both the professional and research degrees are offered by the same institutions. This also tends to hold true when comparing program requirements among major universities. For example, the degree requirements for the Ed.M. and the Ed.D. degrees in industrial education at the University of Illinois may be more *alike* than different from the requirements for the M.A. and the Ph.D. degrees in industrial education from The Ohio State University or the M.S. and Ph.D. degrees in industrial education from Purdue University. It is apparent that the profession has not adhered to guidelines proposed by the Council of Graduate Schools and related professional agencies regarding the "packaging and labeling" of degree programs.

Practice-Oriented Programs

The professional master's degree. The major differences in the master's degree requirements for the professional and research-oriented degrees are in the foreign language and thesis requirements for the M.A. or M.S. research degrees although a few M.Ed., M.F.A., M.B.A., and M.L.S. programs also required or have a thesis option program. Both of these requirements are no longer prevalent in education degree programs. They also appear to be waning in the arts and sciences at the master's level (Spurr, 1970). Rather than the conventional thesis, professional degrees often require a professional project demonstrating mastery of a given subject area. Also, professional degree programs generally require a greater number of formal course credits and professional field experiences as partial fulfillment of the practice-oriented degree requirements.

The professional master's degree program must be designed to meet the unique needs of those actively engaged in professional pursuits. Employed persons may pursue such programs as a means of maintaining and improving those skills necessary to function and advance in their professional role (or field of employment). Increasing demands of governmental and professional agencies for improved standards for certification and license have generated the need for continuing education programs. An organized program of professional study should terminate in the award of an appropriate certificate or degree to provide the appropriate distinction or capstone of the university program.

High quality programs of this type are important for the community and profession. They provide advanced education for elementary and secondary teachers: community college personnel; management in business and industrial concerns; personnel in local, state, and federal governmental agencies; and providers of health, recreational, and personal services. The availability of quality professional programs has become more crucial as professions have become more demanding, mirroring the increasing complexity of socio-cultural conditions.

The establishment of professional practice-oriented master's programs tends to improve the university's relationships with the community and individual professions. The provision for off-campus courses to greater serve the needs of local clientele in the community while maintaining established standards of the university can only help to improve graduate education and professional standards. Also, the university may be perceived as being more credible, that is, providing the leadership for the improvement of socio-cultural conditions by working cooperatively with appropriate professional associations and community agencies.

Most master's degrees in the United States are awarded in education (Grigg, 1965; Spurr, 1970). While the major purpose for pursuing a graduate program may be to improve one's professional skills as an educator, concomitant benefits of earning a master's degree include the meeting of certification or licensure requirements, obtaining appropriate wage increments, or enabling one to make a career change. The latter goal, that of preparing for a new occupation or career, might best be accomplished through a specialist degree program.

It is recommended that a professional master's degree program be designed to enable industrial arts teachers to improve their professional functioning. These high quality, practice-oriented master's programs must provide adequate opportunities for the improvement of educational technology as well as industrial technology skills. Programs should contain a blend of theory and practice thus enabling industrial arts teachers to further expand their abilities to plan, organize, conduct, and evaluate quality instructional programs. It is further recommended that the professional master's degree programs in industrial education be expanded to a two-year program patterned after the respected M.B.A. or M.F.A. degrees. While the M.B.A. and M.F.A. degree programs were generally perceived as professional terminal degrees during their inception, in practice graduate students interested in doctoral study are often encouraged to follow those programs because of their rigor and perceived scholarly and professional values as compared to the one year conventional M.A. or M.S. programs in the same fields.

Practice-oriented programs must clearly describe entrance criteria, program offerings, and exit criteria and distinguish such from those specified for the traditional research-oriented degree programs. Such programs may be of special value to those persons not readily being served by the traditional graduate programs leading to the M.Ed., M.A., or M.S. degrees. For example, one may wish to place a greater emphasis on attained license or professional experience, quality of professional experiences, and commitment rather than overall undergraduate grade point average and scores on standardized tests such as the Graduate Record Examinations (GRE).

A final concern should be with the naming of degree programs. While the M.S. appears to be the most prominent degree title offered in industrial education (available at 70 institutions), a comparable number offer the M.A. and M.Ed. degrees (58 and 56 institutions respectively). Seven other degree titles also exist. It would seem reasonable that the field of industrial education has grown from its infancy as a single graduate offering in a major university in the 1920's, to one of a maturing graduate area now available in approximately 170 institutions at the master's level and in 49 universities at the doctoral level. It is interesting to note, however, that the character of graduate studies in industrial education has not changed dramatically over the past 50 years.

The rationale for identifying degree titles is based in historical practice. That is, graduate students in the arts and humanities at the master's level were awarded the M.A. degree, whereas the M.S. was for those who mastered some specific area in the natural or physical sciences. Those specializing in the social sciences may have earned either the M.A. or M.S. degree depending on institutional practice. It is apparent that those responsible for graduate programs in industrial education experienced some difficulty in identifying which field to associate with – the arts, the sciences, or the related field of professional practice – education. Of greater importance is that the graduate faculty must assume the responsibility for clearly labeling the degree program with a designate that accurately reflects the nature of the program. Thus a practice-oriented graduate program in industrial education should award a degree titled in the major area of study, e.g., M.Ed., master of industrial arts (M.I.A.), master of industrial education (M.I.Ed.) or master of industrial technology (M.I.T.). Such a degree title would more accurately reflect one's *mastery* of a subject area or discipline than the conventional M.A. or M.S. degrees. Also, the professional degree title would help lend credibility and distinction to the scholarly nature of the discipline.

Specialist-level programs. The rationale for specialist-level programs appears to be founded in providing a formalized program of study that would allow persons to become "specialists" in a discipline or program area. A review of recent ACIATE/NAITTE directories suggests that the most active specialist-type programs, i.e., those listing graduates during the past five years, tend to be housed in colleges and universities that do *not* offer the doctorate. This observation supports Kazanas and Miller's (1974, p. 59) position that some former colleges of education introduced the specialist as a means of developing subsequent doctoral programs. Once doctoral programs became active in those institutions, faculties tended to lose interest in specialist-type programs.

The previous discussion suggests that the unique purpose of specialist-type programs has not been clearly defined or subscribed to by the profession. Entrance and exit criteria for the specialist must be different from those of the doctorate in order to maintain the integrity of the degree structure and to serve the professional needs of educationists and the community. For example, industrial educators have debated for years over the appropriateness of including technical courses as an integral part of graduate education. Perhaps the specialist should be perceived as a legitimate vehicle in which industrial educators could (a) pursue an organized program to improve professional skills in educational technology *and* industrial technology practices; (b) obtain appropriate formal training and supervised field experiences to qualify for new license, certification, and career changes; and (c) obtain additional graduate credit and degree that are acceptable for improved salary.

A major portion of the graduate program might be concerned with the acquisition of new technical information and skill, enabling industrial education teachers to improve and broaden their functioning in the laboratory. Independent study in the development, field testing, and evaluating of technical information and skill as well as formalized course work that builds upon basic undergraduate knowledge and competencies should be provided. The development and evaluation of industrial materials, products, and processes should demand the same rigor and scholarly behavior as the study and mastery of social psychological concepts to create a dynamic learning environment.

Since a larger percentage of industrial arts teachers as well as other elementary and secondary teachers are now earning the master's degree, it appears that the specialist-level program might best serve the needs of those who are interested in preparing for supervisory or administrative positions in industrial education. Thus the master's degree would give teachers the opportunity to demonstrate their mastery of information, skill, and knowledge directly relevant to professional practices — the mastery of social and behavioral science theory and skills enabling them to develop, organize, conduct, and evaluate instructional activities in the industrial arts laboratory environment. Knowledge would be *built upon* previously learned information gleaned from baccalaureate studies. Thus the master's degree program would not lead to certification or license in new professional roles.

The specialist program, however, would be designed to help people attain career changes as well as to expand and improve professional development and practice. Such intermediate degree programs could provide opportunities for organized formal study and preparation for professional advancement.

Some universities provide intermediate graduate certification or degrees for those who successfully complete the required course work, residency, and examinations for the doctorate but not the dissertation. The recognition affirms accomplishment of general studies up to the dissertation and is not perceived as a consolation prize for those who fail doctoral studies. The appropriate doctoral degree would be awarded if the candidate completed dissertation research within an acceptable time frame as set by the university administering the degree program.

The Specialist in Education (Ed.S.), Candidate in Philosophy (C.Phil.), and Master of Philosophy (M.Phil.) are the most widely used titles at the present time (Spurr, 1970, pp. 186-187). It is important that the degree title occupy the same distinction as the master's or doctorate and represent an affirmation of accomplishment completely separate from that required for other degrees.

The doctorate in education. The professional doctoral degree in education, the Ed.D. was founded at Harvard University in 1922, to provide distinctive recognition for scholarly study in the field of education. It appears that there was no intention of eliminating the traditional exit requirements of scholarship and research to earn the Ed.D. However, students were generally required to demonstrate a mastery of scholarly knowledge from a broader scope of related disciplines that contributed to the body of knowledge upon which educational practice is based. Thus instead of isolating a microcosmic area of study to research for the Ph.D., candidates for the Ed.D. critically analyzed scholarly literature and research to glean information from cognate areas such as psychology, sociology, anthropology, philosophy, and statistics. Candidates usually terminate their doctoral program by demonstrating their ability to conduct "original" research regarding educational practice.

Robertson and Sistler (1971) studied the doctorate in education in 124 institutions for the Phi Delta Kappa Commission on Higher Education and the American Association of Colleges for Teacher Education (AACTE). There were 98 Ph.D. in education programs and 97 Ed.D. programs with 72 (58.1%) institutions offering both degrees. The Ph.D. only was offered by 26 institutions while 25 offered only the Ed.D. Nearly twice as many Ph.D. in education programs were being offered at public institutions as in private institutions. The Ed.D. programs at public institutions also doubled those at private institutions. Approximately 7% of the Ph.D. programs were under the control of the College of Education, 53% under the control of the Graduate College, and 38% were administered by dual arrangements. Twenty-one percent of the Ed.D. programs were under the control of the College of Education, 38% under the control of the Graduate College, and 39% were operated by dual arrangement.

A rather thorough analysis of the Ed.D. and Ph.D. degrees in the field of education suggests a growing similarity between the two programs. Spurr (1970) stated that

> the Ed.D. is a parallel degree to the Ph.D., has similar requirements, and is grouped with the Ph.D. in graduate school statistics. It has usually been set up by schools of education as a means of avoiding the too literal application of the essentially alien standards imposed by the dominant graduate faculty from the older and more traditional disciplines. (pp. 140-141)

With a decreasing emphasis on the foreign language requirements, a growing number of candidates are choosing the Ph.D. program possibly because of the supposed higher prestige value. In essence, many Ph.D. programs reported were indeed Ed.D. programs in every detail but title. Robertson and Sistler (1971, p. 70) further suggested that in absence of general statements as to the divergent functions of either degree, it would be necessary to critically review the degree programs through their institutional association, as was the case in the AACTE Study.

Unfortunately, the Ed.D. has taken on the same purposes and function as the Ph.D. The basic difference in the two programs has been the requirement of the foreign language for the Ph.D. This historical requirement was perceived as a research tool although many graduate students in education (as well as other fields) perceived it as an artificial hurdle. Graduate scholars needed a mastery of German and/or French to pursue original research in the arts and sciences during the early formation of doctoral programs in the United States, since American universities modeled their graduate programs after European institutions of higher education. In the late 1950's, Russian was added as a viable language – research tool – for some disciplines because of the demonstrated Soviet superiority in science and technology. Some universities would also accept Spanish or other romance languages depending on a candidate's perceived professional goals. Most mature institutions required a reading knowledge of two foreign languages, usually French, German, or Russian; however, some universities like the University of Chicago or The Ohio State University would accept a reading knowledge of Spanish.

Most graduate schools of major universities have made the foreign language requirements for the doctorate an elective option of the individual graduate departments or programs during the 1968-1972 period. A mastery of another research tool such as a computer programming or statistics, those typically required for Ed.D. candidates, is being substituted for the foreign language requirements. A cursory review of graduate catalogues suggests that one can now earn a Ph.D. in industrial education following the same basic entrance and exit requirements as required for the Ed.D. before 1970 with one exception – most Ed.D. programs have greater and broader formal course requirements. A review of dissertation titles and abstracts suggests no differences in research topics (Jelden, 1977) pursued in fulfillment of the demonstrated research requirement for either doctoral degree.

The majority of the doctoral programs in industrial education lead to an Ed.D.; however, there appears to be a trend which suggests that the Ph.D. is becoming the more popular degree designation. In 1966-1967, 62 (81.5%) of the doctorates awarded were Ed.D.; however, 105 Ed.D. degrees were granted in 1975-1976 representing 51.5% of the doctorates. This represents a 30% loss in the number of persons electing the Ed.D. program. Wright (1977) reported that 52 universities in 31 states awarded 1,651 doctoral degrees during the period 1966-1967 through 1975-1976. Those institutions reported 56 Ed.D. and 46 Ph.D. programs using 28 field name designates. An analysis of the titles and catalogue descriptions suggests that 22 of the program fields are in industrial arts, 42 in vocational education, and 19 would accommodate a specialization in either industrial arts or vocational education. Also, only 49 institutions reported offering the doctorate in industrial education in the 1977-1978 directory (Dennis, 1977).

It is apparent that a majority of the incoming industrial education graduate students are electing the Ph.D. degree designate when such an option is available. For example, approximately 58 persons received the Ed.D. and two persons the Ph.D. from the University of Illinois during the 1948-1972 period, while 17 Ph.D.'s and only eight Ed.D.'s have been granted during the past five years. Similar patterns of degree selection are also prevalent at the Universities of Maryland and Missouri. The major doctoral producers in industrial arts, Texas A&M University and the University of Northern Colorado, offer only the Ed.D. in industrial arts.

Research-Oriented Programs

Historically, the major thrust of the research-oriented programs at the graduate level was oriented to improve one's scholarly or research competencies directed mainly toward the acquisition of new knowledge. Approximately half of the M.A. or M.S. and Ph.D. recipients look forward to careers in higher education where they engage in teaching or research. The remaining persons seek positions in government, business, industry, and nonprofit organizations in areas of management, research, and development (Ohio Board of Regents, 1977). In essence, programs are designed to advance research and scholarship and to emphasize learning for the sake of expanding knowledge. This is contrasted with the practice-oriented programs that are primarily concerned with the application of knowledge to improve professional practice outside the university.

Traditional research-oriented degree programs have also been used to obtain professional license, change career roles, obtain monetary gains by employers, and to improve professional practice skills enabling them to obtain and/or maintain employment as well as professorial rank. The major differences between the degree programs as espoused by those providing leadership in graduate education (Spurr, 1970) remain in the purpose of the research degree programs. Graduate students and graduate faculty in research oriented programs conduct basic research to help enhance our human understanding of socio-cultural conditions and expand our mastery of technological phenomena thus enabling an improvement of social, economic, and technological conditions. Those in professional or practice-oriented programs would be more concerned with developing procedures and techniques to utilize and apply the knowledge derived from basic research to improve socio-cultural conditions through improved professional practice.

Let us assume, therefore, that those engaged in conducting research in education are primarily concerned with "evaluating" the application of basic knowledge about society, human development and behavior, and technology. For example, sociologists, psychologists, linguists, philosophers, biologists, chemists, economists, and the like would provide the descriptive and formative knowledge that would serve as the referent for structuring our professional practices. The techniques and practices used by educators, i.e., their knowledge of practice, would be derived from the basic arts and sciences and formulated resulting from the evaluation of applied strategies, techniques, and practices within the educational environment.

However, it seems that the practitioners are also generating new knowledge when they develop a new practice or strategy that effects changes in human behavior and functioning; for example, the development of a teaching methodology that is highly effective in improving the psychomotor functioning of autistic children or the rehabilitation of a partially-paralyzed stroke patient. Granted, information regarding the neuro-physiological functioning of the clients may be used by the "investigator" when developing and evaluating materials, strategies, and practices. However, of paramount importance is the fact that new knowledge has been generated that also has empirical value in the improvement of professional practices. Contrary to conventional practice, more monies have been directed toward the supervision of research-oriented programs than toward those concerned with professional practice. It is time that educators, graduate school deans, legislatures, and university governing boards begin to recognize the broad value of professional or practice-oriented degree programs that also have a research mission.

The Ph.D. appears to be the more prestigious of the doctoral degree titles, especially among those in academia. This traditional degree has historically been the minimum criterion for admission to the professoriate. While other degree titles are prevalent in Europe and the United States, the Ph.D. is perceived as the highest earned academic research degree in this country. This is not to suggest, however, that those completing other doctoral programs such as the D.Eng., D.Sc., D.B.A., D.F.A., or Ed.D. are not, in practice, research-oriented. The Doctor of Psychology (Psy.D.), for example, was originally proposed for practitioners of psychological services as the Ed.D. was proposed for educational administrators, curriculum developers, and those providing leadership services in educational practice. Nevertheless, both programs require that the candidate demonstrate a mastery of research methodology, qualitative and quantitative analyses, and the ability to perform research practices.

Generally, formal courses entitled "research methodology" do not exist in such fields as the physical sciences or classics but have been proliferated throughout the social sciences, agriculture, and business. Graduate students are expected to learn and demonstrate appropriate research techniques, practices, and attitudes as an integral part of their graduate study and possibly their graduate assistantship. Research then becomes an active and integral part of their course work and their work experiences often include serving as an assistant to their professors who are conducting personal or funded research efforts. Also, it is common for doctoral candidates to coauthor manuscripts based on their student research activities with their graduate adviser for publication in refereed journals or papers to be read at professional conferences. Thus many research competencies are gleaned from the mentor-student relationship that generally characterize a quality graduate education.

The adviser-advisee relationship, next to the descriptive character of the institution, is probably the most significant factor influencing the quality of graduate education. The graduate adviser has the responsibility to provide a professional role model for the developing candidate. Thus it is imperative that graduate advisers have demonstrated their success as teachers, researchers, developers, and leaders in the profession to provide a referent for their student-advisees. The mentor-student relationship is one of the strengths of graduate education, providing students with an individualized educational program emphasizing scholarship and independent study under their advisers' direction that they typically do not experience at the baccalaureate or master's levels.

Perhaps it might be more relevant if all earned doctorates were titled in the field of the candidate's area of demonstrated expertise. For example, the Doctor of Mathematics (D.Math) would be conferred upon those who demonstrate scholarly and research contributions in the field of mathematics. It seems ironic that the Ph.D. is awarded to most Ph.D. candidates who lacked even a minor (or a single formal course) in philosophy but did demonstrate scholarly research competencies in some specialized field of study.

Eells and Haswell (1960) identified several hundred doctoral degree titles that have been awarded by institutions in the United States. However, the Ph.D. has continued to be recognized as the ultimate indicator of academic achievement. Much has been written on maintaining the integrity of the Ph.D. as a research degree. Some have suggested that the Ph.D. should not be awarded in fields that are semiprofessional or vocational in nature such as home economics, library science, physical education, and speech (Hollis, 1945).

While the original intent of the research doctorate was to prepare scholars to engage in independent learning to cultivate knowledge and expand the theoretical structure of a specific discipline, a significant percentage of Ph.D. recipients teach as part of their professional role (Association of Graduate Schools, 1976). Some institutions require supervised teaching experiences as part of their graduate residency as a means of improving the teaching performance of doctoral candidates (Spurr, 1970). Educators are recognizing that teaching and research are major responsibilities of those choosing to enter academia and that the Ph.D. degree is broad in scope and the program can be flexible to produce research workers, teachers, and professional practitioners. Many universities that award only the Ph.D. or M.A., and M.S. degrees have already been providing practice-oriented graduate programs under the guise of research degree designates. The master's thesis has been eliminated in favor of additional course work and comprehensive examination. Dissertation titles may deal with expository as well as research treatment of topics.

While the professional degree has become recognized as the legitimate award for those who demonstrate scholarly attainment in a practice oriented field, some have recommended the D.A. for those who are preparing for a teaching career and the D.Sc. for those preparing for a career in research. Other degrees such as the Doctor of Social Sciences (D.S.Sc.) was established for the preparation of a college degree at Syracuse University but was replaced by the Ph.D. after 170 degrees were awarded from 1945-1969. Holders of the D.S.Sc. may now trade in their degrees for the Ph.D. at that institution if they so wish.

The Ed.D. is recognized as a legitimate degree for those in the field of education. Spurr (1970) suggests that education is a valid field of study in its own right and one of the most important professions in the country. Graduate faculties must ensure that the Ed.D. maintain its standards of excellence and accept quality dissertations based on an evaluation or assessment of educational practice, theory building, utilization of research data and comparative studies or case histories.

These appear to be the same goals as those specified for the research doctorate – the Ph.D.

Based on this writer's experience in graduate education and the positions expressed by administrators of graduate degree programs (Spurr, 1970; Ohio Board of Regents, 1977), the titling of degree programs will continue to follow traditional degree designates although program elements may be modified to accurately reflect degree titles.

Program Breadth Versus Specialization

Traditionally, graduate programs called for explicit evidence of some degree of breadth by virtue of minor areas of study, "outside field" requirements as preparation for examinations, and "outside" committee members as program and research advisers. Recent practice has tended to eliminate the requirement of outside field study and committee members, and graduate programs have become more highly specialized.

Programs projected as interdisciplinary have been promulgated and advertised as timely and innovative. Elberg (1977) suggested that these interdepartmental programs are merely representative of the broad base graduate programs that were taken for granted in the past. A general return to the older concept of breadth in graduate education would provide the majority of graduate students with a sound grounding in the professional scholarship of their chosen field. This proposal is based on the assumption that one's undergraduate education provides the appropriate breadth and understanding of those social, economic, and technological concepts necessary for scholarly and research practice in a specific discipline or professional field.

Breadth of instructional programs implies that students will critically examine the scholarly literature and research in related disciplines that hopefully will provide an expanded base for research. Carmichael (1961, p. 25) faults the educational system and, more specifically, leaders in graduate education for encouraging the narrow specialization on essentially trivial subjects rather than directing scholarly efforts toward basic ideas, general concepts, and issues relevant to our changing world.

Graduate study and research, especially at the doctoral level in the social sciences of which education is an integral part, has been criticized as being "too detailed and trivial in scope, in purpose, in the type of mental discipline required; (placing) too much emphasis on facts and too little on ideas and concepts; (being) uninspiring in subject matter; and (being) unworthy of the research required for the highest academic degree" (Carmichael, 1961, p. 24). Appropriate research topics must be selected for dissertations and should represent intellectual inquiry and higher learning. The thesis and dissertation are perceived as the final degree requirement in which candidates demonstrate their intellectual abilities while providing a contribution to knowledge and professional practices.

Formalized minors and cognate areas appear to be an integral part of the formal course work in doctoral programs in education (Robertson & Sistler, 1971). Studies in the theoretical aspects of educational practice – often referred to as professional studies in industrial education to distinguish lecture-discussion courses from laboratory courses dealing with technical practices – comprise a major portion of graduate studies in industrial education, particularly at the doctoral level (Miller & Ginther, 1965).

Lindbeck (1972, p. 152) suggested that the primary purpose of the master's program in industrial arts is the development of depth in an area of technical competency. For example, teachers of electricity/electronics would probably elect to concentrate a third of their program in electricity/electronics studies. This would enable industrial arts teachers to improve those skills they already possess while expanding their knowledge of new technical information and practices useful in their teaching. The remaining portion of their graduate program would be equally divided between professional studies in industrial arts and education to improve their professional competencies in instructional technology and elective fields outside their major field of specialization to expand their liberal education. Thus the master's program may be perceived as providing depth in an area of technical specialization and breadth in fields that will enhance personal and professional competencies.

Technical Competencies

The issues of applying laboratory and technical credit for graduate programs has been a continuing issue in industrial education (Karnes, 1954; Karnes & Lux, 1961). While it seems reasonable to provide technical studies to improve and expand the technological competencies of industrial educators, graduate faculties have questioned the kind of laboratory experiences that might merit consideration for graduate credit. Some industrial educators have suggested that industrial education should provide breadth in the mastery of technological practice, and deficiencies should be ameliorated as part of the graduate program. Therefore, persons with a specialty in construction practices who have never taken a course in electronics or plastics should complete courses in these areas as part of their graduate program. To allow a graduate student to apply undergraduate technical courses even under the guise of independent study or special problems should not be acceptable. Such remedial deficiencies should be treated as any other academic prerequisite and should be completed in addition to one's graduate program and not as meeting minimal requirements for the graduate degree.

Miller and Ginther (1965, pp. 10-11) reported that 70 institutions provided graduate level instruction in 17 technical areas while 17 institutions offering graduate degrees and certificates reported none. The course areas offered most frequently by the majority of institutions included metals, 60; electricity and electronics, 55; drafting and design, 53; and woods, 47.

A majority of the leaders representing the 87 institutions recommended one to 20 hours of technical course work for the master's program although a clear majority (50 institutions) did not *require* technical course work. Sixty-three percent of the institutions offering the specialist-level programs recommended 9-22 hours of technical credit whereas six institutions recommended none. Fifty-eight percent of the doctoral programs recommended no credit for graduate technical courses although 41% recommended from 1-33 hours.

It is imperative that graduate credit not be awarded for undergraduate level industrial arts laboratory courses. Graduate education is commonly defined as being beyond the baccalaureate (Spurr, 1970). The term "beyond" does not refer to a point in time but to the *level* of difficulty. Graduate programs particularly at the master's level should not continue to be concerned with filling-in the gaps and overcoming the inadequacies of undergraduate programs. However, since a major purpose of the practice-oriented master's program is to improve the professional competencies of industrial arts teachers, laboratory courses with rigor and the challenge of substance should be made available as advanced work of graduate level and quality in the technical fields.

It is apparent that formalized graduate level courses are not typically available in departments of engineering or physical sciences to improve the technical competencies of most industrial arts teachers. Much can be added to their understanding of the technological aspects of the culture by pursuing selected courses in the social and behavioral sciences. It is the major responsibility of the industrial arts department to develop rigorous technical courses worthy of graduate level credit to meet the unique professional needs of laboratory teachers (Karnes & Lux, 1961).

Consistent with the mission of industrial education departments, technical courses provide information and experiences for industrial arts teachers who are in need of acquiring knowledge and psychomotor skills regarding technological processes. Also, students should be concerned with the application of knowledge and skills to improve the teaching of industrial technology in public schools. Therefore, they should be able to organize and teach technological concepts and skills in industrial arts programs.

The ability to organize and teach cognitive *and* psychomotor skills can best be developed through the applications of technological practices and information under laboratory conditions. Thus, in addition to the scholarly analysis of the literature relative to economic and production determinants and technological practices used to manufacture the products, students should also develop psychomotor abilities in the use of specialized tools and techniques to change the form of raw materials into a useful, functioning product.

The issue of whether or not to approve technical courses as part of a graduate program should not be made on the basis that an emphasis is being placed on laboratory activities involving the manufacture of a product. Historically, scholars and academicians have attempted to differentiate between activities that "educate" human potential and those that "train" human behavior. Recent research relative to human cognition and behavior may help to alleviate one's need to argue over this controversy. For example, the assumption that a person who is able to produce a metal component on a milling machine or lathe within a .0001" tolerance specification does so because of the "training" of some propensities that are devoid of cognition is *not* founded in research. Empirical research has substantiated that the performance of certain psychomotor tasks, while more a function of a single cerebral hemisphere, are *not* devoid of neuro-cognitive dependency.

The inevitable question that graduate deans and faculties must address relates to the specific criteria used to determine whether a course or subject is worthy of graduate credit. The amount of class time one must meet on campus to earn "X" credits is a standard; however, the university's graduate school guidelines do not adequately specify what educational activities are representative of graduate-level scholarship.

Technical courses can be just as relevant for industrial educators as a graduate course dealing with such special topics as "comfort conditioning" or "solar energy" for mechanical engineers, or the study of the "history of technology" for historians. A course should be considered graduate level if class requirements stimulate thought and require students to learn information that has the potential to function as a "tool" for developing new relationships and phenomena. The "investigative" ability to synthesize, evaluate, and solve problems enabling one to gain new knowledge and create new products or services should be the ultimate goal of scholarly study. Proposals for graduate courses should include those knowledges and skills that may be derived as a result of the proposed learning experiences.

Research Activities

Research activities within institutions of higher learning are an important and intrinsic part of graduate education programs. The resultant training of graduate students and the expansion of the knowledge base are important to the continued growth of social, economic, and technological conditions. Implicit within the master's, specialist's, and doctoral degree programs is the development of research competencies. Professionally oriented degree programs tend to emphasize the independent analysis and utilization of research data to improve professional practice, whereas research-oriented programs are designed to provide the ability to carry out independent scholarly research and investigation. Research activities of graduate students in either program are contributing to the knowledge base of disciplines and professional practice.

Those engaged in elementary and secondary school teaching typically devote most of their professional time to class instruction; generally, little or no time is spent in individual research activities although master teachers often provide supportive services to researchers. Teacher educators, however, employed in universities often find that the reward system (promotion, tenure, and salary increments) is directly related to one's active role in research, service, and teaching. A greater emphasis tends to be placed on research productivity. Publications in refereed journals, funded research and development projects, and scholarly papers read at institutions and conferences tend to be the ultimate consideration in the reward matrix.

A study was conducted to identify research and development activities and interests of industrial arts professors (Buffer & Campbell, 1976). A questionnaire mailed to each current member of the ACIATE asked recipients to report research activities initiated or concluded (non-master's theses or doctoral dissertations) within the last five years (1969-1975).

The instrument was sent to 1,020 educators; 543 forms (53%) were returned. An analysis of the data indicated that the number of persons involved in R & D activities was 226; the number not involved was 295 representing 43% and 57% respectively.

Respondents involved in R & D activities reported a total of 579 studies initiated and/or completed during the period of 1969-1975, an average of 2.6 studies per person. Most persons involved in R & D activities functioned as principal investigators (57%), whereas 23% served as associate investigators and 20% as consultants.

When asked to name crucial research and development topics regarding industrial arts teacher education as perceived by industrial arts educators, a total of 1,090 topics were identified and rank ordered in six major areas:

1. K-12 Curriculum Development
2. Teacher Preparation
   a. Accountability
   b. Certification
   c. Competency Based Instruction

3. Career Education: Relationship to Industrial Arts
4. Instructional Strategies
5. Philosophy of Industrial Arts
6. Relationship of Industrial Arts to Vocational Education

An attempt was made to identify the research productivity of doctoral degree recipients from selected universities. Four hundred and eight respondents reported as receiving doctorates from 61 different universities. Those institutions that granted the doctorate to 50% of the 408 respondents are listed in Table 1 along with the number of persons who were or were not involved in R & D activities.

Allocation of time, teaching load, staff duties, and administrative responsibilities were identified as constraints to conducting research by 64% of the respondents; finances by 19%; and institutional attitude or philosophy toward research by 11%. An analysis of the professional load of industrial arts teacher educators might find an inordinate amount of time devoted to the teaching of laboratory courses as well as laboratory maintenance, stock requisition, and supervision. This may be especially true in those institutions where teaching is a more significant reward factor than research productivity.

Table 1
Major Doctoral Producing Institutions and Research Productivity of Ed.D. and Ph.D. Recipients

Doctoral Granting Institutions*	Number involved in R & D	
	YES	NO
University of Missouri	34	23
The Ohio State University	24	13
University of Northern Colorado (Greeley)	9	20
Texas A & M University	17	11
University of Maryland	11	12
University of Illinois	12	6
Michigan State University	6	5
Arizona State University	3	76

*Represents approximately 50% of the doctoral degrees earned by the 408 doctoral respondents.

Regardless of the constraints that industrial arts teacher educators identified relative to continued or future research pursuits, the results of this study suggest that the group has been relatively productive. Also, based on the number of publications and speeches identified, R & D results are not collecting dust on office shelves but are being disseminated to professional colleagues.

No attempt was made to determine whether any differences existed in the research productivity of Ed.D. and Ph.D. recipients since the majority of the doctorates granted by the institutions listed in Table 1 were Ed.D. degrees. Several national studies that analyzed the percent of time devoted to research and teaching activities of professors with Ed.D. and Ph.D. in education (Bargar, Guba, & Okorodudu, 1965; Bargar, Okorodudu, & Dworkin, 1967, 1970; Worthen, n.d.) found no differences in their professional activities. The Ed.D.'s and Ph.D.'s in education expressed a high interest in curriculum research whereas the Ed.D. recipients also expressed a high research interest in administration and organization. Although some institutions perceive the Ed.D. as a non-research-oriented professional degree, it appears that the Ed.D. programs represented in these studies did not stifle or reduce the research and development activities in their recipients.

Arliss Roaden (1972), President of Tennessee Technological University, and colleagues (Bargar, Okorodudu, & Dworkin, 1970; Worthen, n.d.) studied graduate education programs and the research productivity of their doctoral recipients. It was found that those who were involved in non-thesis research activities with their advisers and/or other faculty tended to conduct post-doctoral research. Also, those graduate students who assumed major responsibilities in research activities (e.g., writing proposals for projects and coordinating the collection of data) were more productive than those who had minor roles in projects (analyzing of data or obtaining supplies). This suggests that those responsible for graduate education should provide a good researcher model for their advisees. Also, it appears important for professors to provide R & D experiences for doctoral students related to their own interests (personal, departmental, or institutional) as a means of stimulating increased student interest and skill in research and development.

Alternative and External Graduate Programs

Much has been written recently regarding the development of alternative forms of graduate studies in the field of education. Salaries and professional attainment of elementary and secondary school teachers and administrators are greatly dependent on university degrees and/or credits earned. The increasing emphasis on the attainment of a master's and doctorate in education to ensure maximum financial gain as well as professional development seems to have created a professional need for alternative forms of graduate education.

Criteria used by established universities for graduate programs particularly at the doctoral level and residency requirements were perceived as restrictive. Several institutions (mostly non-accredited proprietary institutions with minimal entrance and exit requirements) have recently created "external" Ed.D., Ph.D., and master's degree programs for experienced teachers and school administrators. No formal residency is required; however, some programs require student attendance in one summer session of concentrated study of three to five weeks duration. Some institutions require that formal course work be completed at accredited universities, or requirements may be met by correspondence from the external institutions. Candidates return to their regular full-time position after the summer and may be required to prepare a thesis, dissertation, or essay based on some professional field experience during the regular school year. Upon the successful completion of the "research" or "professional activity" report, students receive the appropriate diploma.

Administrators of the external degree institutions often include a disclaimer in their catalogues or dissemination literature that their programs do not lead to state or professional certification. Even though the institution may be chartered and licensed by a state agency, most are not accredited by the appropriate regional accreditation association or professional agencies. The ranking officer of one very productive institution stated that his institution was in the business of providing service to those persons (usually full-time employed teachers) for whom conventional universities apparently were not concerned.

External study from proprietary institutions to obtain "credentials" is not a new phenomenon in the United States. However, it has not really plagued the field of education since employing agencies – namely, school boards, superintendents, college and university administrative staff – have generally demanded degrees from accredited institutions. The increasing number of proprietary institutions "offering" graduate degrees in education and the unusual growth in enrollees and graduates have caused some concern regarding the credibility of the education master's degree and doctorate.

Buffer (1976) conducted a study of the external doctorate in education to (a) analyze common program requirements of the major external institutions in the United States; and (b) determine the acceptability of the programs by administrative personnel in industrial arts.

Entrance and exit requirements appear to have been designed for full-time educators whose vocational pursuits demand continued employment. However, three of the five programs reviewed did not require administrative or teaching experience or certification. A master's degree from an accredited or "approved" institution was required by most of the institutions for admission to their doctoral program;

however, two of the institutions also provided an external master's degree. None of the institutions listed a minimal grade point average nor were standardized test scores or personal interviews required.

Program requirements usually consist of one summer session of two to four weeks in duration, although one of the institutions recently extended its requirement to two four-week summer sessions. It is difficult to determine the number of formal courses or credit hours required. Course credit could be "earned" by the evaluation of "life experiences." Some required the mastery of six to eight "study areas," or 10 courses, or 30-36 hours. One required 60 hours of courses but the requirements could be met by independent study. Four required a dissertation and one a project paper. Written and/or oral comprehensive examinations were generally not required.

Chairpersons and college deans of industrial arts were surveyed to obtain information relative to the acceptability of the external doctorate as a criterion for initial employment, promotion within ranks, tenure, and approval to advise graduate students (Buffer, 1976). A majority of the respondents felt that the external degree was generally not acceptable. However, a few suggested that the earned doctorate was only one factor to be considered, especially as it relates to tenure and promotion.

A selected group of school superintendents, principals, and teachers, along with external degree students, recipients, and advisers were asked to list the strengths and weaknesses of external doctoral programs. Their responses were somewhat congruent (although not so negative) with those of the university chairpersons and deans and are summarized below:

Strengths

1. Flexible admission policy.
2. No formal residence other than summer session.
3. One can maintain his/her present position.
4. Limited to professional practitioners.
5. Actual formal course requirements taught by experienced practitioners.
6. Independent research requirements supervised by someone in his/her immediate geographic area.
7. No need to disrupt one's family by relocation for a year or two of full-time graduate study.

Weaknesses

1. Not appropriate for those who desire to become researchers – more appropriate for the practitioners in education.
2. Lack of continual interaction with a variety of graduate students and community of scholars.

3. Graduate assistantships and mentor-student relationships provide beneficial learning experiences for doctoral students that cannot be replicated by continuing one's regular employment which merely promotes provincial thinking.
4. Less demand for scholarly performance, analytical thought, and creative pursuits in a variety of substantive areas.
5. Degree is held as suspect by many persons in the community *and* the profession.
6. Lack of formal assessment of the programs or evidence of policies and standards to maintain the integrity of the terminal degree.

The reactions of two graduate school deans were consistent with those expressed by most respondents. They generally were not in favor of external doctoral programs and suggested that the growth and acceptance of the programs were, in part, responding to salary and certification requirements of local school systems. Programs were perceived as convenient ways to obtain credentials and usually were associated with less academic rigor and scholarly demands. If anything, the external degree is perceived as a negative indictment of graduate study in education.

The credibility of the education doctorate offered by major accredited institutions will suffer, especially if the external degree with its primarily emphasis on "life experience" is accepted as a viable alternative. Teacher educators must critically review the entrance and exit criteria for their graduate programs to determine how graduates of an external degree program *differ* from those of conventional programs.

SUMMARY

While no attempt was made to evaluate specific graduate programs, readers are invited to critically analyze the issues in relation to programs in which they may be involved or responsible for. Only through the continued self-monitoring and evaluation of graduate programs can the integrity of scholarship in the profession be maintained, improved, and expanded. Truly, the answer is *not* to provide more graduate degree programs and, thus, further delineate meager financial and human resources but, rather, to support those programs that have demonstrated excellence.

The ACIATE may be the appropriate professional agency to develop policies and standards regarding graduate programs. Criteria determined by such an organization then may be used by individual departments to monitor and evaluate their ongoing programs. Resultant and self-evaluation reports may also be used by external reviewers to provide an objective analysis of institutional programs. The growing trend for internal program reviews and the reported success of such activities at major graduate universities (Arns, Poland, & Wilson, 1978) suggest the viability and, perhaps, the need for such an approach.

The Panel on Alternative Approaches to Graduate Education (1973) critically reviewed major issues related to exemplary graduate programs including historical perspectives on expansion and retrenchment. Those responsible for the development of graduate programs would benefit from reviewing the 26 specific recommendations and related implementation strategies offered to modify the goals and character of graduate education while strengthening the integrity of graduate institutions in America.

There also appears to be a need for the in-depth follow-up of graduate degree recipients. The consumers of the master's, specialists, and doctorates (Bettis, 1973) in the field are in a good position to evaluate the value of their degree programs for professional functioning and attainment. A comparative analysis of the graduate programs offered at various institutions and an evaluation of their graduates' "success" in the profession might also provide some valuable information for subsequent program evaluation and developmental tasks. Hopefully, this might be accomplished under the direction of a professional association such as the ACIATE rather than a single institution.

In summary, while the profession's tenure as a graduate discipline is less than 60 years, the growth has been dramatic. In 1928, there were only 146 industrial arts educators (four with the doctorate) in institutions (Warner, 1928), whereas approximately 2,475 persons hold professional rank today in 236 institutions, with 1,435 holding the doctorate degree. Approximately 49 institutions now award the doctorate with a specialization in industrial education and 170 offer the master's degree. Growth has been phenomenal. The future thrust must be in the area of evaluation to help improve program offerings, the professional preparation of educational personnel, and the integrity of the graduate major in the field of industrial arts education.

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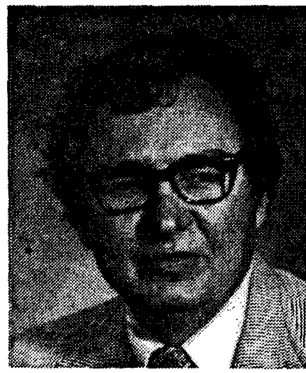
chapter 13

The Role of Supervisors in Industrial Arts



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Effective industrial arts supervision and administration are important in providing exemplary programs and instruction directly related to preparing students to understand and contribute to an industrial-technological society. Unfortunately, during the past several years, educational costs have increased beyond what taxpayers are willing to pay. This increase has caused many state and local school districts to make major reductions in personnel and services. Administration and supervision are often the first targets for these major reductions. The end result is that industrial arts suffers.

This chapter examines the past, present, and future role of industrial arts supervisors. In addition, the present status, identifiable problems, and current expectations of state and local supervisors of industrial arts programs are discussed. While most states and many local school districts employ personnel responsible for the supervision and administration of industrial arts programs, there has been limited research reported on the effectiveness of such persons in carrying out these duties. One excellent publication is the *Recommended Qualifications, Duties, and Responsibilities for State and Local Supervisors of*

Industrial Arts published in 1974 by the American Industrial Arts Association (AIAA). This document was a follow-up of a similar report in 1967 by the American Council of Industrial Arts Supervisors (ACIAS) entitled *Duties of Industrial Arts Supervisors.* Students, teachers, and/or administrators sincerely interested in implementing a quality industrial arts supervisory program should find the 1974 AIAA publication most helpful. This chapter provides an update of that publication.

GROWTH AND DEVELOPMENT IN INDUSTRIAL ARTS SUPERVISION

Supervision is neither a new term nor a new approach to school administration. It has been a part of the educational system for over 200 years, and during this time supervision has assumed new directions as the role of a supervisor has changed.

Need For Supervision

In the early years, a supervisor was employed to check on teachers to see that the desired or prescribed content was being taught by the most acceptable teaching methods of the time. The supervisor acted as an inspector and would immediately inform the teacher of any needed corrections. This informal supervision soon gave way to a more formalized supervision that started developing during the 19th century and matured during the 20th century.

The formal and successful supervisory techniques practiced in industry during the 19th century were tried in the educational system. As schools grew in size and complexity, a person was employed or an existing employed teacher was given the added responsibility of formally supervising the other teachers in the system. While this form of supervision was not as successful in schools as it had been in industry, it did provide the impetus to develop and refine supervisory practices in the educational systems.

Educational systems continued to grow during the 20th century at a significant rate. Increased enrollments, caused by the greater realization of the need for a formal education coupled with mandatory school attendance laws in most states, forced state and local chief school officers to employ supervisory staff. However, there is little indication that the population size of a state, community, school, or department had any effect in determining the need for additional administrative or supervisory assistance.

Smith (1927) conducted a nation-wide study of trade and industrial education administrators and supervisors who represented cities of 20,000 or more in population. The purpose of the study was to determine what the trade and industrial education administrator and supervisor must know and be able to do to be effective. One of the results of the study indicated that it was common to have a full-time administrator or supervisor responsible for industrial arts and industrial education subjects in cities with a population of 20,000 to 50,000. However, there was no supporting evidence of a need for supervision in relation to the population size of a community. An additional result of the survey indicated that in 88 of the 120 cities studied, more than 50% of the teachers taught both industrial arts and trade training. Smith concluded that supervisors must be prepared to improve instruction in both of these subject matter areas.

Byram and Wenrich (1956) stated a criterion for determining the need for administrative and supervisory assistance in vocational education and practical arts.

> It might be expected that a community of 30,000 population or larger should have one full-time person especially qualified to deal with problems of Vocational Education and Practical Arts. (p. 462)

Since 1908 when people were first employed as supervisors of special subject areas including industrial arts (Smith, 1927), industrial arts supervision has increased dramatically. Today, industrial arts supervisors assume a heavy burden in performing the responsibilities assigned to them. The success or failure of this delegated responsibility depends almost entirely on the degree of diplomacy and cooperative efforts employed by those involved. Burton and Brueckner (1955) expressed this same point of view.

> Democracy in supervision means enlisting the abilities of teachers, principals, and superintendents in the cooperative enterprise of improving teaching or other aspects of the teaching-learning situation. The democratic supervisor has and expresses confidence in fellow-workers; he evaluates teaching on the basis of the understandings, attitudes, and skills actually acquired by the pupils, regardless of whether these were secured through teaching procedures suggested by him or not. His classroom interviews with teachers are real conferences characterized by interchange of ideas and suggestions; his teachers' meetings are participatory with opportunity for teachers to present opinions, to differ, to demonstrate. The democratic supervisor encourages self-direction, self-criticism, and self-control among teachers. He realizes that growth requires not only opportunity but time. (p. 83)

Administration and supervision of industrial arts programs at the state and local level is essential to ensure maximum effectiveness and a minimum of fragmentation and inefficiency in program and cost.

Organizational Patterns

Although there is a definite need for the functions performed by administrative and supervisory personnel, little evidence of consistency is found among the organizational patterns of a state department of education or local school district. The following criteria are often used as a basis for including personnel responsible for industrial arts in the administrative structure of a state department of education or local school district:

Past practice. A school district or state department having traditionally employed administrative or supervisory personnel responsible for industrial arts will probably continue to employ these personnel in the future. However, this is not to imply that such personnel will not be given additional responsibilities due to increased demands on the key administrators with reference to financial limitations. For example, Robert Woodward, a former State Supervisor of Industrial Arts in California, was given the responsibility of coordinating the descriptions for state approved courses in California in all instructional areas. Less than two years after assuming the responsibility for district-wide supervision of industrial arts in the Greece Central School District, this author was given the added responsibilities for home economics, business education, marketing and distribution, and cooperative education. While these are only two examples, the practice of multi-responsibilities among industrial arts supervisors is rapidly becoming a trend in education.

Age and weight. Some school districts, seriously considering the elimination of a department head or supervisory position because of budget difficulties or questionable effectiveness as an administrator, elect to retain the position until the anticipated retirement of the personnel involved. These positions often remain unfilled or become consolidated with other administrative responsibilities in these districts.

Administrative structure. Positions are often created, eliminated, or consolidated based on the desire of the chief executive officer responsible for the total instructional program including industrial arts. Such positions, established to assist the administration in carrying out its responsibilities, are highly vulnerable when the administrator or the organizational management is changed.

State and federal funding. Many supervisory positions are created or eliminated based on the availability and extent of state and federal funding. Federally funded projects require a great deal of administrative time in conducting research, developing short and long range plans, preparing proposals, administering approved grants, implementing delivery systems, and completing required evaluations. Many industrial arts programs have been strengthened over the years as a result of federal grants received through a variety of funding options such as Titles III and V of the National Defense Education Act, Title IV of the Elementary Secondary Education Act, and vocational education, especially since 1972.

Many state and local school districts have created administrative positions solely for the purposes of these acts. Since initial funding of vocational education was largely limited to providing programs designed to prepare youth for specific job entry positions, many state and local supervisors had dual responsibilities for industrial arts and trade subjects. Some supervisors were unable to perform their total responsibilities. Industrial arts programs and activities were often shortchanged in the process because priority was given to job entry programs.

Job effectiveness. Many administrative and supervisory positions are retained primarily because of the effectiveness of the personnel involved. Specific job descriptions for such positions are often incomplete or vague. The successes or failures of industrial arts supervisors have often been the direct result of the personal attitudes and perseverance of those supervisors in identifying and carrying out the responsibilities related to their interpretation of the position.

THE CHANGING ROLE OF THE INDUSTRIAL ARTS SUPERVISOR

Since the turn of the century, chief school officers have traditionally employed administrators and supervisors to assist them in the development, implementation, and evaluation of industrial arts programs. Despite this fact, their role and effectiveness has had limited investigation. This oversight was evident in a statement by Bakamis (1954).

> Comparatively little has been written on industrial arts administration and supervision that applies directly and specifically to it. Those in the field of industrial arts supervision have achieved professional improvements by learning the hard way and by associating with supervisors in other fields of education . . . supervisors of industrial arts can attest to the lack of literature bearing upon their own activities. (p. 7)

A study by Wright and Allen (1926) emphasized the following conclusions related to the administration and supervision of vocational and practical arts education:

1. The uniqueness of the organization, teacher training, content, and evaluation of vocational and practical arts subjects require a special form of administration and supervision.
2. Separating administrative and supervisory functions is important. Failure to do so is a major cause of inefficiency in the operating positions.
3. The early stages of a program require largely administrative functions. As the program develops, the need for administrative functions decreases and the necessary supervisory functions increase until the well established program reaches a stabilized ratio of approximately 75% supervisory functions and 25% administrative functions.

Role Development

The role and responsibility of an industrial arts supervisor is derived from powers delegated by an administrator or chief school officer at the state and local level. These responsibilities and expectations are so often vague that they lead to many interpretations and misinterpretations. This was apparent in a study conducted by the Association for Supervision and Curriculum Development (1946) that investigated the role of the department head. A major finding indicated that the most serious handicap faced by department heads was the lack of clearly defined duties, responsibilities, and prerogatives.

The problem was still apparent in 1973. The delegate assembly at the American Industrial Arts Association National Conference in Atlantic City, New Jersey passed a resolution requesting the appointment of a committee to prepare a list of qualifications and responsibilities for state and local supervisors of industrial arts (AIAA, 1973). The list would provide a basis for establishing and maintaining quality industrial arts programs.

The need for this resolution was based on the premise established by the delegate assembly that the quality of industrial arts programs within a state is determined to a great extent by the quantitative and qualitative level of supervision available from the state department of education and/or local school district. However, prior to building a strong case for industrial arts leadership at the state and local level, specific qualifications and responsibilities must be developed and accepted by the industrial arts profession.

Administrative Titles

There is no substantitive evidence of any consistency in the administrative titles used by state departments or local school districts. This inconsistency is evident by the results of a survey conducted by this author and Ralph V. Steeb in March, 1976 on behalf of the Joint Legislative Committees of the AIAA and the Industrial Arts Division of the American Vocational Association (AVA). The survey's purpose was to study the status of federal funding for industrial arts in relation to the Amended Vocational Education Act of 1963. The study surveyed 50 state personnel responsible for industrial arts. Responding to the questionnaire were 49 states using 24 different job titles. These job titles included:

Supervisor, Industrial Arts
Specialist, Industrial Arts
Consultant, Industrial Arts
Director, Industrial Arts
Supervisor, Trades and Industry and Industrial Arts
Supervisor, Industrial Education
Supervisor, Industrial Arts and Occupational Programs

Supervisor, Industrial Arts and Prevocational Programs
Consultant, Industrial Arts and Vocational Handicapped Programs
Chief, Industrial Arts
Coordinator, Industrial Arts
Special Assistant to the Superintendent for Career Education
Career Services and Industrial Arts
Consultant, Career Education, Elementary/Secondary Services
Program Chief, Trades and Industry
Supervisor, Trades and Industry
Consultant, Industrial Education
Supervisor, Secondary Vocational Programs
Consultant, Secondary School Services
Consultant, Industrial Occupations
Consultant, Industrial Oriented Occupations
Assistant Vocational Director, Industrial Arts
Supervisor, Technical Education
Specialist, Curriculum Development

The diversity of job titles is not limited to state personnel. An examination of the 1976-77 mailing list of names and addresses of members of the ACIAS responsible for the administration and supervision of industrial arts at the local level indicated 28 different job titles. These job titles included:

Supervisor of Industrial Arts and Technical Education
Director of Occupational Education
Technical Education Consultant
Vocational Education Specialist
Industrial Arts Coordinator
Industrial Arts Department Chairman
Coordinator of Industrial Arts
Supervisor of T & I
Supervisor of Industrial Arts
Director of Vocational Education
Industrial Arts Advisor
Curriculum Coordinator of Industrial Arts
Chairman, Industrial Arts Department
Director of Career and Continuing Education
Director of Industrial Arts
Supervisor, Division of Instruction
Regional Specialist for Industrial Arts
Head, Industrial Arts Department
Consultant of Industrial Arts
Career Education Coordinator
Coordinator of Vocational Education
Supervisor of Vocational Education

Coordinator of Industrial Education
Industrial Arts Consultant
Curriculum Specialist
Assistant Director of Vocational Education
Assistant Director of Industrial Arts
Director of Career Education

Present Role

In September, 1976, this author randomly selected 20 state supervisors to survey in an attempt to obtain information related to the present role and status of industrial arts supervisors with emphasis on determining:

1. The number of full-time and part-time industrial arts supervisors in each state.
2. Identifiable changes in the roles of the state and local supervisors within the past 15 years.
3. Major responsibilities of state and local supervisors.
4. The effectiveness of local industrial arts supervisors.
5. The trend toward future increases or decreases in the number of state and local supervisors of industrial arts.

The following statements summarize the supervisor's perception of how the role of the industrial arts supervisor has changed during the past 15 years at the state and local level:

1. Seven states (California, Minnesota, Oregon, Texas, West Virginia, Wisconsin, and Wyoming) indicated a definite tendency to consolidate these positions while assigning broader responsibilities, primarily with the trade and industrial segment of vocational education. The most common term used to describe this leadership role is *industrial education,* but one state reported that the title has been changed to *career education* coordinator in many cases.
2. One state (Pennsylvania) reported an increased emphasis on certification of industrial arts supervisors as opposed to just giving a regular staff member a leadership title.
3. Eight states (Idaho, Indiana, Maryland, Texas, Virginia, Wyoming, North Dakota, and Massachusetts) reported an increase in the number of state and local industrial arts supervisors over the past 15 years.
4. In all cases where the number of state and local supervisors increased, there has been a substantial increase in the number of workshops for instructors. The amount of curriculum development, technical assistance, and reimbursement for industrial arts programs and activities has also increased.
5. Another state (West Virginia) indicated that recent emphasis on administration in vocational education greatly diminished the amount of emphasis on industrial arts supervision.

6. Three states (Hawaii, Missouri, and Virginia) reported that the role of the state and local supervisor has changed from a "helping teacher" role to a leader in curriculum development and improvement of instruction.

Concluding Statements

Industrial arts and trade and industrial education. Industrial arts and trade and industrial education administrative and supervisory positions are consolidated at the state and local level in many states either through historical implication or for purposes of economy. The term industrial education is often used to describe the realm of responsibility associated with both trade and industry (T & I) and industrial arts leadership roles. The commonly accepted rationale is that trade and industrial education programs are designed primarily to prepare students for job entry employment and industrial arts programs, while deriving their content from a similar base, are more exploratory and pre-vocational in nature. Together they fulfill all of the major goals of vocational education as defined in federal legislation. This joint position approach to leadership has often weakened the leadership in industrial arts because:

1. The prime focus of federal funding has been on preparation for immediate entry-level employment skills. This funding is based largely on competitive grants requiring considerable preparation and follow-up, thus demanding a large percentage of an administrator's or supervisor's time and leaving little time for industrial arts.
2. In many cases, industrial arts, especially at the secondary level, has been limited to a feeder role for vocational education programs. This has severely limited its function in preparing all students to understand and contribute to our industrial-technological society.

The role and expectations of industrial arts supervisors. The role and expectations of industrial arts supervisors are directly related to the desires of the chief school administrators where there is little evidence of consistency or expectations. Titles appear to be created or eliminated based on current educational jargon. In addition, the fulfillment of the role of the industrial arts supervisor is largely dependent on the individual involved. Most job descriptions are vague at best and wide open to interpretation. This often results in inefficiency or misunderstandings between the supervisor and staff, seriously curtailing the effectiveness of the position.

Those state and local industrial arts supervisors who have clearly defined position descriptions are proving to be the most effective in carrying out their role.

TYPES AND CHARACTERISTICS OF INDUSTRIAL ARTS SUPERVISORS

It has been previously established in this chapter that the position of industrial arts supervisor was created to fill the need of the chief school officer or principal for assistance in coordinating the development, implementation, and evaluation of a quality instructional program. The industrial arts supervisor was required to perform these responsibilities, which included a strong leadership role.

A person responsible for supervising an industrial arts program at the state, county, district, or local level may have been assigned any one of a number of titles. Generally, these titles indicate certain types of responsibilities to be performed. In addition, the size of a state, district, school, and department, along with its management philosophy, tradition and available resources are major factors in determining the type of delegated leadership employed to ensure the industrial arts program remains intact. There does not appear to be any difficulty with administrators recognizing various levels of industrial arts supervisory leadership. The problem is determining how much authority and time is needed to provide this coverage and how it can be accomplished most effectively and economically. The solution at the local level may be with the recommendation of Beck and Rosenberger (1971).

> If a principal elects to delegate some of his responsibilities, let him take the money he was going to use to employ a general secondary supervisor and use it to employ an assistant principal who will help with teacher evaluation as a line responsibility and allow the department chairman to function in the staff role – i.e., that of supervision. (p. 50)

State, County, or District Level

People employed to provide leadership in supervising industrial arts programs at the state, county, or district level are usually given one of the following titles: director or bureau chief; supervisor, specialist, or consultant; or, assistant director or supervisor.

Director or bureau chief. People with a title of director or bureau chief are in a line position with major responsibilities in staff evaluation, policy making, budget preparation, and management. They usually have a staff of assistants reporting directly to them. Except in the very populus states, counties, or school districts, people with this title, who are responsible only for supervising industrial arts programs, are rare. People in these positions are usually employed full-time. They are often given responsibilities beyond those directly related to the supervision of industrial arts programs and personnel. Their salary is comparable to that of senior high school principals at the local level and to that of assistant superintendents at the state level.

Supervisor, specialist, or consultant. The title supervisor, specialist, or consultant usually implies a staff position with major responsibility in curriculum development, leadership and consultation, inservice training, facilities planning, and program evaluating. People in this position usually have technical expertise in industrial arts and are expected to provide advice and recommendations accordingly. This position usually carries limited implementation authority.

Assistant director or supervisor. The title, assistant director or supervisor, usually indicates a level of responsibility as assigned by the director or supervisor. Such positions are created or established based on expanded growth or level of expectations. These positions, while often a stepping stone for more advanced opportunities, have the disadvantage of a lower pay scale than the senior position with a comparable work load. In addition, these positions are highly vulnerable to elimination in times of tight budgets.

Local Level

People employed to supervise industrial arts programs at the local level are usually assigned one of the following titles: department head or chairman; or, curriculum leader or team leader.

Department head or chairman. The predominant organizational pattern used in the public secondary schools is probably the least understood and most highly criticized. According to Callahan (1971), the department head must function as a classroom teacher, curriculum consultant, supervisor, and administrative assistant in a vaguely defined and constantly changing environment.

The role and responsibility associated with this position is usually left to the discretion of the building principal and usually entails routine coordination, management, and leadership responsibilities. The person may also serve as a liaison between the staff and building administration. While the position usually entails some degree of program evaluation, the degree of staff evaluation depends on the interpretation of the position as a line or staff function. The position usually carries some type of salary adjustment and released time. This position tends to evolve into one of two characteristics usually based on the personalities of the persons involved. Either the position is recognized as one with limited effectiveness or one with a strong line authority that is in direct conflict with that of the principal and staff.

Curriculum leader or team leader. The title, curriculum leader or team leader, is commonly assigned to an industrial arts teacher who in addition to full-time classroom teaching duties has been given the added responsibilities for departmental leadership. People in this position are often cast in the role of master teacher, senior resource person, and department catalyst with limited time and training to function as an instructional leader. They are expected to function basically the same as a department head without line responsibilities. Positions of this type have limited effectiveness at best and, once again, are highly dependent on the desire and education of the persons appointed.

DUTIES AND RESPONSIBILITIES OF INDUSTRIAL ARTS SUPERVISORS

Industrial arts supervisory positions have been an integral part of the American educational system since the turn of the century even though there has never been any general agreement on the specific functions or expectations of the job. Several studies have been conducted which attempted to define the duties, responsibilities, and expectations of the industrial arts supervisor.

Woodward-ACIAS Study

Woodward (1967) conducted a study on behalf of the ACIAS to determine the duties of an industrial arts supervisor as perceived by 120 industrial arts supervisors in the United States and Canada. This study organized the responsibilities into six major divisions with specific job tasks listed within each division:

1. Administrative and Executive Duties
2. Professional Improvement
3. Instructional Program
4. Equipment and Supplies
5. Housing
6. Evaluation of Course/Program

All tasks listed in each division were divided into two major categories. Those tasks performed by 85-100% of the supervisors formed one grouping, while the second grouping included those tasks performed by 70-85% of the supervisors.

It is interesting to note that two major responsibilities which were not on the survey list were included in the final report based on additional feedback from the respondents:

1. Assist in the planning and operation of educational programs receiving federal and state financial assistance.
2. Promote and assist professional organizations.

While the study itself did not reveal any startling surprises regarding the role and function of industrial arts supervisors, it did prove to be most helpful to the profession as many states and local school districts incorporated the data into their job description and task expectations of industrial arts administrative and supervisory personnel.

Dudley Study

Dudley (1970), the State Supervisor of Industrial Arts in New York, identified three fundamental classifications of the duties and responsibilities of industrial arts supervisors whether they function in the role as a department chairman, supervisor, head teacher, or director. These classifications of duties and responsibilities were:

1. Administrative functions including management, personnel, and curriculum development.
2. Supervisory responsibilities including the improvement of instruction, promotion of growth of himself and his staff, and program evaluation.
3. Leadership responsibilities including the promotion of positive staff relationships, educational association by playing an active role in professional organizations which promote sound policies for industrial arts education, and school-community relationships.

Virginia State Department of Education Conference

The Virginia State Department of Education (1970) under the direction of Thomas A. Hughes and Marshall O. Tetterton, the State Supervisor and Assistant Supervisor of Industrial Arts respectively, coordinated a state-wide conference in 1970 of industrial arts curriculum specialists and general supervisors for the purpose of preparing guidelines and responsibilities for a cooperative plan of supervising programs.

These guidelines presented two models for supervision, i.e., one for the industrial arts curriculum specialist and one for the general supervisor. In addition, recommendations for establishing supervisory positions, qualifications, standards, and responsibilities were also included. Each model identified specific tasks for the industrial arts supervisor under the major categories of personnel, curriculum development, growth opportunities, facilities, equipment and supplies, budget, public relations, and evaluation.

This document has proved to be most helpful to administrators and supervisors in Virginia and has been a great assistance to them in improving the quality of industrial arts supervision throughout the state.

Good Survey

As part of a 20-state survey conducted by this author, state supervisors of industrial arts were requested to list the five major responsibilities of state, city or county, and local industrial arts supervisors. The results of this part of the survey are provided below.

State supervisor. The most commonly recorded responsibilities of a state supervisor were:

1. Provide leadership in the development of long range plans and the preparation, interpretation, and dissemination of appropriate cur-

riculum materials, facility standards, and supportive materials at the state and local level.
2. Coordinate and conduct inservice, preservice, and continuing education programs and workshops for teachers and administrators.
3. Work in close cooperation with teacher training institutions to ensure that college approved programs adequately prepare industrial arts teachers at both the preservice and inservice level.
4. Assist local educational institutions in the interpretation of state and federal regulations pertaining to industrial arts and in the evaluation and implementation of their program.
5. Participate in local, state, and national programs and conferences to assist in the continual refinement and upgrading of industrial arts.

City or county supervisor. The most commonly recorded responsibilities of a city or county supervisor were:

1. Establish articulated programs consistent with state standards and local needs.
2. Recruit new teachers and retrain existing staff.
3. Plan facilities including the identification of resource materials involving supplies, equipment, texts, audiovisual aids, and safety equipment essential for program implementation.
4. Prepare a budget and maintain a budget management system.
5. Conduct regular program evaluations and assessments.
6. Foster and maintain effective communications and public relations.

Local supervisor. The most commonly recorded responsibilities of a local supervisor were:

1. Provide leadership in the interpretation and implementation of programs in accord with budget parameters.
2. Assist in new teacher orientation and placement.
3. Maintain effective communications among staff, administration, and the community.
4. Assist in budget preparation and routine administrative details.
5. Assist in program evaluation and assessment.
6. Recruit staff and plan training programs for improving staff performance.
7. Coordinate the selection of equipment and instructional needs.
8. Serve as a liaison between staff and administration.
9. Maintain an accurate record and accounting system.

AIAA Accreditation and Evaluation Committee Survey

The AIAA Accreditation and Evaluation Committee conducted a nation-wide survey in 1973 to update the 1967 Woodward-ACIAS study. Its purpose was to obtain current input from more than 200 industrial arts state and local supervisors, teacher educators, and classroom teachers. The results of the survey are reported as a publication entitled *Recom-*

mended Qualifications, Duties, and Responsibilities for State and Local Supervisors of Industrial Arts (Accreditation and Evaluation Committee, 1974).

The results of the survey indicated that the duties and responsibilities of state and local supervisors could be grouped into three major categories:

1. Administrative, which includes executive, personnel, and budget functions;
2. Supervisory, which includes program identification, implementation, assessment and evaluation, and support functions including research, improvement of instruction, staff training and improvement, identification of instructional facilities, equipment and materials, new developments, and safety; and
3. Publications, which include school-community relationships and communications.

Each of the above categories was further delineated so as to avoid any vague misconceptions of job responsibilities. The following personnel functions in the administrative category provide an example of the degree of specifics that were developed (Accreditation and Evaluation Committee, 1974, p. 9).

Assisting in the selection, appointment, assignment, and transfer of staff members by direct or indirect involvement through:

1. Preparing appropriate job specifications.
2. Interviewing and recruiting new staff members.
3. Performing classroom observations and preparing written evaluations.[1]
4. Determining staff assignments.[1]
5. Securing qualified substitutes.[1]
6. Securing qualified resource personnel to supplement regular teaching staff.[1].

Concluding Statements

The scope and complexity of supervising an industrial arts program at the state, district, and local level necessitates a team effort of supervisory and administrative staff, associated in one or more aspects of program identification, development, implementation, and evaluation to ensure all tasks are adequately accomplished on a regular basis in a spirit of cooperation with high professional standards. These tasks may vary in degree and expectation depending on administrative philosophy, size, scope, and complexity of state and local educational systems. However, the following tasks must be accomplished through an industrial arts supervisory network:

[1]May have local application only.

1. A state and local plan for industrial arts programs must be developed and evaluated on a regular basis to maintain consistency with the state and local educational goals and to provide for an articulated K-12 program.
2. Specific courses essential to carrying out the intent of the state and/or local plan must be developed in sufficient detail to include performance objectives, implementation, guidelines, facility specifications, and resource requirements including supplies, equipment, software, and audio-visual aids.
3. A management system should be employed which includes all of the essential ingredients for the implementation of each course including: scheduling, budget preparations and management, and routine administrative requirements.
4. A program assessment and evaluation process should be implemented to ensure that the programs are achieving their intended objectives.
5. All staff members should be professionally evaluated on a regular basis and assisted to improve their effectiveness wherever possible.
6. Inservice training programs should be conducted on a regular basis to promote and improve the professional growth of staff.
7. Participation in local, state, and national programs which will assist in the continual refinement and upgrading of industrial arts should be encouraged.
8. An open and effective line of communications among staff and administration should be established and maintained.
9. Effective school-community relationships and communications including the use of advisory committees, community service projects, and community resources that enhance program objectives should be established and expanded.
10. A comprehensive safety program that equals or exceeds local, state, and federal requirements should be developed and implemented.
11. An effective program of staff recruitment, selection, assignment, and transfer must be developed.
12. State and federal proposals and grants that provide additional financial assistance for the improvement of the industrial arts program should be prepared and monitored.

PRESENT-DAY STATUS OF INDUSTRIAL ARTS SUPERVISORS

While fairly accurate data is available on the number of state supervisors and their prime area of responsibilities, there is limited information on the number of full-time and part-time local supervisors of industrial arts. The following information was compiled as part of the

20-state survey of industrial arts supervisors conducted by the author in preparing this chapter:

State Supervisors

All 50 states and Puerto Rico have persons assigned in the State Education Department with full-time or part-time responsibility for industrial arts according to a mailing list maintained by the AIAA. A more detailed breakdown of this information indicates:

1. Thirty-eight states have full-time supervisors and/or consultants responsible for industrial arts.
2. Nine states have two or more full-time industrial arts supervisors.
3. Nine states have supervisors who also have major responsibilities in trade and industrial education.
4. Four states have supervisors who have broad administrative responsibilities including industrial arts.

Local Supervisors

Only 7 of the 20 states surveyed provided specific data that could be used to determine the present status of local industrial arts supervisors in terms of the amount of time devoted to supervision and the size of the school district. Table 1 indicates the number of local supervisors and the percentage of time they are able to devote to the supervision of industrial arts based on a seven-state area.

Table 2 indicates the percentage of time a supervisor is able to devote to the supervision of industrial arts programs in relation to the size of the school district based on a six-state area. An analysis of this data indicated that:

1. Regardless of the size of the school district, the majority of the industrial arts supervisors devote 25% or less time in this capacity.
2. A district with less than 20,000 students is not likely to employ a full-time industrial arts supervisor.

Table 1
Number of Local Supervisors and Percentage of Time Devoted to Supervision of Industrial Arts

Percentage of Time	Number	Percent Surveyed
100	58	10
50-75	85	14
25-50	124	20
0-25	337	56
Total	604	100

Table 2
Percentage of Time Devoted to the Supervision of Industrial Arts in Relation to the Size of the School District

Percentage of Time	Size of School District											
	Less than 500		500-2500		2500-5000		5,000-10,000		10,000-20,000		Over 20,000	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
100											7	14
50 - 75					5	28			1	3	5	10
25 - 50			10	21	2	11	4	27	9	23	16	33
0 - 25	140	100	37	79	11	61	11	73	29	74	21	43

FUTURE TRENDS

Information gathered as part of the 20-state survey previously mentioned was helpful in indicating some future trends for the industrial arts supervisor. One question posed was, "Are local industrial arts supervisory positions increasing in your state?". Survey respondents in 13 states indicated they were not and five states indicated they were increasing in number.

Reasons cited for not increasing the number of supervisory positions included limited funds for administrative positions, low staffing priority, increased emphasis on vocational and career education and administrative positions with broader responsibilities, and declining enrollments.

The survey respondents in five states indicated an increase in the number of industrial arts supervisory positions in their state for reasons such as an acceptance of industrial arts as an integral part of vocational education, enrollment increases, state incentive funding, a strong thrust for establishing such positions, and a recognized need by local administrators for industrial arts supervision.

Seven states indicated a trend toward the elimination or reduction of industrial arts supervisory positions for reasons such as lack of accountability associated with such positions, financial, an increase in priority emphasis on the administration of vocational and career education, and the anti-administration syndrome.

All states surveyed responded positively in summarizing their perception of the effectiveness, impact, and influence of local supervisors. However, several states indicated that there was considerable room for improvement that could best be accommodated if:

1. Local job descriptions were better defined.
2. More supervisors were utilized in local school districts.
3. More preservice and inservice training programs could be provided to assist them in developing management and supervisory skills.
4. There was less paper work and trivial details.
5. Supervisors could become more united as a group in their efforts.

The impact and influence of local industrial arts supervisors in relation to the state supervisor is a critical aspect in ensuring effective communications and a unity of purpose in the supervision and management of industrial arts programs at the local level in cooperation with the state education department.

Input from the surveyed respondents regarding the role and effectiveness of the local industrial arts supervisor can be summarized as a means of providing a:

1. Close liaison between the industrial arts staff and state supervisor.
2. Close proximity of the industrial arts program and problems in the classroom, thus providing invaluable insight and assistance in determining the direction of curriculum and inservice education needs.
3. Valuable service in handling public relations for the industrial arts program in the community as a means of ensuring priority support of industrial arts at the local level.

CONCLUSIONS AND RECOMMENDATIONS

Based on the research and data gathered in the preparation of this chapter, the following conclusions and recommendations need to be given priority in the development and implementation of quality and responsive industrial arts supervision at the state and local level.

1. Supervision of industrial arts at the state level is relatively stable with the role and expectations well defined. This does not imply that there is no room for improvement in the quality of supervision and the number of supervisors available to do an effective job. However, the first priority should be to ensure that every state has a minimum of one full-time supervisor with prime responsibility in the development of a state plan for industrial arts that is compatible with the overall state educational goals and objectives. This supervisor should be readily available to consult with local school districts in the interpretation and the implementation of the state plan including the coordination of inservice training programs.
2. Local supervision of industrial arts is far from adequate in terms of number, role, definition, and expectations. The role of many super-

visors has evolved and been maintained through their personal determination. They are most effective when allowed to establish a close liaison with the state supervisor and are able to maintain effective communications with both their staff and administration.

3. State supervisors should provide more leadership than is presently being provided in the promotion of inservice training of local supervisors.
4. National leadership conferences should be sponsored by the United State Office of Education, American Industrial Arts Association, American Council of Industrial Arts Supervisors, and American Vocational Association, to promote and develop leadership qualities in state and local supervisors.
5. Efforts should be made at the state and local levels to avoid the consolidation of administrative positions. Consolidation tends to dilute individual effectiveness as responsibilities become broadened beyond the scope of individual expertise.
6. More research must be conducted in the area of effective supervision of industrial arts programs.

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unit iv

Leadership, Organizations, and Journals in Industrial Arts

chapter 14

Leadership in Industrial Arts — A Situational Perspective

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From the inception of industrial arts as a content area in public education, situations have arisen requiring effective leadership at all levels of the profession. Since the profession includes school instructors, department chairpersons, supervisors, teacher educators, association officers and committee personnel, all individuals associated with industrial arts should consider leadership their responsibility.

Frequently, when past industrial arts leaders are recounted, the same few individuals are the focus of attention. Maintaining this narrow perspective of leadership can result in continued numbers of persons not assuming their leadership responsibilities in curriculum development, public relations, and student recruitment. Rectifying this potential leader void requires all members of the industrial arts community to collectively engage in leadership activities that provide the momentum for the profession's advance. To achieve this end, the purpose of this chapter is to identify the variables associated with effective leadership as they relate to situations confronting the profession.

THE LEADER

The leadership posture of industrial arts can be improved only when the myth that every individual must mirror a stereotype leader profile is dispelled. Most leaders are "average" people who come in a variety of sizes and shapes each possessing a unique personality. Support for this viewpoint of leadership is found in the writing of Gibb (1969):

> Leadership is still generally thought of in terms of personal abilities, but now the assumption is made that the abilities in question are the same as those possessed by all normal persons: individuals who become leaders are merely presumed to have them to a greater degree. (p. 18)

Researchers also suggest that some limited number of personal traits may be common to all leaders.

During past decades, numerous studies have been conducted to assess the hundreds of personal traits associated with an effective leader. Data obtained from these research efforts have resulted in an extensive list of traits. A sampling of 12 recurring traits reported in several studies included

Adaptability	Neatness
Aggressiveness	Originality
Dependability	Scholarship
Industriousness	Self-confidence
Intelligence	Sociability
Judgment	Tact

Persons associated with industrial arts should be able to identify several of these traits as strengths of their own personalities. However, this does not indicate that an individual possessing certain traits can adapt to every leadership demand. The findings of Stogdill (1974) and others provide explicit evidence that no specific list of traits will accommodate effective leadership in all situations. Admittedly, the leader's profile is an important consideration but represents only one aspect of a complex interaction of variables when examining leadership.

In addition to the misconception that a single leader profile must be emulated is the erroneous belief that leaders are born. While some unique individuals may possess a natural flair as leaders, most people must consciously develop their talents for an eventual leadership opportunity. Schul (1975), author of *How to be an Effective Group Leader,* identifies a basis for becoming a leader:

> There are reasons to believe that . . . there is sufficient experimental evidence to prove that leadership can also be created, trained, and developed in persons of normal intellectual ability and emotional stability and who are willing to make the effort to learn. (p. 3)

Schul and other researchers agree that a leader is developed through the rigors of mental and physical discipline associated with education, employment, and experiences gained via personal and professional activities.

An example of individuals developing their capabilities as leaders over an extended period of time is college department chairpersons in industrial arts. Those persons aspiring to the position of chairperson normally possess a terminal degree, proven capability as a researcher, writer, grantsperson, and work experience in industry, teaching at both secondary and college ranks, and prior administrative training. To acquire these professional credentials and recognition as a leader necessitates many years of preparation and personal sacrifice. Clearly, most leaders emerge because of initiative, foresight, and dedication.

LEADERSHIP IN PERSPECTIVE

Having established that all normal persons possess the traits to become leaders and that most people associated with industrial arts are leaders in some capacity, the next task is to examine the phenomenon of leadership.

Currently, leadership is viewed by social scientists as a process of human interaction occurring within a situational context. Hollander (1969) supports this perspective of leadership stating the following:

> Leadership constitutes an influence relationship between two, or usually more persons, who depend upon one another for the attainment of certain mutual goals within a group situation. This situation not only involves the task, but also comprises the group's size, structure, resources and history, among other variables. (p. 4)

To Hollander, the effective leader is a person who is able to lead a particular group toward its goals.

Leadership effectiveness in industrial arts encompasses numerous group activities, exemplary of which is sponsoring student organizations. Writing in *Man/Society/Technology,* authors Baker and Miller (1976) noted the following: "In guiding a student group, an advisor is responsible for five basic management functions. These functions are: planning, organizing, staffing, directing activities, and controlling functions and activities" (p. 236). Explicit in the writing of Baker and Miller is the necessity of the advisor to model appropriate leader behaviors so that students will emulate leadership qualities as they assume the management of the student organization and later apply those qualities in their careers and community involvement.

The effective leader helps group members deal with current issues, helps accomplish common goals, and models the standard of performance expected of the group. These characteristics are evidenced in the activities of department chairpersons. In particular, department heads should display exemplary teaching practices, engage in curricular matters, and provide a positive public relations image to students, administration, and public constituencies. Industrial arts teachers must also engage in leadership activities in a variety of instructional and professional situations.

While leadership in industrial arts is frequently concerned with curriculum or national posture, a major focus of the profession is quality instruction conducted by the individual teacher. Being the teacher/leader of students necessitates an understanding of managing classroom instruction. A primary task within an industrial arts laboratory is planning, organizing, and controlling the processes used to accomplish course objectives. In most instances, instruction in industrial arts is accomplished by students working independently of each other and interacting with the teacher as their needs dictate. Using instruction as the primary task, accomplished in a laboratory environment where students work autonomously of fellow students and teachers, provides a leadership situation in which the teacher's competence in subject matter, organization skills, personality, and enthusiasm are important elements in the teacher-student relationship.

Another concern of industrial arts teachers' relationships with their students is the dichotomy between the school's roles/expectations and the students' individual personalities/needs. This factor is of particular importance in industrial arts since the "dumping ground syndrome" compounds classroom management responsibilities. The school expects students to behave in an orderly manner while actively pursuing their studies. Unfortunately, this pattern of behavior is not descriptive of all students in industrial arts. Frequently, the disruptive individual can adversely affect the conscientious students, resulting in their frustration and the view of their immediate work environment (classroom) as non-supportive. Industrial arts teachers must provide leadership that minimizes the non-supportive circumstances occurring within their classroom. The principle of supportive relationships is stressed by Likert (1967) in his text *The Human Organization:*

> The leadership and other processes of the organization must be such as to ensure a maximum probability that in all interaction and in all relationships within the organization each member, in the light of his background, values, desires, and expectations, will view the experiences as supportive and one which builds and maintains his sense of personal worth and importance. (p. 47)

The application of this principle is viewed by Likert as crucial to group performance and to the relationship between superior and subordinate.

Functioning as a leader, the industrial arts teacher must regulate the amount and frequency of teacher-student interaction required to achieve supportive relationships and instructional goals. Bass (1958), author of *Leadership, Psychology, and Organizational Behavior,* identified the basis for leader-follower interaction:

> The further a group is from maximum effectiveness, the more leadership is possible and required; the closer to maximum effectiveness, the less leadership is necessary. (p. 134)

In addition to the leader's impact on class effectiveness, Bass also considers the personality of each individual as pivotal in group achievement.

Teachers have a significant degree of authority they can rely upon as an influential aspect of leadership. When teachers encounter a difficult problem regarding a disruptive student or students, their authority or "position power" can be utilized to mediate the situation. Authority, or "position power," as some researchers title this leverage, is an important factor when adopting a leadership style. In contrast to teachers, the authority of supervisors, association officers, and committee chairpersons must rely more on persuasion than autocratic directives. Regardless of the level of "position power" associated with a particular leader, leadership style should be determined by assessing relevant situational variables.

Research dealing with leadership is not conclusive regarding a single behavior pattern. Tannenbaum and Schmidt (1958), developers of the "Continuum of Leadership Behavior," stated that successful managers cannot be characterized as strong nor as permissive leaders. The authors' view of a successful leader includes "one who is keenly aware of those forces which are more relevant to his behavior at any given time. He accurately understands himself, the individuals and group he is dealing with, and the company and broader social environment in which he operates" (p. 101). Support for a continuum of leadership style is found in the survey results of Stogdill (1974):

> The results clearly indicate that neither democratic nor autocratic supervision can be advocated as a method for increasing productivity, but member satisfaction is associated with a democratic style of supervision. . . . Satisfaction with democratic leadership tends to be highest in small interaction-oriented groups. Members are better satisfied with autocratic leadership in large, task-oriented groups. (p. 370)

Stogdill's findings suggest that an individual in a leadership position should scrutinize each situation to determine which leader behaviors will be most effective. A complete assessment of the group task, size, members, goals, time constraints, and an analysis of factors associated with organizational theory must be examined.

ORGANIZATIONAL THEORY

A situational perspective of leadership requires that several organizational factors be considered when examining group leadership. Most leadership in industrial arts occurs in an educational setting where the organizational pattern is predominately a formal arrangement within a bureaucratic structure. The structure adopted by most educational institutions is identified as a bureaucratic-hierarchical arrangement. An example of such a structure in an educational setting is presented in Fig. 14-1. This format portrays a descending order of accountability from the local superintendent to the classroom teacher.

The importance of bureaucratic arrangement to an organization appears in *Organizational Analysis: A Sociological View* by Perrow (1970). Perrow stated that it is not possible to have completely flexible democratic institutions where people do as they please because of "specialization, the need to control, extra-organizational influences upon the members, and the necessity to deal with a changing and unstable environment" (p. 50). Bureaucratic structure frequently aids the leadership of industrial arts to accomplish local, state, and national

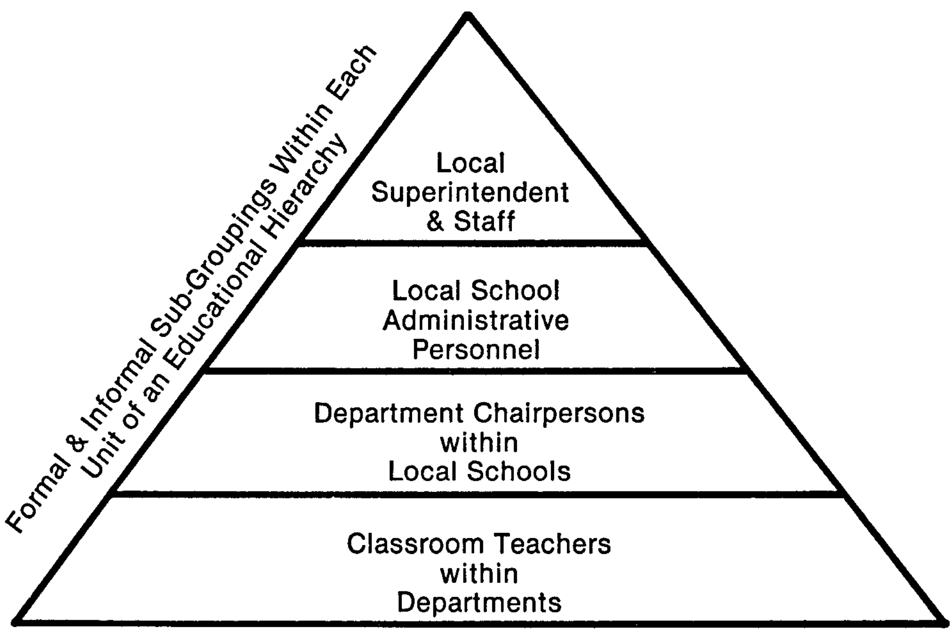

Fig. 14-1. A Heirarchical Structure for a Local School System.

goals that could not be enacted by a loosely defined informal arrangement. The negative characteristics of a bureaucracy are identified by Perrow as slowness of action, inflexibility, and resistance to change and innovation. Both the positive and negative implications of bureaucratically structured educational institutions must be considered by the leaders in industrial arts if the profession is to function effectively as an adaptive, flexible, and productive grouping.

The viewpoint of leadership as a complex interaction of variables in a constantly changing situational context describes the circumstances confronting the leaders of industrial arts. Not only industrial arts but all segments of the curriculum must adjust to change as external factors impact upon education. A formal grouping, such as the industrial arts profession, functions as part of an open system. The open system necessitates an exchange between societal institutions as well as an adaptation to environmental and technological influences. Parsons (1956) stated that "an organization is a system which, as the attainment of its goal, produces an identifiable something which can be utilized in some way by another system; that is, the output of the organization is, for some other system an input" (p. 65). Organizational goals described by Parsons rely upon an exchange with the superordinate system for inputs and marketability of outputs. The primary output for industrial arts includes the elementary, secondary, and post secondary students who, through instruction, are more knowledgeable of the industrial/technological segment of their society.

Concomitant with the marketability of industrial arts output is the continued development of contemporary curriculum. Since the formalization of industrial arts, members of the profession have attempted to assimilate changes occurring in society into relevant curriculum offerings. The very emergence of industrial arts is partially attributable to the transition from an agrarian to an industrial society, the shift developing prior to and at the turn of the 20th century. Gross and Chandler (1964) write of this period:

> The startling expansion of American Education has been in part a direct outgrowth of industrialization. The complexity of urban life, the need for highly specialized skills, and the vast increase in knowledge, all pointed toward an extension of educational opportunities. (p. 336)

This trend, along with numerous others, required those individuals assuming leadership roles for technical education at the turn of the century to do so during a transitional period in society.

With the continued advance of industrialization, a parallel growth was evidenced in industrial education. Leaders emerged at various levels of instruction and administrative responsibility in trade and technical teacher education, professional organizations, and regional conferences. A significant impact upon industrial arts from the open system referent was World War I. In the text *History of Industrial Education* by Melvin Barlow (1967) the author stated that

> the industrial arts shops were ready-made for service in constructing practical articles so necessary at the front and in hospitals or at military bases at home and overseas. The construction of such articles was integrated into the regular instructional program so that uniqueness of design and group participation were maintained as objectives. (p. 243)

Barlow's text provides numerous examples of events that required the leadership of industrial arts to adapt and refine existing programs.

More recently, open system influences impacting industrial arts include space exploration, declining enrollments, mainstreaming, environmental concerns, federal legislation and funding, back to basics movement, diminishing resources, and the directions of science and technology. If industrial arts is to accommodate these and the many other trends in society, then effective leadership must be employed at all levels of instruction and in professional activities. To accomplish this end, the continued involvement of the leaders in industrial arts should include several of the following activities:

1. Graduate education
2. Curriculum development
3. Participation in professional organizations
4. Knowledge and application of the research process
5. Attendance and participation at state and national conferences
6. Dissemination of new knowledge and practices
7. Participation in inservice workshops
8. Recruitment of quality students and faculty for industrial arts programs

While some individuals receive "historical remuneration" for their efforts in one or more of the aforementioned activities, every person in industrial arts should excel in several of these areas for professional development and personal edification.

Indeed, the profession has a rich heritage in leading the educational community in pedagogical innovations. Current educational practices such as peer instruction, performance objectives, programmed learning, open education, and individualized instruction are noted by John Feirer (1975), in his editorial appearing in the journal *Industrial Education:*

> While industrial educators may not know each of these concepts by the current 'in' terms, every one of these so-called new ideas has in actual fact been practiced by good industrial education teachers for many years now. (p. 20)

It is the spirit of innovation cited by Feirer that the industrial arts community must continue to foster when dealing with open system issues confronting the profession.

A final consideration in examining the complex interaction between the leader and group members is the identification of leadership behaviors associated with group effectiveness.

LEADERSHIP BEHAVIORS

Leadership places numerous demands upon a person's time and energies. To make the best use of the leader's limited resources, it is necessary to cultivate those behaviors which have been statistically proven to facilitate a leader's impact upon a group's effectiveness. A major study concerning this topic is the research reported by Stogdill in the text *Handbook of Leadership* (1974) which represents a synthesis of the leadership behavior studies begun at The Ohio State University after World War II. A salient contribution of these leadership investigations has been the isolation of "Consideration" and "Initiating Structure" as basic dimensions of leadership behavior, correlated with group effectiveness. One of the primary researchers during the initial development of the leadership subscales was John Hemphill.

Hemphill, with the assistance of several members of the Personnel Research Board, generated 1800 statements descriptive of most supervisory behaviors. Refinement of these statements resulted in 150 items measuring 10 dimensions, entitled the Leader Behavior Description Questionnaire (LBDQ), which are defined by Fleishman (1973) in the text *Current Developments in the Study of Leadership:*

1. *Initiation* — the frequency with which a supervisor originates, facilitates, or resists new ideas or new practices.
2. *Representation* — the frequency with which a leader defends his group against attack.
3. *Fraternization* — the frequency with which a supervisor mixes with the group, stresses informal interaction between himself and members.
4. *Organization* — the frequency with which the supervisor defines or structures his own work, the work of other members, or the relationships among members in the performance of their work.
5. *Domination* — the frequency with which the supervisor restricts the behavior of individuals or the group in their activities.
6. *Recognition* — the frequency with which a supervisor engages in behavior which expresses approval or disapproval of group members.
7. *Production emphasis* — the frequency with which the supervisor sets levels of effort or prods members for greater effort or achievement oriented toward volume of work.

8. *Integration* – the frequency with which a supervisor tries to increase cooperation among group members, tries to reduce conflicts within the work group, or promotes individual adjustment to the group.
9. *Communication-down* – the frequency with which the supervisor provides information to group members to increase understanding and knowledge about what is going on.
10. *Communication-up* – the frequency with which the supervisor seeks information and tries to keep informed about what is going on in the group.

When leaders in industrial arts examine their performance, they should consider their effectiveness regarding these 10 behaviors identified by the LBDQ.

Subscales of the LBDQ have undergone numerous revisions since their inception in 1952. Stemming from an analysis of the data obtained from administering the LBDQ, the leadership subscales of "Consideration" and "Initiating Structure" have been developed. Definitions of the two major subscales of "Consideration" and "Initiating Structure" were reported by Fleishman (1969) in the *Manual for Leadership Opinion Questionnaire:*

> *Consideration* – Reflects the extent to which an individual is likely to have job relationships with his subordinates characterized by mutual trust, respect for their ideas, consideration of their feelings, and a certain warmth between himself and them.
> *Initiating Structure* – Reflects individuals who play a very active role in directing group activities through planning, communicating information, scheduling, criticizing, and trying out new ideas. (p. 1)

Characteristics explicit in the dimensions of "Consideration" and "Initiating Structure" are the descriptions of the leader's behavior in a specific situation. Interpretation of these dimensions does not reflect a generalized "traits" of leadership connotation.

Research utilizing "Consideration" and "Initiating Structure" has been conducted in a variety of educational, governmental, industrial, and military organizational settings. Results of 29 studies relating these dimensions of leader behavior to "Group Productivity," "Satisfaction" and "Cohesiveness" were summarized by Stogdill (1974):

> Group productivity is somewhat more highly related to structure than to consideration. Member satisfaction, on the other hand, is somewhat more highly related to consideration than to structure. Group cohesiveness is related equally often to consideration and structure. (p. 396)

Stogdill reported that several of the studies indicated the most effective leaders tend to be described highly on both scales.

In reviewing literature pertinent to their dissertation, Allen (1971) and Schroeder (1969) found several investigations using the two subscales in educational settings. Both authors reported findings similar to those of Stogdill (1974) concerning a positive relationship between effective leadership and leaders who achieve higher scores on both "Consideration" and "Initiating Structure." Of particular interest to Allen and Schroeder was the study conducted by John Hemphill in 1955. Hemphill (1955) surveyed 22 departments in a liberal arts college to determine leader behavior associated with the administrative reputations of the departments. Hemphill found that the departments with the best campus reputations for good administration had chairmen who were described as above average on both leader behavior scales (Schroeder, 1974, p. 47).

In a study dealing with industrial arts, Mohan (1976), surveyed teacher educators to identify the leadership behavior of their chairmen and ratings of departmental effectiveness. Results of this study support previous research in that department chairmen who scored highest on the combined measures of "Initiating Structure" and "Consideration" were those chairmen whose departments had the highest effectiveness rankings.

Leadership studies conducted in various educational settings suggest the need for educators to carefully examine their leadership behavior regarding "Initiating Structure" and "Consideration." Whether the group task is instruction, committee meetings, conference activities, or other administrative/supervisory activities involving peers, students, or subordinates, the effectiveness of the organizational unit can be enhanced by the application of appropriate leadership behaviors.

CONCLUSION

The leadership of industrial arts is comprised of all persons who consider themselves members of the industrial arts profession. While the accomplishments of some educators receive greater recognition than the achievements of others, the "total output" of the profession is represented by the attainments of every teacher, supervisor, and teacher educator associated with industrial arts. Therefore, every person in industrial arts should understand those variables associated with group leadership and the appropriate leader behaviors correlated with effective group performance.

To achieve effective group performance, leaders must be able to orchestrate the variables of group: size, task, and history as they occur situationally in education. Since most educational activities are structured on a co-acting basis, the potential for group member input and direction should be encouraged. Of special concern to those in the area of industrial arts is the open system implication of change that requires the need for an anticipatory approach to group goal setting and planning for the profession's future directions.

In most leadership situations, behaviors of "Consideration" and "Initiating Structure" as defined by Fleishman (1969) in the *Manual for Leadership Opinion Questionnaire* should provide a foundation to facilitate attainment of group goals. Specific leader behaviors identified for members of the industrial arts profession were reported by Michelon (1977), in *The Journal of Epsilon Pi Tau.* Michelon stated that personal commitment, a positive self-image, and competence, with the effective use of talents, intellect and skills are important factors in determining an individual's success as a leader.

Success in group leadership involves more than giving (leading) of the leader's talents and time; it also concerns getting (esteem). To receive esteem, a leader must function at a level at which the group expects or frustration results within the unit, with its accompaniments of low morale, fault finding, and internal dissension. In general, research findings indicate that subordinates react favorably to experiences that they feel are supportive and contribute to their sense of importance and personal worth (Bass, 1958, p. 296). Thus subordinates are most likely to show esteem for their leader if the interaction is viewed as supportive.

Since effective leadership is necessary for the continued advance of the industrial arts profession, those responsible for preservice and inservice activities should consider the inclusion of the following:

1. Local, state, and national seminars on leadership effectiveness.
2. Recognition of local, state, and national leaders.
3. Dissemination of current bibliographies on leadership.
4. A portion of the preservice methods course devoted to leadership.
5. Scholarship monies to promote leadership development.
6. Further research on the topic of leadership.

It is through the summation of efforts and continued growth of each individual that the leadership and scholarly advancement of the total industrial arts profession is evaluated and supported.

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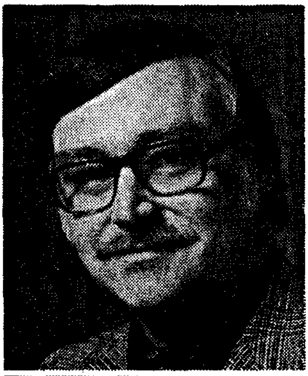
chapter 15

The American Industrial Arts Association



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The American Industrial Arts Association (AIAA) is the only national professional association that devotes all its energies to the improvement of industrial arts at all levels. From the beginning, the Association has strived to upgrade the profession through activities and encouragement of professional involvement of the membership.

This chapter highlights the growth and development of the AIAA and its contributions to the profession. In addition, the chapter focuses on the organizational structure, committee functions, conference activities, legislative responsibilities, relationship to the National Education Association (NEA) and the Industrial Arts Division of the American Vocational Association (IAD/AVA), as well as future directions and expectations of the Association.

It is not possible in the space allotted to cover all aspects of the AIAA and the many people who have been involved for over four decades. Therefore, names, for the most part, have been excluded from this chapter with more space devoted to Association activities. A historical scholar interested in the Association is encouraged to visit the AIAA Archives at Millersville State College, Millersville, Pennsylvania, and the national office and/or NEA archives in Washington, D.C.

ORIGIN

The prominence industrial arts attained during the 1930's required hundreds of teachers to instruct the thousands of students enrolled in industrial arts as either a required or an elective subject in junior and senior high schools. Also during this same time period, the depression of the 1930's had a marked effect on industrial arts programs. Noticeable among these was the number of unqualified personnel entering the teaching profession, particularly in industrial arts. Certification standards for entering the teaching profession had been lax during the depression. Laboratories or "shops" were ill equipped, and often the tools and machines were antiquated. As industrial arts programs grew in numbers across the United States, differing philosophies began to emerge, and varying qualities of instruction became apparent to several industrial arts leaders. William E. Warner of The Ohio State University was one of the leaders who recognized the need to unite the fledging but growing profession, to accelerate the growth and development of industrial arts, and to improve the instructional content of its programs.

As part of the 10th anniversary of Epsilon Pi Tau and in conjunction with the annual convention of the American Association of School Administrators (AASA), a two-day conference for industrial arts teacher education was held in Cleveland, Ohio, on February 27-28, 1939. It was during this two-day conference that plans for the formulation of the AIAA were formalized and adopted.

The second day of that conference witnessed the formulation of a constitutional convention and the development of a "rough" constitution. Officers elected at that conference included a President, Vice-President for Elementary School Programs, Vice-President for Secondary and Special School Programs, Vice-President for Higher and Teacher Education Programs, Vice-President for Adult and Out-of-School Programs, and a Secretary and/or Teasurer. Thus, the AIAA was officially born and for the next several years held Association meetings during conventions of the NEA and the AASA.

William E. Warner 1939-1941	William S. Wilkinson 1962-1963
Louis V. Newkirk 1941-1943	Walter C. Brown 1963-1964
Everett J. McIntosh 1943-1945	Robert S. Swanson 1964-1965
Paul E. Harrison 1945-1947	Earl M. Weber 1965-1966
Harold G. Palmer 1947-1948	Robert L. Woodward 1966-1967
John A. Whitesel 1948-1949	Ralph C. Bohn 1967-1968
Walter R. Williams, Jr. 1949-1950	Delmar W. Olson 1968-1969
DeWitt Hunt 1950-1951	George H. Ditlow 1969-1970
Gordon O. Wilber 1951-1953	Sherwin Powell 1970-1971
Fred J. Schmidt, Jr. 1953-1954	Fred Kagy 1971-1972
Gerald Baysinger 1954-1955	Paul DeVore 1972-1973
Burl N. Osburn 1955-1956	Joseph J. Littrell 1973-1974
Roy A. Radtke 1956-1957	Donald F. Hackett 1974-1975
Kenneth F. Perry 1957-1958	Alvin E. Rudisill 1975-1976
Kermit A. Seefeld 1958-1959	Lee D. Carter 1976-1977
M. Ray Karnes 1959-1960	Billy W. Mayes, Sr. 1977-1978
Ivan Hostetler 1960-1961	Willis E. Ray 1978-1979
William J. Micheels 1961-1962.	

Fig. 15-1. Past Presidents of the American Industrial Arts Association.

The first AIAA convention was held in Minneapolis, Minnesota, in conjunction with the NEA convention in 1940. On February 25, 1941, in Atlantic City, New Jersey, during an AASA convention, a more formal and final constitution was adopted. William E. Warner, who had been elected as the first AIAA President in 1939, presided at these early organizational meetings. A list of former AIAA Presidents is shown in Fig. 15-1.

GROWTH AND DEVELOPMENT

As noted in the preceding section, a formal constitution was adopted at the AIAA convention in Atlantic City, New Jersey, in 1941. In general, the constitution established the name of the Association as the American Industrial Arts Association, defined the purposes of the Association, identified the officers and executive committee, identified the types of membership, established affiliation and alliance standards, established annual meetings, and determined the procedure for making amendments to the newly formed constitution. The By-Laws to the constitution, however, were not formalized and adopted until May 9, 1943, when an executive session of officers of the AIAA was held in New York City. It was during this time period, 1942, that the AIAA published its first journal — *Industrial Arts Teacher,* a journal that contained much of the news and views of the Association. This journal acted as the principal means of communication to the membership. Also in 1942, the AIAA became a department of the NEA. In 1943 a classroom teacher, Everett J. McIntosh, was elected President of the AIAA.

World War II and the aftermath of the readjustment period all but curtailed growth and organizational development for several years. Although Executive Committee meetings were held during the war years, it was not until 1947 that the next annual convention was held in Columbus, Ohio, and not until the mid-1950's that signs of organizational maturation became readily apparent. The AIAA convention in Cincinnati, Ohio, in 1950 witnessed the first major revision of the constitution. Most noteworthy of these revisions was the nomination and election of officers by mail ballot.

The AIAA witnessed a significant growth during the 1950's. This was evident in membership, activities, publications, and involvement by members of the profession. In 1951 the American Council on Industrial Arts Teacher Education (ACIATE) was organized as a Council of the AIAA, and in 1951 ACIATE conducted its first annual business meeting. In addition, organizational meetings of the American Council of Industrial Arts Supervisors (ACIAS) and the AIAA State Representatives were held in 1951. In 1955 the first meeting of officers of state associations (now known as the American Council of Industrial Arts State Association Officers) was held in Atlantic City, New Jersey. In 1956 the AIAA was incorporated in the State of Pennsylvania and retains corporate status from that state to this day.

Membership dues set at one dollar in the 1940's steadily climbed to three dollars in 1959. At the same time, the Association was receiving substantial revenues from commercial exhibitors who rented booth space at the annual AIAA conventions. Additional income was received from the registration fees charged attendees. Originally initiated at the 1952 convention in Chicago, these monies contribute significantly to Association income each year.

The AIAA journal, *The Industrial Arts Teacher,* which started in 1942 with Volume 1-Issue 1, as an annual issue, had by the 1950's expanded to five issues per year. The journal grew in the number of pages devoted to a single issue, in the variety of articles, and the inclusion of photographs. In 1952, color was included for the first time on the cover page.

Prior to the 1960's almost all work done for and by the AIAA was volunteer contributions of the membership. During the 1940's no monies had been paid to any of the AIAA officers or volunteer staff. In the 1950's a token amount was paid to the Editor of the *Industrial Arts Teacher* and to the Executive Secretary, Kenneth W. Brown, for office assistance. This amount, however, was not commensurate with the services they rendered the Association and the industrial arts profession. By 1961 the Association had grown large enough and was financially stable enough to employ a full-time Executive Secretary. This person, Kenneth E. Dawson, directed the operation of the Association from an office in the NEA building in Washington, D.C., where the AIAA office remains today.

In 1962 the annual AIAA convention was held in Pittsburgh, Pennsylvania. At that convention the American Council on Elementary School Industrial Arts (ACESIA) was accepted as a council of the Association. The formation of this council resulted from the need for a separate organized body to provide direction and leadership to those in the profession who had an interest or who were involved in elementary school industrial arts.

In 1964 the name of *The Industrial Arts Teacher* was changed to *The Journal of Industrial Arts Education.* Weber (1964), in an editorial in the January-February issue, stated the new *Journal* allowed the Association to

> (1) present its official views; (2) report on activities; (3) publish differing viewpoints on basic issues; (4) provide ideas of people outside our field on how to improve it; (5) comment on how such groups as administrators can help us; (6) pinpoint trends and developments within the field; (7) offer subject matter specialists practical help in their particular teaching-learning situations. (p. 11)

The change in name more clearly reflected the direction the Association was pursuing to benefit the profession.

The increased interest in industrial arts during the 1960's as reflected in the number of innovative programs being proposed across the United States and Canada was also evident in increased AIAA membership. In May 1965, the AIAA reached the highest membership since its formation – 10,001 members, but in February 1967, the Association set the membership record that is yet to be duplicated – 10,005.

In 1958 Congress passed the National Defense Education Act (NDEA). A major purpose of the Act was to improve the instruction in academic subjects through direct aid to public schools. Important to the future of industrial arts was Title III of the Act that provided for the upgrading of programs in science, mathematics, and modern foreign languages – not industrial arts. Through the efforts of the AIAA officers, staff, and many of its members, the Higher Education Act of 1966 was passed with industrial arts included in Title III of the NDEA. This was a milestone for industrial arts since industrial arts as a subject matter area was now included in all general federal legislation and was legislatively equal to English, sciences, foreign languages, and mathematics.

Another significant event in 1966 was the legal acceptance of industrial arts personnel to be involved in the conduct of NDEA Title XI institutes for advanced study for elementary and secondary school teachers. The inclusion of industrial arts programs and people was approved in 1965, but authorization for the disbursement of funds was not passed until January, 1966. Five pilot programs were conducted in that year, and in the summer of 1967, 29 Title XI industrial arts institutes were conducted. AIAA, through its members, had led the fight for inclusion of industrial arts in Title XI.

Many accomplishments of that decade are noteworthy. Services of the Association had been expanded and upgraded. More than 10 motion pictures, several audio tapes, a series of pamphlets, and several slide and tape series all benefited classroom teachers. Each of these was available for rent or could be purchased at a nominal fee. The Association was also publishing two newspapers – *The Monitor* and *The Scene.* In addition, *The Journal of Industrial Arts Education* provided a means for the membership to keep up-to-date on the happenings in the profession – especially noteworthy is the room provided in the *Journal* for the description of the innovative curriculum efforts of the 1960's and the inclusion of the I A Forum. Finally, in 1968 a two-day meeting of representatives from the education profession, industry, and government was held in Washington, D.C. to discuss the pressing issues in industrial arts education. Major outcomes of what was called The Washington Symposium was the ratification of position statements concerning the vital issues of that era. On August 1, 1969 Edward Kabakjian assumed the duties of Executive Secretary. Two distinguished Executive Secretaries had preceded him in that office in the 1960's – Kenneth E. Dawson and Howard Decker. In 1969 the membership voted to increase annual dues from $10 to $15.

The 1970's were just as eventful as the 1960's. First, the name of the AIAA journal was changed to *Man/Society/Technology — A Journal of Industrial Arts Education.* Kabakjian (1970a) justified the name change in the first issue under the new name.

> The new name . . . was not made merely for the sake of change, but rather in response to a continual effort by the profession to remain sensitive to the needs of society and its role in the educational community. . . . Basically, there are three categories of consideration which were used in making the decision for modification of the name of our *Journal:* Editorial, professional and economic. (pp. 5-6)

The second major event was a two-day conference called the 1970 National Forum on Industrial Arts, which was also referred to in the profession as *Man, Society, Technology — An Invitational Forum of Organizations of the American Society.* Kabakjian (1970b) described the purpose and outcomes of the conference in the September-October 1970 issue of the new *Journal.* Most noteworthy is the description of the outcomes.

> A . . . focused attention upon careful analysis of the social, environmental, economic, physical and political problems facing our society both now and in the future. Close attention was given to the resultant changes occurring between man, society and technology, with particular emphasis upon how these changes can and will affect teacher preparation, in-service training and graduate programs in and between industrial arts and other educational disciplines. Major attention was given to identification of the problems as mentioned above and in determining the structure and methods to be employed in future regional institutes to be held throughout the country. (p. 11)

The success of the 1970 National Forum resulted in a series of eight regional forums conducted between March 1970 and November 1971. Lemons (1972) identified the purposes of the forum series.

> First, the forum was to examine the promises and problems of technology as related to man and his environment with the focus on improvement of industrial arts programs and industrial arts teacher education. . . . Second, in order to accomplish the first goal, dialogue had to be initiated and developed between industrial arts educators and others in education, and they in turn would communicate with persons from other segments of society. To be more specific, organized segments of our society were invited from the broad categories of government, labor, industry, and education. These groups were charged with analyzing the promises and problems of technology to extract implications for education. . . . Third, each forum was asked to analyze critically the goals of industrial arts to establish more clearly and firmly the relationship of industrial arts and technology. . . . The fourth goal was to synthesize the promises and problems of technology with industrial arts education. (pp. 3-4)

The regional forum series capitalized on the national forum concept and placed it in the field for the benefit of all industrial arts educators. The series clearly established that it was possible and beneficial for leaders of industrial and labor organizations, leaders of government and government agencies, and representatives from foundations and professional education associations to work cooperatively toward common goals and understandings.

In 1970-1971, the Association continued to grow both professionally and in service to the membership. Several significant events occurred including (a) the publication of *Man/Society/Technology* (M/S/T) in eight issues per year, (b) the employment of a Director of Public Relations and Advertising, (c) the participation by the Executive Board in the first Man/Society/Technology Forum, (d) the Association's representation at several state and national conferences, and (e) the promotion of a Department of Education at the Cabinet level of the federal government. Council and AIAA committees were active in promoting industrial arts education throughout the United States even though the AIAA membership declined from about 9,000 to just under 8,000 members.

The year 1971-1972 witnessed an economic slowdown and a change in societal values and educational goals. Frederick D. Kagy, then AIAA President, made this very point in his report to the AIAA conference in Dallas, Texas, in March 1972. This was the period that Sidney Marland, then United States Commissioner of Education, began promoting the career education concept. In addition to the M/S/T Advisory Board being initiated, several other noteworthy items occurred including (a) the completion of AIAA's Forum project, (b) the designing of a new AIAA logo, and (c) a limitation of 20% of Life Membership to total membership was imposed to prevent further financial strain on the Association. Membership continued to decline and stabilized around 6,600 members. A Loyalty Fund was initiated to provide life members an opportunity to voluntarily contribute to the support of the Association.

By 1973, the national office staff and the Executive Board was growing in numbers. A position of "Coordinator of Professional Services" was approved for the national office with duties to include the coordination of high school and college organizations. In January 1973, the position of Vice-President for College Students was created on the Executive Board to be filled by the American Industrial Arts College Student Association (AIACSA) President. The Association was becoming increasingly concerned about the lack of involvement of classroom teachers in Association affairs, and thus the Executive Board appointed an Ad Hoc Committee on Governance to improve their involvement. The first of several studies to relocate the national office in another geographical region was initiated.

The conference proceedings book, originally published in 1964, continued to reflect the forward movement and concern of the Association in 1974. Public Law 92-318, which was jointly supported by the AIAA and the IAD/AVA, was enacted. An agreement was reached between the AIAA and Millersville State College, Pennsylvania to establish an archives to house AIAA historical materials. Other significant events included (a) employing James Dixon as Coordinator of Professional Services, (b) the publication of *Industrial Arts in Career Education* under the joint sponsorship of the AIAA and the IAD/AVA, and (c) the awarding of a three-year grant from the Damon Foundation to underwrite the cost of a conference keynote speaker. Joseph J. Littrell, AIAA President in 1973-1974, concluded in his report to the AIAA Seattle conference "the AIAA must be the stimulus and often the prime mover in promoting the philosophy and the practice of industrial arts education" (1974, p. 372).

On August 25, 1974, Edward Kabakjian resigned as AIAA Executive Secretary/Treasurer. The AIAA, under the leadership of its President, Donald F. Hackett, conducted a nation-wide search to fill this vacancy and at the 1975 AIAA Cincinnati, Ohio, conference, formally introduced Donald L. Rathbun as the Association's new Executive Director. As the cost of conducting annual conferences increased, the AIAA initiated a feasibility study of a tandem conference with the American Vocational Association. In addition, approval was given to establish an organizational plan for AIAA State Representatives to better recognize the representatives' contributions.

Alvin E. Rudisill, AIAA President in 1975-1976, referred to his year in office as a year of reorganization in a report to the House of Delegates at the AIAA Des Moines, Iowa, conference. This reorganization was evident in a number of new efforts including (a) the development of a new policy and procedure manual for the House of Delegates, (b) the improvement of the membership accounting system, (c) the approval of a new constitution following a three-year effort by an 80-person committee chaired by Lawrence S. Wright, (d) the development of a national legislative network, (e) the initiation of a life membership study, and (f) the acceptance of a new Professional Liability Plan for participating members. It has been previously noted that membership was gradually decreasing since the late 1960's. This trend was reversed during FY76, and a substantial gain to over 6,000 members was recorded.

The latter half of the 1970's proved to be a great challenge to the profession in general and the AIAA in particular. By 1977, the membership total had reached 7,000, the highest total in a decade. Still, a prime objective of the Association became increased membership. Executive Director Rathbun developed and the Executive Board approved a membership "plan of action" to be carried out by the memberhip committee. In addition, the membership approved in 1978 a dues increase from $15 to $30 with 10% to be returned to affiliated state associations as incentives in recruiting members. However, the Executive Board established annual dues at $25 per year effective July 1, 1978. A dues incentive plan is currently being studied and will be placed in effect during the 1979-1980 Association year.

In 1976, James Dixon resigned as Coordinator of Professional Services, and the Executive Board chose to abolish that position. A position of Director of Student Organizations and Conference Coordinator was initiated. This position was assumed by Ronald W. Applegate in August, 1976.

The Association continued to experience financial difficulties during the late 1970's in spite of gradual increases in membership. In addition to cost cutting economies at the national office, the American Industrial Arts Student Association (AIASA) was reorganized and incorporated in December, 1977, so that it could operate autonomous of the Association. During the 1977-1978 period, the Executive Board turned over the control of AIACSA to the national office in the hope that it might experience growth. Two additional national office relocation studies were conducted, but the consensus of opinion was that the national office should remain in Washington, D.C. A part-time advertising manager was employed to increase M/S/T advertisements and thus monies to the Association. Willis E. Ray, AIAA President in 1978-1979, sent a letter to life members appealing for additional contributions. His efforts resulted in the collection of some $15,000, part of which was received from industry.

The late 1970's was also a time when the profession demanded leadership and the Association assumed a formidable role in providing that leadership. That the Association assisted affiliated state industrial arts associations was evident in the case of the Minnesota Industrial Arts Association. Increased emphasis on legislative efforts was evident at the national office, in the legislative committee, and in the continued refinement of the legislative network. A national advisory council was approved by the House of Delegates at the 1977 conference in New Orleans, Louisiana, to assist in providing direction to the profession in the years ahead. When Willis E. Ray assumed the Presidency in 1978, he appealed to members of the profession to evidence a sense of pride and responsibility.

> We are members of an important profession. We should take pride in working with the youth of our land as they learn about the nature of our world. We should be willing to accept our small share of the responsibility of improving our profession. (Ray, 1978, p. 2)

The pride and responsibility the profession needed to assume was well stated and on record.

ORGANIZATIONAL STRUCTURE

The organizational structure of the AIAA and the lines of communication are illustrated in Fig. 15-2. This is a simplified version of a much more complex matrix of relationships and communication linkages.

Membership

"Organization" as applied to associations like the AIAA can refer to the functions of management, or it can refer to the way people unite around a common cause or purpose, e.g., industrial arts education, to accomplish certain goals and objectives. Figure 15-2 shows the relationship of major bodies (groups or individuals) and how these bodies communicate among themselves. The membership is placed at the top of the organization because the membership is paramount. A voluntary association cannot exist without members. Unless good relationships

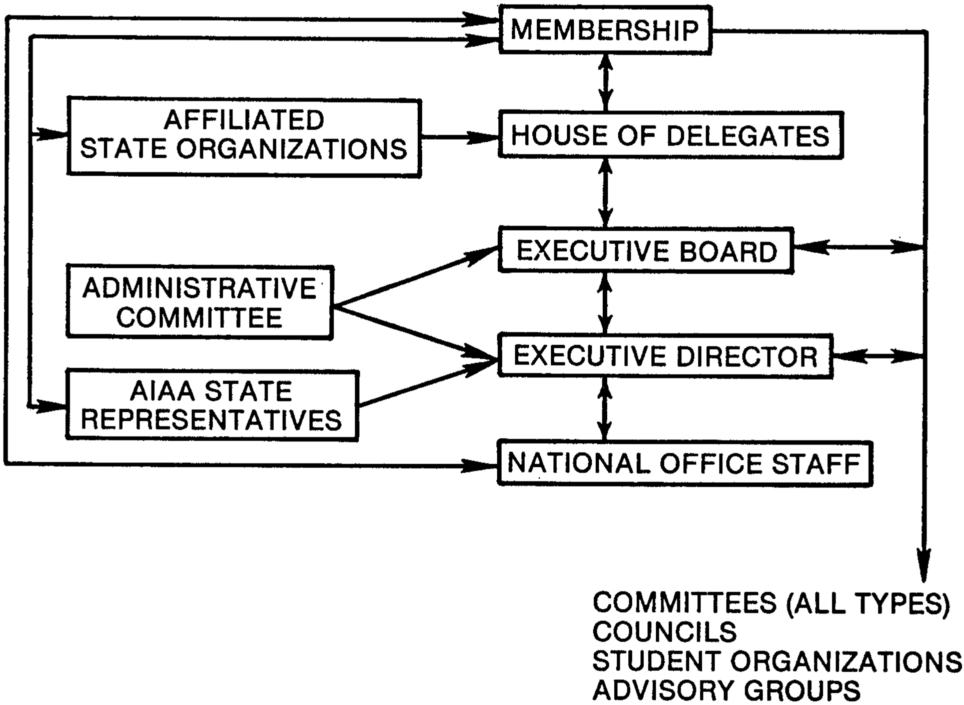

Fig. 15-2. The American Industrial Arts Association — Organization and Lines of Communication.

exist and function between the major bodies, there is no organization; without avenues of communication, there is no means of management. Few individuals ever become so deeply enmeshed in all levels of these association activities as to fully comprehend the divisions of labor, the functional processes, or the structural differences of the varying decision-making responsibilities found within the voluntary organization.

An association, according to the American Society of Association Executives, is a hybrid organization, i.e., it is structured to identify roles and involve members who are volunteers and at the same time fix staff relationships and functions. It could be said that the same identification, relationship, and functions pertain to the bodies or organized groups, inter-organizational and intra-association.

House of Delegates

The House of Delegates, formerly called the AIAA Representative National Assembly, is next in the line of communications. Members, through affiliated state organizations, provide input regarding the affairs of the Association through their representatives called "delegates." Each year in January, the Executive Director determines the current AIAA membership in each state and allocates one delegate and one alternate for each 50 state memberships or fraction thereof as authorized in the AIAA constitution. The House of Delegates considers such business as may be brought before it by the Executive Board, but may also consider other business as initiated by the delegates themselves.

Executive Board

The Executive Board is neither superior to nor subordinate to the House of Delegates. What exists is not only a dichotomy of function and purpose but also a check and balance relationship. While both are supposedly representative of the membership and each is comprised of AIAA members, the House of Delegates addresses the broad, overall concerns of Association business, considers resolutions and official statements of the Association, and charges the officers with certain tasks and responsibilities; whereas the Executive Board formulates policy, delegates authority to groups and/or staff, more closely supervises the financial and management activities of the Association through the Administrative Committee (consisting of the President, President-Elect, and Past President while the Executive Director serves as secretary) and maintains the ultimate responsibility for the operations, services, and management of the Association. The Executive Board may pass judgment upon the actions of the House of Delegates and act accordingly. Likewise, the House of Delegates may support or reject items of business brought before it by the Executive Board. The prevailing and guiding question is "What is best for the Association?"

The Executive Board, being more closely aware of the financial and opeational capabilities and limitations of the Association, may accept, reject, or amend recommendations or requested actions by the House of Delegates. In any case, the President gives a full report to the House of Delegates at the following annual conference. The Executive Board has also adopted a policy of having the Executive Director report to the House of Delegates within 60 days after the annual business meeting the actions of the Executive Board as related to resolutions and other action items of the House of Delegates. If the Executive Board rejects or alters the House of Delegates' action, the President is expected to outline why the Executive Board did not concur and report to the House of Delegates within 60 days of the delegate meeting. In most considerations, the Executive Director is the key advisor to both the House of Delegates and the Executive Board.

Membership on the Executive Board consists of the President, President-Elect, Immediate Past President, two Vice-Presidents for Classroom Teachers, Executive Director, Vice-President for College

Students, Vice-President for Elementary School Industrial Arts, Vice-President for State Association Officers, Vice-President for Teacher Educators, and Vice-President for Supervisors. All except the Executive Director are voting members.

Executive Director

Individuals, more than groups within the Association, make it a hybrid organization. The Association executive of the AIAA was formerly referred to as the "Executive Secretary." The title was changed to "Executive Director" in the 1976 constitutional revision to more clearly depict the nature and scope of this position in a national professional organization. There have been five Executive Secretaries/Executive Directors in the history of the Association. These individuals are John J. Hatch (1941-1947), D. Arthur Bricker (1947-1953), Kenneth W. Brown (1953-1961), Kenneth E. Dawson (1961-1966), Howard Decker (1966-1969), Edward Kabakjian (1969-1974), and Donald L. Rathbun (1975-present).

The Executive Director today balances precariously on a managerial tightrope. This person must be knowledgeable of every aspect of the Association and manage all of the organization's complex and dynamic functions without offending, coercing, or alienating any member or group. AIAA's Executive Director, according to its constitution, serves at the pleasure of the Executive Board, but has as well the higher charge of serving the best interests of the Association. On occasion, the two charges do not completely coincide, and conflict may arise. It takes a great deal of patience, communication, friendly persuasion, and fortitude to reconcile viewpoints that differ because of uncommon orientation and different vantages of a continuing parade of different individuals.

An Executive Director has no authority over the membership. Yet, paradoxically, the success or failure of an association is generally directly attributed to the Executive Director's ability to quietly and unobtrusively lead an organization by suggestion, example, and persuasion.

The AIAA's Executive Director serves as secretary of the Association and secretary of both the Executive Board and the Administrative Committee. The Executive Director is appointed by the President and approved by the Executive Board for a three-year term.

The Executive Director is the manager of the Association's affairs under the direction of the elected President and the Executive Board. This person is responsible for the minutes of the Executive Board and the annual business meeting; the day-to-day operation of the Association; maintaining budgets; maintaining communication with the membership in reference to any proposed changes to the constitution; maintaining financial reports and preparing for audits; overseeing the publication of the journal (M/S/T), *The Monitor,* and other publications that serve the membership. Since the Executive Director is the chief fiscal officer of the Association, and since practically every function, service, or activity conducted in the name of the AIAA has some financial implication either as income or expense, the Executive Director is involved directly or indirectly in practically every aspect of the Association.

The Ballot Counting Committee (prior to the 1976 constitution revision called the Elections Committee) is chaired by the Executive Director. Four standing committees and one operating comittee report directly to the Executive Director. These committees are the Legislative, MST Advisory, Membership, Publications, and Public and Professional Relations. Activities relating to the first three of these committees command much of the Executive Director's time and attention.

The Association's Executive Director also serves as director of the annual AIAA international conference. Since four and sometimes five future conferences are being planned simultaneously, conference management is almost a full-time job.

National Office Staff

The staffing pattern of the national office has varied considerably since 1961 when the AIAA first opened an office in Washington, D.C., with a full-time Executive Secretary. Since the staff has always been small and the tasks of the Association are many, each staff person including the Executive Director serves many functions.

Ronald W. Applegate joined the national office staff in 1976 to become Director of Student Organizations – AIASA and AIACSA. He is now Executive Director of AIASA, Inc. In November of 1978, the AIASA became financially independent of AIAA. However, AIASA continues to maintain an office at the AIAA national office.

Mr. Applegate also has the title of Conference Coordinator and is responsible for the numerous tasks necessary for the success of the conference. Originally this position was a voluntary one but became a full-time position (1973-1976) under the title of Coordinator of Professional Services. The Executive Director continues to serve as Conference Director.

In recent years there has usually been an office manager and/or bookkeeper. Because of staff cutbacks, this person also processes membership applications and renewals, coordinates computer services, and prepares invoices. In addition, the office manager coordinates requests for services by various departments of the NEA and assists the Executive Director as an administrative assistant.

Since the late 1960's, there has been a person in the national office with the responsibility for publishing M/S/T, *The Monitor,* and more recently *The School Scene,* and *The College Scene,* as well as other publications. That person also publishes the conference proceedings and is responsible for the coordination of all activities pertaining to the production, sale, and distribution of all the AIAA publications. This person works closely with the Executive Director and from time to time has had the assistance of a secretary. The title for the position has sometimes been Editor, Managing Editor, Publications Coordinator, or Director of Publications. The job description for this position also calls for managing advertisement campaigns for the M/S/T.

Other approved national office positions are (a) receptionist/typist, (b) membership secretary, (c) publications secretary, and (d) secretary to the Executive Director, none of which have been filled since 1972, except for "c" periodically.

AIAA State Representatives

In theory, but not always in practice, the AIAA State Representatives provide a vital liaison between the AIAA and the state industrial arts organizations, both affiliated and non-affiliated. AIAA State Representatives must be members of both the AIAA and the state association they represent. They are appointed by the state association from among the membership of its governing board. If the state association does not appoint an AIAA representative, the AIAA Executive Director may appoint one.

The State Representatives report directly to the AIAA Executive Director and are supposed to serve as membership development contacts in each state. In addition, they receive information and directions from the AIAA Executive Director regarding state delegates to the AIAA national conferences, membership promotion, and other communications of interest to the industrial arts profession. They are to relay concerns and requests from the field to the AIAA office.

Affiliated State Organizations

The affiliated state organizations complete the partnership between the national and state bodies. The AIAA provides the means of unifying the state groups to arrive at federal benefits that otherwise would be unavailable to individual members of either or both organizations. In return, the AIAA looks to state associations to assist in recruiting and maintaining membership, providing input and direction via the delegates, and in helping plan and conduct international conferences.

Affiliated state associations can communicate directly with the AIAA Executive Board, President to President, or through the AIAA state representative to the AIAA Executive Director, or through their delegates to the AIAA House of Delegates

The state affiliate assists the IAD/AVA and the AIAA by encouraging and operating a legislative network that provides information of vital interest to local industrial arts educators.

Communications — Other Groups

Figure 15-2 also indicates other avenues of two-way communication necessary for the comprehensive programs, projects, and concerns of each respective group – committees, councils, student organizations, and other subordinate or autonomous groups. Aside from the vested interest of each group, the strength and effectiveness of the national organization is interdependent upon these avenues as it strives to improve industrial arts education and serve its members.

OBJECTIVES, FUNCTIONS, AND BENEFITS TO THE PROFESSION

Objectives

Today every viable association has identifiable objectives to provide direction over both the short and long term. The AIAA has from the very beginning clearly identified two major objectives: (a) to insure the accessibility of industrial arts education for all students; and (b) to improve the quality of industrial arts programs at all levels everywhere. These objectives continue to provide direction for the present and the future.

Specific purposes of the Association that serve the profession are clearly defined in Article II of the constitution and bylaws.

> *Section 1. Industrial Arts for All.* To define, stimulate, coordinate and strive for the ideal form of industrial arts education as a vital aspect of education for all students on all levels: elementary, secondary, collegiate, and adult; national and international.
> *Section 2. Improvement of Quality.* To promote the improvement of the quality of instruction in industrial arts education by assisting educators, students, and all others concerned to keep instructional content, methods, and facilities current with the rapid changes on industry and technology. (*Man/Society/Technology,* 1976, p. 19)

Functions

Conferences. Historically, the AIAA activities have varied only slightly. The annual highlight on industrial arts education and major emphasis of group participation is the annual international conference that serves as the major trade show exposing the latest materials, equipment, publications, teaching aids and methodology, supply sources, and processes to the industrial arts community. In addition, the annual conference provides the opportunity for people to discuss current topics. There are planned programs for students, classroom teachers, teacher educators, and supervisors. The various councils of the Association conduct their annual business meetings and sponsor programs for their membership. The AIAA committees meet and the House of Delegates participates in the annual business meeting.

During the early years of the Association, the AIAA conferences (then called conventions) were held in conjunction with the national conventions of the AASA and the NEA. Starting in 1944, however, the AIAA held its first national convention, independent of either the AASA or the NEA, in New York City. Since that time, the AIAA conferences have been held in the major cities across the United States and Canada to allow the greatest possible participation of all industrial arts educators and guests. Since 1972 the AIAA conference has been publicized as an international conference on industrial arts education and attracts an average of 3,000 or more members and guests from around the world. The 1979 San Antonio conference marked the 41st National and 8th International conference sponsored by the AIAA.

Media resources. Since the Association's inception, more publications have been produced than space allows for listing. These publications range from conference proceedings to the monthly Journal – M/S/T. Many AIAA publications serve as supplemental texts and resource materials for industrial arts teacher education programs and/or provide information for teachers about new curriculum concepts or plans, evaluation criteria, standards, and topics of special interest. The Association provides a forum for the exchange and debate of information of vital concern to industrial arts education.

Committees. Committees account for another major function of the AIAA activities. They not only provide an opportunity for individual professional growth through active participation but also a vehicle for accomplishing many Association goals.

National office. The national office and full-time staff provide most membership services. Liaison with other groups, agencies, and individuals is constantly maintained. A general clearinghouse of information regarding industrial arts and related fields is provided the AIAA member upon request. An audio-visual materials purchasing and rental service is maintained for field use.

The Association Executive Director serves the membership in many roles. Within the Association he acts as key contact person and liaison between individuals, committees, and officers. Outside the Association he works with congressional persons, United States Office of Education (USOE) officials, special governmental task forces, and other associations.

The national office is located in Washington, D.C., and is maintained as the focal point of the Association. It serves also as the headquarters for AIASA and AIACSA, and contact office for the AIAA councils and affiliate groups. Its close proximity to Capitol Hill, the USOE, other major educational associations such as the NEA, American Vocational Association, American Association of Community and

Junior Colleges, American Personnel and Guidance Association, and the AASA in Washington, D.C., renders the AIAA more effective representation of the membership in promoting industrial arts education.

Benefits

Aside from the broad, general benefits implied in the preceding paragraphs, individual members are provided opportunities to participate actively in democratic activities that not only chart the course of the Association but also contribute to the improvement of the profession.

Benefits to the membership. Each member receives eight issues of M/S/T. For the past several years, the AIAA has also published *The Monitor,* a tabloid of industrial arts and Association current events, for the membership. It was printed four times each year and included *The Scene,* which carried news and current events for middle/junior high and college students. During 1976-1977 *The Scene* was divided into two separate publications – *The College Scene* for the AIACSA and *The School Scene* for the AIASA. During the 1977-1978 publication year, *The Monitor, The School Scene,* and *The College Scene* were included in two issues of the M/S/T to save production and mailing costs. Because of rising costs, it is doubtful that any of the three newspaper publications will be produced for the AIAA members. AIASA, however, will continue to publish *The School Scene* for its members, sponsors, and advisors only. At this writing, no decision has been made regarding publishing *The College Scene* for the AIACSA members.

The AIAA members have access to a variety of insurance plans that either provide better coverage or have lower premiums because of group purchasing power. Professional liability plans have been available in the past, but because of limited membership participation and the failure of most insurance underwriters to offer such coverage in today's market, the AIAA has not provided this service since the 1976-1977 school year.

An AIAA member is offered several other savings. These include travel tours, reduced rates at annual conferences, and the rental or purchase of AIAA media library materials. The AIAA members can pursue their interests and concerns through 32 committees that deal with all aspects of industrial arts education.

Only as a member of the AIAA can a classroom industrial arts teacher become eligible for the AIAA "Industrial Arts Teacher of the Year" recognition program.

Industrial arts educators who have been active participants in AIAA affairs over the years can elaborate on what the Association has meant to them personally – the fellowship, personal recognition, job opportunities, professional inservice updating, resource information, and personal satisfaction of knowing individual support of the AIAA provides the revenue that helps keep the profession together as a responsible organization.

Benefits to the profession. The AIAA serves as the professional voice of organized industrial arts educators and has gained the recognition of Congressional leaders and USOE key persons as the national organization whose sole purpose is the development and enrichment of industrial arts as an intrinsic part of American education. The AIAA has succeeded in demonstrating the career education opportunities available in current industrial arts programs. The Association's continued emphasis on the consumer, avocational, recreational, and prevocational aspects of industrial arts as it relates to the needs of all students and the importance of technology in our social and economic lives today has done more to promote industrial arts and to gain program support than have the actions or activities of any other agency or organization.

AIAA COMMITTEES

Membership in a professional organization is evidence that a person supports the goals, philosophy, and ideals of that organization. Professional involvement, however, is more than just membership; it denotes a person's sincerity towards and active participation in that organization. The AIAA provides an abundance of opportunities for the classroom teacher, teacher educator, and supervisor to become professionally involved. Many of these opportunities are in committee activities that perform the bulk of the work for the AIAA and the profession.

Types of Committees

There are three types of AIAA committees – Standing Committees, Operating Committees, and Special Committees. The profession benefits to the extent that these three types of committees accomplish their assigned goals.

Standing Committees. There are 18 Standing Committees in the AIAA. These include Accreditation, Ballot Counting, College Clubs, Conference, Curriculum, High School Clubs, International Relations, Legislative, Membership, Mission and Goals, Nominating, Publications, Public and Professional Relations, Research, Resolutions, Safety, Special Citations, and Teacher Recognition. Standing Committees are specifically provided for in Article IX, Section 1 of the AIAA Constitution.

Operating Committees. Operating Committees are established by the Executive Board as it feels they are needed. Currently, there are 14 Operating Committees that include Administrative, Affiliation, Contests and Special Events, Credentials, Environmental Education, History and Archives, Liaison (AVA-AIAA), M/S/T Editorial Board, Metric, Past Presidents, Recruitment, Allied Student Programs, Special Services, and Women and Minorities.

Special Committees. Special Committees are appointed, as needed, by the President and must be approved by the Executive Board. These committees are usually formed to accomplish some immediate task or goal. Therefore, the length of time a Special Committee may function depends on the task assigned to it by the President.

Committee Membership

AIAA committees consist of a chairperson and usually one member from each of the seven AIAA regions. Figure 15-3 shows that these regions are the West, South, North, Central, Northeast, East, and Southeast. For example, the Central region may have only one member on any one committee, and this member must be from one of the following states: Indiana, Illinois, Kentucky, Michigan, Ohio, or Wisconsin. Exceptions to this type of committee structure are the M/S/T Editorial Board, Resolutions, Nominating, Administrative, Liaison, Past Presidents, and Ballot Counting. These latter committees follow separate guidelines unique to their own structure and purpose.

A person must be a member of the AIAA to be eligible for membership on a committee. Generally, committee members are nominated by the committee chairperson, appointed by the President, and approved by the Executive Board. A committee member serves for three years at which time the member is eligible for reappointment. Terms of membership on a committee are staggered so that only one-third of the committee members are new each year.

Chairpersonship of a committee is a high honor that represents the recognition of one's leadership abilities by his peers. Committee chairpersons must have been AIAA members for at least two years prior to assuming the chairpersonship. Generally, chairpersons are nominated by retiring chairpersons and/or Executive Board members, appointed by the President, and approved by the Executive Board. The chairpersonship is a two-year term. At the conclusion of this term, the chairperson remains on the committee for one more year to help provide continuity to the new committee chairperson. Chairpersons may, however, be reappointed for another two-year term.

Committee Structure

AIAA committees work under the direction of the Executive Board and report to individual board members as shown in Fig. 15-4. The major duty of the President-Elect is to coordinate all activities of the AIAA committees, update the committee handbook, and prompt individual board members to become actively involved in their committee's work and, at the same time, help provide better coordination and supervision of the AIAA committees.

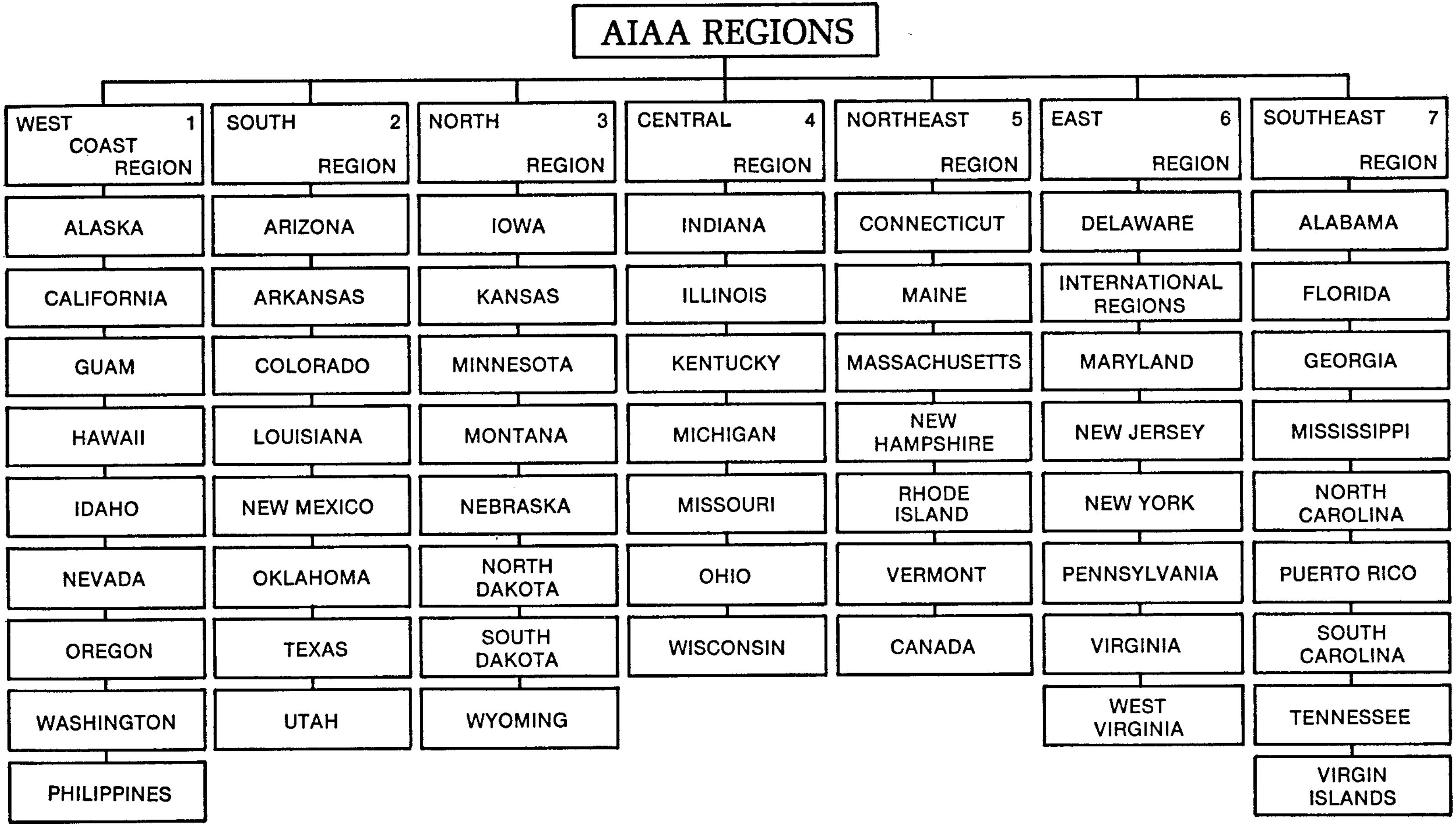

Fig. 15-3. The Seven Regions of the American Industrial Arts Association.

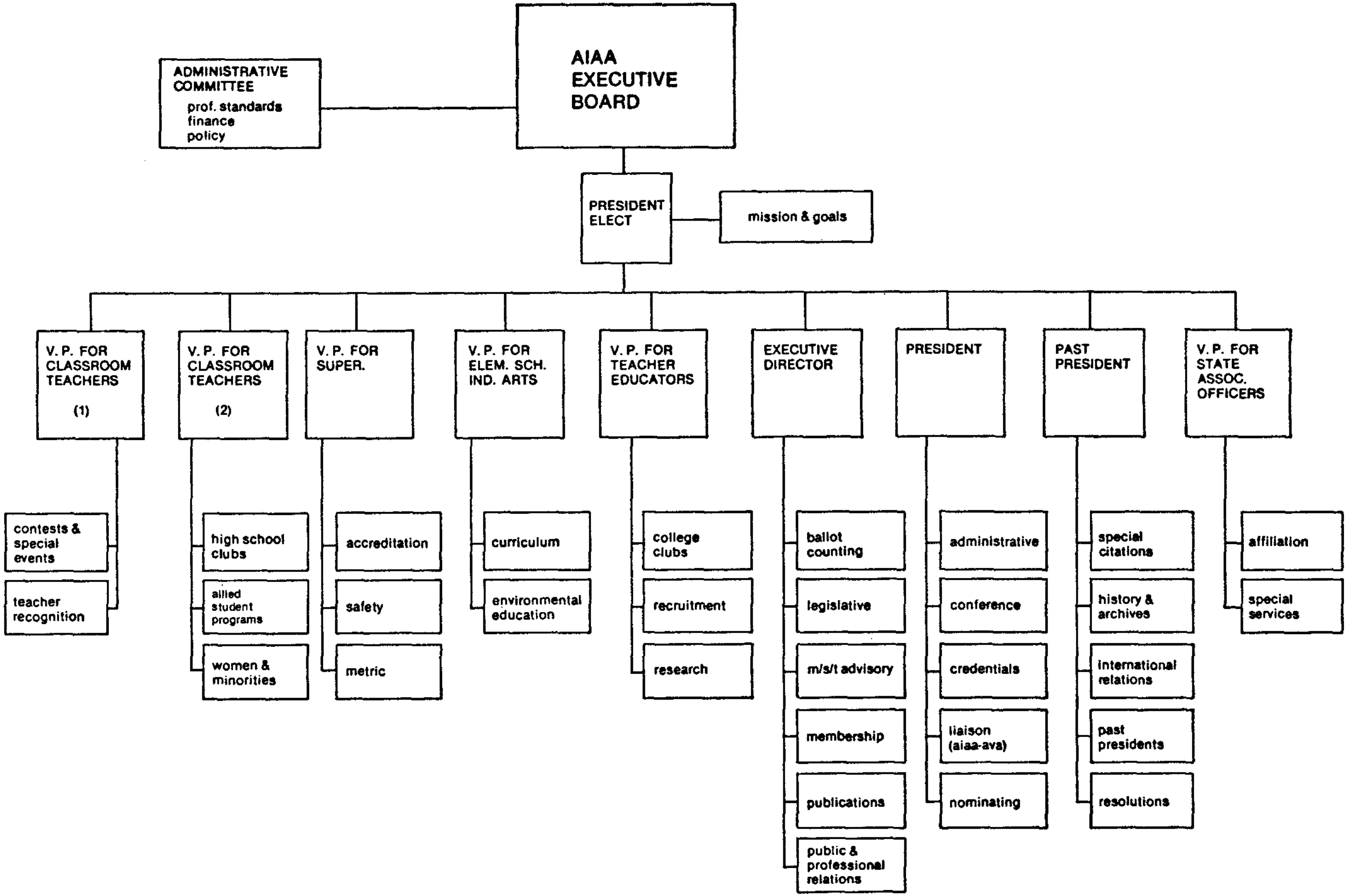

Fig. 15-4. Committee Structure of the American Industrial Arts Association.

Committees meet at least once each year at the AIAA international conference. A report compiled by the chairperson of each committee is distributed to the respective committee members. This report outlines the past year's activities and accomplishments and sets goals for the following year. Since most committee work is handled by mail, this once-a-year meeting provides opportunities for committee members to get to know each other better. Strategies for the following year are also developed and discussed. Committee reports are made a part of the Association's permanent record. During the 1978-1979 Association year, then President-Elect James E. Good initiated a short- and long-range planning mechanism for the committees to use in improving their effectiveness and to provide continuity and direction for succeeding members. The mechanism also provides for improving the correlation of committee activities with Association goals and objectives.

CONFERENCE ACTIVITIES

The AIAA annual conference offers time to learn, to review, to voice concerns and opinions, and, most importantly from a professional point of view, to provide input, guidance, and direction through committee activity, the House of Delegates, and the Executive Board on the conduct of the Association, its activities and programs. Participants, consequently, have a voice in shaping the destiny of the profession. The Association is industrial arts people working collectively and cooperatively to improve the profession and its role in American education. The annual conference culminates a year's activity. It offers rebirth and regeneration of ideas, old and new. It is a time to renew old professional ties and to establish new ones. It is a place to grow, to see, and to be seen professionally.

Most of the activities that go into planning an annual international conference are conducted by a local planning committee in the state where the conference is held and under the guidance and direction of the national office. Members of this committee may represent one state industrial arts association or several state associations, and members may spend up to three or more years planning for an international conference. The membership and organizational structure of a conference planning committee varies from one year's conference committee to the next. Usually, however, there is a Conference General Chairperson and a Conference Program Chairperson. Other positions on the planning committee often include persons responsible for publicity, exhibits, arrangements, registration, membership, communications, tours, and interest sessions. Each position may have one or more people carrying out the responsibilities assigned to it.

Members of a planning committee are not paid for service, but the AIAA does provide a substantial grant to offset costs incurred in planning a conference. The AIAA pays for facilities and services necessary to operate a conference. The Conference Director handles all contractual arrangements, negotiates hotel and room rates, and oversees the entire conference operation. The Conference Coordinator prepares exhibitor invitations, coordinates all national office mailings in reference to the conference, sells exhibit booth space and program advertising, schedules commercial educational presentations, liaisons with EEA-SHIP, and performs numerous tasks associated with planning and conducting an international conference. Many months of planning and preparation go into each five-day conference.

The AIAA conferences are generally held in March or April. A major part of the conference is the trade show that attracts from 100 to 150 commercial exhibitors who purchase up to 200 booths. Receipts from the exhibits and registration offset the costs involved in operating the conference, and any monies remaining go toward annual Association operating expenses.

During a conference over 200 general and special meetings are conducted and usually three general sessions are scheduled. Scores of special interest sessions are conducted to provide inservice information and training on almost any topic of interest to industrial arts educators. The third of the three general sessions is devoted to the "Teacher of the Year" program where outstanding industrial arts teachers from the states and Canadian provinces are honored.

At the conference the various councils affiliated with the AIAA meet for business and special interest sessions. The AIACSA meets with its board and conducts business and special interest sessions to those preparing to become industrial arts teachers. Through 1978 the AIASA conducted its conference in conjunction with the AIAA's, but with reorganization, incorporation, and growth of the AIASA, and because of the increased program of work, proliferation of competitive events programs, and difficulty of students getting released time from school, the advisability of conducting its conference later in the year became apparent. In 1979, the AIASA conference will be held for the first time as a separate conference in Memphis, Tennessee, on June 17-21.

Many administrators, supervisors, and school board members, as well as persons working in the closely related fields of career education, vocational-technical education, and guidance attend the AIAA conferences. As a result, a placement service has proved to be popular among conference attendees. During the 1977 and 1978 conferences, this service was computerized and conducted for the AIAA by members of the Vocational and Adult Education Department of

Auburn University. In 1979 the responsibility to provide this service reverted to the Recruitment Committee.

Several educational and industrial tours are scheduled during each conference, and a number of commercial tours are arranged as part of the program for spouses.

LEGISLATIVE RESPONSIBILITIES

The AIAA has a tremendous responsibility to monitor all social and educational legislation at the federal level that could in any way affect industrial arts. This is one of the most important functions the Association serves individually for each member and collectively for the profession. This function, unfortunately, is the least understood and appreciated by the membership.

Many educators mistakenly believe that the legislative process favors all educational disciplines equally or at least fairly. It does not. A group must make its needs known and stand up for what its members believe in. The AIAA today must assess the professional concerns and desires of its members and translate these into programs of work for specific time periods. By the same token, the group must object through appropriate action and channels when a condition is not dealt with impartially; when regulations, laws, or procedures violate the purposes for which the Association was formed and continues to serve; or when the industrial arts point of view is not considered.

Monitoring federal legislation and reacting to unfavorable bills or proposed regulations are only part of the Association's responsibility toward legislative activities. The AIAA, to be effective, must maintain various liaisons with other groups, agencies, and individuals enmeshed in the legislative process and from time to time join forces to achieve goals that are mutually beneficial. The most difficult and demanding of all activities relating to the legislative process is that of initiating legislation favorable to industrial arts education and generating support adequate for passage and enactment into law. Even then the job is not complete. The Association must work with various individuals and appropriate groups and agencies to help develop regulations that govern the expenditure of funds and the conduct of programs as Congress intended. Assuming the regulations adequately reflect the intent and purpose of the legislation, there is seldom any guarantee that the law will be properly funded. In cases of an overridden veto, the administration can still render most legislation ineffectual through inadequate funding or failure to fund altogether. The Association must track the proceedings and bring its strength to bear against the opposing forces at the proper time, or all the effort and expense expended over one, two, three or more years will be lost. No appropriation, no program – it's usually that simple regardless of the language of the law.

The Association's responsibility toward legislation does not end at the federal level. If the AIAA is to accomplish its purpose, it must be equally concerned with state legislation. State legislation that is counterproductive to the emphasis of industrial arts education at the local level is incompatible with the precepts of the Association. Since such legislation would not be supportive of programs taught by the AIAA members, the Association is obligated to react and do whatever possible to improve conditions for its members in that state.

Sooner or later, in any discussion of the role and responsibility of the Association at the state level, the question is raised about numbers of membership and percentages of industrial arts teachers in given states. If the AIAA membership or percentage of teachers represented is low, then is the Association's responsibility reduced proportionately? The answer is no! Even if a state does not have a single industrial arts educator as a member of the AIAA, the Association has assumed a larger, more far-reaching charge to improve programs throughout the nation, regardless of the degree of support by state or local membership. Responsibility toward individual members is yet another matter as is the Association's responsibility toward affiliated state and local groups. It is impossible to overemphasize the need for large numbers of people to be behind these efforts.

This legislative responsibility is reached through a variety of means. While communication networks for legislative purposes are not unique, it is quite possible that the system used effectively for the 1976 legislative accomplishments is, if not unique, relatively uncommon. Partly because of the difficulty in organizing a network nationally, and partly because of the limited interest and involvement initially demonstrated by the field, the AIAA under the leadership of James E. Good, then chairperson of the Legislative Committee, undertook in cooperation with the national office and the Executive Board the formation of a national legislative network jointly with the IAD/AVA. With Ralph V. Steeb, then chairperson of the Legislative Committee of the IAD/AVA, a network of industrial arts persons was developed in 1975-1976 to literally make contact with every state, congressional district, and key person nationally. The network is used to disseminate legislative information, to generate responses from the field on issues affecting industrial arts, to receive direction and advice regarding legislative matters of interest to state and local persons, and to inform legislators directly through their respective constituents.

In addition to the network, the Association has further assumed its responsibility toward legislation by providing testimony directly to congressional committees, by collecting data for legislators, by meeting with congressional leaders, aides, and counsel, and by holding meetings with various agencies and organizations to gather information and to discuss the goals and purposes of industrial arts education. The program of information disemmination must be a continuous one to gain support for industrial arts.

Although the Association's responsibility toward legislative matters may be the least seen and valued by the teacher, it is the most consequential and productive toward serving the purposes of the Association. Increased funding for industrial arts, monies for inservice workshops, curriculum development activities, leadership development (teacher and student), and improved recognition and acceptance of industrial arts education all make for an improved climate of employment and service to students.

NEA AFFILIATION

The AIAA was given department status with the NEA in July 1942, but as the NEA reorganized in 1968, department status was discontinued. In 1969 the AIAA became a national affiliate of the NEA and remained so until 1973 when the NEA again changed its bylaws. The AIAA subsequently qualified as a nongovernance affiliate and by 1975 had petitioned for such designation. The approval process included approval by the NEA Executive Committee and ratification by the AIAA House of Delegates at the Des Moines, Iowa, conference. As of April 28, 1976, the AIAA is recognized as a nongovernance affiliate of the NEA. To qualify as a nongovernance affiliate of the Nea,

> a professional organization shall comprise at least seventy-five (75) percent Association members with a common occupation or subject matter assignment who are organized to further specific educational objectives. Such organizations shall meet at least the minimum standards for nongovernance. These minimum standards are: (a) the affiliate shall have common interests with the NEA; (b) the affiliate shall be a self-governing organization with governance documents compatible with those of the NEA; (c) at least seventy-five (75) percent of the members of the affiliate shall be members of the NEA; (d) the affiliate shall comprise at least one hundred (100) members; (e) the affiliate may assess its own dues; (f) the affiliate shall adopt a policy that recognizes the preeminence of the Code of Ethics of the Education Profession; (g) the affiliate shall not duplicate NEA services; and (h) the affiliate shall have the same membership year as that of the NEA. (NEA, 1976-1977, p. 170)

The AIAA meets all criteria for nongovernance affiliation with the possible exception of "c" above.

The AIAA, as a nongovernance affiliate of the NEA, receives special consideration in the form of reduced rent for space in the NEA office building. This allows the AIAA to maintain offices in downtown

Washington, D.C., at a cost less than that for comparable facilities in other parts of the country. Payroll, shipping, printing, and like services are available to the AIAA from various NEA service units on a pay basis. Beyond these benefits, however, there are no special benefits that accrue to the AIAA or the national office and staff. The AIAA/NEA relationship is one born of tradition and earlier compatibility; each organization, however, must reassess these alliances as goals, objectives, and viewpoints change.

INDUSTRIAL ARTS DIVISION/AMERICAN VOCATIONAL ASSOCIATION

Industrial arts educators have for many years belonged to either or both the AIAA and the AVA. During the 1920's there was a growing dissatisfaction among several industrial arts educators who belonged to the AVA that they did not have direct representation on the AVA Executive Committee (called the Board of Directors today). In 1931, Robert Selvidge of the University of Missouri petitioned the AVA Executive Committee on behalf of the industrial arts section membership to add a position of vice-president for industrial arts to the Committee and to recognize the industrial arts section as a division within the AVA. This petition became a reality the following year in Kansas City on December 9, 1932, when the AVA constitution was unanimously amended giving industrial arts divisional status and full representation on the Executive Committee through an industrial arts vice-president (AVA, Minutes of House of Delegates, December 9, 1932). Industrial arts has maintained its divisional status to the present. Today, divisional status means a division must maintain the minimum membership required when that group became a division. In the case of the IAD/AVA, this means a minimum membership of 1,000 people.

Since the inception of the IAD/AVA, the division has served many functions including (a) providing representation on the AVA Board of Directors, (b) providing an officially constituted group to work on problems and consider issues unique or of special concern to the IAD/AVA members, (c) affording the vehicle and process whereby industrial arts educators can have a part in determining AVA policies, (d) generating special brochures, pamphlets, and booklets of interest to the industrial arts field, and (e) affording the IAD/AVA an opportunity to nominate candidates for the office of AVA president.

The IAD/AVA cooperates with the AIAA in developing joint publications, developing and maintaining the industrial arts legislative network, formulating national policy relating to industrial arts education, preparing position papers, and in taking uniform stands for and against current issues affecting industrial arts.

The question has been raised frequently over the years, "Why join two organizations of industrial arts educators?" While it is true that the AIAA and the IAD/AVA have many common goals and work jointly on some of the same projects as briefly outlined above, each is a separate and distinct organization. The IAD/AVA falls under the auspices of the AVA, which, being dedicated to vocational education, cannot properly emphasize and support the general education roles of industrial arts education. It is, however, within the purview of the AVA and consequently the IAD/AVA to support the prevocational and vocational guidance aspects of comprehensive industrial arts education. Avocational, recreational, exploratory, and orientational aspects of industrial arts, emphasis on the development of technologically literate citizens and concern for the career education concept, as well as the overall role of industrial arts as general education for all students are purposes and contributions to American education that the vocational education mission is not expected to address.

Industrial arts as a profession and as a program fares much better despite limited membership in both organizations because it has the support of both the AIAA and the IAD/AVA.

Through the IAD/AVA the political clout of the AVA is manifested, or at least implied, but as a subordinate organization it is not free to move as decisively and as quickly as the AIAA. Overall support on any issue coming from the AVA is tempered by inputs of constraint and obligation from 13 other divisions, some of which may have viewpoints and concerns not altogether supportive of the industrial arts philosophy or its broad based goals.

Any subject field as large as industrial arts needs its own separate organization. Industrial arts educators need the AIAA to be ever watchful of changing events in education. The Association provides a pure catalyst to unite all the elements of industrial arts and yet in so doing fosters the need for more specialized groups such as the IAD/AVA. For the most part these two organizations serve different thrusts and contexts of concerns. To combine one with the other would serve no worthwhile purpose, either monetarily or philosophically.

FUTURE DIRECTIONS AND EXPECTATIONS

The preceding sections have clearly illustrated that the AIAA possesses a rich heritage. From its founding as part of the 10th anniversary of Epsilon Pi Tau in 1939 to the present, the AIAA has been people working together to improve the status of the industrial arts profession at all levels. However, the success of the AIAA cannot alone be attributed to people or events or dates, but to a combination of these and other factors. An AIAA future will require more than just leadership; it will require people at all levels of education, industry, and government uniting behind a common cause.

To comprehend the future, one must be aware of the past. If this is a plausible and acceptable assumption, then the future of the AIAA is encouraging. A scholar may take only a cursory view of the growth and development of the AIAA as decribed in this chapter to discern that a future exists. A future, however, will not be achieved easily but will, as the history of the Association has indicated, be achieved through the efforts of all industrial arts educators.

A professional organization cannot exist without membership. While the AIAA has witnessed periods of both high and low membership, the future of the AIAA is highly dependent on increased membership. A high percentage of industrial arts educators must unite around the AIAA to make it a more viable and productive organization.

The AIAA must continue to address problems facing educators today and those in the future. This will require careful planning by members in the AIAA leadership positions and at large. Only through careful and organized planning can the AIAA be of direct benefit to all. Historical evidence indicates that this has occurred in the past and the present and will surely occur in the future. However, the future will require more people and stronger leadership than ever before to address the problems expected to confront educators in the future. A partial answer would be the united effort of at least one-third of all industrial arts educators (currently some 60,000+).

The AIAA must become more viable and vocal in Washington and particularly on Capitol Hill. The AIAA has made great strides over the past two decades in its efforts to work cooperatively with governmental and nongovernmental agencies, other professional organizations, and industrial enterprises. The industrial arts profession cannot let these initial efforts subside but must exert a more positive, potent, and influential force. While an AIAA member may not comprehend the immediate impact of such efforts, the long-range benefits to the profession are immense.

Finally, an AIAA future will depend on its resources – both finances and personnel. While the history of the AIAA evidences a gradual increase in its financial base, more financial resources will need to be found. Increased membership is a great part of the answer, but not the only answer. External financial resources will need to be identified and steps are currently being made in that direction. In addition, more people will be required in the future to help operate the AIAA. While voluntary assistance continues to be of great value, more people, and thus financial resources to employ these people, will be required to make the AIAA of more direct service to the profession. Increased resources (finances and personnel) will be required if the AIAA is to have a future.

The question now becomes, "What does the future hold for the AIAA?" This year the Association is 40 years old. If one believes that life begins at 40, then the AIAA should really begin to accelerate; the authors believe it will. There are new signs of maturation, reorganization, budding leadership coming from new stock bound and determined to make the system work, and determined young people with the intestinal fortitude to get their point across. The Association can grow only in size, in contribution, and in scope of accomplishment. The challenge is also clear – each must do a little better, put forth more effort, and help the Association to help itself.

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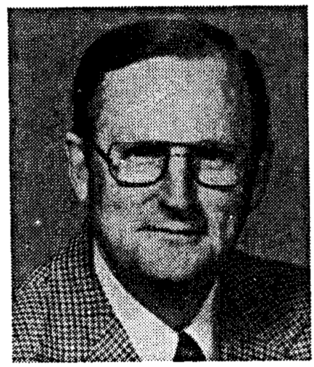
chapter 16

Councils and Associations Related to the Industrial Arts Profession



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Literally hundreds of local, state, regional, and national groups of professional persons work on behalf of industrial arts in the United States, in Canada, and in other parts of the world. Of necessity this chapter will delimit coverage to only a few of these groups working at the national level principally in the United States.

Two parent associations at the national level are concerned in total or in part with industrial arts. These are the American Industrial Arts Association (AIAA) and the American Vocational Association (AVA). The AIAA is a single-discipline (multiple-purpose) association working solely on behalf of the interests of the industrial arts profession. The AVA is a multi-discipline (vocational purpose) association concerned with the entire practical arts, vocational, and technical education spectrum.

Since this yearbook is sponsored by the American Council on Industrial Arts Teacher Education (ACIATE), an affiliate of the AIAA, it seems only proper that more emphasis be placed in this chapter upon those professional councils and student associations related to the AIAA. Somewhat less emphasis will be placed upon those groups that are a part of, or related to, the AVA.

Therefore, the following six professional organizations affiliated with the AIAA will be treated here in a modest way: (a) the American Council on Industrial Arts Teacher Education (ACIATE), (b) the American Council of Industrial Arts Supervisors (ACIAS), (c) the American Council of Industrial Arts State Association Officers (ACIASAO), (d) the American Council for Elementary School Industrial Arts (ACESIA), (e) the American Industrial Arts Student Association (AIASA), and (f) the American Industrial Arts College Student Association (AIACSA). The following two national-level groups related to the AVA will receive more limited mention: (a) the Industrial Arts Division of the AVA (IAD/AVA) and (b) the National Association of Industrial and Technical Teacher Educators (NAITTE).[1]

GROUPS RELATED TO THE AIAA

Elsewhere in this yearbook the AIAA has been treated in some detail. However, to provide a setting for a more detailed consideration of the organizations related to it, some background material will be presented here.

The AIAA was formed by a group of individuals that felt a need to have industrial arts considered more within the context of general education. To that end, a group of persons met in Cleveland, Ohio, in February of 1939 and drafted the skeleton of a constitution that gave birth to the Association. In many ways, the founding group was reacting to the close relationship, at that time, of industrial arts with vocational education philosophy and program. In 1939 the only national group that served industrial arts interests (in part) was the AVA. Individuals at this Cleveland meeting felt that industrial arts subject matter derived from a vocational or pre-vocational philosophy, alone, presented an indefensible program for general education purposes (Hunt, 1960, p. 3).

From the beginning the AIAA was conceived as a mechanism that would unify classroom teachers, supervisors, and teacher educators into a national organization acting solely on behalf of the interests of industrial arts. The initial Constitution approved at the 1939 meeting provided for the following officers: (a) President, (b) Vice-President for Elementary School Programs, (c) Vice-President for Secondary and

[1]*Technically, the NAITTE, according to its Constitution and By-Laws, Revised 1974, is affiliated with three divisions of the AVA and not with the AVA itself. These divisions are: (a) the Industrial Arts Division, (b) the Trade and Industrial Division, and (c) the Technical Education Division (Article I, Section 2).*

Special School Programs, (d) Vice-President for Higher and Teacher Education Programs, (e) Vice-President for Adult and Out-of-School Programs, and (f) Secretary and/or Treasurer (Hunt, 1960, p. 5). William E. Warner, one member of the founding group, became the first president of the Association in 1939.

The 1941 Constitution listed only the following four officers: (a) President, (b) Vice-President, (c) Executive Secretary, and (d) Treasurer. In 1950 the Constitution was changed to provide for the following: (a) a President; (b) a First Vice-President; (c) three Second Vice-Presidents representing (1) teachers, (2) supervisors, and (3) teacher educators; and (d) an Executive Secretary and/or Treasurer (Hunt, 1960, pp. 7-8).

This detailed information is presented only to demonstrate the desire of the early (prior to 1950) leaders of the Association to include officers representing levels of education (elementary, secondary, higher, etc.) and functional positions (teacher, supervisor, teacher educator) from within the profession. The needs of each group apparently were only partially served by the AIAA as witness the development, over the years since 1950, of special interest subgroups that have affiliated with the Association.

Today there are four councils and two student associations affiliated with the AIAA. Each will be considered in separate sections of this chapter. The councils represent only one school level (elementary school – ACESIA) and three functions of people (teacher educators – ACIATE; supervisors – ACIAS; and state association officers – ACIASAO). Classroom teachers have not organized a council. Also, councils have not been developed for other levels of education such as secondary or adult education. This simply demonstrates that logic has not been the single guiding factor in the growth of professional organizations.

Student associations have been organized by school level (secondary – AIASA and college – AIACSA). The college student group is considering (at the time of the preparation of this manuscript) council status.

Up until the present time, each of the eight groups considered in this chapter conducts an annual meeting with the group to which each is affiliated.[2] The AIAA first initiated the term "international conference" to describe its annual meeting in 1972. The AVA continues to meet in "convention."

[2]The term "affiliation" is used in this chapter in an informal way. There seems to have been no special, official procedure used by each organization to "affiliate" with its parent group.

Beginning in 1979, the AIASA will not conduct its annual meeting with the AIAA. This legally incorporated student group will meet in early summer at sites of its own selection. This action has been encouraged and is supported by the AIAA.

American Council on Industrial Arts Teacher Education (ACIATE)

Persons involved directly or indirectly in industrial arts teacher education may find that the ACIATE will provide them with professional experiences of a significant nature. Membership is open to all persons engaged in industrial arts teacher education and those who have an expressed interest in the field.

Goals of the council. The ACIATE strives to fulfill three principal purposes: (a) To support and further the professional ideals of industrial arts education, (b) To define and strive to achieve the purposes and professional goals of industrial arts teacher education, and (c) To stimulate research and the dissemination of information of professional interest (ACIATE *Constitution and By-Laws,* 1975, Article II).

Origin and early development. Unlike the other seven councils or associations considered in this chapter, the ACIATE has had a comprehensive study conducted regarding its origin and early development. Those interested in historical details are referred to the outstanding work of Kinzy (1973).

The ACIATE was the first council to affiliate with the AIAA. Its origin grew out of the need to consider problems of teacher education in an official, organized way. It was officially formed at the 1950 AIAA Convention on May 10, in Cincinnati, Ohio. The first officers were Walter R. Williams, Jr., University of Florida, Gainesville, president; Gordon O. Wilber, New York State Teachers College, Oswego, vice-president; John A. Whitesel, Miami University, Oxford, Ohio, secretary; and Gerald B. Baysinger, Wayne State University, Detroit, Michigan, treasurer (AIAA, 1950).

Major accomplishments. About 70 men attended the organizational meeting in Cincinnati in 1950. The Council has grown from 105 charter members (Kinzy, 1973, p. 82) in 1950-1952 to a membership of approximately 1,170 persons in 1977-1978. Each year since 1950 the ACIATE has held meetings in conjunction with the AIAA annual meetings. At these sessions topics of interest to industrial arts teacher educators are considered, and the business of the Council is transacted.

It is generally accepted that the major professional contribution of the ACIATE has been the publication of a yearbook series. The first yearbook was published in 1952, and there has been one yearbook published each year since then. In 1969 a *Who's Who in Industrial Arts Teacher Education* was published in addition to the regular yearbook. It was similar to Yearbook Two. The front matter in this yearbook reveals the nature of the yearbook titles over the years and the procedure for selecting titles.

Another contribution to the profession, originally initiated by the ACIATE, is the *Industrial Teacher Education Directory.* Since 1956-1957, the directory has been jointly sponsored by the ACIATE and the NAITE (now NAITTE).

Six monographs have been published by the ACIATE, and others are in preparation. A newsletter to members has been a useful communications device. A number of committees (14 standing plus other ad hoc) perform much of the work of the Council.

Influence on the profession. The ACIATE has had a significant impact on the improvement of industrial arts teacher education. For example, the accreditation standards prepared by the Accreditation Committee are used by the National Council for Accreditation of Teacher Education (NCATE) as *the* standards in industrial arts teacher education (ACIATE, 1977).

Through its meetings and publications, the Council has developed leadership within the ranks of its members and has contributed to the ideals and goals of the industrial arts profession. Many feel the teacher education group has dominated the parent organization (AIAA), and in many ways, over the years, this may have been true. If domination has been the case, it has been done through honest initiative but without malice.

The present officers are Ervin A. Dennis, University of Northern Iowa, Cedar Falls, president, 1978-1980; Alvin E. Rudisill, University of Northern Iowa, Cedar Falls, vice-president, 1977-1979; Louis J. Pardini, Arizona State University, Tempe, secretary, 1978-1980; Jack Kirby, University of Wisconsin-Platteville, treasurer, 1977-1979; and David L. Jelden, University of Northern Colorado, Greeley, past president, 1978-1980. The president of the ACIATE serves the AIAA as a vice-president on the AIAA Executive Board.

American Council of Industrial Arts Supervisors (ACIAS)

Persons with supervisory responsibilities within industrial arts programs at the local, state, or national levels should seek membership in the ACIAS. Provision also is made for membership of persons expressing an interest in industrial arts supervision. Such membership will provide professional experiences of significance for all involved.

Goals of the council. The purposes of the ACIAS are given in the following four statements: (a) To support and further industrial arts education, (b) To promote effective supervision and program development at the local, state, and national level, (c) To provide a vehicle for exchanging ideas, programs, and legislation related to the goals of industrial arts, and (d) To provide for the personal and professional growth of its members (ACIAS *Constitution and By-Laws,* 1978, Article II).

Origin and early development. The formation of the ACIATE in 1950 certainly was one of the forces behind the formation of a "council" for industrial arts supervisors. The ACIAS held its first or organizational meeting on May 2, 1951, at the AIAA Convention in New York City. The meeting was called to form a proposed "American Association of Industrial Arts Supervisors." In pre-convention announcements, the following statements were made:

> Supervisory personnel who have responsibility of directing the program of industrial arts instruction in all cities of 20,000 or more have been invited to attend the New York Convention of the American Industrial Arts Association for the purpose of effecting an organization of industrial arts supervisors. The ten or more state supervisors in industrial arts have been invited to assist in this enterprise and to become members of it.
>
> The need for an organization of industrial arts supervisors is quite evident. Little attention has heretofore been given to the problems of the industrial arts supervisors either in teacher education departments or in national association meetings. The professional literature concerned with industrial arts has disregarded this aspect of the total problem of industrial arts instruction. It is believed that many supervisors in American cities and states will find help in attending an annual session devoted solely to the problems of industrial arts supervisors. (AIAA, 1951, p. 1)

The proposed name of the "American Association of Industrial Arts Supervisors" was changed at the 1951 organizational meeting. The new ACIAS approved a constitution and by-laws at that meeting, and its substance appeared in the AIAA house organ (Brown, 1952). The first officers of the Council were Merrill C. Hamburg, Detroit, president; Kenneth W. Brown, Philadelphia, vice-president; and J. Osborne Johnson, Denver, secretary-treasurer (*Association News,* 1951).

As early as December of 1950, the AIAA Executive Committee had discussed, in Gainesville, Florida, the desirability of involving city, county, and state supervisors of industrial arts in AIAA affairs. It was recognized that the AIAA was an organization that had been dominated, for the most part, by teacher educators. It seemed important to have a separate organization of supervisors.

> A proposal was made that a separate organization of supervisors be formed to meet concurrently with the ACIATE and the prospect for occasional meetings with the teacher education group was mentioned as a goal. (Hunt, 1960, p. 101)

The ACIAS, then, became the second council to be affiliated with the AIAA.

Major accomplishments. Membership in the ACIAS has grown over the years and in 1978 stood at approximately 150 members. Each year at the AIAA International Conference, the Council conducts meetings of interest to supervisors and to other professional personnel. Significant publications have been produced by the ACIAS and are available for sale through the AIAA. Among them have been monographs on safety, laboratory management, facilities, and curriculum. A directory of members produced periodically is a valuable resource to the membership and to other interested persons.

Influence on the profession. Practices of local and state supervisors have been improved greatly over the years due to the activities of the ACIAS. These improved practices have had a significant impact on school programs and the school students they serve. For example, supervisors have taken the leadership in evaluating innovations in industrial arts curriculum by field testing and improving new ways of teaching using broad-based subject matter. The functions of planning, organizing, and controlling industrial arts programs at local and state levels have been perfected because of the ACIAS influence.

Not to be overlooked is the impact the ACIAS has had on the professional development of its members. Improved leadership capability has been an important outcome of Council activities.

The current officers (1977-1979) are John E. Bonfidini, Manassas, Virginia, president; Leonard F. Sterry, Madison, Wisconsin, president-elect; James F. Snyder, Charleston, West Virginia, secretary-treasurer; and Herbert Y. Bell, Olympia, Washington, past president. The president of the ACIAS serves the AIAA as a vice-president on the AIAA Executive Board.

American Council of Industrial Arts State Association Officers (ACIASAO)

Persons who are officers in state associations in the field of industrial arts find this organization especially useful. Membership is open to state officers and to persons who exhibit an interest in local and state association work. The ACIASAO seeks ways of strengthening local and state organizations as well as the AIAA.

Goals of the council. The purposes of this affiliated group within the AIAA may be stated as follows: (a) To promote and strengthen state associations so they may be more effective in achieving their goals in industrial arts education and (b) To develop and extend industrial arts as part of the educational programs of the United States, its territories, and Canada through mutual assistance of the members in matters of organization, supervision, and administration of programs of instruction at the national, state, and local levels (ACIASAO *Constitution and By-Laws,* 1978, Article II).

Origin and early development. Interest in the establishment of special meetings at AIAA annual conventions for "executive secretaries of state and local industrial arts associations" was reported by G. B. Baysinger (1954). The purposes of such meetings were to allow persons to discuss their problems related to state or local association matters and to solve them in a cooperative matter.

According to Baysinger, then president of the AIAA, the Executive Committee of the AIAA authorized a special section meeting "for executive secretaries of industrial arts associations that are less than national in scope (regional, state, local) at the 1955 convention which will be held in Atlantic City" (p. 3). The following rationale for such a special section meeting was given:

> The AIAA is particularly interested in working with the executive secretaries because, in most associations, the executive secretary represents the concept of "continuing leadership." Most of the other officers rotate annually, but the executive secretary remains on the job for several or many years; consequently, of all the officers he, in general, is the most apt to be acquainted with the many ramifications of the various problems facing his association. Because of this, the AIAA feels that the most effective assistance that can be given local, state, and regional associations is to provide an opportunity for these executive secretaries to meet and exchange suggestions, criticisms, and ideas.
>
> One possible outcome of this section meeting would be the organization of another affiliated group of the AIAA – the Council of Executive Secretaries. This Council could sponsor area workshops where representatives of state and local groups could meet to talk over problems, explore the possibility of joint conventions, and, in general, work toward the dynamic organization of their groups. (Baysinger, 1954, p. 3)

Ten respresentatives from state and provincial organizations met in Atlantic City on April 26, 1955. The new group was "tentatively called the American Council of Secretaries of State Industrial Arts Associations" (AIAA, 1955, p. 26). However, according to Hunt (1960), the new organization carried the title of the "National Council of Officers of State and Local Industrial Arts Associations" (p. 28).

To illustrate the confusion regarding the name of the new group, a third title was reported as the American Council of Industrial Arts Provincial and State Secretaries. The reported officers for the 1955-1956 year were Leo R. Ebben, Kohler, Wisconsin, chairman; Cory L. Hill, Stillwater, Oklahoma, vice-chairman; and Leo V. Gittzus, Wilmington, Massachusetts, secretary-treasurer (AIAA, 1956a).

On April 24, 1956, at the AIAA Convention in Milwaukee, Wisconsin, a constitution was adopted by the group, reported under yet a fourth title of the American Council of State and Provincial Industrial Arts Association Officers (AIAA, 1956b). In the program materials for the 1957 AIAA Convention in Kansas City, the meetings of the organization were listed as the "Third Annual Convention of the American Council of Industrial Arts State Association Officers" (AIAA, 1957). This is the title that the organization now carries – ACIASAO. This council became the third affiliate of the AIAA, in addition to the ACIATE and the ACIAS.

Major accomplishments. During the 1977-1978 year, 28 state associations were dues-paying "members." State membership involves six individual memberships to the ACIASAO: (a) the state president; (b) the state vice-president or president-elect; (c) the state immediate past president; and (d) three other state officer positions, one of which is the AIAA State Representative. In addition to 28 "state" memberships, individual-active and individual-associate members numbered 10 persons in March of 1978.

One major problem of the Council is the high membership turnover, a concern recognized during the early period of organization. Another difficulty grows from the fact that state officers are expected to serve in high-profile positions at the state and national level during the same period of time.

Significant program sessions are held each year in conjunction with the AIAA International Conference. These meetings allow a sharing of problems and solutions of mutual concern of state associations. Publication of state newsletters is one example.

Of great importance is the publication of a directory of state association officers, regardless of whether the persons listed hold membership in the Council. This directory is of immeasurable value to those wishing to communicate between states on common concerns.

Influence on the profession. It is difficult to discern the impact of Council activities. Without question state associations have been strengthened. One example of increased strength relates to state-level publications such as newsletters. Newsletters are improved by the sharing of ideas and experiences. Techniques of state and AIAA membership promotion also are improved by sharing ideas. Individuals who are involved in the ACIASAO activities improve their leadership skills in many ways.

The current (1978-1980) Council officers are Charles E. Earhart, Newark, Ohio, president; Thomas R. Baldwin, Menomonie, Wisconsin, president-elect; and William H. Skelly, Lancaster, Pennsylvania, secretary-treasurer. In addition, seven regional vice-presidents are officers of the Council. The president of the ACIASAO serves the AIAA as a vice-president on the AIAA Executive Board.

American Council for Elementary School Industrial Arts (ACESIA)

Persons interested in elementary school industrial arts should seek membership in the ACESIA. The work of this group focuses upon matters of special interest at this school level.

Purposes of the council. The ACESIA has stated its goals to include the following: (a) To define, stimulate, coordinate, and strive for the ideal form of industrial arts education as a vital aspect of education in the elementary school, (b) To enlist and coordinate the efforts of all people contributing to the development of the program, (c) To publish materials for use and information to the profession of education, with special reference to industrial arts activities in elementary grades, and (d) To perform any necessary acts in upholding these purposes, including the receiving, holding, and administering of funds and property (ACESIA *Constitution and By-Laws,* 1977, Article II).

Origin and early development. According to Hunt (1960), since 1939, "officers of the AIAA have shown a deep interest in the place of industrial arts in elementary education" (p. 162). Convention programs and articles in publications of the AIAA attested to such interest in the 1940's and 1950's. The seedbed for the development of a special organization for those interested in elementary education was prepared "during and immediately following the AIAA convention in Toronto" (Brown, 1977).

As reported by Loats (1964), "the seeds, which had been germinating for many years, sprouted April, 1962, in Pittsburgh" (p. 17). In an organizational meeting held on April 18, 1962, the following officers were elected from the floor: Elizabeth E. Hunt, Oswego, New York, president; Henry A. Loats, Muncie, Indiana, vice-president; and Richard N. Hall, Oswego, New York, secretary-treasurer.

The first annual convention of the ACESIA was held in Indianapolis at the 1963 AIAA Convention. To demonstrate the uniqueness of its mission, the following quotations are offered:

> Elizabeth E. Hunt, President of ACESIA, presided at the opening session and, following action on the new constitution, briefed members on the future plans of the Council which include co-producing a brochure on elementary school industrial arts with the NEA Department of Elementary-Kindergarten-Nursery Education and the publishing of an article on elementary school industrial arts in the *NEA Journal.*
>
> Mr. Wayne Wonacott, in the second session of ACESIA, described the kinds of backgrounds which provide the unique "make-up" of the individuals who serve as leaders in the elementary industrial arts school programs. He pointed out that they come not only from industrial arts teacher education programs, but from elementary education programs as well. The uniqueness of these individuals comes about through their experience and/or education in both areas. . . . he stated that 'We must look at all varieties of programs with open-mindedness and a desire to know and understand what others are doing.' (AIAA, 1963, p. 6)

With this spirit, the ACESIA embarked upon its journey as the fourth affiliated council of the AIAA.

Major accomplishments. Over the years membership in the Council has grown, and in 1978 it stood at about 320 members. Meeting sessions are held each year in conjunction with the AIAA International Conference. Outstanding presentations are made on elementary school industrial arts of interest to Council members and other professional personnel. Ten standing committees presently function within the ACESIA.

Several significant publications have been produced through the efforts of the ACESIA, including the 1974 ACIATE yearbook entitled *In-*

dustrial Arts for the Elementary School. Two monographs and a directory of resource people are presently being sold by the ACESIA. In addition, a package of 12 product ideas for elementary schools is being sold on a cost-recovery basis. The ACESIA publishes a quarterly newsletter. Periodic packet mailings have been made available to members involving useful ideas and resources for teaching elementary school industrial arts. Bibliographies have been prepared and distributed to the membership. The ACESIA *Membership Directory* facilitates communication among persons with common interests.

Influence on the profession. Programs of industrial arts at the elementary school level have been improved because of the efforts of the ACESIA. There was a time when secondary school content and methods were transplanted into the elementary school, but because of the work of the Council, more appropriate ends and means have been suggested and demonstrated. Leadership capability of Council members has been enhanced due to the program of work of the ACESIA.

Present (1978-1980) officers of the ACESIA are Norma Heasley, Akron, Ohio, president; F. Milton Miller, Columbia, Missouri, vice-president for programs; Marjorie Inman, Cheyenne, Wyoming, vice-president for representatives; Denis J. Foley, Millersville, Pennsylvania, secretary; Roger Schaefer, Menomonie, Wisconsin, treasurer; and William A. Downs, Warrensburg, Missouri, immediate past president. The president of the ACESIA serves the AIAA as a vice-president on the AIAA Executive Board.

American Industrial Arts Student Association (AIASA)

The AIAA has supported the concept of club work for secondary school students. A standing committee of the AIAA works to encourage industrial arts teachers to form and operate high school clubs affiliated with the AIASA.

Goals of the association. The purposes of the AIASA, a secondary school student association, are stated in two levels – general and specific. The general purposes follow: To widen and deepen the interest and knowledge of students in this technological age, to motivate regular school work, and to promote industrial arts in the public schools of America. Ten specific purposes are (a) To provide the student with the opportunities for the development of leadership in social, civic, school, and community activities; (b) To develop through group action the ability of members to plan together, organize, and carry out worthy activities and projects; (c) To explore industry and the American industrial civilization; (d) To promote high standards of craftsmanship, scholarship, and safety; (e) To foster a deep respect for the dignity of work; (f) To provide good leisure-time activities and hobbies; (g) To provide opportunities for wholesome recreation; (h)

To encourage students in creative expression; (i) To develop consumer knowledge in students; and (j) To instill in students desirable habits and attitudes toward the American way of life (AIASA *Handbook*, 1973, Constitution, Article II).

Origin and early development. Student clubs in industrial arts were common during the 1950's in Texas and a few other states. In 1957, a committee composed of Pat Atteberry, W. A. Mayfield, Harry Thomas, and Lawrence Wiltz made a study of industrial arts clubs in the United States for the AVA. They found that although local clubs had been in operation for 30 to 40 years, state clubs had been operating no more than 15 years. No national group existed (Gasperecz, 1972).

Based upon the interest and efforts of W. A. Mayfield (Texas), Raymond S. Ginn, Jr. (Georgia), Rex Miller (New York), Leroy H. Bengston (Oklahoma), and others, the AIAA Executive Board was approached in 1964, and monies were appropriated to start an "AIAA Student Clubs" organization (for high school and college students). In 1965 at the Tulsa AIAA Convention the group was officially organized. Officers for high school clubs and for college clubs were elected. The first national president for high school clubs was Larry Presswood, Deer Park High School, Deer Park, Texas. The first national president for college clubs was Wayne C. Eller, Appalachian State Teachers College, Boone, North Carolina (AIAA, 1965).

During the 1965-1966 school year, Rex Miller, AIAA Student Club Committee chairperson, worked with the new organization. In 1967-1968 the group separated into two organizations: (a) The Industrial Arts College Clubs (IACC) and (b) The American Industrial Arts Student Association (AIASA). Rex Miller became the AIAA chairperson for IACC and W. A. Mayfield became the AIAA chairperson for AIASA (Gasperecz, 1972).

Major accomplishments. Membership in the AIASA fluctuates during the year and from year to year. As of June, 1978, there were 381 chapters in 28 states with 8,129 members.

Annual AIASA meetings have been held at the AIAA International Conference. Beginning in the summer of 1979, the AIASA will meet separately from the AIAA.

At the 1977 AIAA International Conference in New Orleans, the AIAA Executive Board took action to allow the AIASA to incorporate as a legal entity. An official Board of Directors was established by the AIASA at the AIAA International Conference in Atlanta in 1978. The AIASA, Inc., Board of Directors has a membership of 11 persons. Dennis W. Hirsch, Nashville, Tennessee, was elected president and chairperson of the corporation and board, respectively. William P. Elrod, Madison, Kansas, Chairperson of the AIAA High School Clubs Committee, is a member of the board and National Advisor. Ronald W. Applegate, formerly Director of Student Organizations, AIAA National

Office, Washington, D. C., now serves as the AIASA Executive Director. Many state and local advisors assist the organization in its program of activities. In November of 1978, the AIASA became financially independent of the AIAA.

The official name of the major AIASA publication is *School Scene*. It is distributed to members from the AIAA Washington, D. C., office four times a year. News and articles of interest that it contains are enjoyed by the membership. The current practice is to include the *School Scene* as center material in the AIAA journal entitled *Man/Society/Technology*. Other publications such as the AIASA *Handbook* and brochures have made contributions to the success of AIASA.

Influence on the profession. Early in 1978 the United States Office of Education recognized the AIASA as an official "vocational" youth group. Under state plans for vocational education, if it is judged that industrial arts can make contributions to vocational education, then AIASA activities may be supported with vocational funds.

Students are really what educational association work is all about. Leadership growth and development have been fostered in students, advisors, and other professionals associated with the AIASA. The impact on these individuals is not easily evaluated, but it can be stated with certainty that great things happen when students and teachers get together through the AIASA.

The 1978-1979 AIASA president is Jeff Short, Weatherford High School, Weatherford, Oklahoma. He is assisted by a vice-president, secretary, treasurer, reporter, and sergeant-at-arms.

American Industrial Arts College Student Association (AIACSA)

College students preparing to be industrial arts teachers are the future lifeblood of the profession. If they are to be association-minded with a willingness to serve, they should become involved at an early stage in their professional development. The AIAA promotes college student membership with AIAA and active campus chapters of the AIACSA.

Goals of the association. The following purposes have been stated for the AIACSA: (a) To promote leadership, fellowship, and scholarship by industrial arts college students and to coordinate activities among industrial arts colleges and universities at the local, state, and national levels and (b) To promote professionalism through association and participation in AIAA proceedings and the annual conference (AIACSA *Constitution and By-Laws*, 1975, Article II).

Origin and early development. College students preparing to be industrial arts teachers have been encouraged to belong to the AIAA since 1943. In that year the AIAA Constitution was revised to set student dues for the Association (Hunt, 1960, p. 14). Development of student "chapters" of the AIAA was encouraged starting as early as 1950, and

16 such groups had affiliated with the AIAA by the 1950-1951 school year. By 1955, 50 college clubs had affiliated with the AIAA (Hunt, 1960, p. 115).

In 1967 the IACC group was formed. Little can be found as to the activities of college clubs during the 1967-1972 period. Certainly there was activity, but few records exist as to progress made. In 1972, at the Dallas AIAA International Conference, the college clubs group reorganized (AIAA, 1972).

Shortly thereafter, in January 1973, Merle Mead of Kearney, Nebraska, then the president of the newly established AIACSA, became the first person to occupy the position of Vice-President for College Students of the AIAA (AIAA, 1973).

Major accomplishments. As of June 1978, there were 1,078 college student members of the AIAA. For one-half the annual regular-member dues, college students receive all of the AIAA membership benefits except the voting privilege. Prior to 1978, no separate dues structure existed for the AIACSA. College students who became AIAA members merely were assumed to be AIACSA members.

At issue at the time of this writing is whether the AIACSA chapters are the focal point of the AIACSA work or whether college students see the parent body (AIAA) as the focus of their pre-professional experience in association work. Beginning with the 1978-1979 year, college students must first join the AIAA as a student member. Then, if they wish, they may become a member of the AIACSA by paying additional dues to that group through an AIACSA campus chapter of 10 or more members.

Interest in college "club" involvement has sharply decreased over the years. In 1966-67 there were 83 college clubs with 2,089 members, but in 1975-1976 only 11 AIACSA chapters served but 162 members (Applegate, 1977). In June of 1978, there were 17 AIACSA active chapters serving 352 students.

Each year, at the AIAA International Conference, the AIACSA conducts meetings of interest to college students and to other professional personnel. The principal publication of the AIACSA is the *College Scene,* which is now included in the center material of several *Man/Society/Technology* issues per year.

Influence on the profession. Leadership qualities are developed through the work of the AIACSA. Unfortunately, large numbers of college students have not become members or attended national meetings. If membership can be built up and participation increased, the AIACSA activities can have a far-reaching effect upon professionalism in the field. It should be remembered that a prerequisite for AIACSA membership is AIAA membership. A separate dues structure, beginning in 1978, should promote the development and support the activities of the AIACSA.

The work of the AIACSA is assisted by William E. West, Clemson, South Carolina, Chairperson of the AIAA College Clubs Committee, and by the staff of the AIAA National Office, Washington, D. C.

The 1978-1979 president of the AIACSA is Greta L. Boroff, Fairmont State College, Fairmont, West Virginia. She is assisted by a vice-president and seven regional vice-presidents. Only four of these regions elected a vice-president for 1978-1979. Three others were appointed for the year. A new constitution is presently under consideration and should be approved by the time of the publication of this yearbook. The president of the AIACSA serves the AIAA as a vice-president on the AIAA Executive Board.

GROUPS RELATED TO THE AVA

The American Vocational Association (AVA) was officially formed on December 4, 1925, when the first constitution was ratified. This was accomplished at a meeting of a joint committee consisting of representatives of the National Society for Vocational Education and the Vocational Education Association of the Mid-West held in Cleveland, Ohio (AVA, 1926).

Throughout the years the AVA has been a most effective professional organization. Total membership at the time of this writing is between 54,000-55,000 members. The AVA has maintained a staff in Washington, D. C., to work on behalf of the legislative and professional interests of vocational education. The Association has a multi-faceted structure with an industrial arts division being just one of many subgroups within the organization.

Two such groups considered here are the Industrial Arts Division of the AVA (IAD/AVA) and the National Association of Industrial and Technical Teacher Educators (NAITTE). They are described in the sections which follow.

Industrial Arts Division of the AVA (IAD/AVA)

Some individuals wish to emphasize the pre-vocational purpose of industrial arts. They feel industrial arts should be closely related to vocational education. The IAD/AVA provides them with an excellent means for such consideration. Membership is open to all persons interested in the industrial arts field.

Purposes of the division. The general purposes of the Industrial Arts Division of the AVA are (a) To develop high professional standards among the membership; (b) To define the function and scope of the Industrial Arts Division of the American Vocational Association; (c) To foster and promote the growth and development of industrial arts education in the United States; (d) To foster and promote the growth and development of industrial arts teachers, supervisors, and teacher educators; and (e) To foster, promote, and encourage professional development programs and activities for the varied interest groups within the Industrial Arts Division (*Handbook of Operating Policies,* IA Division of AVA, FY 79).

Origin and early development. The first annual convention of the AVA was held in Louisville, Kentucky, in December of 1926. One series of meeting sessions was held by an "industrial education" group. During 1927 a special (not standing) committee was established for industrial arts (AVA, 1927b). The first industrial arts sessions, by that name, were held in Los Angeles at the December, 1927, AVA Convention (AVA, 1927a). Special meetings for industrial arts were scheduled at the annual conventions between 1927 and 1932.

Industrial arts personnel grew restless with the minor status afforded them at the annual meetings (Selvidge, 1932). Robert W. Selvidge, University of Missouri, requested the AVA Executive Committee, on behalf of industrial arts professionals, to form an official "section" of the AVA for industrial arts. In December of 1932, the AVA constitution was amended to create an Industrial Arts Section and the first vice-president for industrial arts became a member of the AVA Executive Committee. Professor Selvidge was the first person to fill that office (AVA, 1933). In 1947 another change in the AVA constitution gave "division" status to seven groups, one of which was industrial arts (AVA, 1947).

Major accomplishments. The special committee for industrial arts, first formed in 1927 (cited earlier), published "standards" for industrial arts in 1934 and revised them in 1946. This group was known as a committee on "Standards of Attainment in Industrial Arts Teaching." Revisions of 1953 and, especially, 1968 have brought this guide into harmony with contemporary thought (AVA, 1968).

In the 1940's the original (1927) committee became known as the Industrial Arts Policy and Planning Committee (Fales, 1956). Today, the Industrial Arts Policy Committee is the principal group that assists the IAD/AVA vice-president in planning and policy matters.

In order to maintain "division" status, and thus be represented by a vice-president on the AVA Board of Directors, the IAD/AVA must obtain and hold a membership of 1,000 persons. In 1977-1978 that minimum was reached and exceeded by more than 700 persons. Each year, in conjunction with the AVA, the IAD presents an outstanding program of meetings and conducts the business of the Division.

Recent years have seen a spirit of open cooperation between the IAD/AVA and the AIAA. The student club group (AIASA), created and supported by the AIAA, has been recognized by the AVA as the "official" youth organization for industrial arts (AVA, 1978).

Influence on the profession. Programs of industrial arts at the school level have been greatly influenced by publications and programs of the IAD/AVA over the years. The pre-vocational objective of industrial arts has been paramount in the work of the Division, and the relationships of industrial arts to vocational education have been carefully defined by its members. At the present time the pre-vocational nature of the field is being promoted as the "pre-specialization" stage of a broad program of education for work. The organization has provided a vehicle for leadership development of its members.

Current divisional officers are Ralph V. Steeb, Florida State Department of Education, Tallahassee, AVA vice-president representing industrial arts, 1978-1981; Carl R. Wallis, Utah State University, Logan, Chairperson of the Industrial Arts Policy Committee, 1978-1981; and James L. Boone, Jr., Texas A&M University, College Station, secretary, 1976-1979. Four elected representatives (elementary-secondary; supervision; teacher education; and post-secondary and adult) serve on the Policy Committee. A number of committees accomplish various objectives of the IAD/AVA.

National Association of Industrial and Technical Teacher Educators (NAITTE)

For persons interested in teacher education in the related areas of industrial arts, trade and industrial, and technical education, the NAITTE provides a promising organization to join. Membership is available to teacher educators and to others interested in teacher preparation problems and issues.

Purposes of the association. The aims or purposes of the NAITTE are as follows: (a) To bring about closer cooperation among those engaged in preparing and improving teachers and other workers in health occupations,[3] industrial arts, technical education, and trade and industrial education; (b) To stimulate and to take appropriate action concerning practices and proposals in industrial and technical teacher education and in other educational phases related thereto; (c) To increase the contribution of the group to the extension and perfection of all phases of industrial arts and vocational and technical education; (d) To foster research and recording of experiences in line with professional interests; and (e) To promote other common desires of the group (NAITTE, *Constitution and By-Laws,* 1974, Article II, Section 1).

[3]At the Fourth Session of the NAITTE Executive Committee, December 7, 1976, in Houston, Texas, action was taken to delete any reference to health occupations in future revised editions of the NAITTE *Constitution and By-Laws.*

Origin and early development. Teacher education had been a topic of interest for many members of the AVA. Program sessions were held during early conventions of the Association, but in 1936 at the San Antonio convention, a new organization was created. It was called the National Association of Industrial Teacher Trainers (NAITT). The first officers were George E. Myers, University of Michigan, president; Robert W. Selvidge, University of Missouri, vice-president; Oakley W. Furney, New York State Department of Education, vice-president; and Homer J. Smith, University of Minnesota, secretary-treasurer (AVA, 1937).

In 1951, the title of the organization was changed in Minneapolis to the National Association of Industrial Teacher Educators (NAITE) (AVA, 1952). In 1967 in Cleveland the name of the organization was changed a third time to its current title of the National Association of Industrial and Technical Teacher Educators (NAITTE) to reflect the influence of technical education on the Association scene (NAITE, 1967).

Major accomplishments. Membership has fluctuated over the years of the past decade. It stood at about 475 paid and honorary members for the 1977-1978 year. NAITTE conducts an annual meeting each year in conjunction with the AVA Convention. Program sessions of interest to members are held, and the business of the Association is conducted.

The principal publication of NAITTE is the *Journal of Industrial Teacher Education* (JITE). It is the only scholarly, refereed journal in the field. Published quarterly, it is in its 15th volume during the 1978-1979 year. NAITTE sponsors jointly with the ACIATE the annual *Industrial Teacher Education Directory.* In addition, it has published a manual on safety and accident prevention and several task force reports.

Influence on the profession. Programs of teacher education have been strengthened through the work of the NAITTE. The organization has provided a forum where teacher educators interested in industry and technology have shared ideas and common problems. Research and development literature published in the JITE has provided the profession with an outlet for scholarly work. Members have experienced leadership development as they have participated in committee work of the Association.

The 1978-1979 officers of NAITTE are H. C. Kazanas, University of Illinois, Urbana, president; Floyd Krubeck, Kearney State College, Kearney, Nebraska, past president; David C. Bjorkquist, University of Minnesota, Minneapolis, president-elect; Robert E. Andreyka, The Pennsylvania State University, University Park, vice-president for trade and industrial education; Michael N. Sugarman, The University of Akron, Akron, Ohio, vice-president for technical education; James

L. Boone, Jr., Texas A&M University, College Station, vice-president for industrial arts; F. Milton Miller, University of Missouri, Columbia, secretary; and Bill Wesley Brown, California State University, Chico, treasurer. In addition, three trustees (one for each field) and the editor(s) of the JITE comprise the officer group.

SOME REFLECTIONS

Each of the councils or associations reviewed in this chapter was created to satisfy a special need for organized activity of a professional nature. It was not too difficult a task to cite the purposes of each group as contained in current organizational documents.

It was more difficult to trace the origin and early development of each group. These sections, as presented in this chapter, lack appropriate scholarly treatment and documentation. In most cases the house organ of either the AIAA or the AVA was used; however, some of the sources cited (e.g., Hunt, 1960) may be open to some question. Good scholarship and adequate historiography demand extensive corroboration on points of history. With the exception of the exacting scholarly work of Kinzy (1973) that traces the development of the ACIATE, very little effort has been extended by the profession to study other councils or organizations discussed in this chapter. Such work needs to be done. It is the hope of this author that the partial reporting done here will motivate others to delve more deeply into the origin and early development of each organization considered.

Archives have been established at Millersville State College (Pennsylvania) for the AIAA and related organizations. Persons owning documents of historical significance should have them placed on file there so that they may be used by historians of the field.

Space has not permitted a comprehensive treatment of the accomplishments of each organization considered. Taken collectively, the activities of the eight groups have enhanced the status of the profession. Healthy debate and effective action have served the profession well. The foundation for a body of scholarly literature has been created, but much needs to be done to build upon limited, yet useful, contemporary efforts.

It is difficult to assess the influence of each group or that of the groups taken together as a whole. It is important, however, to keep two avenues of influence open; hence the need to foster professional groups related to the AIAA and the AVA. Regarding the former, there is the need to study the fundamental nature of the discipline of industrial technology and extend and enhance practice as a part of the liberal, general education of all youth. The latter provides the opportunity to thoroughly consider the potential of industrial technology within the vocational segment of education. Each avenue of influence is important, and both should command the support of all industrial arts professionals.

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chapter 17

The Mississippi Valley Conference

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For the past 70 years, one of the most influential agents for formulating and disseminating goals and programs in industrial arts has been a group commonly known as the Mississippi Valley Conference. The influence of this Conference persists in spite of the fact that it has never officially held the name by which it is most widely known, does not include the entire Mississippi Valley, has no dues or paid staff, has no written journal or newsletter, and has refused for many years to adopt a formal position on any topic.

THE EARLY DAYS

Robert W. Selvidge suggested to Charles A. Bennett in 1908 that there was a need for yearly meetings of Midwesterners concerned with manual training and manual arts (Bennett, 1937, p. 502). The initial meeting, held at Bradley Institute, Peoria, Illinois in 1909, was limited to a short list of "teachers and organizers of manual training" invited by Bennett, who chaired this meeting of the group and was regarded by Bawden (1930, p. 55) as its organizer. In spite of the wording of the invitation, the phrase "manual arts" was used throughout the first program in preference to "manual training."

In 1913 two of the present-day rules of the Conference were formalized: (a) the principal concern would be teacher education and (b) only one member would be chosen from any one teacher education institution. It was assumed that this member would usually be the head of a manual arts department that was responsible for training manual arts and vocational teachers, and for teaching the manual arts as cultural subjects to college students.

The influence of the Conference grew sharply in 1914 with the election of William T. Bawden as its chairman. The United States Commissioner of Education, Philander P. Claxton, had appointed Bawden, his specialist in industrial education, to represent the United States Bureau of Education at the Conference meetings, and had agreed to publish the Conference proceedings as official government circulars. The Commissioner could not have been insensitive to the fact that many of those who favored vocational education intended to take it out of the comprehensive, public schools and to finance it in part with local tax funds that would be saved by the elimination of manual arts. As Bawden (1950) recalled the situation much later,

> The old National Society for the Promotion of Industrial Education . . . was financed and controlled by eastern men . . . [who] . . . seemed ignorant of and indifferent to . . . public education in the middle west . . . and . . . certain eastern leaders were not hospitable to the interests of manual training (now industrial arts), but were critical and even scornful of its educational values, and disposed to eliminate it entirely from the schools. (p. 174)

Who were these "eastern men"? The answer is not entirely clear. Commissioner Claxton, himself, asked Congress not to assign to the Bureau of Education responsibility for administering the Smith-Hughes Act (Barlow, 1967, p. 115), thus separating its administration from general education. But Commissioner Claxton was probably bowing to the inevitable. Bawden's most likely target was David Snedden, a moving force in the National Society for the Promotion of Industrial Education (NSPIE), and a strong advocate of "real" vocational education conducted in separate institutions outside comprehensive high schools (Drost, 1967, p. 157). Snedden was a professor at Columbia University and was a moving force in both the NSPIE and the National Society for Vocational Education (NSVE). Drost suggested that Commissioner Claxton's move to get the NSVE to meet with the Vocational Education Association of the Middle West in 1920 perhaps was an attempt to "temper the extreme approach of the Easterners [sic] with the more moderate views of the middle west association" (p. 158). Perhaps Drost's "Easterners," the NSVE, were the same as Bawden's "easterners." Bawden (1950) noted that unlike the attitudes in the east, it was

> common to find in the middle west the conviction that the quickest, most economical, and most efficient way to develop a program of vocational education is to build it on a foundation of strong courses in industrial arts, home economics, commercial subjects, and other practical activities in the [public] elementary and high schools. (pp. 174-175)

It is impossible to be sure of the Commissioner's motivations, and Bawden's jaundiced views of easterners were written long after he had left Columbia University and the United States Bureau of Education to return to the Midwest. Consequently we may never know whether the Commissioner and Bawden chose to give prominence to the Conference in order to further their own views or whether they viewed the Conference as a convenient vehicle for general development of the profession. The historical files make it clear that the Conference consistently has upheld the view that vocational education is a public school responsibility, and that one of the important goals and benefits of industrial arts is to provide opportunities for exploration and skill development for students prior to their enrollment in vocational education. Bawden, however, gave credit to "experience," rather than to the Conference for the changed views of the easterners:

> In later years the eastern leaders were forced by the lessons of experience to acknowledge the contribution of vocational education made by well-organized programs of industrial arts, and their attitude became somewhat more cordial. But there never has been any adequate public explanation for the obstinacy with which the initial determination to eliminate all manual training from the schools in favor of 'honest-to-god' [sic] vocational education was adhered to for so long. (Bawden, 1950, p. 175)

London (1977) recalled that Charles A. Prosser (Snedden's successor as head of the NSPIE and the first head of vocational education in the federal government) "once told me that for years he honestly believed that genuine vocational education could not be thoroughly established in the schools without elimination of manual training." The midwestern successes in relating the two were a major factor in changing his mind.

It is easy to see why there was conflict between the manual arts proponents in the Conference and those "real" vocational educators who wanted to minimize the influence of manual training and of the new colleges of education. As early as 1913, the Conference endorsed a four-year teacher education program for teachers of the manual arts who could also teach a vocational subject. Bennett suggested in 1913 that vocational schools cannot get efficient men from the trades as teachers because industries can pay more than schools and because specialization in employment produced only a few who knew a trade thoroughly enough to teach in a vocational school. In any event, Bennett believed that it was necessary to teach the tradesman how to teach and that the man from the technical school must get practical shop experience in addition to his pedagogic training. "Training schools for teachers can give all the preparation except the trade experience and they can go a long ways in that direction" (Barlow, 1967, p. 95).

"Easterners" and "'real' vocational educators" were not the only groups challenged by the Conference. Those industrial arts educators who were believed to de-emphasize skill development and who sought a basis for industrial arts content any place but in trade and job analysis also came in for considerable criticism during the 1940's and 1950's. Naturally, these views tended to affect decisions as to who should be invited to become Conference members.

MEMBERSHIP IN THE CONFERENCE

Membership in the Conference has always been by invitation. The first group of twelve was invited by one man – Charles A. Bennett. It appears that from 1910 to 1972 the process of selection involved nomination by one or more members and a unanimous favorable vote of the members present. One very prominent industrial arts educator was never invited to membership, allegedly because at least one member of the Conference felt that he would attempt to dominate discussion, but perhaps also because he was vocal in preferring general to unit shops, and hence was felt to wish to de-emphasize skill development in industrial arts.

For many years, 5 to 10% of the active membership was recruited from among the supervisors of vocational education and practical arts or of industrial arts in major midwestern cities. In the post-World War II era, this practice gradually ended. Throughout its history, a similar percentage of the membership has come from the ranks of publishers of professional books and magazines in the field. Currently, one active and one at-large member are clearly from this group, while a few others combine editorial and professorial duties.

At present, active members must be serving as head of an industrial education program or as head of industrial arts or industrial education supervision in a state department of education, must be nominated by a member, and must receive the support of two-thirds of the active members voting. One of the requirements of active membership is that the person must have been a spectator at least twice: during the meeting at which he is voted into membership, and at least once previously. Those who retire or relinquish their administrative role for any reason are moved to associate membership, and active or associate members are moved automatically to "former active member" status if they fail to attend three consecutive annual meetings. Only one person from any one institution or agency may be an active member at any one time.

For many years there has been a limit on the number of active members. (Currently, the maximum is 65.) This limit was imposed to allow opportunity for involvement of all active members in discussion. An added effect of restrictions on membership, however, has been to give a feeling of belonging to an exclusive group. "At-large" membership (a category added in 1973) is even more exclusive. A maximum of five persons may be invited to this type of membership with the sole qualification being their contributions to industrial teacher education. Only two persons have been so honored.

Pride in membership and respect for other members appear to add to the influence of the Conference. Changes in teacher education programs are brought about more quickly when they are backed by a sizable group of key leaders in the profession.

Visitors at Conference sessions are often as numerous as members. One of the duties of the General Chairman is to attempt to keep the number of visitors small so that their presence detracts as little as possible from the discussion. Members are expected to ask the Chairman before issuing an invitation to a visitor, and at times the Chairman has personally issued all invitations to visitors. It is understood that visitors are not to participate in the discussion unless invited to do so by the session's presiding officer. Visitors usually include publishers, advanced graduate students, and prospective members. Conference meetings are reported briefly in professional periodicals, and are believed by members to affect the content of their professional publications and the structure of their teacher education curricula.

ROLE OF THE GENERAL CHAIRMAN

Almost since its inception, the Conference has asked members to suggest topics for discussion at the annual meeting and then to vote on the topics of most interest to them; thus the program topics largely reflect contemporary problems of the membership. It is expected, however, that the General Chairman will exercise some direction in grouping topics, in choosing speakers, and in making recommendations for the good of the order.

Only four have held the General Chairman position: William T. Bawden 1914-1941, Verne C. Fryklund 1946-1961, Hoyt H. London 1962-1971, and Rupert N. Evans 1972-present. London (1977) summarized the contributions of each of the first three as follows:

> Bawden was above everything else an organizer par excellence. He ran the Conference like he had been ordained by God to do it, and everybody seemed to like it. His enthusiasm and his promptness permeated the Conference from the very beginning until the last.
>
> Fryklund was a bit like Bawden. His experience with Professor Selvidge at the University of Missouri, and his work with the Army during World War II, resulted in his having an unusually stubborn conviction that he was right about things and at times he appeared to impose his points of view on the Conference. He managed the Conference in an efficient way and kept it going along the line that Bawden had fashioned before him.
>
> London's chief contribution, if there was one, was to keep the Conference in line with its traditions and at the same time include discussions of trade and technical education as well as industrial arts, and to extend the benefits and influence of the Conference to all areas of the Mississippi Valley, not just the north end of it. (Personal communication to R. N. Evans)

It seems to this writer that London is too modest about the contributions that he and Fryklund made. It certainly is true that Fryklund lost no opportunity to remind the members that analysis of the activities of workers was the only true source of industrial arts content, but he also developed the members by giving them key responsibilities for conducting Conference sessions. London continued and expanded this practice and was quite successful in stimulating graduate study for those Conference members who did not have doctorates. Evans has promoted consideration of contemporary concerns that are on the fringes of traditional industrial education (e.g., career education and Comprehensive Employment Training Act programs), and has encouraged the membership to agree that all of the practical arts (not just industrial arts) and vocational education (not just trade and industrial education) have a place in Conference discussions. All four of the General Chairmen have seized the opportunity at least once each year to pontificate on one or more subjects that they feel to be for the good of the order. They are joined in this habit by certain members, but other members are not shy about calling anyone to task when the preaching interferes too much with discussion.

Why was Bennet not included among the list of General Chairmen? Karnes (1977) offers this explanation:

> When Bawden was Chairman, he chaired every session, as I recall. Fryklund followed the practice of appointing a chairman to plan, coordinate and conduct each half day session. I think this may have led to the use of . . . 'General Chairman.' My guess is that from 1909 to 1913 the Conference was so small and loosely organized that Bennett simply served as chairman and discussion leader and that the term 'General Chairman' was not used. (Personal communication to R. N. Evans)

Robert W. Selvidge, the initiator of the Conference, never served as Chairman. He "loved nothing more than a heated discussion and lively debate" (Karnes, 1977), but he left the honor of chairing programs to others. His legacy of enjoyment of discussion and debate has been inherited by many of the current members.

Each of the first three General Chairmen served until retirement from his professional position. This may have led to the term, Permanent Chairman, used by G. Harold Silvius for many years in his stirring charge to those being initiated into membership. (From time to time a senior member of the Conference has served an unofficial role of historian and conservator of traditions. For more than a decade Silvius combined this with the more formal responsibility of inducting new members. Upon his retirement, one of his students, William Wolansky, took over this duty.)

Before his service in Washington, D.C., Bawden served as a teacher educator; later, he headed vocational and practical arts education in Tulsa, Oklahoma (Barlow, 1967, p. 136). Each of the other three General Chairmen has also had close ties with both industrial arts and vocational industrial teacher education. It seems unlikely that this uniformity is an accident. It is probable that this combination of interests reflects the biases of the majority of the membership and, in turn, reflects the organization of industrial education programs in a high proportion of the public schools and teacher education institutions in the Mississippi Valley.

CHANGES IN CONFERENCE NAME AND PROGRAM

A key indication of developments in the program of the Conference is seen in the changes of its name. The first name was "A group of men from institutions in the Mississippi Valley engaged in training teachers of manual arts." (There has never been a woman member.) By 1915, "and industrial education" had been added to the name (Barlow, 1967, p. 97). Shortly thereafter the group began to be known in its official records as the "Manual Arts Conference of the Mississippi Valley." Commonly, however, the members referred to themselves as the "Conference" (Historical file).

The name was modernized by substituting "Industrial Arts" for "Manual Arts" in 1947 (Bawden, 1950, p. 178). This change in terminology had occurred by 1930 in many of the papers presented at the Conference, but the formal title of the Conference had been retained, probably out of respect for tradition. G. Harold Silvius recalled that the name was changed in 1948 as a result of a comment by C. Kenneth Beach of Cornell University, who said that he had for the last time asked his dean for permission to attend a conference on the manual arts. With a slight rearrangement of words, the name then became the "Mississippi Valley Industrial Arts Conference."

The most recent change in name occurred in 1973. A committee surveyed the membership and found some support for retaining the old name and some for substituting "Vocational and Practical Arts Teacher Education." The majority decision, at the following Conference, however, was to change the name to "Mississippi Valley Industrial Teacher Education Conference," thus including trade and industrial education along with industrial arts and making explicit the group's long-term concern with teacher education.

The most interesting view of changes in the Conference and in the profession comes from a review of past programs. Fortunately, the Conference history is reasonably well documented and is preserved in the Archives of the University of Illinois Library in Urbana, Illinois. From its inception the Conference has emphasized discussion both of philosophy and goals and of the means for achieving these goals. The major change in the latter has been a shift from discussion of public school programs, especially in big city schools, to teacher education programs as a means of affecting public school programs.

The early days were devoted largely to the content of undergraduate programs and to problems of inservice education for the industrial teacher who had little formal education. During the late 1920's the Conference became increasingly concerned with graduate education. Few doctoral programs existed, and master's programs rarely provided instruction in the subject matter of industrial arts. Philosophy, theory, and administrative courses predominated. The successful experience of Conference members in operating graduate programs emphasizing subject matter was used by other members as a lever to influence approval of such programs at institutions which had more conservative graduate colleges. But this emphasis on practical graduate instruction did not indicate a lack of respect for research.

The Conference moved early to emphasize research as a means of identifying the pressing problems of the profession and as a way of finding possible solutions. This emphasis on research, although the early studies were conducted almost entirely by degree candidates rather than by their professors, had the effect of both increasing the academic respectability of the field and influencing the content of teacher education and public school programs at every level. Particularly under Fryklund's leadership, almost every annual meeting gave attention to trade and job analysis as a source of curriculum content. Perhaps the greatest influence, however, was on the establishment of doctoral programs. The relatively great number of strong industrial education doctoral programs in the Midwest, as compared with other sections of the country, is most easily explained by the long-term influence of the Conference.

The controversies that have affected industrial arts have tended to come in cycles, as they do in most human activities. These controversies and the reactions of the profession to them are reflected better in the records of the Mississippi Valley Conference than in any other literature. Histories are necessarily selective, and recent histories are particularly subject to current biases. The periodical literature is often tempered by the need to appeal to a wide audience of readers. But the files of the Conference reflect the members' concerns of the moment, practically unvarnished.

The most serious problems arose from proposals to eliminate or greatly decrease the size of manual arts or industrial arts programs in the public schools. One can read into Bawden's 1950 account an inference that fear of such a move gave impetus to the creation of the Conference 40 years earlier. Arthur B. Mays was more direct:

> The years after 1900 to the World War [I] were years of controversy with those who would substitute real vocational education for the established manual training. . . . The attacks on manual training (the then prevalent name for what is here called industrial arts) by the leaders of the vocational-education movement [beginning about 1906] stimulated greatly the writings of men engaged in the teaching of this work, and their efforts to meet these assaults mark the beginning of a genuinely comprehensive, distinct, and representative literature of industrial arts. (1934, pp. 106; 113-114)

The first meeting of the Conference came in 1909, and a very high proportion of the professional books about industrial arts from then until the end of World War II was written by members of the Conference.

A similar threat to industrial arts came at the start of the great depression. Spurred by economic problems, several groups had begun to attack both industrial arts and vocational eduction as "Fads and Frills" that should be eliminated from public schools to save money and at the same time protect the "basic" subjects. Vocational educators, especially Prosser (Fisher, 1967, p. 201 ff), rebutted these arguments by attacking educators who were preparing people solely for leisure. Prosser was aiming at those educators who espoused the liberal arts, and he in return was attacked by those educators who advocated taking vocational education out of the public schools. His targets included those who felt that vocational education was not important, and those who advocated the establishment of federal vocational training programs under the auspices of the National Youth Administration. However, industrial arts was caught in the crossfire because some of its leaders had sought to differentiate it from vocational education by emphasizing the major role of industrial arts in promoting worthwhile leisure-time activities. Some industrial arts educators responded to Prosser by de-emphasizing the role of skill development in industrial arts, thus further differentiating it from vocational-industrial education, and by suggesting that neither skill development nor vocational education had a place in the public schools.

Certainly the Conference has had members who were perfectly willing to sacrifice vocational education in order to ensure support for industrial arts, and others who held the opposite view. The consensus view, however, has invariably been that the two fields reinforce each other, and that both belong in the schools supported by the public. Further, the Conference programs repeatedly show a belief that both fields need improvement and that an indispensable method of improvement is to strengthen teacher education programs. If a bias shows in the Conference programs, it is in the tendency to view trade and industrial education as all of vocational education.

Far more of the program topics deal with industrial arts than with vocational education. The term "industrial education" appears frequently, however, indicating views that industrial arts teacher education and trade and industrial teacher education share many problems and solutions, and (sometimes) that they may be most efficiently conducted by the same industrial teacher education department. Rarely, however, is there discussion of the work of vocational and practical arts teacher education departments that are responsible for all phases of vocational teacher education, or discussion of practical arts other than industrial arts. Because industrial education departments frequently conduct programs in industrial technology, the Conference has discussed problems of such programs relatively frequently in the last 20 years.

Almost without exception, Conference discussions have been positive in nature. Current topics (ranging, recently, from the Occupational Safety and Health Act to the Youth Employment and Demonstration Projects Act and from accountability to public bargaining) are treated in terms of their impact on industrial teacher education and constructive suggestions for dealing with this impact are presented and discussed.

Topics are chosen by the members. At the close of each year's Conference in November, members are asked to list topics that they would like discussed the following year. In January these are arranged into groups of similar topics by the General Chairman and voted on by the members. In late spring a program is developed and assignments made for four half-day sessions, each with a presiding officer and a chairman, and usually with three presenters. It is a tradition that each member accepts his assignment and performs it to the best of his ability, even if that means taking a debate position contrary to his own view.

Presenters are chosen by the General Chairman, with some attention paid to involvement of all of the members, to geographic and philosophic variety on any one program, and to identification of those particularly interested in each topic. Usually each presenter has five months to prepare his paper on the topic assigned; however, the presenter must not read the paper and can use it only for reference purposes. Papers are distributed to all active and associate members, whether or not they are in attendance. The thread of continuity in all of the programs is a continuing concern with the philosophy and goals of industrial education.

The only publication of the Conference has been *Industrial Arts in Modern Education,* a book with chapters by most of the giants of industrial education in the early 1930's. By the late 1930's, however, the views of what industrial arts could and should be were so at odds that it would have been difficult to secure unanimous agreement on any policy document. Rather than choose between two equally unattractive alternatives – (a) split into separate groups along ideological lines, or (b) talk and write about innocuous topics that could not offend anyone – it was decided to revert to an earlier agreement not to take an organizational position on any topic. To maximize freedom of discussion, no individual's views have been identified outside the meeting room. Consequently, the extensive and uninhibited discussion that follows the oral presentation of each year's dozen or so formal papers has not been preserved. A frequent statement in the archives is that "each member takes with him what he can use and leaves the rest behind." The results would seem to indicate that enough has been *taken* to have a major effect on industrial arts, on vocational-industrial education, on their relationships, and especially on their teacher education programs.

FUTURE OF THE CONFERENCE

A major problem of the Conference has been rapid turnover as members are promoted to head the newly organized colleges, schools, and departments that include not only industrial teacher education, but also agricultural education, business education, distributive education, health occupations education, home economics education, and programs designed to prepare technologists. This rapid turnover has not only taken away some of the most effective members (among those interested in being promoted, presumably those who are promoted are a bit more likely to be effective than those who are not) but has kept members who may be less likely to be as interested in working closely with people from other practical fields. On the other hand, the quality and breadth of preparation of the new members often is far superior as compared with that of the initiates of 20 years ago.

One direction in reorganizing the Conference could have been to admit those who have administrative responsibility for all of vocational and practical arts teacher education in their university. Certainly such an organization is needed, but the Conference rejected this task in 1973 and would be unlikely to move in this direction now.

The immediate past, the best predictor of the future, indicates that with the possible exception of decreasing the proportion of favorable votes required for membership, the Mississippi Valley Industrial Teacher Education Conference is unlikely to change structurally. It will continue to be a place where excellent ideas can be discussed and transported rapidly into practice. However, one can also count on the Conference to be the one place in the industrial teacher education profession where one can count on foolish ideas being recognized publicly for what they are. (Department heads are too rarely told this by their subordinates, but their peers in the Conference have no such inhibitions.) It will also serve as the one place where increasingly beleaguered industrial teacher education administrators can find sustenance from their similarly beleaguered peers. The only wonder is why other sections of the country and other subject matter fields have not more frequently used the Mississippi Valley Industrial Teacher Education Conference as a model.

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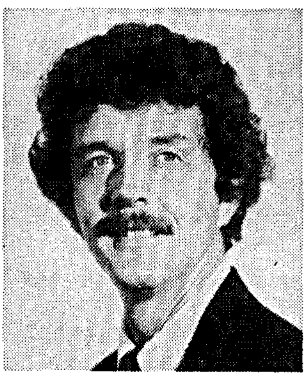
chapter 18

The Role of Professional Journals and Their Contributions to Industrial Arts



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Professional journals often develop in response to a specific need. Although there may be unique reasons for the evolution of each journal, most seem to provide a vehicle for professional interaction in at least three areas: philosophic issues, operational issues, and current news and information. Each journal contributes to the stability of professional practice, yet, at the same time, provides a vehicle for vitality and growth. These two notions may appear to be mutually exclusive and, in fact, at certain points may act in opposition to each other. However, most journals tend to deal with both stability and change and yet avoid conveying a sense of internal conflict.

Clearly, the industrial arts journals have not varied from the general patterns of journal development. Since the inception of the earliest journals, a variety of issues, problems, and directions for industrial arts have been the focus of attention. Although many of the journals may have been edited by individuals or groups that held specific ideological perspectives of the role, purpose, and directions for industrial arts, they nonetheless have encouraged diversity of expression. There is no evidence to suggest that any of the industrial arts journals purposefully controlled the presentation of ideas to preclude the full expressions of all points of view. On the contrary, even a cursory examination of early issues of many journals reveals a strong sense of the value of diversity.

The balance of this chapter will focus on three major areas: (a) the historical development of journals in the industrial arts and closely related fields, including an overview of content emphasis and patterns, (b) the status of journals currently published with impact on industrial arts, and (c) future developments likely to occur in industrial arts professional journals.

HISTORICAL DEVELOPMENT

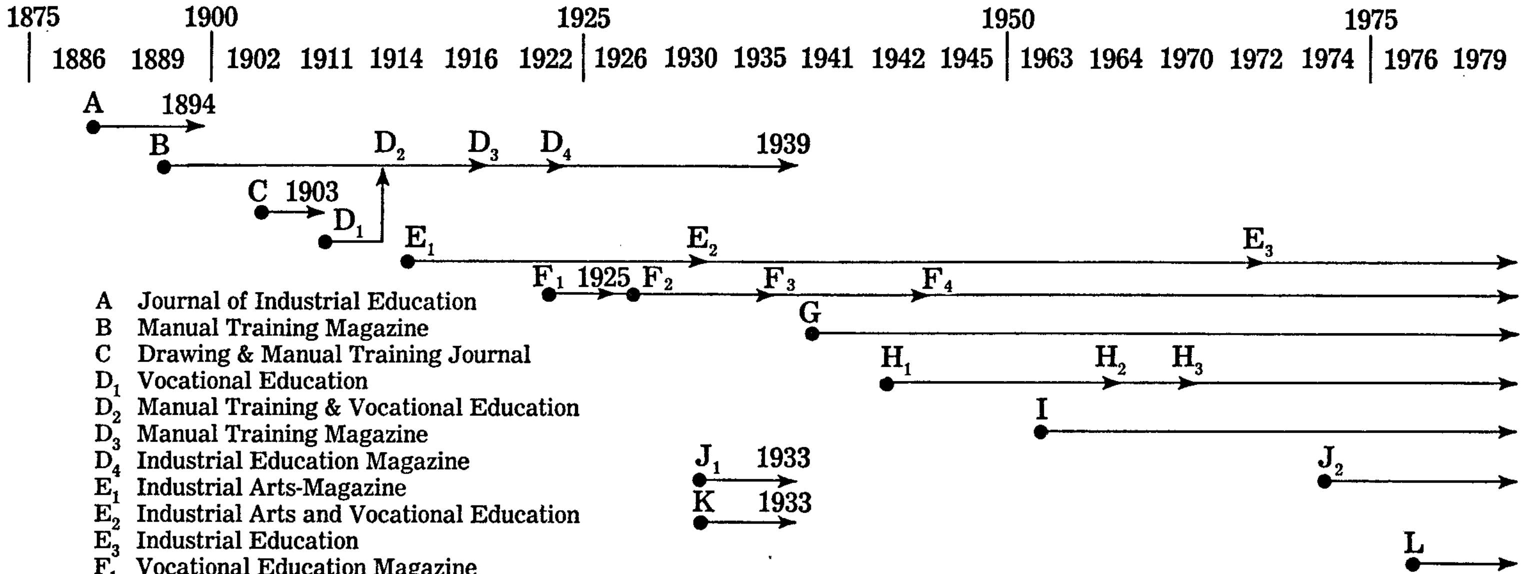
The historical development of professional journals in industrial arts education is both complex and elusive. No single piece of published research has examined comprehensively the development of journals in industrial arts. There have been only a few studies that have dealt with national, regional, and state professional associations and their attendant publications. The standard histories of the field of industrial education refer to journals only in footnote references with no attempt to trace any journals historically. Thus, a large gap in historical information exists in the field of industrial arts.

The development of professional journals in industrial arts is not only elusive because of the lack of available research, but also is very complex because of a variety of forces that were at work particularly during the earliest years of the 20th century. Although most contemporary journals are relatively stable, many early journals lacked the stability, both economic and professional, necessary to sustain them over time. A number of journals long since relegated to archives were developed in the private sector (not associated with established professional organizations) and soon lost the subscription volume necessary to sustain publication. Other journals developed in the private sector flourished. Several journals with direct links to professional organizations also were short lived.

Figure 18-1 traces the development of journals in industrial arts from 1886 to the present. Every attempt has been made to show the evolution of each journal at titles and publishers changed over time.

Journal of Industrial Education

The earliest journal in the field was the *Journal of Industrial Education* published in Chicago, Illinois, between 1886 and 1894. During that period nine volumes were published. None of the volumes were



A Journal of Industrial Education
B Manual Training Magazine
C Drawing & Manual Training Journal
D$_1$ Vocational Education
D$_2$ Manual Training & Vocational Education
D$_3$ Manual Training Magazine
D$_4$ Industrial Education Magazine
E$_1$ Industrial Arts-Magazine
E$_2$ Industrial Arts and Vocational Education
E$_3$ Industrial Education
F$_1$ Vocational Education Magazine
F$_2$ News Bulletin – American Vocational Association
F$_3$ AVA Journal and News Bulletin
F$_4$ American Vocational Journal
G School Shop
H$_1$ The Industrial Arts Teacher
H$_2$ The Journal of Industrial Arts Education
H$_3$ Man/Society/Technology
I Journal of Industrial Teacher Education
J$_1$ Epsilon Pi Tau Review
J$_2$ The Journal of Epsilon Pi Tau
K Vocational Teacher[2]
L Manufacturing Forum

Fig. 18-1. Chronological Development of Professional Journals

available to the writer for examination.[1] It is interesting to note the early use of the generic term "Industrial Education" since many journals published less than 20 years later used terms applicable to more narrow fields of interest within the total field of industrial education. The source of publication and the reasons for ceasing publication after 1894 are not known.

Manual Training Magazine

The second journal in historical sequence of development was the *Manual Training Magazine,* first published in October 1899 and edited by Charles A. Bennett. *Manual Training Magazine* was published by the University of Chicago Press from 1899 until 1903, at which time publication was taken over by the Manual Arts Press in Peoria, Illinois. As was the case with a number of journals in the field, the *Manual Training Magazine* was published under a variety of titles between its first publication in 1899 and the last publication in 1939. The list of dates and titles are as follows:

October, 1899 – June, 1914	*Manual Training Magazine*
September, 1914 – June, 1916	*Manual Training and Vocational Education*
September, 1916 – June, 1922	*Manual Training Magazine*
July, 1922 – November, 1939	*Industrial Education Magazine*

After October, 1909 the various forms of the *Manual Training Magazine* were jointly edited by Charles A. Bennet and William T. Bawden until the journal ceased publication in 1939.

The journal, designed to meet the professional needs of manual training teachers at all levels, included articles descriptive of programs at various locations and covering a variety of technical emphases.

Charles R. Richards proposed "Industrial Arts" as the new name for the field, in an editorial appearing in the October 1904 issue of *Manual Training Magazine.* This article inaugurated the effort that changed the direction industrial arts would take for approximately 50 years.

Drawing and Manual Training Journal

The *Drawing and Manual Training Journal* was an early journal that represented the intersection of two subject areas within school programs: fine arts and manual training. Since industrial related courses were, from their inception for the most part, based on mechanical drawing, the link-up between drawing as an expressive art and drawing as a study of industrial practice was natural. An interesting

[1]The Union List of Serials indicates that Volumes 2-7 of the *Journal of Industrial Education* are held in the collection of the John Crerar Library, Chicago, Illinois.

feature of this journal was the justification for the study of drawing discussed in the first issue of the journal published in Charleston, South Carolina, in 1902. The essential ingredient of that justification was the emphasis on the development of instruction in drawing, based on its value for all children. Although the notion of the general educational value of industrial arts is generally considered to be a contemporary point of view with widespread acceptance, there are repeated examples well prior to 1900 suggesting that the study of industry-based subjects was recognized in a number of sectors as a legitimate liberal education experience.

Elizabeth M. Getz, as one editor of *Drawing and Manual Training Journal,* made the argument for drawing as a general education experience in the introductory article to the first issue of the journal by stating:

> As we learn to appreciate drawing in our school curriculum for its real value, we no longer look upon it merely as a pleasing accomplishment for a few, but as a necessity for all. (Getz, 1902, p. 1)

The table of contents for the journal also points out the interface of art and the more 'shop' oriented emphasis in traditional manual training. 'Elementary Wood Work' and 'Clay Modeling' were regular features in each of the numbers of the journal published between October 1902 and June 1903. The journal appears to have gone out of publication with the last issue published as Volume 1, Number 9 in June 1903. Although there is no reference in any available copies of the journal to explain the journal's short life, one can only assume the journal lacked the breadth of appeal required to sustain the subscription volume necessary to finance continued publication.

Vocational Education

The journal entitled *Vocational Education* commenced publication with Volume 1, Number 1 appearing in September 1911. Published by the Manual Arts Press, Peoria, Illinois, the journal was edited by Charles A. Bennett and William T. Bawden. Apparently the journal title was intended to represent an inclusive approach to the field since neither of the editors held positions with a title or attendant responsibilities in programs that today would be classified as vocational education. Charles A. Bennett was Professor of Manual Arts at Bradley Polytechnic Institute, Peoria, Illinois, while William T. Bawden was Assistant Dean of the College of Engineering at the University of Illinois at Urbana. The journal was published in the months of September, November, January, March, and May and was available at the subscription price of $1.50 annually.

Vocational Education appears to be the earliest journal to utilize an advisory board to guide its format and content. Since all potential authors were directed to submit manuscripts to William T. Bawden, Managing Editor, it seems unlikely that the advisory board served as a jury with respect to specific materials published, but probably served as a general policy sounding board. The people serving on the advisory board during the first two years of publication represent an interesting and diversified mix of professional positions, with education, industry, and government at all levels represented.

The content of the early issues of *Vocational Education,* as was the case with its predecessors, dealt less with questions of direct relevance to classroom and laboratory teachers than with the highly philosophic and often politically charged issues surrounding the emergence of industrial education in its many formats.

A topic that appeared again, this time in the early issues of *Vocational Education,* is the advance of industrial education as a subject of general education value. In one of the most scathing attacks up until that time, John Dewey lashed out at an organizational plan being promoted for adoption by the legislature of the State of Illinois. The arguments presented by Dewey were both politically timely and philosophically heady.

The plan proposed in Illinois would have established two separate administrative bodies at the state level: one for general education subjects and one for industrial education. Dewey systematically attacked the scheme as ill-advised from both an economic and a philosophic point of view. Dewey stated his case quite explicitly.

> The statement of the scheme ought to be enough to condemn it. . . . the scheme tends to paralyze one of the most vital movements now operating for the improvement of existing general education. The old-time general, academic education is beginning to be vitalized by the introduction of manual, industrial, and social activities; it is beginning to recognize its responsibility to train all the youth for useful citizenship, including a calling in which each may render useful service to society and make an honest and decent living. (Dewey, 1913, pp. 374-375)

This article is typical of many found in early journals. The overall tone of articles in early journal issues reflected a position in many quarters that journals at that time should deal with substantive philosophical questions, specifically the questions that were to shape the development of the field for many years to come. It is interesting to note that the questions and positions posed by Dewey are not unlike those being dealt with today.

Between its inception in September 1911 until September 1914, *Vocational Education* was published bimonthly as cited previously; *Vocational Education* was merged with the *Manual Training Magazine* beginning with the September 1914 issue (see Fig. 18-1.). The merger reflected an awareness of the interrelationships, both philosophically and operationally, that existed between the relatively young and emergent field of vocational education and manual arts education. The announcement of the merger of the two journals, including the rationale and general subscription information, appeared in the September 1914 issue of *Vocational Education.*

The journal entitled *Vocational Education* apparently continued in publication under various titles until 1939 (see Fig. 18-1.). Following the merger with the *Manual Training Magazine* in 1914, the title changed to *Manual Training and Vocational Education.* The title subsequently reverted to *Manual Training Magazine* from 1916-1922, at which time the journal continued publication as *Industrial Education Magazine* from 1922 to the ceasing of publication in November 1939.

Industrial-Arts Magazine

The first journal to use the term industrial arts in the journal title was the *Industrial-Arts Magazine,* which began publication in January 1914. Published by The Bruce Publishing Company, Milwaukee, Wisconsin, the journal was published monthly under the direction of a board of editors.

As is indicated in the introductory editorial statements in Volume 1, Number 1, the intent of the publication was to serve as a congealing force in the development of a unified arts program where the philosophic elements of vocational education, manual training, manual arts, and art would be represented and integrated. The issue stated in the 1914 editorial statement is not unlike sentiment that has been expressed in professional circles in recent years.

The editorial statement decried the tendency toward antagonistic competition among various components of industrial education. The journal was clearly designed to bridge the differences with a view toward a unified approach based on similarities. As meritorious a concept as that might have been, the journal needed to continuously reinforce the idea in subsequent issues.

An examination of the contents of early issues of the *Industrial-Arts Magazine* reveals that efforts to represent divergent points of view were successful, at least to the extent that articles were published identifying and discussing divergent perspectives. The first issue contained separate articles on manual training and vocational education written by different members of the board of editors. Additionally, editorial statements tended to focus on similarities within the several fields represented to reinforce the strength of common purpose rather than to highlight differences. Editorial comments in areas such as (a) the desirability of constructive professional criticism, (b) the importance of accuracy in the use of educational terminology (i.e., definitions of purpose), and (c) the importance of serving a diverse student population, served to reinforce the service intent of the journal.

One article that significantly shaped the course of the industrial arts field was the letter to the editors of the *Industrial-Arts Magazine* from Frederick G. Bonser, Director of Industrial Arts at Teachers College, Columbia University. It was in this letter that Bonser suggested using "industrial arts" as a term representative of the content area focusing on the study of industry for purposes of general education. This letter and its attendant point of view represent a milestone in the development of today's industrial arts. The arguments that trace the philosophical differences between manual training, vocational education, and the newly coined term industrial arts were summed up by Bonser:

> Industrial arts is a content term, not a disciplinary term. We would not think much today of a man who would propose a school course in memory training, or imagination training or reasoning training. We get all of these kinds of training, but we get them thru content subjects in which they are vital parts of the study, just as is manual training vitally an important part of industrial arts. Reduced to its real meaning, manual training is establishing nervous connections between the sense organs and muscles, making for muscular control. Of course penmanship is a form of manual training.
>
> Industrial arts is not used at all as synonymous with industrial education. Industrial education is a form of vocational education and training, just as is commercial education. Industrial arts is not to be thought of primarily for vocational purposes, altho its appropriate development would go far toward providing a foundation for vocational specialization, and especially as a basis for vocational guidance. The large claim for industrial arts is its importance in making for intelligence as consumers, and intelligence as citizens in an age in which industrial life is so prominent a factor.
>
> Which shall it be, industrial arts, a subject almost unlimited in possibilities for rich thought content of fundamental importance to everyone in our day, or manual training, a subject, which if it remains what its name really signifies, is devoted merely to the development of control of the hands – industrial arts, a term which suggests mental content and training using the hand work as a most important means, or manual training, suggesting something not at all largely inclusive of mental elements? Are not our teachers of the industrial arts just as much concerned with the mental development of the children as with their hand training? The Industrial-Arts Magazine and its readers can do much to give reality, worth, and dignity to a school subject called industrial arts, possessing all of the values of manual training and much not appropriately included by that term. Is there not some significance in the appropriateness of a name?
>
> Frederick G. Bonser,
> Director Industrial Arts,
> Teachers College, Columbia University
>
> EDITOR'S NOTE – The editors of the Industrial-Arts Magazine welcome at all times, criticisms and discussions of articles, illustrations and news matter which appear in the magazine. Communications to receive attention must be signed in all cases. No letters will be published without the permission of the writers. (Bonser, 1914, p. 112)

The term industrial arts appeared in print to denote a generic field of instruction well in advance of Bonser's employment of the term to reflect a particular subject emphasis. For example, the United States Department of the Interior, Bureau of Education, the organizational forerunner of the United States Office of Education, published an analysis of programs of education in industrial and manual training in 1892. The analysis took the form of a book entitled, *Education in the Industrial and Fine Arts.*

Additionally, the journal title *Industrial-Arts Magazine* was originally intended to reflect not Bonser's use of the term, but rather generic use of the term that has since been supplanted by the term industrial education.

The historical development of the *Industrial-Arts Magazine* represents an example of survival based on a flexible response to changing emphasis within the field. First, the apparent popularity of the journal resulted in an inability of the publisher to satisfy requests for copies of the journal's early issues, and an offer to purchase back copies from subscribers appeared in the journal after 1914.

The popularity of the *Industrial-Arts Magazine* is also reflected in its merger with two other publications after 1914, namely the *Arts and Crafts Magazine* and *Handicraft.* The newly merged journal retained the title *Industrial-Arts Magazine* and continued publication under that title until 1930. The title of the journal changed in 1930 to *Industrial Arts and Vocational Education* while continuing under publication by The Bruce Publishing Company. *Industrial Arts and Vocational Education* continued publication under that title until 1972, at which time the present title of the journal, *Industrial Education,* was adopted (see Fig. 18-1.). The Bruce Publishing Company continued publishing the journal under its many titles until Volume 58, Number 6, in June 1969. Publication was then assumed by CCM: Professional Magazines, Inc. formerly The Bruce Publishing Co., a divisioin of CCM. It has been published by MacMillan Professional Magazines, Inc. since Volume 62, Number 2, February 1973. In all cases in which the journal title changed, the changeover came without apparent fanfare. In at least one instance, the change of title gradually appeared via subtle changes in cover design to reflect a new title.

The *Industrial-Arts Magazine* and the subsequent titles reflect the first industrial education journal that has sustained itself up to the present time.

Vocational Education Magazine

The National Society for the Promotion of Industrial Education was formed at New York City on November 16, 1906, and subsequently reorganized on February 23, 1918, as the National Society for Vocational Education (NSVE). The organization of these two groups marked the initiation of a process of professional evolution that ultimately resulted in the formation of the American Vocational Association in 1926. A part of that evolutionary process resulted in the publication of a journal sponsored by the National Society for Vocational Education. *Vocational Education Magazine* was published by J. B. Lippincott Company, Philadelphia and was issued 10 times each year, September to June inclusively. Initially, the subscription price was $3.00 annually, with single copies available at $.40.

The *Vocational Education Magazine* was edited by David Snedden, Teachers College, Columbia University and apparently operated without the use of an editorial or advisory board. The intent of the journal as stated in Volume 1, Number 1, issued in September 1922 was to provide an organ of communications among all people interested in vocational education.

In his initial editorial in 1922 Snedden introduced the journal. Snedden made specific reference to the fact that industrial arts was, in 1922, represented very adequately by two professional journals. Snedden was apparently referring to the *Industrial-Arts Magazine* and *Manual Training and Vocational Education,* both in active publication in 1922. There seemingly was a movement afoot during this time period to identify each journal according to a narrowly defined scope of interest, presumably in an effort to concentrate dialogue on certain issues and perspectives. Following this analysis to its reasonable conclusion, one would expect the *Vocational Education Magazine* to concentrate on the somewhat constricted field of vocational education excluding manual arts, manual training, and industrial arts. That was not the case. Throughout its short existence, the journal continued to publish articles that discussed the full range of issues and ideology in industrial education. Making a concerted effort to back away from initial editorial positions regarding the primary thrust of the journal, Snedden issued a statement on editorial policy only five issues after the first issue in September 1922.

The editorial was carefully constructed in an apparent effort to smooth any feathers ruffled by the September 1922 editorial statement. Snedden restated the journal position as follows:

EDITORIAL POLICY

The question has several times been asked in friendly spirit "What is the editorial policy of Vocational Education Magazine?"

Speaking for one of the editors, the undersigned is of the opinion that the only editorial "policy" thus far defined or likely to be so in the near future is one of helpfulness to all good causes, to the cause of good education more particularly, and still more particularly, to the cause of good vocational education.

> Certainly this magazine should not and will not represent a policy of antagonism to any good education. Naturally, it seeks to assemble opinion, the results of experience, and scientific knowledge in one field only – just as do journals devoted respectively to the classical studies, to visual education, to the teaching of science, to physical education, to the industrial arts, to general secondary education, and the like.
>
> The first few pages of each issue are designedly devoted to topics supposedly of relatively general interest or significance either to vocational education or to the connecting links and twilight zones between vocational and non-vocational education. For this department contributions are especially invited from men and women not identified with vocational education. Certainly no pertinent and significant contribution receives adverse consideration because of any difference of point of view between contributor and editor. (Snedden, 1923, p. 329)

The conflict that was apparently triggered by the early editorial statement and the subsequent restatement may have been resolved at the philosophic level, but was reinforced by the actual contents of the journal. On the one hand, the table of contents for the journal listed articles by departments within the journal. There were seven departments listed for the last issue of the journal published in 1925. The seven departments were: (a) Department of Agricultural Education, (b) Department of Commercial Education, (c) Department of Homemaking Education, (d) Department of Industrial Education, (e) Department of Part-Time and Continuation Education, (f) Department of Training in Industry, and (g) Department of Book Reviews and News Items. There were no departments listed for allied fields, namely manual training and industrial arts. One would assume that the effort to limit the contents to vocational education in a narrow sense was in fact effected. This was not the case. In fact, David Snedden himself published an article that stressed the importance of industrial arts as a subject in general education.

The article entitled, "Reconstruction In Industrial Arts Education" appeared as the major article in Volume II, Number 4, issued in December 1923, eleven months after the restatement of editorial policy that appeared in January 1923. The article presented by Snedden was an article of significant importance in the historical evolution of industrial arts. Snedden's position provided a clarification of the role and purpose of industrial arts, particularly at the junior high school level. Snedden systematically challenged the pre-vocational objectives of industrial arts while emphasizing the importance of the "developmental experience." The philosophical posture taken by Snedden coupled with the article by Bonser in the *Industrial-Arts Magazine* in 1914, set the stage for the maturation of the entire range of philosophic and operational perspectives in industrial arts right up to and including the present.

Snedden's article was the forerunner of a book published in 1927 with a similar title and edited by David Snedden and William E. Warner. The book, *Reconstruction of Industrial Arts Courses*, was published by the Bureau of Publications, Teachers College, Columbia University in 1927.

The *Vocational Education Magazine* ceased publication with Volume III, Number 1, in January 1925. The decision to cease publication came on the heels of continued subsidization of the journal by the NSVE. A report issued by the Executive Board of the NSVE at the Cleveland Convention on December 4, 1925, and published in the *News Bulletin — American Vocational Association* in February 1926 cited economic reasons for ceasing publication of the magazine.

> One of the outstanding problems facing the Executive Committee at the beginning of the year was the publication of the *Vocational Education Magazine*. There seemed to be a very strong sentiment for the continuance of the publication of this magazine if a means could be found for adequately financing it. The Executive Committee . . . vigorously set to work to produce, if possible, sufficient subscriptions to put the magazine on a self-supporting basis. . . . The result . . . was a greatly increased subscription list. This proved to be insufficient, however, to meet the financial needs of the publication as the number of those who failed to renew their subscriptions was so large as to nullify much of the effectiveness of the subscription campaign. (*News Bulletin — American Vocational Association*, 1926, p. 5)

The *Vocational Education Magazine* was supplanted by a quarterly news bulletin published beginning in February 1926 (See Fig. 18-1.). The *News Bulletin — American Vocational Association* was primarily a vehicle for the dissemination of information related to important news regarding the field of vocational education and the work of the newly formed American Vocational Association. The *News Bulletin* continued in publication from 1926 to 1935 at which time the title changed to the *AVA Journal and News Bulletin* (See Fig. 18-1.). The Association reported the change in policy beginning with Volume IX, Number 3, August/September 1934 and continuing with Volume X, Number 1, 2, May 1935.

The general pattern of change reflected the Association's desire to formulate a journal that provided a vehicle for both news and professional discussion of relevant issues. The *AVA Journal and News Bulletin* continued in publication until January 1945 at which time it became the *American Vocational Journal* (See Fig. 18-1.). The *American Vocational Journal* has continued in publication since 1945 up to the present. The *American Vocational Journal* and its predecessors represent the second professional journal related to industrial arts to have survived in continuous publication from its inception to the present time.

School Shop

Following closely on the heels of the formation of the *AVA Journal and News Bulletin* was *School Shop,* published since 1941 by Prakken Publications, Ann Arbor, Michigan.

The impetus for the introduction of *School Shop* was based on two factors: (a) the editors reported that more than two-thirds of the shop teachers in the country did not receive any journal edited exclusively for teachers of industrial subjects and (b) the fields of industrial arts and vocational education were growing at an accelerating pace. Lawrence Prakken, the editor and publisher, cited the above reasons as the backdrop for the development of the journal (Prakken, 1941, p. 2).

The first issue of *School Shop* also included a request for manuscripts for publication in the journal as well as a statement of circulation policy.

The identification of the areas in which manuscripts were solicited is noteworthy because of the emphasis on practical classroom material. The emphasis that *School Shop* placed on the dissemination of information directly relevant and useful to classroom practitioners has been the key element in the editorial policy of *School Shop* since its inception in 1941. *School Shop* was very clearly soliciting materials written by classroom teachers to be published in a journal aimed directly at classroom teachers.

The circulation policy of *School Shop* was entirely consistent with editorial policy. The journal was issued to all teachers and supervisors of shop subjects on a complimentary basis, with all others receiving the journal at a subscription rate of $2.00 per year. The cost of publication was underwritten by the selling of advertising space to manufacturers and suppliers of school shop equipment and supplies. *School Shop* is the only journal published up to the present that has provided the journal at no cost to teachers and supervisors and that has continued to bear the cost of publication and distribution through advertising.

Although the primary emphasis for *School Shop* was centered on practical teaching materials, the journal nonetheless also provided the forum for discussion of philosophic ideas and positions relative to the development of industrial arts. The journal's pages are repleat with examples of materials of non-shop orientation, although even the most conservative reader should have been able to relate the content and thrust of articles to practical teaching or supervision problems.

One of the better examples of non-shop articles was published in October 1941. The manuscript was prepared by Maris M. Proffitt, Educational Consultant and Specialist in Industrial Education, United States Office of Education. Entitled "How Goes Industrial Arts?", the article summarized some of the trends in industrial arts as they were noted from reports made to the United States Office of Education and from observation and study by the author. Proffitt identified the following eight categories of trends in industrial arts:

1. Alignment with objectives and principles obtaining in general education.
2. A broadened program of activities.
3. General-shop form of organization.
4. Increasing enrollments.
5. Increasing the qualifications of teachers.
6. Improved physical facilities.
7. Extending pupil experiences beyond the four walls of the classroom.
8. A keener realization of the value of industrial arts for girls.

(Proffit, 1941, p. 3)

The article by Proffitt was consistent with the philosophical position being promoted by many national leaders in industrial arts at that time. The accelerating emphasis on the formation of an industrial arts curriculum was based primarily on the role of industrial arts in general education and its inherent focus on the breadth of student experiences and the interface of industry and society. Although this position was undoubtedly not universally embraced by the profession, and in particular the clasroom practitioner, it did reflect the general philosophical trend that was manifest in many articles published in all professional journals at the time.

As was the case with virtually every journal in the field, the title of the journal varied slightly over time, although in the case of *School Shop,* the varying title occurred in the subtitle of the journal, including *School Shop: For Industrial Arts and Vocational Education Teachers* and *School Shop: Industrial-Technical Education.* The varying subtitle enabled the journal to reflect subtle changes that occurred in the total field of industrial education and did not reflect a substantially new editorial posture. *School Shop* has continued in uninterrupted publication from 1941 to the present.

The Industrial Arts Teacher

The year 1942 marked a milestone in the development of professional journals in industrial arts education. *The Industrial Arts Teacher* was published in April 1942 from Newark, New Jersey, by the newly formed American Industrial Arts Association (AIAA). The Association was organized in 1939 as a vehicle for the conducting of programs in the conventions each June of the National Education Association. Additionally, the organization was to sponsor industrial arts leadership conferences during the meetings each February of the American Association of School Administrators. The publications of the AIAA between the formation in 1939 and the introduction of *The Industrial Arts Teacher* in 1942 consisted primarily of 14 mimeographed releases in 1940 and four printed releases in 1941. As was indicated in the genesis statement appearing in Volume 1, Number 1, of *The In-*

dustrial Arts Teacher, the earlier publications were generally designed to disseminate news of the Association. The genesis statements described the reason for development of a mechanism for periodic reporting as follows:

> GENESIS
>
> The present publication supplements and varies from our habit of producing programs and addresses to something that will permit of periodical reporting. We hope in this way to gain for our members and friends a closer professional relationship in the job of developing industrial arts education in the United States. Any suggestions, as well as memberships, will therefore be appreciated. It will cost about $250 to print and place 15,000 copies of this publication in the mails each time, which we shall hope to do either three or four times in 1942, but that is entirely up to the support of our members.
>
> To say that this sheet must be uncontrolled by any business or political interest is just as obvious as that it must be motivated entirely by professional goals. The industrial arts profession has never had anything quite like this before – something completely its own – so, many should therefore be wanting to help us make something of it. Some want us to 'get down to the level,' and we assume they refer to the 'teacher in the basement' whose superintendent usually refers to him as 'that fellow with the sawdust in his hair.' Some feel that we 'won't be read unless there are pictures,' which has inspired one understanding university president to inquire, 'Of bathing beauties?' A city director has ventured even further with the observation that our men expect five dollars worth of personal return for their individual dollar memberships, which all goes to show the impression that some of us make. Be that as it may, our fourteen mimeographed releases of 1940 were very small editions produced and mailed at relatively small cost, but our four printed releases of 1941 were produced in editions of 10,000 copies and mailed at a cost of slightly over $1,000.00. (American Industrial Arts Association, 1942, p. 1)

The introduction of *The Industrial Arts Teacher* marked the first journal published exclusively for industrial arts educators. Previous journals, including those that used the term "industrial arts" in their titles, were eclectic to the extent that they were designed to serve the needs of divergent groups. Industrial arts people felt a need for a periodical dedicated solely to addressing topics that would appeal to those who viewed industrial arts as uniquely and distinctively different in content, thrust, breadth, scope, and purpose from all of the other allied areas of industrial subjects. Louis V. Newkirk expressed that position in a blunt and sometimes stinging appeal for membership and support of the newly formed Association and its journal in a brief statement in the first issue of *The Industrial Arts Teacher.* He stated:

LET GEORGE DO IT

The inimitable Nicholas Murray Butler, long-time president of Columbia University, is quoted as saying that he divides the world into three classes: 'First, the few who make things happen; second, the many who watch things happen; and third, the overwhelming majority who have no notion of what happens.'

The opportunity to participate actively in the development of one's profession, not to mention one's civic responsibilities, is a rare privilege, and ought not ever to be passed by. An instance has recently come to our attention of the art teachers in one state who faithfully pay dues to the state vocational association, one dollar of which is then sent on regularly to the national association where no return to them or art education is even remotely possible. But if this is odd for art teachers to do, then we should be shocked over the fact that the industrial arts teachers are so inept in twenty-three of the states as to support a great assortment of local, district, and state specialized interest groups that do not use the term 'industrial arts' in their titles, which leads us to doubt that they can ever foster a geniune type of industrial arts program.

Perhaps an altogether too prominent critic was right when he stated recently that the industrial arts profession was generally inarticulate and easy to exploit. Shall the accusation stand? Are we simply not very bright, or are we just complacent and perfectly willing to let George do it? If you feel that the industrial arts profession should stand on its own feet, think for itself, have a program, all in the interest of American education and the welfare of the nation, then say it by sending a dollar in to the national office now for 1942 dues and by inviting your friends to do likewise. If our profession is to be united and win the respect of the nation's educational and industrial leadership, it will be only as a result of our own initiative – because George simply can't do it for us. (Newkirk, 1942, p. 2)

The Industrial Arts Teacher did not delay in utilizing its pages as a forum for delineation and clarification of the philosophical differences that were rapidly developing between industrial arts, manual training, and vocational education. Leon Mones, Principal of Cleveland Junior High School in Newark, New Jersey, published an article in January 1944 that clearly represented a direct, frontal attack on those forces that viewed industrial arts either as: (a) an intolerable departure from traditional education or (b) an infantile form of vocational education. Presumably reflecting the position of the AIAA, Mones stated:

We who believe we know the value of Industrial Arts in a program of liberal education must be bold and alert in revealing the fallacies and misinterpretations of those who do not choose to love us or understand us.

Those who do not love us tell us so quite frankly. They are the hostile legions of academicians, educational feudalists, literati, classicists, and intellectual cultists who accuse us of vulgarizing the aristocratic traditions of education. Some of these people are well meaning enough, but they don't try too hard to understand us. They hug the notion that we who sponsor the Industrial Arts are Philistines, vandals, or industrial bulls in academic china shops. Sometimes they are tolerant enough to concede that Industrial Arts can offer some help in the schooling of dullards and some relief from the mental exertion of real education.

Our point is simply this. We do not differ from the traditionalists in basic aims and objectives. Not at all. We believe, as they do, that a liberal education should develop mental power, articulate expression, conscious appreciation, and principled taste. And we insist that by skillful education revolving about Industrial Arts we can do just these things, and this point of view we must continue to explain and emphasize patiently, tactfully, again and again.

But curiously enough, even in our own camp, we have colleagues and brothers who only partially appreciate our position. We have, for instance, our well-disposed but rather confused co-thinkers who do not clearly differentiate between Vocational Education and Industrial Arts. To such as these we say frankly and honestly, 'We are all in favor of Vocational Education. We do not oppose it at all. But let Vocational Education fly its own banner and stand on its own feet. Vocational Education is very definite training in the use of a skill that can be sold on the market. It is good training and worth-while training. It is training that takes brains, and interest, and application on the part of the teacher and learner. More power to it, and if necessary, more financial subsidy. But it is not Industrial Arts Education. Vocational Education is a selective type of training for the selected ones who want it. Industrial Arts Education is a broad, comprehensive, liberal education for everybody, even for those who will later select Vocational Education – as who will not.' (Mones, 1944, p. 1)

This article by Mones and numerous others, similar in thrust, continued the long and rich heritage of literature in the industrial arts field. The literature has continued to shape industrial arts as general education and, specifically, as a subject area distinctly different from all other allied fields that draw content from an industrial content base.

The Industrial Arts Teacher continued as the periodical journal of the AIAA from April 1942 until December 1963. The last issue of *The Industrial Arts Teacher* was published in December 1963 and was replaced by *The Journal of Industrial Arts Education* beginning with Volume 23, Number 3, published in February 1964 (See Fig. 18-1.). Earl M. Weber, the seventh editor of *The Industrial Arts Teacher,* marked the transition to the new title and format for the journal in the regular column entitled "The Editor Has the Last Word." Weber, conveying a deep sense of historical sensitivity, made the following appraisal of the meaning of the change in the journal by stating:

THE EDITOR HAS THE LAST WORD

The 'Last Word' has a kind of special meaning in this issue, since this is the last issue of 'The Industrial Arts Teacher.' In January our magazine passes from adolescence to maturity. A new magazine with a new name, a new format, a new editor, and a new staff will appear. We wish it well.

> But growing up doesn't come easy (as any adolescent knows) and growing pains are very real; they do hurt. So at the risk of an unbecoming show of sentimentality, allow me to shed a few tears and express a few thanks for myself and the previous editors who put a part of themselves into this slim little journal we called *The Industrial Arts Teacher.*
>
> The tears are of the same kind that were shed by many farmers of a generation ago as they converted from horses to tractors as a source of power on their farms. Though the change was completely practical, an economic necessity, and inevitable, this did not alter the kind of hollow feeling the farmer had as he saw his horses sold at auction. This partnership of horse and man had shared too much hard work and had experienced too many pleasant memories for the separation to be taken lightly. So it is with the editor and *The Industrial Arts Teacher.*
>
> Thanks for the cooperation from so many of you in helping to review books, prepare manuscripts, submit news items, and write letters to the editor. (There were never too many of these.)
>
> Thanks for being not too critical when the magazine came out a bit late as it sometimes did.
>
> Thanks for the many kind expressions of encouragement – they frequently came when we needed them most.
>
> But most of all:
>
> Thanks for allowing us the privilege and luxury of airing our personal views and ideas in 'The Editor has the Last Word.' (Weber, 1963, p. 22)

The new directions implicit in the reorganization of the journal of the Association were highlighted in the first issue of *The Journal of Industrial Arts Education.* Earl Weber described the rationale for the new journal title and format in a February 1964 editorial contained in Volume 23, Number 3.

The Journal of Industrial Arts Education continued in the tradition of its predecessor in dealing with issues and problems basic to the field of industrial arts. Articles continued to deal with the substantive issues of philosophy, curriculum, and supervision with the belief that discussion of those issues would over the long term, strengthen and solidify the evolving field. The striking difference between *The Journal of Industrial Arts Education* and a number of the other journals was the lack of space devoted to the direct classroom activities, student project ideas, and "shop hints." The journal seemed to take the position that the other journals should deal with that type of content and the journal should concentrate on the more fundamental questions. In any event, that editorial format appears to have been continued until very recently.

As the industrial/technological society of the mid 20th century and beyond emerged, the journal once again took on a new title and direction.

Edward Kabakjian, Executive Secretary of the AIAA, announced the new title for the journal in 1970 in an editorial appearing in the September/October issue. Kabakjian stated the reasons for the change as follows:

> With the challenges of a new decade now before us and with the many signs in evidence indicating the beginning of a new era in the growth and development of that discipline which dedicates itself to the task of enriching the lives of youth with the knowledge and skills of the past, present and future technologies of mankind, in order that they might find the world a more enjoyable and profitable place in which to live and to contribute, a change in name seems appropriate. The new name for *The Journal of Industrial Arts Education* was not made merely for the sake of change, but rather in response to a continual effort by the profession to remain sensitive to the needs of society and to its role in the educational community. In recent years the profession has been telling itself that it must change. The organization has presented papers at its conventions and in its publications supporting the need for modification and changes in our policies and practices. Although we have been quick to suggest change, we have been somewhat reluctant to do so ourselves. It would almost appear that what we are saying is meant for others and not ourselves, but fortunately sufficient evidence exists which would dispel such a notion.
>
> *Man/Society/Technology — A Journal of Industrial Arts Education* has been selected as the new title of the magazine formerly known as *The Journal of Industrial Arts Education* and *The Industrial Arts Teacher* (Kabakjian, 1970, p. 5)

There were three categories of consideration used in making the decision for modification of the journal title: editorial, professional, and economic. Some editorial changes included: (a) increasing the number of issues from five to eight per year, (b) establishing a standard professional contribution of free pages to the profession and authors of the journal. Authors were to be limited to articles four pages in length with a per page charge for publishing pages in excess of the four page limit, (c) dropping some regular feature departments and adding others and, (d) inviting people outside the field to contribute articles.

Economic factors resulted in a reduction in the number of pages of each journal and the quality of the paper stock used in printing. Inflationary trends and the cost of mailing necessitated economy measures to insure continued publication.

Kabakjian placed the bulk of rationale for the change in title in the professional area. He stated that the economic and editorial reasons and their attendant decisions were relatively easily arrived at.

Man/Society/Technology has continued in publication under that title from 1970 until the present. As the official periodical journal of the AIAA, the journal has continued as the only journal with an exclusive emphasis on industrial arts.

Journal of Industrial Teacher Education

A journal directed exclusively to teacher educators began publication in the fall of 1963. The *Journal of Industrial Teacher Education* is the official publication of the National Association of Industrial and

Technical Teacher Educators and is provided free to all members of that organization. Subscriptions to the journal were available with the first volume. The cost of publishing the journal is underwritten by the American Technical Society. A quarterly journal since its inception in 1963, the journal is published three times each year: Fall (November), Winter (February) and Spring (May).

The first editor of the journal, Ralph C. Bohn, stated the objectives for the journal in Volume 1, Number 1, as follows:

1. Provide rapid publication and distribution of research and professional reports to members of the industrial teacher education profession.
2. Promote free and venturesome thinking – challenge and evaluate the accepted and the traditional – encourage experimentation and creative problem solving.
3. Establish harmony within the profession by promoting the unification of all phases of industrial teacher education into a common objective of providing an ever improving program of industrial education for all the youth of America. (Bohn, 1963, p. 1)

The journal was intended to focus on issues of concern primarily to a narrow segment of the total profession. The editors stated from the beginning that the journal was intended not to serve the readership of the journals published at that time, but rather to complement them and fill a void in professional literature. The journal solicited manuscripts for consideration under the following topical categories: (a) Research studies, (b) Collegiate curriculum, (c) Philosophical concepts, (d) Collegiate teaching methods, (e) Evaluation, and (f) Related disciplines.

As the journal issued successive volumes, the general thrust and priorities began to mature and become apparent. The relative emphasis on research became evident as early as the second number of the first volume. Volume 1, Number 2, introduced a section on "Research in Progress." The editorial staff stated its intent to include this section in each journal issue.

The research emphasis continued to flourish during the journal's earliest years and was evidenced by the inclusion within the journal of increasing numbers of articles with an experimentally based research model.

The *Journal of Industrial Teacher Education* has remained in continuous publication since 1963 and is the only journal in industrial education to be exclusively directed at teacher educators.

The Journal of Epsilon Pi Tau

Although the first volume of *The Journal of Epsilon Pi Tau* was published June 1, 1974, the roots of that journal go back to 1930. *The Epsilon Pi Tau Review* was published beginning with Volume 1 in 1930 and continued through Volume IV in 1933. The Review ceased publication after 1933 and was replaced after World War II with a series of monographs on a selected list of topics.

The central mission of *The Journal of Epsilon Pi Tau* has been to serve as a medium of communication between Epsilon Pi Tau fraternity chapters and to stimulate chapter activity that warrants international publicity. Additionally, the journal is intended to act as a sounding board for dialogue among the membership of Epsilon Pi Tau on professional problems and issues as well as to provide a vehicle for reporting research.

The first issue of the journal was a tribute to William E. Warner, founder of Epsilon Pi Tau fraternity. The issue consisted of testimonial statements of individuals who knew and worked with Professor Warner. Although the future intent of the journal was somewhat clouded at the time the first volume was published, the direction became clearer with subsequent issues. Outstanding people in industrial arts and industrial vocational education were invited to submit timely articles. The list of contributors to the journal has indeed been impressive.

The journal was published as one volume annually until the editorial responsibility was shifted from Delmar Olson to Jerry Streichler. Volume III, Number 1, edited by Executive Secretary Streichler was published in the spring of 1977 and marked the first issue offering non-member subscriptions at $3.50 per copy.

Although the contents of the journal have not fixed on a regular sectional structure, the emphasis remains as it was stated in Volume II published in 1975: namely feature articles, chapter news, research, miscellaneous items.

Manufacturing Forum

The most recently developed journal in industrial arts is the *Manufacturing Forum,* which began publication with the first volume issued in the fall of 1976. The journal is a quarterly publication dedicated to providing an avenue for the presentation and discussion of ideas and the sharing of information pertaining exclusively to the teaching of manufacturing.

The *Manufacturing Forum* had its roots in a meeting of individuals interested in developing and/or improving manufacturing programs. That meeting at the AIAA conference in Des Moines, Iowa, resulted in the formation of the Manufacturing Educators Consortium that was to act as the nucleus of the publication effort. The purpose of the Manufacturing Educators Consortium was to develop a publication to serve as a vehicle for the exchange of philosophical positions and practical information related to the teaching of manufacturing. The first issue contained a series of articles written by authors who have published materials concerning manufacturing and presented a broad overview of manufacturing programs, their scope and content.

The *Manufacturing Forum* is produced by an editorial board consisting entirely of college and university personnel. Each issue is edited by one or more members of the editorial board with editorial responsibility rotating throughout the complete editorial board. The articles published have included writings by industrial personnel, college and university staff, and classroom teachers. Most authors have had direct experience teaching in a manufacturing program.

Since the inception of the journal, nine issues have been published at the time of this publication. Each issue has concentrated on a specific topic in manufacturing. The first issue, published in the fall of 1976, provided the broad overview of manufacturing and the following issues and topics followed.

Winter, 1977	Volume 1, Number 2	Research and Development: Developing Products
Spring, 1977	Volume 1, Number 3	Production: Developing Productive System
Fall, 1977	Volume 2, Number 1	Finance: Organizing and Financing the Enterprise
Winter, 1978	Volume 2, Number 2	Marketing: Developing Marketing Systems
Spring, 1978	Volume 2, Number 3	Research and Development: Designing and Selecting Products
Fall, 1978	Volume 3, Number 1	Production: Engineering Production Facilities
Winter, 1979	Volume 3, Number 2	Production: Developing Quality Control Systems
Spring, 1979	Volume 3, Number 3	Industrial Relations: Developing Personnel Systems

PROFESSIONAL JOURNALS: PRESENT AND FUTURE

Present Status

Currently there are seven journals published in the field of industrial education with materials related to or of direct interest for industrial arts educators. Six of the seven journals are multi-purpose in terms of the subject specialties they serve, while one journal is directed exclusively to industrial arts content. All levels of the profession are served in the current mix of journals. The full specturm from pre-service to college and university personnel are served by at least one or more of the journals. Of the seven journals presently published, only one is designed exclusively for a single specific readership.

As was the case historically, there appears to be no journal that has adopted a particular ideological perspective with the result that there remains a forum for the discussion of a full range of ideas and philosophic positions.

In an effort to gauge the current status of professional journals, a survey questionnaire was developed and sent to the editors of six of the seven journals currently published. The seventh journal, *Manufacturing Forum* was introduced so recently as to preclude the necessity of current survey.

The survey was divided into two major sections. The first section dealt with historical information while the second section concentrated on current publishing information.

Since the format of the research survey does not lend itself to tabulation of data, the general findings of the survey have been summarized in prose format by examining the responses by current journal editors to several key survey questions.

Question: Does the journal have a current editorial policy governing manuscripts published in the journal?

All respondents to the survey indicated the existence of an editorial policy. The policies varied in both amount of detail and the substance of the policy statement. All journals reported similar stylistic requirements for manuscript preparation, including typed, double-spaced copy. Some journals reported a maximum word count permissible while one journal reported detailed standards for artwork.

Question: Does the journal have an editorial review board? If yes, is the board responsible for reading and approving articles prior to publication?

All journals reported the existence of editorial review or editorial advisory committee. The functional role of the committee varied from journal to journal. Four of the journals reported that the editorial boards acted as jurors in the reading and approval of manuscripts for publication, while the two others reported the role as strictly advisory in matters of editorial policy and manuscript publication. As one might expect, those journals that utilized a recommending jury were associated with professional organizations in industrial education, while the two reporting the nonjuried approach to manuscript approval were published in the private sector. In all cases, the editorial boards appeared to assist in the setting of overall goals and directions of the journals.

Question: Is the journal designed for a particular reader market, i.e., classroom teachers, teacher education, researchers, curriculum specialists, and supervisors?

All editors reported that their respective journals were designed to appeal to a specific reader group. All journals except one reported a primary emphasis on the classroom teacher in industrial education with one journal limiting the classroom teacher group to industrial arts teachers exclusively. One journal reported a reader market restricted primarily to teacher educators and doctoral level graduate students preparing as teacher educators. Five of the six journals reported a somewhat lesser emphasis on teacher educators, supervisors, curriculum specialists, and researchers in that order. Thus, the journals currently being published placed primary emphasis on the classroom teacher market and the least emphasis on the researcher market. The currently published journals do, however, attempt to present materials of interest to a very broad, diverse reader group.

Question: If the journal is designed for a broad reader appeal, approximately what percentage of the articles would appeal to the following groups: classroom teachers, teacher educators, researchers, curriculum specialists, supervisors, college students, administrators?

This question was intended to gauge the material presented in the journal with the reader market(s) identified in the previous question. The responses are reported in Fig. 18-2 and provide an overview of the percentage distribution of articles that would appeal to the identified reader groups. In all cases, there was consistency between the reader market being served, and the proportion of articles that would appeal to that same group. Only those journals that responded to this question are included in the profile presented in Fig. 18-2.

	Classroom Teachers	Teacher Educator	Researcher	Curriculum Specialist	Supervisors	College	Administrators
Man/Society/Technology	25%	30%	30%	20%	25%	50%	25%
American Vocational Journal	55%	25%		35%			30%
Journal of Industrial Teacher Education		100%	25%			95%	
School Shop	95%	95%	0%	10%	100%	90%	25%
The Journal of Epsilon Pi Tau	50%	50%	25%	50%	25%	50%	50%

Fig. 18-2 Reader Market Profile

	Curriculum	Philosophy	Contemporary Issues	Teaching Techniques	Student Projects	Research Techniques	Industrial Developments	Legislation	Futurism	Environment	Safety
Man/Society/Technology	*	*	*	*	*			*	*		
American Vocational Journal	*	*	*	*				*			
Journal of Industrial Teacher Education		*	*								
School Shop	*	*	*	*	*		*	*		*	*
The Journal of Epsilon Pi Tau	*	*	*						*		
Industrial Education				*	*						

Fig. 18-3. Journal Self-Perceived Strengths

Question: In which of the following areas do you feel the journal makes its strongest contribution to the profession?

This question was posed to assess the content areas in which each journal perceived its strengths. The responses to the question presented in Fig. 18-3 reflect only those journals responding to the question.

The self-perceptions summarized in Fig. 18-3 tend to support the view that the journals currently publishing materials in industrial education are very diverse. There were no single categories in which there was universal agreement by all journals, and all categories except research techniques received attention by at least one of the reporting journals.

Future Directions

In an effort to gauge the direction(s) to be taken by the individual journals in the future, each journal editor was requested to submit a statement describing plans for the future. The responses ranged from brief, generalized statements of direction to specific detailed description of role and function and future directions. The statements submitted by each journal editor are presented in their entirety in order to present as clear a picture of the future as possible. (White, 1977).

MAN/SOCIETY/TECHNOLOGY

Man/Society/Technology is a major medium of communication among industrial arts educators. It is the official journal of the only national professional organization dedicated solely to the development and improvement of industrial arts education. The journal is written by and for industrial arts teacher educators, supervisors/administrators and classroom teachers from kindergarten through high school. It provides industrial arts educators with a forum for discussing classroom techniques, classroom projects, curriculum ideas and theory about industrial arts education as an integral part of the general education system and its role today and tomorrow in helping students become knowledgeable and skilled in the industrial arts to enable them to be technologically literate, career conscious and community aware citizens. As such, material in the journal addresses the areas of energy education, career education, vocational/technical education to a limited extent, and interdisciplinary education in addition to industrial arts education.

Industrial arts educators are attempting more and more to have their instruction reflect technological developments in industry, such as alternative energy sources for powering the machines and the products of industry, and the impact of its products. They are becoming increasingly concerned about the rapid advances of technology which causes many jobs to become obsolete in short time and are helping their students become career conscious. They are acting on their realization that industry is not divided into industrial arts, math, sociology, etc., by teaching related content areas and subjects using an interdisciplinary approach. They are becoming cognizant of women's needs to have careers outside of the home and the talent women can contribute to community development and productivity. M/S/T will continue to focus on energy (technological) education, career education and interdisciplinary education and industrial arts education and to encourage females to become involved in industrial arts. M/S/T also will help I.A. educators bring industrial arts into communities through adult education programs and community involvement through their classroom activities. Potential authors are encouraged to point to the impact their theses will have on the classroom teacher and his/her students and the application of their ideas in the classroom.

AMERICAN VOCATIONAL JOURNAL

The safest comment to make here is that the direction of the *AV Journal* in the next five to ten years will be determined by what happens in the field of vocational-technical education. The Journal will always reflect the trends and developments in the vocational education field. This will necessarily include developments in federal legislation and developments in the national economy. We are already seeing some of this in the trend to energy education. I have no doubt that accountability will be a continuing concern, and along with this, I believe the Journal will continue to address social issues such as special needs education, sex stereotyping, vocational education for prison inmates, etc. Youth unemployment, for example, has been named a "must" consideration for the next publishing year.

There are some other signs indicating that the content of the Journal could become broader in scope, in terms of the interest groups it addresses. From the point of view of this observer, these signs can be seen in the volume of unsolicited manuscripts that reach the Journal office – pressures from interests that want to be represented. One example of this is a broadening in terms of educational levels. There is a marked increase in postsecondary authors who want to tell their story, and even some college-level authors (and I don't mean teacher educators) who seem to feel that their concerns are legitimate vocational education concerns. The same can be said of articles from the grade-school level, even (in one instance) reaching down to the primary grade level.

Another example is the growing interest on the part of 'related subject' educators – reading specialists, vocational math and science teachers – not to mention general educators involved in work experience programs. Judging from unsolicited manuscripts, there is a strong interest here. And, as you may know, the AVA at the Houston Convention approved a new affiliated section called the Related Studies section.

How much of this will be reflected in the Journal pages will, of course, depend on the philosophy of those at the helm in the next five to ten years. There is definitely some adverse reaction to too much 'broadening' – broadening to the extent that it becomes a dilution of the goals of vocational education. Personally, however, I think that it is a trend that cannot be completely reversed, and as such, will be reflected in the Journal coverage in the years ahead.

SCHOOL SHOP

School Shop is intended to provide teachers in the industrial education field with significant, current professional information that will be of assistance to them in their work. Evidence from readers, both oral and written, attests to the fact that it is making a contribution to the profession.

Articles are carefully selected to bring to readers updated information on a wide variety of topics by practicing teachers and leaders in the profession. The editorial content is precisely balanced so that the interests of a wide spectrum of industrial educators are met. Issues confronting the profession are discussed by professional leaders, and information about methods, practices, and projects cover a wide variety of topics.

Coverage is given of the latest in instructional materials such as books and audio-visuals, new equipment, news from the profession, federal legislative and other activities, and through the advertising columns descriptions of available materials, supplies and equipment.

The columns of the magazine are open to all varieties of professional opinion as it is completely independent.

From the evidence we feel that *School Shop* has made a significant contribution to the profession by bringing teachers help in their work and thoughtful discussions by a distinguished list of leaders in the profession.

During the coming years we expect to continue our basic editorial policy of making the magazine a working tool for the teacher and an open forum for new and provocative ideas. As public and legislative pressures continue to be exerted on the schools in such areas as sexism, updating technology with new and different processes, materials, and procedures, better understanding of the learning processes, placement, and a host of others we expect that the magazine's editorial content will reflect these changes and sometimes anticipate them.

JOURNAL OF INDUSTRIAL TEACHER EDUCATION

It is the only refereed journal that focuses on the needs of industrial arts teacher education personnel. It provides a forum and a respectable place for these persons to publish their thoughts, ideas, research and development, and the like.

Its book reviews bring critical appraisals of new professional texts available to the profession.

Its dedications serve to honor recognized leaders in the field.

At present our only plans for the future are to continue to increase the stature of the journal within the broad field of education by increasing the quality of the manuscripts published in the *Journal.*

THE JOURNAL OF EPSILON PI TAU

The *Journal of Epsilon Pi Tau* is the only refereed journal devoted to serving all levels and all interests connected with industrial arts. As such it fulfills the fraternity's ideals of leadership recognition and leadership development and devotes its publication policy to promote leadership & leadership development, skill, research and social proficiency among its members and all professionals.

The continued application of the policy outlined above will insure that the *Journal of Epsilon Pi Tau* will remain in the forefront of issues of importance and will promote the field of education for and in technology.

INDUSTRIAL EDUCATION

The same direction as that taken by industrial arts and vocational education – which at present seems to be that of training for employment and giving students as much information as possible concerning working opportunities available to them.

CONCLUSION

The field of industrial arts education has a rich heritage of literature in the professional journals that have developed since the late 19th century. The contents of the journals are replete with examples identifying industrial arts as an emergent force in general education – a force whose impact has been continuously nurtured and sustained by a body of significant literature. Only as historians in industrial arts continue to explore the intricacies of the development of the field will the full richness and value of the written heritage become clear and receive the attention it deserves.

A rich history is insufficient to sustain a dynamic profession. The future and all it portends must be viewed within the context of promise and potential. For the journals to continue in the tradition of significant contribution, they must build a reasonable view of the future and select a strategy that will take perceptions of the future into account. To do less in the future would be inconsistent with the past.

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unit v

Industrial Arts Education: Retrospect, Prospect

chapter 19

A Retrospective View of a Prospective Future

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Sufficient evidence has been presented in the yearbook to substantiate the premise that industrial arts possesses a rich heritage of excellence. This heritage has been the result of the determination and foresight of not a few select individuals, but the thousands of industrial arts educators across this land. Each person has contributed in a personal and special way to this achievement. The summation of these contributions has allowed industrial arts to achieve the high stature it now possesses among the various disciplines.

The primary purpose of this yearbook was to examine the forces involved in this heritage. To accomplish this goal, it was necessary to view industrial arts in retrospect and its prospect. Topics of emminent importance to this heritage were selected, and each topic was assigned a chapter title. An industrial arts educator was selected and invited to address a chapter topic from a retrospective and prospective point of view. The authors possessed an interest and knowledge in their respective chapters, and each author had a sense of retrospect and prospect for the future of industrial arts.

A secondary purpose of the yearbook was to challenge the profession to move on to greater heights and accomplishments. In researching and writing the chapters, the respective authors have clearly identified new challenges to be met, hurdles to be crossed, and accomplishments to be achieved. When viewed in its entirety, industrial arts education possesses great viability for the years ahead. Caution should be noted, however, that the road in the future will not be smooth. It will require more human energy than we thought we possessed, more time than we anticipated spending, and more talent than we thought could be expended. A future is there and now the question becomes: "Are we ready for the challenge?"

As the scholar views the yearbook in retrospect, the prospect for industrial arts is evident and encouraging. The various authors have identified for the profession key elements for a future. These elements should not be viewed as all-inclusive, but as food for thought as the profession commences the next 100 years.

A HISTORICAL AND PHILOSOPHICAL ORIENTATION TO INDUSTRIAL ARTS

Joseph F. Luetkemeyer and G. Eugene Martin provided a synopsis of the past, present, and future of industrial arts. A picture was etched as to where the profession has been, where it is, and where it might be going. No new data were presented, or previously undiscovered facts identified; the authors simply set the stage for the yearbook. It is interesting to note, however, the gradual and yet methodical development of industrial arts. In a historical sense, industrial arts is very young, even though its antecedents date to the most primitive forms of life. The authors have identified and critically analyzed the movements and events that led to present day industrial arts education.

Historians might question the date and place of origin of industrial arts as it is known today, but that was not the purpose of the chapter. Likewise, it was not the purpose to identify *all* events in the history of the discipline. The authors did, however, identify, analyze, and present those movements generally regarded as critical to the present stature of industrial arts. A more detailed analysis was presented by the other authors in their respective chapters.

W. R. Miller pointed out that the antecedents of elementary school industrial arts dated to the late 18th and early 19th centuries, although the most direct impetus for the establishment of programs in this country came about through the work of John Dewey, Frederick G. Bonser, and Lois C. Mossman during the late 1800's and early 1900's. Elementary school industrial arts programs grew rapidly during the third quarter of the 20th century. Miller cited as evidence the following: (a) the employment of industrial arts specialists to work in the school systems; (b) the publication of numerous books that aided in the preparation of teachers; (c) the establishment of industrial arts courses in elementary schools; and (d) the organization of a council within the American Industrial Arts Association (AIAA) – American Council on Elementary School Industrial Arts.

Elementary school industrial arts has evolved from the child-centered philosophy and has withstood the test of time because of its unique contribution to the development of youth. Miller concluded that the future of elementary school industrial arts was positive with the continued emphasis on career education and the increased demand for technical literacy of the citizenry.

Traditionally, the industrial arts profession has promoted the concept that industrial arts plays a very important part in general education. Kendall N. Starkweather, however, concluded in the chapter "An Examination of the Relationship of Industrial Arts to General Education" that this view has not been widely accepted by those educators outside the industrial arts field. In addition, Starkweather concluded that accepted definitions of industrial arts and general education have "yet to be formulated" by educators both within and without the industrial arts profession. Added confusion has resulted from the education profession's unsuccessful attempts to differentiate between what is general education and what is a liberal education. In addition, confusion and debate continue to permeate the industrial arts profession with regard to the degree of specialization of industrial arts, e.g., the relationship of industrial arts to vocational education. The detailed review of the evolution of general education and the analysis of the similarities between the two terms is noteworthy to the scholar attempting to formulate such a relationship.

Although the type of general education required by future societies will be quite different from that of the present or the past, there will still be a need to prepare all for "the common life of their time and their kind." Starkweather proposed (a) that the existence and relationship of industrial arts and general education will change in the future; (b) the two terms may be identified by new names; (c) the nature of industrial arts will change simply because technology will become more sophisticated, and industry will reflect that sophistication; (d) industrial arts will continue to be ignored by the advocates of general education outside of the field; and (e) there will always be a need to educate society about the relationship of industry and technology to its culture.

In the preceding paragraphs it was emphasized that confusion existed when educators attempted to define and establish a relationship between industrial arts and general education, and industrial arts and vocational education. In order to clarify part of the problem, Ralph V. Steeb critically analyzed the *legal* relationship between industrial arts and vocational education. The attention given to the chronological development of the relationship, especially since the 1960's, assists the scholar in understanding the legal relationship. The inclusion of industrial arts by name and definition in the Education Amendments of 1976 (Public Law 94-482) and its subsequent inclusion in the Federal Rules and Regulations in the *Federal Register* has now provided the legal authority for administering industrial arts programs when they assist in meeting the purposes of the Vocational Education Act of 1963. It is especially important that the scholar take note that comprehensive general education courses which students enroll for personal and avocational purposes, and which are not directly related to vocational education, do not qualify for vocational funding. The key element to maintaining this relationship as concluded by Steeb is that industrial arts maintain its identity and objectives, and not lose sight of its goals, for not all of industrial arts is vocational education.

Laboratory facilities have traditionally served as the "home" for the industrial arts educator. These facilities have provided an environment where the tools, materials, processes, products, and organizational structure of industry are taught, analyzed, and experimented with to foster a better understanding of the technological world. Previous American Council on Industrial Arts Teacher Education (ACIATE) yearbooks have provided an excellent account of facility planning – process, people, organization, and management. In addition, these yearbooks have provided descriptions of facilities for "new" programs.

Perry R. Gemmill analyzed industrial arts facilities from a different perspective – the developmental process. Gemmill's account of the growth and development of facilities from the pre-1920 period to the present was interesting to the scholar who desires a better understanding from a historical point of view of how facilities contributed to program development during a given time period. Facilities changed during the past century as evident in the unit construction shops of the late 1800's designed for their economic value, to comprehensive cluster technology laboratories of today designed for their educational value. It was evident that while programs changed, new machines and tools developed, and new materials and processes refined, the *principles* of laboratory planning remained somewhat the same. The explanation of a "laboratory" and a "shop" was noteworthy to those contemplating a facility name change. Gemmill's concluding statements regarding future directions and expectations seemed both reasonable and logical. Specifically, the profession must become more cognizant of the "developmental, emotional, psychological, sociological, and physical needs of *all* students" when designing facilities.

CURRICULUM THEORY AND PRACTICE IN INDUSTRIAL ARTS

Curriculum and curriculum development have long been a topic of interest to industrial arts educators. While Luetkemeyer and Martin overviewed curriculum thrusts of the pre-1960 period, Daniel L. Householder provided a more detailed analysis of curriculum efforts of the 1960's. This was the decade that witnessed the most activity in curriculum design and development in industrial arts.

A review of Chapter One indicated that while curriculum change occurred, it was a cautious change. A select few individuals and/or groups had challenged existing practices with some degree of success. Householder concluded that the realization of rapid technological change, the encouragement of program diversity and purpose, the search for basic program improvements at all levels and disciplines, and the substantial increase in the availability of funds, were responsible for initiating this most active period in curriculum development in industrial arts.

It was impossible and unnecessary to identify *all* programs across the United States and Canada that underwent curriculum change. Householder did, however, select and review major curriculum efforts that were both popular and received the greatest amount of space in the professional literature. Especially noteworthy was the classification scheme used by Householder to describe these programs. Acceptance or rejection of this scheme was not the goal of the chapter – it simply provided a means for studying and understanding the various programs.

Extensive literature that explains the rationale and operational procedures of many of the curriculum efforts of the 1960's has been readily available to the profession. However, little or, in some instances, no literature has been published on "why" certain programs were developed. The "why" has often been part of in-house professional discussions. Donald Maley and Donald G. Lux provided an interesting account when they addressed the "why." Evidence was provided as to their personal philosophies and professional influences that gave them the impetus for major curriculum development. Their identification of concerns, limitations, and problems in the development of their respective programs was especially interesting for industrial arts educators contemplating a major curriculum change in their own setting. Upon reading the chapter, it was evident that curriculum change was not easy or smooth. It was, however, a means by which the authors and their colleagues met the challenges as they viewed them for industrial arts. One may only assume that other programs and developers during this period met similar obstacles and met the challenges in a similar way. Upon reading the chapter, all industrial arts educators should be encouraged and motivated to try new ideas.

James T. Ziegler concluded in the chapter "Industrial Arts Curriculum Development Efforts of the 1970's" that the curriculum efforts of the 1970's were at most "disappointing." The many and varied curriculum efforts of the 1960's, as described by Householder, did not continue into the 1970's. The availability of funds (local, state, and federal) that influenced curriculum change in the 1960's was not duplicated in the 1970's.

Ziegler noted that curriculum involves a process, and that curriculum development is the first stage in the initiation of that process. Other important stages included the "selection and specification of a philosophic base, rationale, function, assumptions, and procedures." In addition, a curriculum developer must be cognizant of and consider all phases of the curriculum.

Ziegler identified and described the four major emphases prevalent in curriculum development in the 1970's. These included the learner, content, instructional materials and methods, and evaluation. The status of a curriculum and its stability can be found (by an investigation of the amount of activity) in these four emphases.

The 1970's were highlighted with two significant industrial arts curriculum movements – technology-based industrial arts and the cluster concept. The acceptance of the technology-based content has gained momentum since the early efforts of William E. Warner. Today, individuals such as Paul W. DeVore, Donald G. Lux, Donald Maley, and Willis E. Ray are on record in the professional literature as being supportive of this effort. Some states have even adopted technology-based industrial arts content for state-wide consideration. The justification for technology-based content has been positive as the justification has centered on the psychological and sociological bases. Ziegler cautioned the scholar, however, not to lose sight of the fact that the proponents of the technology-based curriculum must "limit, operationalize, and qualify the curriculum" before total acceptance by the profession could be expected.

The antecedents of the cluster concept in industrial arts date to the early efforts of Frederick G. Bonser and Lois C. Mossman. Its acceptance and wide use in the industrial arts profession grew rapidly in the 1970's. Ziegler, however, concluded that the status of the use of the clusters in industrial arts in the 1970's could at best be described as a "dilemma." Evidence provided in the chapter included the lack of acceptance of cluster titles and content in general, and the exclusiveness and order of the clusters that are widely used in the profession.

The emphasis on instructional considerations has a long history in industrial arts. Ziegler noted that this emphasis has gained momentum (at the expense of lesser emphasis on content issues) through the increased emphasis on career education in the 1970's. Ziegler emphasized that the concept of career education was not new to the industrial arts profession, but the influence this concept would assume in the 1970's was significant. Specifically, the significance is in the abundant monies being provided the vocational education community for research, development, and implementation efforts in career education. The debate continues in the profession as to the emphasis that should be placed on career education in the development of an industrial arts curriculum.

As the decade came to a close, it was evident the industrial arts profession had placed emphasis (in varying amounts) on the learner, content, and instructional procedures. However, for the most part, the evaluation of educational programs was largely ignored. Ziegler concluded that "evaluation will become the rule rather than the exception in all phases of education" in the future. Ziegler challenged industrial arts educators to assume a greater role in this important element of the curriculum.

Paul W. DeVore, George R. Maughan, and William E. Griscom provided an interesting analysis of the discrepancies/relationships of the industrial arts curricula and the technological systems extant in society from 1900 to 1978. The authors analyzed the critical events in each of the technological systems identified, determined what had been taught in industrial arts programs in the United States during the time period under study, compared citations of content from selected journal articles to technological developments during the selected time frames, and identified and analyzed the inherent discrepancies that existed. Their conclusion was of special significance since it challenged the profession to move from the "reactionary and fragmented response" in curriculum development to a "planned response incorporating elements that would produce conceptual understanding of technological systems and their behavior." In addition, the authors challenged industrial arts educators to reflect on what industrial arts has been, and what the authors believe it could be.

Donald P. Lauda has been one of the most prolific writers in industrial arts in the area of futuristics, and has presented an interesting chapter entitled "Industrial Arts as a Discipline for Studying the Future." Although, as Lauda pointed out, the study of the future is relatively new, the interest in the industrial arts profession of its future has a long historical base. Lauda established the importance of "why" study the future, and the implications for industrial arts were especially noteworthy. The profession must start now in preparing "teachers who can teach about the future and in the future." The profession should take note of Lauda's seven recommendations, for it is these and others that may well set the stage for the future of industrial arts. Lauda's goal or intent of the chapter was not necessarily the acceptance or rejection of these identified recommendations. The recommendations simply provided a direction for the profession to consider its future and the future of industrial arts as an academic discipline.

Lauda concluded that education must become future-oriented if we, as educators, expect students to become effective thinkers and learners – an attribute all students must possess in order to survive in their future. The industrial arts profession must assist in the development of a Future-Focused Role Image in each student if industrial arts is to continue to profess to be the interpreter of industry and technology. Nothing short of this goal is acceptable.

Industrial arts teaching methods have long been an important part of industrial arts in general and the professional preparation of industrial arts teachers in particular. The number and diversity of these methods is impressive. The identification and discussion of all teaching methods utilized in education would have been an insurmountable task for the space allotted the chapter in the yearbook. Therefore, Ming H. Land identified and reviewed those teaching methods that have had a direct bearing on industrial arts education.

There is significant data presented in Land's chapter to cause the scholar to conclude that not all teaching methods have been readily accepted by the profession. In fact, there is research evidence to substantiate the premise that any one selected teaching method will not work in all teaching situations. The role and interrelationship of the teacher, student, and learning environment is significant. It is particularly important, as Land concluded, that the teacher first identify the objectives to be achieved, and then select the appropriate teaching method(s) to achieve those objectives that will cause maximum learning to occur. The scholar was encouraged to conduct further research on the methods identified in the chapter before implementing one or more of them in the classroom.

The new and innovative teaching methods and those projected by Land for use in the future should substantially improve the teaching and learning process. The increased utilization of those methods involving the new and emerging media and technologies will have a significant impact on industrial arts in the future. Land concluded that those teaching method(s), whether conventional, new and innovative, or yet to be identified, must allow the student to develop "life-long learning skills." These instructional strategies will place greater emphasis on such techniques as problem solving, analysis and communication, identifying technological problems, utilizing all kinds of learning resources through individual and group activities, and presenting solutions and appropriate alternatives. The teacher's role will change from one of "telling" to that of an instructional facilitator.

PROFESSIONAL ROLES AND EDUCATION IN INDUSTRIAL ARTS

James J. Buffer, Jr., stated in the chapter entitled "Graduate Education in Industrial Arts" that graduate education serves three purposes: "(a) developing the innate talents of people preparing for specialized disciplines or professions; (b) contributing to the utilization, expansion, and transmission of knowledge; and (c) improving social-cultural conditions to insure optimal development and functioning of all people." Traditionally, these purposes have been fulfilled by the comprehensive, mature universities, and today, these same purposes continue to be the goals of most established and neophyte colleges as well as proprietary institutions.

Buffer concluded that graduate education has changed "drastically" in the last 100 years. This change occurred on many fronts that included (a) the acceptance of graduate study as a worthy scholarly discipline, (b) the professionalization of the education discipline and related degree programs, and (c) the increasing numbers of educators seeking advanced degrees beyond the baccalaureate. The latter has been especially prevalent in industrial arts during the profession's tenure as a graduate discipline over the past 60 years. Buffer's description of the degree structures in industrial arts was an interesting and accurate account of those degrees industrial arts educators commonly pursue. The holder of a baccalaureate should take note of these "general" descriptions and the purposes the various degrees in graduate education serve.

The most interesting section of the chapter to both industrial arts teacher educators and students contemplating pursuing a graduate degree in industrial arts was the "issues" in graduate study. While Buffer clearly stated that these were the "issues" as he viewed them, they, nonetheless, are the issues commonly discussed in professional literature and at local, state, and national meetings. These issues included (a) the purpose of graduate degree programs, (b) practice-oriented programs, (c) research-oriented programs, (d) program breadth versus specialization, (e) technical competencies, (f) research activities, and (g) alternative and external graduate programs. Buffer's personal thoughts and biases were evident. However, they were presented not for the purpose of acceptance or rejection, but to challenge the profession to continue to address and critically analyze these and other issues in graduate education. Buffer concluded that "only through the continued self-monitoring and evaluation of graduate programs can the integrity of scholarship in the profession be maintained, improved, and expanded." The process of self-monitoring and evaluation needs to be conducted by teacher educators immediately responsible for graduate programs and the consumers of the master's, specialist's, and doctoral degrees.

James E. Good noted that the role of the supervisor has undergone significant changes during the past 200 years. Most prevalent among the many changes has been the approach to supervision – from the informal, prescribed approach to the more formal, successful supervisory techniques as practiced in industry. While many of the successful techniques practiced in industry were not as successful in the education setting, industrial applications of supervisory techniques provided the impetus to develop and refine supervisory practices in the education setting.

Supervisory practices in education had a significant impact on the changing role of the industrial arts supervisor. Good provided sufficient evidence to conclude that (a) while the role of the industrial arts supervisor has constantly changed, supervisors at all levels, e.g., local, city, district, and state, have lacked clearly defined duties and responsibilities; (b) administrative titles at all levels were as diverse as the duties and responsibilities assigned to supervisory personnel; and (c) the present role of industrial arts supervisors was not consistent from one state to another. While the present role and expectations of industrial arts supervisors was open to many interpretations and misinterpretations, Good concluded that they were largely dependent upon the desires of the chief school administrative officer and the individual (supervisor) involved. In general, however, industrial arts supervisors have been responsible for providing leadership and assisting the chief school administrative officer in coordinating the development, implementation, and evaluation of a quality industrial arts program. The scholar should take note of Good's conclusions and recommendations at the end of the chapter.

LEADERSHIP, ORGANIZATIONS, AND JOURNALS IN INDUSTRIAL ARTS

H. David Mohan emphasized in the chapter entitled "Leadership In Industrial Arts – A Situational Perspective" the importance of all industrial arts educators considering their responsibility with respect to effective leadership in education. Effective, productive leadership is not the responsibility of a select few individuals, but all educators must assume an important leadership role. Mohan's purpose was not to identify a select few individuals in the profession who exhibit effective leadership traits, but "to identify those variables associated with effective leadership as they relate to situations confronting the profession."

Several commonly accepted personal "traits" directly associated with leadership were identified in the chapter. Mohan stressed that while these and other traits may be common to all individuals, some individuals tend to display or exhibit these traits more than other individuals. The scholar was cautioned, however, not to accept these personal traits as working in all leadership situations. Mohan emphasized that while personal traits are important to identifying effective leaders, they are not all-inclusive, and are only one part of a "complex interaction of variables when examining leadership."

Mohan's identification and description of leadership behaviors was interesting. The scholar is reminded that the subscales of "Consideration" and "Inititating Structure" are leader behavior descriptors that relate only to a given situation. According to Mohan, the continued advancement of the industrial arts profession is directly related to effective leadership at all levels.

One of the stalwarts of industrial arts has been the profession's interest in organizing and sustaining professional organizations. These organizations and their affiliated councils and associations provide avenues for industrial arts educators to share their ideas and concerns to the profession. These organizations, councils, and associations were established for several purposes, one of which was to represent a particular segment in the profession who believed that there was a strong need for such a body.

In order to achieve one of the goals of the yearbook, it was necessary to analyze and present the professional organizations that serve industrial arts. For purposes of the yearbook, two types of organizations were selected: (a) the American Industrial Arts Association (AIAA) that serves a large number of people with a variety of interests; and (b) the Mississippi Valley Industrial Teacher Education Conference that serves a select group of people with generally common interests. The intent was not, however, to minimize the effects and contributions of the many regional, state, and local organizations throughout the country.

Donald L. Rathbun and G. Eugene Martin overviewed the growth and development, and proposed a future for the only national organization that devotes all its energies to the improvement of industrial arts – AIAA. Its heritage has been remarkable because in the final analysis, it represents the culmination of efforts of all industrial arts educators who have chosen to be members. While the identification of people, for the most part, was eliminated from the chapter, Rathbun and Martin devoted more energies to describing the functions, purposes, and day-to-day operations of the AIAA. The chapter is replete with suggestions for the professional industrial arts educator to get "involved." Industrial arts educators, at all levels, were encouraged to become more "active" members through committee work and conference activities. The future of the AIAA will be dependent upon increased financial resources, membership, and participation. The chapter should cause all industrial arts educators to pause and reflect on the importance of maintaining a national professional organization.

Willis E. Ray, AIAA president 1978-1979, undertook a formidable task in reporting to the profession the goals, origin and early development, major accomplishments, and influence on the profession of the various councils and associations related to the AIAA and the Industrial Arts Division of the American Vocational Association (IAD/AVA). Ray concluded that the historical records available clearly indicated that professional councils and associations of the AIAA and the IAD/AVA continue to address the important issues of the day. These groups have been successful not only because of the people who had the foresight to found them, but, and probably more important, the people who have had the foresight to sustain them.

The chapter provided an excellent overview of the various councils and associations for the novice and the experienced industrial arts educator as well, but, as Ray concluded, the various sections treated in the chapter lacked "appropriate scholarly treatment and documentation." A scholar with interest in the various councils and associations described by Ray is encouraged to conduct further and more extensive research. Ray has provided the foundation for further research, and now it is a challenge to other scholars to develop and report new data about the councils and associations. The profession was encouraged to contribute to the AIAA archives located at Millersville State College in Millersville, Pennsylvania.

Rupert N. Evans provided an interesting account of one of the best known (and maybe least understood) professional organizations – the Mississippi Valley Industrial Teacher Education Conference. As current General Chairman and long-time member of the Conference, Evans provided significant evidence as to why this Conference has been most influential in the teacher education segment. The overview of the early days of the Conference was presented merely to provide the reader a general understanding of why the Conference was formed. The mechanics of the Conference are most interesting: who may join, expectations of membership, types of membership, program format, and role of General Chairman. The analysis of the contributions of past General Chairmen was enlightening. Evans' analysis of the changing name and programs provided insight into not only the thinking of its membership during any given time period, but also its awareness of important events that were occurring in the field. Historical scholars interested in conducting further research into this Conference are encouraged to visit the archives at the University of Illinois in Urbana, Illinois.

Little is known and even less has been written about the development, contributions, and future directions of professional journals in the field. These journals continue, however, to provide two important functions: (a) they serve as a communications link both within and without the field; and (b) they report information of value to classroom teachers, teacher educators, supervisors, and administrators. Edward H. White has provided an interesting account of the development of professional journals, both past and present, while examining some of the major themes the journals have addressed. White's analysis of the forces influencing the development as well as the termination of the various journals was significant. The presentation by present journal editors as to the future of their respective journals was enlightening. It was evident that the rich heritage of industrial arts has been adequately reported in the professional journals. However, in order for these journals to continue to make a significant contribution in the future, then they must, as White concluded, "build a reasonable view of the future and select a strategy that will take perceptions of the future into account. To do less in the future would be inconsistent with the past."

THE EDITOR HAS THE LAST WORD

Just as the Editor has chosen to utilize this chapter to conclude the 28th ACIATE Yearbook, it shall also be the Editor's prerogative to conclude this chapter and the yearbook with the "last word." Industrial arts has witnessed significant changes and challenges during its brief but interesting history. These have been met, some with greater successes than others, through the contributions of industrial arts educators at *all* levels of education. While the successes have far outweighed the failures and near-failures, the profession must continue to address the important issues in education in the future. A fragmented and reactionary approach will not work and should not be condoned. Industrial arts must maintain a united effort and be at the forefront of educational change.

While this yearbook addressed many of the important elements in the history of industrial arts, it was evident from reading the chapters that the authors have identified many more significant ones. The authors have clearly identified topics that need further research and analysis.

Finally, the heritage of the ACIATE yearbook series is one of excellence. Hopefully, the authors of the 28th ACIATE Yearbook have maintained that excellence and contributed to that heritage.

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