

**Core Occupational Competencies for Secondary Agricultural Education
Programs as Identified by Ohio Agricultural Business and Industry**

by

William Dale Waidelich

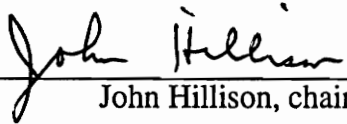
Dissertation submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

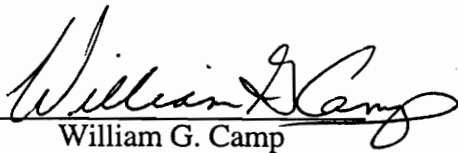
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VOCATIONAL AND TECHNICAL EDUCATION

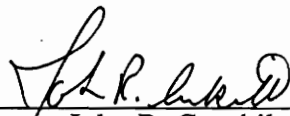
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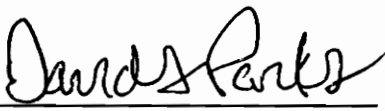
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June 1995

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Key words: Agricultural education, Job Analysis, Core competencies

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CORE OCCUPATIONAL COMPETENCIES FOR SECONDARY AGRICULTURAL
EDUCATION PROGRAMS AS IDENTIFIED BY OHIO AGRICULTURAL BUSINESS
AND INDUSTRY

by

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(ABSTRACT)

The purpose of this study was to determine the critical core occupational competencies for secondary agricultural education programs as identified by Ohio agricultural business and industry. The method used to generate this information was an item analysis of the competencies that industry experts identified as core competencies in the Ohio Competency Analysis Profile (OCAP) process. OCAPs are a source of competencies that agricultural educators use to teach the essential skills needed for employment in agricultural careers.

The study identified the importance of and relative time spent on core competencies in 10 agricultural occupations, determined the critical core of occupational competencies in each of 10 agricultural occupations, and determined the common core of critical occupational competencies across all 10 agricultural occupations. A survey of Ohio agricultural business and industry workers was conducted.

The competency lists for this study consisted of 10 agricultural education OCAPs developed by the Vocational Instructional Materials Laboratory at The Ohio State University. The OCAP lists consisted of: Agricultural Production, Agricultural Sales and Service, Agricultural/Industrial Mechanical Technician, Animal Management Technician, Floriculture and Greenhouse Worker, Forest Industry Worker, Meat Processor, Nursery and Garden Center Worker, Resource Conservation, and Turf and Landscape Worker.

Conclusions included:

1. Competencies in the general safety precautions unit: demonstrate safe work habits, maintain safe work environment, and operate equipment and vehicles were ranked among the 20 most important competencies in all 10 agricultural occupations.

2. One competency in the general safety precautions unit, operate equipment and vehicles, was the only competency ranked among the top 20 competencies on relative time spent in all 10 agricultural occupations.

3. A critical core of occupational competencies was identified for each agricultural occupation.

4. Each agricultural occupation is so highly specialized that a substantial common core of critical occupational competencies in agricultural occupations could not be identified.

Selected recommendations included:

1. Given that the competencies in the general safety precautions unit are the most important competencies in all agricultural occupations, agricultural educators should concentrate on preparing workers with general safety precaution competencies.

2. Because a critical core of occupational competencies can be identified, agricultural education programs that need to determine the occupational content for the program should concentrate on the critical core competencies for the occupational focus of that agricultural education program.

3. Because the common core of critical occupational competencies across all 10 agricultural occupations is not substantial, agricultural education programs cannot be generic agricultural education programs with a common core of critical occupational competencies for program content. Agricultural education programs should be occupationally specific.

Acknowledgments

For the completion of the dissertation I owe a big thank you:

—to my committee members: John Hillison, John Crunkilton, Stan Burke, Bill Camp, and Dave Parks for your years of patience.

—to my family and friends both in Ohio and Virginia, many of you made this possible.

—to my wife Holly for your love, understanding, and encouragement through the years.

—to my daughters Elizabeth, Katherine, Caroline, and Abigail daddy will be home now.

—to the staff at the Vocational Instructional Materials Laboratory for your assistance in gathering data for the OCAP, criticality, and job profiling processes to fulfill Ohio's Future at Work and subsequently my dissertation.

—to the staff at the Ohio Agricultural Education Curriculum Materials Service for your encouragement.

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Chapter 1

Technology, academics, basic skills, and authentic assessments are just some of the terms used in today's educators daily teaching and learning process. Educational reform movements, state and federal commission reports, and ever shrinking financial support for education can make the daily life of an educator challenging to just plain frustrating. Educators at all levels seem to be consumed by the latest movement towards the better school, the inclusion of all students, and the scrutiny of the general public. If educators, especially vocational educators, cannot focus on developing the best educational opportunities for their students to succeed and advance into today's ever changing societal environment, they will have left a generation of workers without the necessary skills.

"The nation's schools must be transformed into high-performance organizations in their own right" (Secretary's Commission on Achieving Necessary Skills, 1991, p. vi). Vocational education has a unique opportunity to develop a process for this transformation. Many of the current reform movements call for "new" components such as business/industry linkages, community input, and product-based rather than process-based evaluation. The new jobs to be created in the next decade will require more, not less, education (Bailey, 1991). Vocational educators' commitment to developing occupationally and academically competent, as well as employable, individuals through a curriculum development process utilizing business and industry advisory committees is the role model that reform movements could follow.

Background and Recent History

Agricultural education has addressed the need for agricultural producers for nearly 80 years and agricultural businesses for more than 30 years. A little over 25 years ago the agricultural education profession debated changing vocational agriculture. Themes of The Agricultural Education Magazine in the 1960s included:

1. "Making Vo-Ag Broader Vocationally,"
2. "The Effect of Vo-Ag on College Success," and
3. "Agricultural Education at the Crossroads."

Articles included:

1. "Agriculture is more than production farming,"
2. "College success with and without vocational agriculture in the high school," and
3. "Virginia study reveals need for new type of vocational training."

The fundamental issues of how agricultural education programs are designed have not changed for 30 years. The same topics are still prevalent today, but with ever-increasing complexity. Professionals in agricultural education have had a difficult time defining careers or academic areas in which to prepare students. The Committee on Agricultural Education in Secondary Schools (1988) even concluded that "what agricultural education is and should become at the secondary level if a competitive agricultural industry is to survive in this country builds on the programs and approaches of the past, but goes beyond them in scope and content" (p. 1).

Content Efforts

While members of the agricultural education profession seem to disagree over whether programs should be occupationally specific, job training based programs or broader agricultural and science principle-based programs; most in the profession believe that a blend of academic, employability, and occupational competencies serves students' interests best. Roegge and Russell (1988) contended that "while the excellence movement in education has certainly exacerbated the situation, long-standing confusion over what to teach and the changing nature of secondary agriculture students may be more serious long-term problems" (p. 1).

The Carl D. Perkins Vocational and Applied Technology Education Act of 1990 (PL 101-392) addressed the need for a combined effort. Section 116 of the Perkins Act specified that each state board shall conduct an assessment of program quality using several criteria, including the following:

1. the integration of academic and vocational education,
2. sequential courses of study leading to both academic and occupational competencies,
3. increased student work skill attainment and job placement, and
4. the relevance of programs to the workplace and to the occupation for which the students are to be trained, and the extent to which such programs reflect a realistic assessment of current and future labor market needs.

Perry (1991) suggested that:

Basic and technical skills are both essential elements for youth and adults seeking entry-level employment in agriculture. Neither area should be emphasized over the other in preparation for work at the high school level. A firm foundation of basic and technical skills needed in the agricultural industry is recommended for students' successful transition from school to work. (p. unnumbered)

Need for the Study

What competencies are needed so that youth and adults, in an efficient and timely fashion, can make informed career choices and successfully enter, compete, and advance in a changing agricultural industry? How do we determine these competencies?

In the past, various factors determined the inclusion or exclusion of competencies within an agricultural education course of study. Examples of these factors were (a) the type of equipment and facilities available, (b) degree of instructor expertise, (c) labor market demands, and (d) amount of time available. "Factors such as time and dollars

available; internal and external pressures; federal, state, and local content requirements; and the particular level of content all have potential to affect the means by which content is determined for a particular curriculum" (Finch & Crunkilton, 1993, p. 134). This reasoning, or sometimes excuses, should not apply today.

Today's modern agricultural industry is requiring more technical equipment operation. Students will need to learn to operate complex pieces of equipment safely. However, if our school facilities do not include the new equipment, should the agricultural educator delete a critical competency from the particular course of study? If the employer identified and verified a certain competency as one that all students need, alternative methods of instruction must be developed. Perhaps closer ties between agricultural educators and the agricultural industry can solve many of these previously seemingly unsolvable problems.

If a teacher's expertise is in floral design, he or she will probably devote more time and energy to helping students attain mastery of floral design competencies than in greenhouse plant growth and development. Any teacher is more comfortable teaching familiar content. However, this practice is not necessarily in the student's best interest. In today's rapidly changing agricultural environment, teachers must be managers of information and people, not necessarily experts in all technical agricultural content areas. Therefore, teacher expertise should not be the driving force in curriculum content.

Not having the needed amount of instructional time suggests the need for improved agricultural experience programs outside the school, expansion of the youth organization's role, and greater community involvement. With employer-verified competency lists, mastery of some competencies will happen only with on-the-job training; making experience programs and youth organizations more valuable than ever. Business and industry placement will provide excellent opportunities for students to gain occupational,

academic, and employability competencies. Youth organizations such as the FFA can also provide the necessary structure for measuring performance of competencies.

The Center on Education and Training for Employment (1992) asked several questions:

How can you address current and projected labor market patterns across a state as diverse as Ohio?

How do you identify the occupational, academic, and employability skills that should be included in particular programs? . . .

How do you involve a large number of business, industry, labor, and community agencies in the verification of competencies for a wide variety of occupations?

(p. 1)

Keeping Agricultural Education Curriculum Up-To-Date

"In content, the vocational agriculture curriculum has failed to keep up with modern agriculture. More flexibility in curriculum and program design . . . is essential" (Committee on Agricultural Education in Secondary Schools, 1988, p. 31).

The curriculum content in agricultural education needs to be made more contemporary. Agricultural educators have a continual battle with what content to teach. A subject matter textbook that is published today is already out of date. Consequently, our agricultural education curriculum is almost continually in need of renewal.

The responsibility of keeping agricultural education curriculum up-to-date has fallen on the shoulders of teachers for most of the last 75 years. This is still a good model; however, today, students are too mobile to design programs that focus only on the local labor market. If we believe in international agriculture and the global market economy, we should be preparing students for careers that might take them outside the local community and even outside the country.

Industry (Employers) Needs and Perceptions

"Agricultural occupations have generally experienced growth at a rate similar to the general labor market. Growth was faster than normal in the following occupations:

1. Animal care workers;
2. Biological, agricultural, food technicians;
3. Environmental technicians;
4. Farm managers;
5. Horticultural workers including landscape architects; and
6. Nursery workers.

The occupation of farmer experienced a net decline" (Ohio Department of Education, 1993, p. 4). Table 1 shows how agricultural education programs in Ohio are currently not meeting the growing agricultural labor market trends.

"In a growing and changing economy, information on the occupational composition of the current and future work force is essential" (National Occupational Information Coordinating Committee, 1994, p. I-1). Even agricultural educators believe that the lack of accurate employment data in agriculture and agribusiness is the number one problem in administering and supervising state programs of vocational agriculture as perceived by state supervisors (Smith, Lawrence, Gartin, & Odell, 1990).

Movement in Ohio

In 1989, Amended Substitute Senate Bill 140 was passed by Ohio's 118th General Assembly. This bill mandated development of a plan by July 1, 1990, to accelerate the modernization of vocational education. "The State Board of Education shall prepare a plan of action for accelerating the modernization of the vocational curriculum . . . that can furnish students with the . . . skills needed to participate successfully in the work force of the future" (Ohio Department of Education, 1990, p. 2). The plan, Ohio's Future at Work:

Table 1

Current Labor Market Needs in Ohio

Cluster code	Taxonomy	Total openings ^a	Current training ^b
0010	Animal Production and Care	256	172
0020	Farm Management	3,087	1,307 ^c
0030 & 0085	Agricultural Supplies and Business	292	381
0040	Agricultural Mechanics	443	388
0050	Agricultural Products and Processing	431	77
0060	Horticulture ^d	1,747	549
0070	Agricultural Resources ^e	24	421
0080	Forestry	65	145
	TOTAL	6,345	3,440

Note. From Ohio Department of Education. (1993). Agricultural education service annual report. Columbus, OH: Division of Vocational and Adult Education, Agricultural Education Service, p. 5.

^aOhio Bureau of Employment Services, Automated Labor Market Information Systems, March 1992. ^bProgram completers of secondary vocational programs, full-time adult programs and associate degree programs. ^cExcluding Farm Business Planning and Analysis (FBPA) completers who are already employed upon entering the program. ^dDoes not include floristry occupations. The Automated Labor Market Information System does not provide these numbers individually. ^eDoes not include newly developing environmental management occupations.

Action Plan for Accelerating the Modernization of Vocational Education in Ohio, was adopted by the Ohio Department of Education in June 1990.

"A comprehensive and verified employer competency list will be developed and kept current for each program" (Ohio Department of Education, 1990, p. 12). This is the second objective of Imperative 3 of the Ohio's Future at Work: Action Plan for Accelerating the Modernization of Vocational Education in Ohio (Ohio Department of Education, 1990). Ohio Competency Analysis Profile (OCAP) lists were the Division of Vocational and Career Education's response to that objective. OCAP lists evolved from a modified DACUM (Developing A CurriulUM) process involving business, industry, labor, and community agency representatives from throughout Ohio. The OCAP process was directed by the Vocational Instructional Materials Laboratory at The Ohio State University's Center on Education and Training for Employment.

As a result of these efforts the Agricultural Education Service, Division of Vocational and Career Education, Ohio Department of Education, developed a new agricultural education program mission that aligned agricultural education with the mission contained in Ohio's Future at Work, the strategic plan for the acceleration of the modernization of vocational education.

Agricultural education's mission is to prepare youth and adults, in an efficient and timely fashion, to make informed career choices and to successfully enter, compete, and advance in a changing agricultural industry. This mission will be achieved in concert with educational and business communities by offering comprehensive agricultural education that develops the following:

1. Occupational skills – those skills involving the technical abilities to perform required agricultural workplace tasks, including problem solving and critical thinking.

2. Academic skills – those core competencies necessary to prepare for and secure a career in the agricultural industry, facilitate lifelong learning, and assure success in a global agricultural economy.

3. Employability skills – those personal development and leadership abilities essential for increased productivity, economic self-sufficiency, career flexibility, business ownership, and effective management of work and family commitments. (Ohio Department of Education, 1993, p. 5)

Each of these skill areas contained psychomotor, cognitive, and affective domain skills. That is occupational skills, as well as academic and employability skills, contained skills from all the educational domains.

The Agricultural Education Service also adopted the definition for agricultural occupations that was developed by the 1992 National Agricultural Occupational Information Task Force as the basis for agricultural education programs in Ohio.

"Agricultural education provides career preparation for students interested in Ohio's agricultural occupations. Agricultural occupations are those occupations related to the production, care, marketing, and initial processing of air, water, soil, plants, and animals" (Ohio Department of Education, 1993, p. 3).

Background of the Problem

Agricultural educators can create programs with employer-verified competency lists. The use of business, industry, and labor representatives to analyze the occupational competencies was recommended in The Unfinished Agenda (National Commission on Secondary Vocational Education, 1984).

The occupational skills portion of the curriculum must be based upon an analysis of the occupation for which the training is provided. Additionally, business, industry, and labor must be involved in vocational curriculum development and revision

activities on a continuous basis to keep curricula current with technological advances. (National Commission on Secondary Vocational Education, 1984, p. 14)

"Curricula for vocational education are derived from requirements in the world of work" (Miller, 1985, p. 117). As a result vocational curriculum must be adapted to fit the ever changing work environment. The first step is to analyze and verify the occupational, employability, and academic competencies necessary for successful employment and advancement in agricultural occupations (Waidelich, 1991). Agricultural educators should analyze the competencies by occupation and level within the occupation, not by current program types and courses. Landscaper, forester, and animal management technician are examples of occupations that agricultural educators should analyze before they develop their agricultural education programs. Many state level occupational analyses are available for agricultural educators' use. Therefore, each occupation should develop three employer-verified competency lists:

1. Academic competencies -- The knowledge necessary to prepare for and secure a career, facilitate lifelong learning, and assure success in a global economy.
2. Employability competencies -- Those personal development and leadership abilities essential for increased productivity, economic self-sufficiency, career flexibility, business ownership, and effective management of work and family commitments.
3. Occupational competencies -- Those technical abilities used to perform required workplace tasks, including problem solving and critical thinking. (Vocational Instructional Materials Laboratory, 1991e, p. 3A)

Within that outline there are three levels of items: core, advancing, and futuring. Core items identify the knowledge, skills, and attitudes essential for entry-level employment. Advancing items identify the knowledge, skills, and attitudes needed to advance in a given occupation. Futuring items identify the knowledge, skills, and attitudes

needed to enter and remain in a given occupation three to four years from now (Vocational Instructional Materials Laboratory, 1992h).

Figure 1 demonstrates the hierarchy and the OCAP terminology used in this study. Units are made up of two or more competencies, and competencies are made up of two or more competency builders. Units, competencies, and competency builders may be core, advancing, or futuring. This terminology applied to the occupational, academic, and employability competency lists.

All agricultural education students in a program should receive a basic core of agricultural and employment competencies for each program, regardless of the student's geographic location in the state, the type of agriculture in that location, the agricultural background of the student (or lack of it), and the student's agricultural occupational goals. All agricultural programs should teach the core competencies. This core will be the course content over the program length. Districts may add or expand as many units, subunits, competencies, or competency builders as desired to reflect local needs, trends, and specialties. However, local advisory committees should identify and verify additional items (Vocational Instructional Materials Laboratory, 1992h).

Problem Statement

Agricultural educators can determine the competencies students need from employer identified and verified academic, employability, and occupational competency lists that contain core, advancing, or futuring competencies. However, many times these lists are longer than a typical agricultural education program can administer. Therefore, agricultural educators need to know the "critical core competencies."

When the critical core competency data from the OCAP process were initially analyzed by the Vocational Instructional Materials Laboratory (VIML), problems were identified. The data analysis method employed by the VIML did not account for

Ohio Competency Analysis Profile Agricultural Sales and Service

Unit 5: Inventory

Competency 5.0.1: Inventory business

Competency Builders:

- 5.0.1.1 Conduct physical inventory of merchandise
- 5.0.1.2 Describe process of inventorying structures and equipment
- 5.0.1.3 Identify high-activity and low-activity items
- 5.0.1.4 Determine merchandise to stock*
- 5.0.1.5 Determine amount of merchandise to stock*
- 5.0.1.6 Use computer to enhance just-in-time delivery and to monitor inventory**

* Advancing

** Futuring

Figure 1. Hierarchy of OCAP Terminology. From Vocational Instructional Materials Laboratory. (1994). Agricultural sales and service. Ohio Competency Analysis Profile (OCAP). Columbus, OH: The Ohio State University, p. 5.

respondents who indicated a competency was not part of their job. The VIML's method also created an index of both the importance and relative time spent ratings. This index could not be used with the quadrant method. Because of the researcher's knowledge of agricultural education and the OCAP process and agricultural educators' need for critical core competency information, the opportunity to re-analyze the data was explored with the VIML staff.

Purpose of the Study

The purpose of this study was to determine the critical core occupational competencies for secondary agricultural education programs as identified by Ohio agricultural business and industry. The method used to generate this information was an item analysis of the competencies that industry experts identified as core competencies in the Ohio Competency Analysis Profile (OCAP) process. OCAPs are a source of competencies that agricultural educators use to teach the essential skills needed for employment in agricultural careers.

Research Objectives

1. To identify the importance of the core occupational competencies in 10 agricultural occupations.
2. To identify the relative time spent on the core occupational competencies in 10 agricultural occupations.
3. To determine the critical core of occupational competencies in each of the 10 agricultural occupations.
4. To determine the common core of critical occupational competencies across all 10 agricultural occupations.

Definitions

There are several definitions of primary importance to understanding this study.

Academic Skills are "those core competencies necessary to prepare for and secure a career, facilitate lifelong learning, and assure success in a global economy" (Ohio Department of Education, 1990, p. unnumbered).

Advancing Competencies are "the occupational, academic and employability competencies needed to advance in a given occupation" (Vocational Instructional Materials Laboratory, 1991e, p. 13).

Agricultural Education Program is the cluster of agricultural occupations used to design an agricultural education course of study. Programs included are agribusiness, agricultural mechanics, agriscience, animal production and care, environmental management, food processing, horticulture, natural resources, and production agriculture (Ohio Department of Education, 1993).

Agricultural Occupations are those occupations related to the production, care, marketing, and initial processing of air, water, soil, plants, and animals" (Ohio Department of Education, 1993, p. 3).

Common Core Competencies are the occupational competencies that are included in 5 or more of the OCAP core competency lists.

Competency Builders are "the skills, knowledge, and attitudes (written in measurable terms) needed to perform a given competency" (Vocational Instructional Materials Laboratory, 1991e, p. 3C).

Competency is "an observable and measurable behavior that has a definite beginning and ending, can be performed within a limited amount of time, consists of two or more competency builders, and leads to a product, service, or decision" (Vocational Instructional Materials Laboratory, 1991e, p. 17).

Critical Core Competencies are the occupational competencies that are above the mean for both importance ratings and relative time spent ratings in an occupation.

Employability Competencies are the "personal development and leadership abilities essential for increased productivity, economic self-sufficiency, career flexibility, business ownership, and effective management of work and family commitments" (Ohio Department of Education, 1990, p. 7).

Entry-level Workers are individuals identified by the Division of Vocational and Career Education, Ohio Department of Education as working full time in an occupation that would require initial entry with a vocational education high school training background.

Futuring Competencies are "the anticipated occupational, academic, and employability competencies needed to enter and remain in a given occupation three to four years from now" (Vocational Instructional Materials Laboratory, 1991e, p. 3B).

Importance describes how important the competency is to overall job performance.

Ohio Competency Analysis Profile (OCAP) is the process by which, "(1) employers determine (that is 'verify') the occupational, academic, and employability competencies required of workers to enter and remain in a given occupation and (2) school districts are provided with competency lists to use in developing courses of study for vocational programs" (Vocational Instructional Materials Laboratory, 1991e, p. 13).

Occupational Skills are "those technical abilities used to perform required workplace tasks, including problem solving and critical thinking" (Vocational Instructional Materials Laboratory, 1991e, 3A).

Relative Time Spent is "the amount of time spent on a competency relative to that spent on other tasks" (American College Testing Program, 1994, p. G-1).

Units and subunits consists of "two or more competencies grouped together for instructional purposes. Units may be further divided into sub-units" (Vocational Instructional Materials Laboratory, 1991e, p. 17).

Limitations

In the strictest sense, data collected were directly applicable only to those 222 individuals who responded to the study. Also, only the occupational competencies needed in each particular agricultural occupation was studied. Academic and employability competencies were not studied. In the research design, probabilistic inferences to larger populations were not intended. Consequently, conclusions and recommendations listed in Chapter 5 are applicable only to those same 222 individuals. By the same token, the respondents to the survey do represent competent workers in agricultural occupations. Logically, their responses to the survey should be of interest to all involved in agricultural education.

Summary

The curriculum in agricultural education needs to be made more contemporary. The functional issues in agricultural education have not changed for 30 years especially over whether agricultural education programs should be occupationally specific, job training based programs, or broader agricultural and science principle-based programs. The method

by which agricultural educators determine the content agricultural education courses should be based on labor market information rather than resources available. A movement in Ohio to develop a modernized vocational education program was mandated by Ohio's General Assembly and plans to implement this process were developed at all levels including the Agricultural Education Service. Finally, agricultural education programs need a list of the critical employer identified and verified competencies.

Chapter 2

Review of Literature

Introduction

The purpose of this study was to determine the critical core occupational competencies for secondary agricultural education programs as identified by Ohio agricultural business and industry. The method used to generate this information was an item analysis of the competencies that industry experts identified as core competencies in the Ohio Competency Analysis Profile (OCAP) process. OCAPs are a source of competencies that agricultural educators use to teach the essential skills needed for employment in agricultural careers. This section of the study will examine opinions on the issue in the form of a review of literature and research. The purposes of this review were to: (a) describe the conceptual framework that shaped this research; (b) describe competency verification in agricultural education; (c) examine the methods of identifying the importance of competencies; (d) examine the methods of identifying the relative time spent on competencies; and (e) outline the methods of core competency development.

Conceptual Framework for the Research

"Theorization on any level tends to open up new avenues of inquiry . . ." (Van Dalen, 1979). Van Dalen described the way in which research relates to theory as follows: "the gathering of factual (or estimated factual) information leads one through intellect and logic to some type of theorization. This theorization leads one in turn to gather more factual information to confirm or disconfirm this theory" (p. 60). Agricultural education curriculum must be responsive to its customers, the businesses and industries that employ our graduates. "Curricula for vocational education are derived from requirements in the world of work" (Miller, 1985).

Agricultural educators need the latest information regarding competencies required in agricultural occupations. To provide this information a researcher must identify and assess the criticality of each competency in order to determine its place in a course of study.

Competency Verification Process

First, agricultural educators have to determine the competencies students need from employer identified and verified academic, employability, and occupational competencies as core, advancing, or futuring. Agricultural educators can create programs with employer-verified competency lists. The use of business, industry, and labor representatives to analyze the occupational competencies was recommended in The Unfinished Agenda (National Commission on Secondary Vocational Education, 1984).

The occupational skills portion of the curriculum must be based upon an analysis of the occupation for which the training is provided. Additionally, business, industry, and labor must be involved in vocational curriculum development and revision activities on a continuous basis to keep curricula current with technological advances. (National Commission on Secondary Vocational Education, 1984, p. 14)

"Curricula for vocational education are derived from requirements in the world of work" (Miller, 1985, p. 117). As a result vocational curriculum must be adapted to fit the ever changing work environment. The first step is to analyze and verify the occupational, employability, and academic competencies necessary for successful employment and advancement in agricultural occupations (Waidelich, 1991). Agricultural educators should analyze the competencies by occupation and level within the occupation, not by current program types and courses. Landscaper, forester, and animal management technician are examples of occupations that agricultural educators should analyze before they develop their agricultural education programs. Many state level occupational analyses are available

for agricultural educators' use. Therefore, each occupation should develop three employer-verified competency lists:

1. Academic competencies -- The knowledge necessary to prepare for and secure a career, facilitate lifelong learning, and assure success in a global economy.
2. Employability competencies -- Those personal development and leadership abilities essential for increased productivity, economic self-sufficiency, career flexibility, business ownership, and effective management of work and family commitments.
3. Occupational competencies -- Those technical abilities used to perform required workplace tasks, including problem solving and critical thinking. (Vocational Instructional Materials Laboratory, 1991e, p. 3A)

One such model was completed in Ohio. The development of employer-verified competency lists called Ohio Competency Analysis Profiles (OCAPs) was an undertaking that was the direct result of legislative reforms at the state and federal levels. Ohio's Future at Work (Ohio Department of Education, 1990) outlined an action plan to accelerate the modernization of vocational education in Ohio.

For each of these occupations, extensive national searches identified competencies in each occupation that produced a composite draft list. Industry panels of 8-12 persons reviewed the draft lists. Committee members were to add to, delete from, and/or alter the wording of the content found on the draft lists. From these lists, occupational, academic, and employability competencies were identified.

Critical Core Process

In order to concentrate efforts in the most productive manner, agricultural educators must accompany the competency verification process with a criticality process. Some competencies are of higher importance to the employer than other competencies. Workers

spend larger amounts of time on some competencies relative to other competencies.

Knowing which competencies are of major importance and require a large amount of time, will assist agricultural educators in setting priorities in program development.

McCracken and Yoder (1975) used a project advisory committee to determine that an essential rating of 2.3 or higher (1 = not important, 2 = useful, and 3 = essential) in one-half of the occupations was needed to place that competency on the common core of agricultural competencies. Forty-eight competencies from the over 2,500 competencies were selected.

Hater (1992) used these two factors to determine the competencies critical to a job. This allowed for a very effective method of determining the critical (core) competencies for instructional purposes (American College Testing Program, 1994). Woolsey and Bula (1973) also used this two-dimensional profile in determining core competencies.

Therefore, this study used two factors, importance and relative time spent, to determine the critical core competencies needed in each of the 10 agricultural occupations. The mean ratings of importance and relative time spent was plotted on a four-quadrant grid (Witkin, 1984).

Exploratory methods are typified by less rigorous sampling methodologies and somewhat less stringent approaches to analysis (Patton, 1990). The literature in the area of needs assessment (Witkin, 1984) has identified the use of mail survey as an effective way to determine the importance and utility of a variety of goal statements.

Summary

The conceptual framework behind this study is that employer-verified competency lists that have the most critical core competencies identified provide the most valuable information to agricultural educators in planning their courses of study. Agricultural

educators need to use this two-step process in order to obtain the most reliable program content information.

The goal of this research then, was to examine the perceived importance of and relative time spent on competencies identified by business and industry representatives. The research utilized exploratory descriptive methodologies in an attempt to gather needed empirical evidence for the field of agricultural education research.

Competency Verification in Agricultural Education

With the increased emphasis on academic and employability competencies, today's agricultural educators have less class time to teach occupational skills. The higher cost of equipment and supplies has also caused school administrators to look most closely at which occupational competencies are included in agricultural education programs. Students entering the program today have less of an agricultural background; therefore, students may actually need more class time on occupational competencies.

Roediger, McGhee, and Householder (1976) recommended a greater emphasis on career preparation in specialized agribusiness programs such as renewable natural resources, environmental protection, ornamental horticulture, and food processing. However, most studies have only analyzed the food and fiber production occupations. Also many studies merged the analysis of occupational, academic, and employability competencies into one study making it more difficult for educators to determine which competencies were critical. The curriculum guide development phase of this project made the following recommendations:

1. That national coordination be given to further development and maintenance of occupational descriptions and analysis of all entry level jobs in the eight agribusiness occupational areas and that close attention be given to not only current job availability but also to future employment trends in these occupational areas.

2. That national coordination be given to further development and maintenance of job skills or competency list for each of the agribusiness occupations.
 3. That national or regional efforts be applied to developing instructional materials for teachers and students in the instructional programs where specific teaching materials are very limited.
 4. That the classification system developed for use in this project be proposed as a model for classifying agribusiness materials in national information systems. Curriculum material developers should have access to a more detailed classification of each type of information included in each document.
 5. That educators make provision in pre-service and in-service programs to develop knowledge and skills regarding the use of various types of curriculum materials.
- (Roediger, et al., 1976, pp. 48-49)

A study to determine the perceived educational needs of agribusiness employees (Anderson & Miller, 1983) concluded that skilled and unskilled employees preferred the high school as a delivery system to meet their educational needs. The study also determined that five areas (inventory control and management, budget planning, cost control and analysis, profit planning, handling problem customers, and the development of general business policy) were the most frequently needed technical education competencies. This study emphasized the need for a deliberate method of identifying the competencies needed by employees and providing the delivery system as a part of the high school vocational education program.

Perry's (1991) survey included the farming, forestry, and fishing occupations. Other natural resource, horticulture, environmental, and processing occupations were not encompassed under the job classification system used by the Virginia Employment Commission. The respondents in this study were primarily managers, unlike the Anderson and Miller study (1983) which utilized mostly entry-level employees. Anderson and Miller

(1983) found that the educational needs of employees vary within levels of educational background and that the educational needs of employees as perceived by employers were greater than those perceived by the employees. Anderson and Miller (1983) also found that agribusiness employers believe the best delivery system to meet the educational needs of unskilled employees was the high school. Therefore, it seems that to determine the educational needs of entry-level workers, one must use entry-level workers as the population rather than supervisors of entry-level workers or educators.

The National Centre for Research and Development, Ltd. of Australia developed, How to Do a Skills Analysis and Skills Audit (Hayton & Loveder, 1992). They identified the questionnaire-based method as "commonly used in skills projects, particularly skills audits" (p. 28). Questionnaires may contain one or more of five main sections:

1. questions concerned with the organization (e.g. numbers of employees, main products/services, training policies);
2. questions concerned with the individual respondent (e. g. name, age, gender, education and training undertaken, career path, present salary);
3. questions concerned with the individual respondent's present job (e.g. main job functions, duties and tasks performed, task frequency, or relative time spent);
4. questions concerned with the skills or competencies required for the present job;
5. questions concerned with the skills or competencies possessed by the respondent. (p. 29)

Competency Verification in Agricultural Education Summary

Programs of Agricultural Education have used various methods of verifying competencies to be taught in the classroom; however, most efforts have been placed on the analysis of production agriculture occupations only. The need to expand into agricultural business related training programs has increased with the addition of new careers in

agriculture (Anderson & Miller, 1983; Roediger, et al., 1976). Many state departments of education have suggested competency lists that teachers use in developing local programs, but are they based on modern agricultural practices in areas of career expansion?

To develop agricultural education programs in these new career areas, agricultural educators must verify the competencies needed by those individuals actually employed in these new career areas. The competencies that will be taught in these new programs need to be identified and verified by the entry-level employees that the program serves.

Questionnaire-based methods "are relatively economical for large organizations with many employees to be surveyed" (Hayton & Loveder, 1992, p. 28).

Importance

Perry (1991) identified the basic and technical competencies that were important for high school graduates to develop as identified by Virginia Agribusiness Council members. Members were surveyed to determine the rank order importance of basic and technical skills for high school graduates seeking entry-level employment in Virginia agricultural firms. Producers (35%) and suppliers (35%) dominated the respondents with processors and marketers, general organizations, and professional individuals rounding out the sample. "Basic skills and technical skills were ranked separately, but overall basic skills ranked slightly higher than technical skills, but not a meaningful difference" (p. 57). Perry (1991) found that equipment safety, maintenance, and product salesmanship competencies were the highest ranked technical skills (see Table 2).

Chalupsky and others (1982) at the American Institutes for Research in the Behavioral Sciences developed a process for identifying important competencies in which a series of occupational competency tests representing all seven vocational education curriculum areas were to be developed. Surveys were collected from both supervisors and

Table 2

Ranking of Importance of Basic and Technical Skills by Virginia Agribusiness Council

Members

Skill description	n	Overall ranking	M	SD
Technical skills				
Safe equipment operation	73	4	4.67	0.47
Equipment maintenance skills	70	7	4.37	0.54
Product salesmanship	66	10	4.20	0.84
Interpreting work plans	70	12	4.10	0.64
Economic principles	68	15	3.97	0.82

Note. Calculated mean scores, n, and rankings include the following responses:

1 = Strongly Disagree; 2 = Disagree; 3 = Undecided; 4= Agree; 5 = Strongly Agree.

From Perry, J. A. (1991). Virginia agribusiness council members' perceptions of basic skills for high school graduates. Unpublished masters thesis, Virginia Polytechnic Institute and State University, p. 44.

job incumbents for each of 17 different occupations (agricultural chemicals applications technician, farm equipment mechanic, computer operator, word processing specialist, apparel sales, fabric sales, grocery clerk, hotel (motel) front office, dental assistant, physical therapist assistant, custom sewing, restaurant service (waiter, waitress, and cashier), electronics technician, water treatment technician, wastewater treatment technician, carpenter, and diesel mechanic).

Each respondent was asked to provide information on task frequency, importance, and whether the task was learned on the job or before being hired. For each task inventory item (about 100 per occupation), the ratings were separately summed and averaged for supervisors and job incumbents. The total score was then weighted to give responses from supervisors additional importance in the final weighting. These weighted average scores indicated whether or not the inventory items were considered important, frequently performed, or both (Chalupsky & others, 1982).

McClay (1978) identified and validated essential competencies in 57 major production agriculture and 139 agribusiness occupations as a part of a national study funded by the U.S. Department of Health, Education, and Welfare. McClay conducted this study with the help of teacher educators in agricultural education at 40 colleges and universities throughout the nation. This study like the McCracken and Yoder study (1975), identified the essential agricultural competencies, but McClay did not identify the common core of competencies. McClay (1978) used a two step process. Employer/Employee Review Groups (EERG) were used to modify, correct, or change the survey instrument. A national EERG was selected with at least 30 responses from each occupation.

McClay (1978) classified the importance of the competencies on a 4 point scale. McClay did not try to determine the common competencies across all agricultural occupations, but like Perry (1991) he only studied the occupations in the food and fiber systems of production. A conclusion of McClay that seemed to follow the other researchers

was that most employers of agricultural workers for occupations at or below mid-management prefer workers to be prepared in the essential agricultural competencies for the occupation when they enter employment.

Palmieri and Vecchiola (1987) developed a handbook to assist vocational teachers and administrators in preparing vocational curricula that included entrepreneurship competencies. Five-hundred-ninety Pennsylvania area vocational-technical school instructors and 60 small business owners and managers from Allegheny County, Pennsylvania were asked their opinion concerning 18 entrepreneurship competency areas that were validated by the National Center for Research in Vocational Education's model for lifelong entrepreneurship education and the Program for Acquiring Competencies in Entrepreneurship (PACE).

When teachers were asked if they included these competencies in their curriculum, 71.9% said no; however, 87.8% of the small business owners and managers said that the teaching of entrepreneurship competencies was important. Also, the instructors and business owners did not agree which entrepreneurship competencies were most important to teach. Only one competency (Manage the Business) was ranked in the top five competencies among instructors and business owners; however, business owners seemed to be stronger in their opinion with 96.7% response compared to an 86.1% response by instructors (Palmieri & Vecchiola, 1987).

Berkey and Hamilton (1987) determined the ranked importance of the teaching tasks of physical education student teachers as perceived by cooperating teachers and supervisors. Ninety-one cooperating teachers ranked the importance of 15 teaching tasks. The two groups, cooperating teachers and supervisors agreed with respect to the importance of demonstrating ability to self-assess, writing functional lesson/unit plans, and knowledge of subject matter.

Kazanas (1978) conducted a study to identify specific affective work competencies that are desirable and common for vocational education programs. Kazanas found 42 affective work competencies identified by industry and 54 identified by educators. However, the study concluded that there was a lack of continuity between educational institutions and employers, the same as Palmieri and Vecchiola (1987).

Porreca and Stallard (1975) also attempted to verify the affective competencies which vocational-technical areas have in common. Questions were asked of three different groups: Employees, employers, vocational teachers, and vocational directors. Employees were asked whether each competency was or was not important in relation to their present work situation. Employers were asked whether each competency was or was not important for their workers to possess, and vocational teachers were asked whether or not each competency could be taught to their vocational students. All three groups appear to have agreed on the commonality of the statements and vocational directors verified the commonality.

American College Testing (ACT) has developed an occupational test called Work Keys for:

- (1) Communicating to educators the skill requirements for an employer's particular jobs on a national basis;
- (2) providing students with a realistic preview of skills needed for jobs and an assessment of their standing on those skills;
- (3) helping employers selection decisions;
- and (4) helping employers in need of upgrading their current work force. (Hater, 1992, p. unnumbered)

This job analysis information was used as part of the Work Keys validation process before test questions were generated.

To determine those competencies that were critical to a job, ACT used ratings of a competency's importance. The rating options for the Likert-type importance scale included:

(1) = of no importance, (2) = of minor importance, (3) = of importance, (4) = of high importance, and (5) = of critical importance.

Importance Summary

Whether or not a particular competency is important seems to be one of the most used methods of determining the essential competencies in any occupational program. Determining the level of importance is necessary for successful vocational education programs. Time and resources do not allow educators to devote enough time to develop competencies in all aspects of an occupation. Educators could develop the list of competencies; however, employers are the most logical to identify the important competencies needed by incumbent and new workers (Palmieri & Vecchiola, 1987).

Most researchers use a two step method to identify the most important competencies. First they develop valid lists of competencies for the respective occupations, then they conduct surveys to determine the rankings of the identified competencies (McClay, 1978). Determining the mean importance ratings for each competency can be determined with a numerical scale, followed by a ranking of the means.

Relative Time Spent

Woolsey and Bula (1973) analyzed the tasks industrial supervisors actually performed and the supervisors reported levels of significance of those tasks. Twenty-eight industrial supervisors from nine different firms in the North Central Vocational, Technical and Adult Education District participated in the study. Direct task frequencies were recorded by the researcher, as well as significance of each task as reported by the supervisor under observation. They reported that there were not real correlations between frequency of tasks actually performed and the reported levels of significance for those tasks.

Researchers at the Iowa University (1990) College of Education conducted a study with rehabilitation aides working in residential facilities, hospitals, and long-term care

facilities to determine the competencies that were performed and the frequency of their performance. Surveys were mailed to 95 facilities with 35 completed and returned. The researchers reported their results by percentage of respondents who performed the competency and frequency of performance. Frequency of performance was rated only on those competencies performed by respondents as "frequently" or "often."

American College Testing Program's (ACT) Work Key test used relative time spent along with importance to determine those competencies that were critical to a job, ACT used a rating of how often a competency was performed. The rating options for how often a competency was performed included a Likert-type scale of: (0) = never, (1) = infrequently, (2) = less frequently, (3) = moderately frequent, (4) = more frequent, and (5) = most frequent. "Tasks were eliminated if they were performed by less than 70% of the total sample (i.e., more than 30% chose "never" on the frequency scale)" (Hater, 1992, p. 3).

ACT has even used the frequency and importance rating method on their own Work Keys assessments (McLarty, 1992). Educators and business people were surveyed about the importance and frequency of endorsement for 17 different Work Keys assessments. Business and education ranked the Interpersonal/Teamwork Work Keys assessment the most important, but both groups ranked the Ability To Learn Work Keys assessment as the most frequently endorsement.

Burrell and Talarico (1981) collected data on 55 community jobs to be incorporated in curriculum and teaching strategies for high functioning trainable and low functioning educable mentally retarded high school students. The task analysis included the performance frequency, importance level, and learning difficulty. Rating scales for each category included: (1) - very high, (2) - high, (3) - moderate, (4) - low, and (5) - very low.

Usiewicz (1985) conducted job analysis on six food service occupations for secondary-level vocational food service programs. Data were collected on both proficiency

and frequency. The proficiency ratings were: (1) = no proficiency, (2) = slight proficiency, (3) = moderate proficiency, (4) = considerable proficiency, and (5) = complete proficiency. The frequency scale included: (a) = never, (b) = frequently, (c) = constant. Tasks that had over 50 percent of the respondents rating the task with four (4) or five (5) to the proficiency question and a "c" to the frequency question were included for further analysis. The top tasks for a chef/cook included the human relation skills of grooming, cooperative attitude, team work, and self-direction.

Educational administrators used the frequency approach to identify competency standards in the area of student assessment. Impara (1993) conducted a national survey of educational administrators to determine the frequency and importance of student assessment tasks that they performed. The means of both frequency and importance were reported for each of three groups: The American Association of School Administrators, the National Association of Elementary School Principals, and the National Association of Secondary School Principals.

Chalupsky and others (1982) at the American Institutes for Research in the Behavioral Sciences developed a process for identifying the task frequencies of competencies in which a series of occupational competency tests representing all seven vocational education curriculum areas were to be developed. Each respondent was asked to provide information not only on task frequency, but also importance and whether the task was learned on the job or before being hired. For each task inventory item (about 100 per occupation), the ratings were separately summed and averaged for supervisors and job incumbents. The total score was then weighted to give responses from supervisors additional importance in the final weighting. These weighted average scores indicated whether or not the inventory items were considered frequently performed (Chalupsky & others, 1982).

Relative Time Spent Summary

Determining the relative amount of time spent on any particular competency is another method of determining the essential competencies in any occupational program. Determining the relative time spent on a competency is also necessary for successful vocational education programs. Time and resources do not allow educators to devote enough time to develop competencies in all aspects of an occupation. Like importance, educators could develop the list of competencies; however, employers are the most logical to identify the relative time spent on competencies by incumbent and new workers (Hater, 1992).

Most researchers use one of two methods to identify the relative time spent on competencies. One is direct observation by the researcher (Woolsey & Bula, 1973). The other is a questionnaire-based method, which is ideally suited for large statewide surveys (Hayton & Loveder, 1992).

Core Competency Development

The study that most parallels this study was a funded research project by United States Department of Health, Education, and Welfare in 1975. McCracken and Yoder (1975) identified a common core of basic competencies in agricultural occupations. They developed an initial inventory of the competencies performed by workers in selected occupations representing all occupational areas of agriculture. The initial inventory was conducted on 28 agricultural occupations:

1. dairy farmer,
2. swine farmer,
3. beef farmer,
4. horse farm hand,
5. grain farmer,

6. forage producer,
7. commercial vegetable producer,
8. farm manager (owner-operator),
9. feed salesman,
10. feed mill worker,
11. bulk fertilizer plant worker,
12. chemical application equipment operator,
13. animal health assistant,
14. agricultural-industrial equipment mechanic,
15. agricultural-industrial set-up and delivery man,
16. agricultural-industrial equipment partsman,
17. tree service worker,
18. floral designer,
19. greenhouse worker,
20. retail landscape and garden center salesman,
21. horticultural firm equipment mechanic (small gas engines),
22. park worker,
23. buildings and grounds foreman,
24. soil conservation aide,
25. sawmill worker,
26. all-round logger,
27. meat cutter, and
28. dairy plant worker.

Occupational surveys were then conducted seeking answers to two questions: (a) Does the incumbent perform the competency, and (b) How essential is the competency to successful performance in the occupation.

The project advisory committee determined that an essential rating of 2.3 or higher (1 = not important, 2 = useful, and 3 = essential) in one-half of the occupations was needed to place that competency on the common core of agricultural competencies. Forty-eight competencies from the over 2,500 competencies were selected. An examination of the competencies identified the competencies were from six duty areas (Performing General Office Work, Following General safety precautions, maintaining equipment, using and maintaining hand and power tools, operating equipment and vehicles, and maintaining building and structures). These competencies agreed with Perry's (1991) list of competencies essential for agricultural businesses.

McCracken and Yoder (1975) concluded that:

1. The tasks identified as the common core are needed by workers in most agricultural occupations.
2. The common core skills should be developed in students with career goals involving agricultural occupations.
3. The common core tasks represent only a small portion of the skills a worker must possess to succeed in any of the agricultural occupations in this study.

(p. 5-6)

Because there was only a low correlation between frequency of tasks actually performed and the reported levels of significance for those tasks, Woolsey and Bula (1973) designed a two-dimensional profile of the observed tasks of industrial supervisors.

The vertical profile of such a profile could be frequency of occurrence for each task and the horizontal axis could be the reported significance of each task. Each task could then be plotted on the graph, using the two coordinates for that task. (p. 13)

Core Competency Development Summary

The development of core or common competencies for vocational training programs allows educators and administrators to focus their efforts in areas that are highly important and are frequently performed on the job. Most core competency lists are developed from a variety of factors; however, importance and relative time spent dominate the research. Hater (1992) used these two factors to determine the competencies critical to a job. This allows for a very effective method of determining the critical (core) competencies for instructional purposes (American College Testing Program, 1994). Woolsey and Bula (1973) also used this two-dimensional profile in determining core competencies.

Chapter 3

Materials and Methods

Introduction

The purpose of this study was to determine the critical core occupational competencies for secondary agricultural education programs as identified by Ohio agricultural business and industry. The method used to generate this information was an item analysis of the competencies that industry experts identified as core competencies in the Ohio Competency Analysis Profile (OCAP) process. OCAPs are a source of competencies that agricultural educators use to teach the essential skills needed for employment in agricultural careers.

The competency lists for this study consisted of 10 agricultural education OCAPs identified by industry experts through an OCAP process developed by the Vocational Instructional Materials Laboratory (VIML), Center on Education and Training for Employment (CETE), The Ohio State University (Vocational Instructional Materials Laboratory, 1991, 1992, & 1994). The OCAP lists consisted of:

1. Agricultural Production,
2. Agricultural Sales and Service,
3. Agricultural/Industrial Mechanical Technician,
4. Animal Management Technician,
5. Floriculture and Greenhouse Worker,
6. Forest Industry Worker,
7. Meat Processor,
8. Nursery and Garden Center Worker,
9. Resource Conservation, and
10. Turf and Landscape Worker.

OCAP Process

The process used to analyze the agricultural occupations at the entry-level was called the Ohio Competency Analysis Profile (OCAP). The OCAP philosophy is built on the following premises:

1. Expert workers are better able to describe and define their job[s] than anyone else.
2. Any job can be effectively and sufficiently described in terms of competencies that successful workers in that occupation perform.
3. All competencies have direct implications for the skills, knowledge, and attitudes that workers must have in order to perform those competencies correctly.

(Vocational Instructional Materials Laboratory, 1991e, p. 10)

An Example

One such example of a critical core competency development process was completed in Ohio. The development of employer-verified competency lists called OCAPs was an undertaking that was the direct result of legislative reforms at the state and federal levels. Ohio's Future at Work (Ohio Department of Education, 1990) outlined an action plan to accelerate the modernization of vocational education in Ohio.

State supervisors in each service area (e.g., Agricultural Education, Business and Marketing Education, Trade and Industrial Education, and Home Economics Education) identified occupations in which vocational education programming was needed in Ohio. Over 60 occupations (16 in agriculture) were identified by the state supervisors in the service areas. Then, business, industry, labor, and community agency representatives analyzed and verified the competencies needed for employment in these occupations (Vocational Instructional Materials Laboratory, 1991, 1992, & 1994).

The Vocational Instructional Materials Laboratory (VIML), Center on Education and Training for Employment (CETE), The Ohio State University, conducted the OCAP process on 16 agricultural occupations (Vocational Instructional Materials Laboratory, 1991, 1992, & 1994). Those occupations consisted of:

1. Agricultural Business Feed and Grain Worker,
2. Agricultural Products Sales and Service Worker,
3. Agricultural/Industrial Mechanical Technician,
4. Animal Management Technician,
5. Beef and Sheep Producer,
6. Crop Producer,
7. Dairy Producer,
8. Fertilizer/Chemical Sales and Service Worker,
9. Floriculture and Greenhouse Worker,
10. Forest Industry Worker,
11. Meat Processor,
12. Nursery and Garden Center Worker,
13. Poultry Producer,
14. Resource Conservation Worker,
15. Swine Producer, and
16. Turf and Landscape Worker.

For these 16 agricultural occupations, the researcher and staff members of the Ohio Agricultural Education Curriculum Materials Service conducted extensive national searches of vocational curriculum centers, ERIC resources, and business and industry training materials to identify the draft occupational competency list in each occupation. Industry panels of 8 to 12 persons reviewed the draft lists. Committee members were to add to,

delete from, or alter the wording of the content found on the draft lists. From these lists, committee members identified the occupational, academic, and employability competencies.

After the OCAP process was completed, the researcher combined eight of the competency lists to form two new OCAP competency lists. This combination process was necessary to meet a request by the Director of Vocational Education, Ohio Department of Education, to publish OCAP competency lists for only those occupations where at least 10 vocational education programs exist. The Agricultural Business Feed and Grain Worker, Agricultural Products Sales and Service Worker, and Fertilizer/Chemical Sales and Service Worker OCAP competency lists were combined to form the new Agricultural Sales and Service OCAP competency list (Vocational Instructional Materials Laboratory, 1994). The Beef and Sheep Producer, Crop Producer, Dairy Producer, Poultry Producer, and Swine Producer OCAP competency lists were combined to form the new Agricultural Production OCAP competency list (Vocational Instructional Materials Laboratory, 1992a). The researcher ensured that each competency from the original OCAP competency lists was included in the new OCAP competency lists

Importance and Relative Time Spent Process

The criticality process of American College Testing Program (1994) was used as the method of collecting information on the importance of each competency to the job and the relative time spent on that competency. The criticality process identifies "the extent to which a task is critical to one's job" (American College Testing Program, 1994, p. G-1). ACT surveys a group of subject matter experts (SMEs), usually incumbent employees, to determine the most critical competencies for the occupation. ACT then develops test items for their Work Keys tests based on these critical work behaviors. Even the Uniform Guidelines on Employment Selections Procedures developed in 1979 by the Equal Employment Opportunity Council (EEOC) states that "work behavior(s) selected for

measurement should be critical work behavior(s) and/or important work behavior(s) constituting most of the job" (American College Testing, 1994, p. unnumbered).

Population and Sample

The population for this study was employees of agricultural firms in Ohio working full time in an occupation that would require initial entry with a vocational education high school training background. From this population, the researcher and state supervisors in the Agricultural Education Service, Division of Vocational and Career Education, Ohio Department of Education, asked teachers, state and local advisory committee members, and trade and business organization officers to help identify individuals who met the definition of the population. The state supervisors identified a group of 50 individuals for each OCAP competency list. Of the 500 identified individuals 222 employees responded to the survey (see Table 3).

Non-response error, which is the potential error introduced by non-respondents, was deemed not to be an issue in this research. This decision was made based on the fact that non-probability sampling methods were used in selecting the participants. The researcher was involved in the identification of the participants; however, because data had been already collected by the Vocational Instructional Materials Laboratory (VIML), follow-up of non-respondents to increase the response rate was not possible.

The researcher determined that 213 of the 222 respondents (96%) actually worked in the agricultural occupation for which they responded to the OCAP survey. The respondents were asked to indicate whether a competency was part of their job. Only nine respondents indicated that all the OCAP competencies for that agricultural occupation were not part of their job.

Table 4 shows the gender of the respondents while Table 5 depicts the age of the respondents. The size of the company for which the respondents worked is shown in

Table 3

Description of Respondents (N = 500, 50/occupation)

Occupation	No. responding	% return
Agricultural Production Worker	21	42%
Agricultural Sales and Service Worker	35	70%
Agricultural/Industrial Mechanical Technician	24	48%
Animal Management Technician	29	58%
Floriculture and Greenhouse Worker	25	50%
Forest Industry Worker	12	24%
Meat Processor	12	24%
Nursery and Garden Center Worker	25	50%
Resource Conservation Worker	18	36%
Turf and Landscape Worker	21	42%
TOTAL	222	44%

Table 4

Gender of Respondents

Occupation	No. of Males	% Males	No. of Females	% Females	Missing Data	% Missing Data
Agricultural Production Worker	20	95%	0	0%	1	5%
Agricultural Sales and Service Worker	29	83%	5	14%	1	3%
Agricultural/Industrial Mechanical Technician	23	96%	0	0%	1	4%
Animal Management Technician	1	3%	19	66%	9	31%
Floriculture and Greenhouse Worker	22	88%	3	12%	0	0%
Forest Industry Worker	11	92%	0	0%	1	8%
Meat Processor	9	75%	0	0%	3	25%
Nursery and Garden Center Worker	22	88%	1	4%	2	8%
Resource Conservation Worker	17	94%	0	0%	1	6%
Turf and Landscape Worker	18	86%	2	9%	1	5%

Table 5

<u>Age of Respondents</u>											
Occupation	Under 21	21 to 30	31 to 40	41 to 50	51 to 64	65 or over	Missing Data				
Agricultural Production Worker	0	2	9	7	2	0	1				
Agricultural Sales and Service Worker	0	9	10	6	7	1	2				
Agricultural/Industrial Mechanical Technician	0	2	5	10	6	0	1				
Animal Management Technician	0	1	10	7	2	0	9				
Floriculture and Greenhouse Worker	0	0	7	6	9	3	0				
Forest Industry Worker	0	0	0	5	3	3	1				
Meat Processor	0	0	4	4	1	0	3				
Nursery and Garden Center Worker	0	0	5	8	10	0	2				
Resource Conservation Worker	0	1	2	5	1	8	1				
Turf and Landscape Worker	0	0	13	3	3	1	1				

Table 6. Racial/ethnic group of the respondents; the highest degree, certificate, or diploma that the respondents held; and number of years the respondents have been employed full-time in their occupation are depicted in Tables 7 through 9, respectively.

Data Collection Plan

The Vocational Instructional Materials Laboratory (VIML), Center on Education and Training for Education, The Ohio State University, developed the survey according to guidelines for American College Testing Program. The VIML conducted the mailing. Data were collected by mail survey. Cover letters (see Appendix A) and questionnaires (see Appendix B) were sent out January through May 1994.

Instrumentation

The importance and relative time spent survey was developed by the Vocational Instructional Materials Laboratory (VIML), Center on Education and Training for Education (CETE), The Ohio State University. Each survey included all the core competencies for each agricultural occupation. These competency statements were developed from the OCAP competency lists (Vocational Instruction Materials Laboratory, 1991, 1992, & 1994).

Respondents rated how important the competency was to overall job performance as “minor”, “average”, or “major”. They rated how much time they spent on that competency relative to the time spent on other competencies as “small”, “medium”, or “large.” If the competency was not one associated with the job of the respondent, it was marked as “not part of the job.” The instrument utilized was a modification of a “double-barreled” pre-needs assessment survey design outlined by Witkin (1984). A numerical scale was assigned to each rating that allowed ranking of the competencies. Importance ratings were based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance), 1 = minor importance,

Table 6

Size of the Company for Which Respondents Worked

Occupation	Average no. of full-time employees	Average no. of part-time employees
Agricultural Production Worker	1.75	0.95
Agricultural Sales and Service Worker	321.59	23.24
Agricultural/Industrial Mechanical Technician	15.65	0.87
Animal Management Technician	5.25	3.75
Floriculture and Greenhouse Worker	12.60	9.96
Forest Industry Worker	258.55	19.82
Meat Processor	13.22	3.89
Nursery and Garden Center Worker	8.22	13.96
Resource Conservation Worker	215.24	82.47
Turf and Landscape Worker	3.70	7.05

Table 7

Racial/Ethnic Group of Respondents

Occupation	Afro- American or Black	Native American (Indian, Alaskan, Hawaiian)	Caucasian or White	Mexican- American, Mexican Origin	Asian American, Oriental, Pacific Islander	Puerto Rican, Cuban, Other Latino or Hispanic	Other	I prefer not to respond
Agricultural Production Worker	0	0	20	0	0	0	0	1
Agricultural Sales and Service Worker	1	0	32	0	0	0	0	2
Agricultural/ Industrial Mechanical Technician	0	0	21	0	0	0	0	3
Animal Management Technician	0	0	18	0	0	0	0	11
Floriculture and Greenhouse Worker	0	0	23	0	0	0	0	2
Forest Industry Worker	0	0	11	0	0	0	0	1
Meat Processor	0	0	7	0	0	0	0	5
Nursery and Garden Center Worker	0	0	21	0	0	0	0	4
Resource Conservation Worker	0	0	16	0	0	0	0	2
Turf and Landscape Worker	0	0	18	0	0	0	0	3

Table 8

Highest Degree, Certificate, or Diploma Respondents Held

Occupation	High School Diploma	Certificate or Diploma	Technical Program	Associate's Degree	Bachelor's Degree	Master's Degree	Doctor's Degree	Professional Degree	Other	Missing Data
Agricultural Production Worker	9	1	2	6	2	0	0	0	0	1
Agricultural Sales and Service Worker	12	1	1	18	2	0	0	0	0	1
Agricultural/ Industrial Mechanical Technician	12	5	0	6	0	0	0	0	0	1
Animal Management Technician	7	3	3	3	0	1	2	0	0	10
Floriculture and Greenhouse Worker	9	0	0	13	3	0	0	0	0	0
Forest Industry Worker	2	1	2	3	3	0	0	0	0	1
Meat Processor	3	0	1	3	1	0	1	0	0	3
Nursery and Garden Center Worker	9	0	3	8	2	0	0	0	1	2
Resource Conservation Worker	4	1	1	5	5	1	0	0	0	1
Turf and Landscape Worker	3	4	3	9	1	0	0	0	0	1

Table 9

Number of Years Respondents Have Been Employed Full-Time in Their Occupation

Occupation	Less than one year	1 to 2 years	3 to 5 years	6 to 10 years	11 to 15 years	16 to 20 years	21 to 30 years	More than 30 years	Missing Data
Agricultural Production Worker	1	0	1	1	3	3	10	1	1
Agricultural Sales and Service Worker	1	2	7	3	7	5	6	3	1
Agricultural/Industrial Mechanical Technician	0	0	1	1	1	5	9	6	1
Animal Management Technician	2	0	1	3	4	5	3	1	10
Floriculture and Greenhouse Worker	0	0	1	1	4	4	7	8	0
Forest Industry Worker	1	0	1	1	1	1	5	1	1
Meat Processor	0	0	0	1	2	3	2	1	3
Nursery and Garden Center Worker	0	0	0	0	4	4	6	9	2
Resource Conservation Worker	5	0	0	3	0	4	3	0	3
Turf and Landscape Worker	0	0	1	1	10	4	2	2	1

0 = 0 1 = minor

2 = average importance, and 3 = major importance. Relative time spent ratings were based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent), 1 = small relative time spent, 2 = medium relative time spent, and 3 = large relative time spent. Each competency on the questionnaire collected data relevant to the research questions. A sample instrument is included in Appendix B.

Validity

This study used a comprehensive and verified employer competency list. Ohio Competency Analysis Profiles (OCAP) evolved from a modified DACUM (Developing A CurriulUM) process involving business, industry, labor, and community agency representatives throughout Ohio. The competency lists for this study consisted of 10 agricultural education OCAPs identified by industry experts through an OCAP process developed by the Vocational Instructional Materials Laboratory (VIML), Center on Education and Training for Employment (CETE), The Ohio State University (Vocational Instructional Materials Laboratory, 1991, 1992, & 1994). The researcher is a certified OCAP facilitator and Work Keys facilitator and personally facilitated the OCAP process for six of the 16 OCAPs and all of the job profiling processes.

The process used to analyze the agricultural occupations at the entry-level was called the Ohio Competency Analysis Profile (OCAP). The OCAP philosophy is built on the following premises:

1. Expert workers are better able to describe and define their job than anyone else.
2. Any job can be effectively and sufficiently described in terms of competencies that successful workers in that occupation perform.
3. All competencies have direct implications for the skills, knowledge, and attitudes that workers must have in order to perform those competencies correctly.

(Vocational Instructional Materials Laboratory, 1991e, p. 10)

The development of employer-verified competency lists called OCAPs was an undertaking that was the direct result of legislative reforms at the state and federal levels. Ohio's Future at Work (Ohio Department of Education, 1990) outlined an action plan to accelerate the modernization of vocational education in Ohio.

State supervisors in each service area (e.g., Agricultural Education, Business and Marketing Education, Trade and Industrial Education, and Home Economics Education) identified occupations in which vocational education programming was needed in Ohio. Over 60 occupations (16 in agriculture) were identified by the state supervisors in the service areas. Then, business, industry, labor, and community agency representatives analyzed and verified the competencies needed for employment in these occupations (Vocational Instructional Materials Laboratory, 1991, 1992, & 1994).

For these 16 agricultural occupations, the researcher and staff members of the Ohio Agricultural Education Curriculum Materials Service conducted extensive national searches of vocational curriculum centers, ERIC resources, and business and industry training materials to identify the draft occupational competency list in each occupation. Industry panels of 8 to 12 persons reviewed the draft lists. Committee members were to add to, delete from, or alter the wording of the content found on the draft lists. From these lists, committee members identified the occupational, academic, and employability competencies.

Staff at the Vocational Instructional Materials Laboratory designed the instrument according to guidelines by American College Testing Program. The Work Keys System uses a strategy called content validation. The validation process involves identifying a pool of qualified subject matter experts to determine a list of competencies important to their job (American College Testing Program, 1994).

Since the Work Keys occupational profiling depends on a looser linkage between the competency requirements and skill requirements on the job than those called for by the Uniform Guidelines on Employment Selections Procedures developed in 1979 by the Equal

Employment Opportunity Council (EEOC), it does not meet the content validation standards set by the EEOC. As a result, it is not intended to be used for any human resources applications in businesses, such as personnel selection and training. However, it is very effective in determining criticality of competencies for instructional purposes (American College Testing Program, 1994). A draft of the instrument was developed by the VIML following guidelines prepared by American College Testing Program.

Reliability

"The traditional reliability procedures (K-R 20 and correlation) are generally not considered appropriate because these methods are dependent on the variability of the subjects for which they are computed" (Ary, Jacobs, & Razavieh, 1985, p. 238-239). This study has little or no variability in responses. Standard deviations of less than 0.50 are common throughout the competencies. Ary et al. suggested several procedures for estimating the reliability of instruments like the one used in this study, but measurement specialists disagree on the merit of the procedures. The researcher did not have any means of using traditional reliability procedures and, therefore, cannot provide any direct evidence of reliability.

Reliability measures such as test-retest reliability were not available to the researcher. The researcher was involved in the development of the instrument; however, it was not until after data were collected that the researcher identified the problem with the data analysis method employed by the Vocational Instructional Materials Laboratory that set up the problem for this study. Consequently, it was impossible to conduct a test-retest survey.

Data Analysis

Descriptive statistics (means and standard deviations) were used to analyze the data related to the following research objectives:

The first objective of this study was to identify the importance of the core occupational competencies in 10 agricultural occupations. Importance was based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance), 1 = minor importance, 2 = average importance, and 3 = major importance.

The second objective of this study was to identify the relative time spent on the core occupational competencies in 10 agricultural occupations. Relative time spent was based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent), 1 = small relative time spent, 2 = medium relative time spent, and 3 = large relative time spent.

The third objective of this study was to determine the critical core of occupational competencies in each of 10 agricultural occupations. For each competency the mean score for importance (horizontal axis) and mean score for relative time spent (vertical axis) were plotted as a point. The grand means of all importance ratings and relative time spent ratings for each agricultural occupation were plotted to determine the "critical coordinates." The distribution of importance and relative time spent ratings were graphically divided into four "quadrants" by these lines. Those competencies that fell into the upper right quadrant were rated relatively high in importance and relatively high in time spent (i.e., both the importance and the relative time spent ratings were above the overall mean ratings for each scale) and were identified as the critical core competencies for the occupation. The process was repeated for each agricultural occupation.

Figure 2 is an example of how the quadrant method (Witkin, 1984; Woolsey & Bula, 1973) was used to show the distribution of the ratings for each agricultural occupation. An arbitrary mean of all importance ratings (1.50) is shown superimposed with a dotted line on the X-axis, while an arbitrary relative time spent mean (1.50) is shown with a dotted line along the Y-axis. The grand means of all importance and relative time spent ratings for each occupation varied; therefore, the critical coordinate point changed

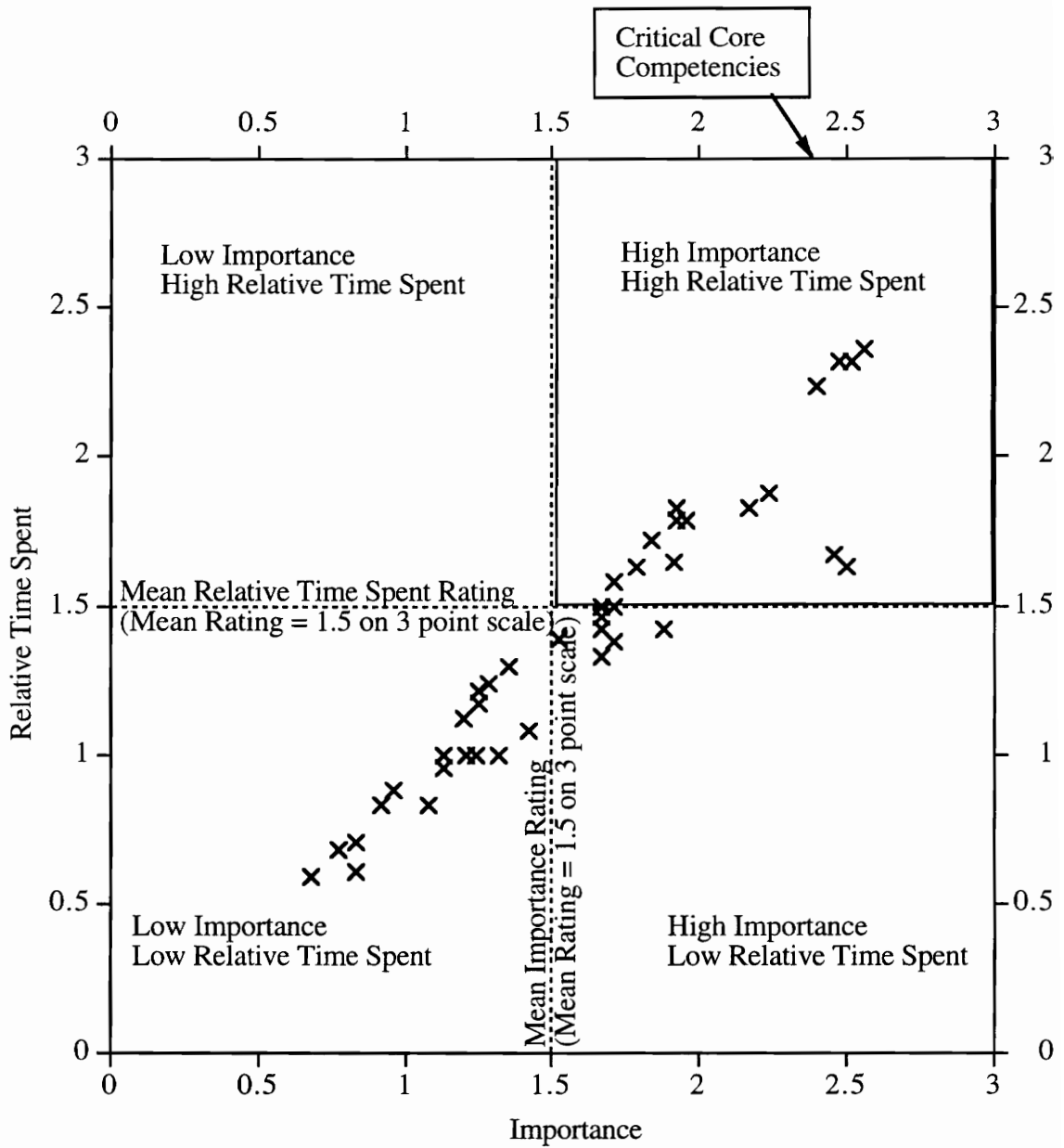


Figure 2. Sample Plot of Competency Importance and Relative Time Spent Ratings with Arbitrary Grand Means of 1.50

from occupation to occupation. Competencies having both high importance and relative time spent ratings fell into the outlined box in the upper right quadrant.

The fourth objective of this study was to determine the common core of critical occupational competencies across all 10 agricultural occupations. The common core of critical occupational competencies was determined by counting the number of times that a competency was included in the critical core competencies of objective three. Those competencies that were in the critical core of five or more of the agricultural occupations were considered to be the common core of critical occupational competencies for all 10 agricultural occupations.

Summary

The researcher used 222 industry workers from 10 different agricultural occupations to determine the importance of and relative time spent on lists of competencies identified in the OCAP process. These ratings were used to determine the 20 most important and top 20 competencies with the most relative time spent for each core competency in 10 agricultural occupations. The quadrant method (Witkin, 1984) was also used to determine the critical core competencies within each agricultural occupation. Those competencies that were in the critical core of five or more of the agricultural occupations were considered to be the common core of critical occupational competencies for all 10 agricultural occupations.

Chapter 4

Results

Introduction

The findings of the research are presented in this chapter. Summarized descriptions and interpretations of all data analysis are provided. Results are presented in reference to the following four research objectives that guided the research:

1. To identify the importance of the core occupational competencies in 10 agricultural occupations.
2. To identify the relative time spent on the core occupational competencies in 10 agricultural occupations.
3. To determine the critical core of occupational competencies in each of the 10 agricultural occupations.
4. To determine the common core of critical occupational competencies across all 10 agricultural occupations.

Objective One: To Identify the Importance of the Core Occupational Competencies in 10 Agricultural Occupations

To meet the research objective, agricultural industry workers were asked to rate the importance of each competency on a four point scale. A value of three was assigned to a response of "Major," a value of two was assigned to a response of "Average," a value of one was assigned to a response of "Minor," and a value of zero was assigned to a response of "Not Part of the Job" (interpreted as no importance). Descriptive statistics (means, standard deviations) were calculated on each competency in 10 agricultural occupations. The competencies were ranked from highest to lowest, with the highest overall mean rating receiving the highest rank. This ranking was performed on each agricultural occupation.

Tables C1 through C10 in Appendix C contain a listing of the means and standard deviations for the competencies not in the top 20 for each agricultural occupation.

Table 10 lists the 20 most important competencies as rated by agricultural production workers ($n = 21$) who responded to the survey. The highest rated competency was: apply safe work habits ($M = 2.79$). Seven of the top 20 most important were from the crop and forage production unit. Another five of the top 20 competencies were from the agricultural mechanics unit. Four of the competencies were from the business management unit, three of the competencies were from the general safety precautions unit, and the remaining competency was from the marketing unit.

The 20 most important competencies as rated by agricultural sales and service workers who responded to the survey ($n = 35$) are listed in Table 11. Interact with customer, was the competency rated the highest ($M = 2.85$). Of these 20 competencies, nine were from the fertilizer/chemical sales and service worker unit, three were from both the general safety precautions and sales skills units, two each from the customer service and business management units, and one was from the inventory unit.

The 20 most important competencies as rated by agricultural/industrial mechanical technicians ($n = 24$) who responded to the survey are listed in Table 12. The highest rated competency was: maintain safe work environment ($M = 2.87$). Of the 20 most important competencies rated by agricultural/industrial mechanical technicians, four were competencies from both the general safety precautions and drivetrain units, and three others were from the general repair procedures unit, two each from the electrical systems and engine block units, and one competency from the general equipment maintenance, lubrication system, fuel and air systems, and hydraulics units.

The 20 most important competencies as rated by animal management technicians who responded to the survey ($n = 29$) are listed in Table 13. Demonstrate safe work habits and maintain safe work environment were tied for the competencies rated the highest

Table 10

Twenty Most Important Competencies as Rated by Agricultural Production Workers(n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
1.0.2	Apply safe work habits	2.79	0.15
1.0.3	Operate and maintain equipment and facilities	2.74	0.16
2.0.4	Plant and till crops	2.70	0.18
3.0.11	Operate equipment and vehicles	2.68	0.17
5.0.6	Complete financial and tax records	2.63	0.28
1.0.1	Maintain safe work environment	2.63	0.18
3.0.4	Lubricate equipment	2.61	0.25
3.0.3	Service lubrication systems for large engines	2.61	0.25
2.0.10	Control weeds	2.60	0.28
5.0.7	Complete general and production records	2.58	0.28
5.0.8	Summarize and analyze business records	2.53	0.28
5.0.10	Finance business	2.53	0.35
2.0.2	Plan crop planting	2.50	0.28
4.0.2	Establish marketing plans	2.47	0.35
2.0.13	Harvest and manage forages	2.45	0.33
2.0.12	Harvest grain crops	2.45	0.26
2.0.15	Maintain quality of stored crops	2.45	0.28
2.0.14	Store crops	2.40	0.22
3.0.21	Use and maintain hand and power tools	2.37	0.22
3.0.5	Service fuel and air systems for large engines	2.37	0.35
	Grand Mean (137 competencies)	1.54	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table 11

Twenty Most Important Competencies as Rated by Agricultural Sales and Service Workers(n = 35)

Number	Competency	<u>M</u>	<u>SD</u>
2.0.2	Interact with customer	2.85	0.28
3.0.2	Perform customer relations activities	2.68	0.31
3.0.1	Provide technical assistance	2.65	0.39
1.0.2	Apply safe work habits	2.55	0.46
1.0.1	Maintain safe work environment	2.52	0.48
2.0.1	Plan sales procedure	2.44	0.58
2.0.3	Conduct sale	2.43	0.65
10.2.1	Determine customer needs	2.28	0.79
10.2.2	Provide technical assistance	2.28	0.74
10.1.2	Follow emergency response procedures	2.28	0.76
10.1.1	Maintain safe work environment	2.19	0.79
10.2.3	Conduct sale	2.16	0.75
10.2.4	Perform customer relations activities	2.16	0.72
10.4.2	Formulate fertilizer and chemical mixtures	1.88	0.89
1.0.3	Operate and maintain equipment	1.84	0.64
10.4.4	Inspect fields for weed, disease, insect, or other damage	1.79	0.92
10.4.1	Collect field data	1.79	0.86
4.0.1	Perform general office duties	1.73	0.65
5.0.1	Inventory business	1.71	0.76
4.0.6	Determine costs and revenues of conducting business	1.63	0.83
	Grand Mean (78 competencies)	1.27	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table 12

Twenty Most Important Competencies as Rated by Agricultural/Industrial Mechanical Technicians (n = 24)

Number	Competency	<u>M</u>	<u>SD</u>
1.0.1	Maintain safe work environment	2.87	0.20
1.0.3	Demonstrate safe work habits	2.73	0.26
16.0.1	Maintain hydraulic systems	2.65	0.33
16.0.2	Repair hydraulic systems	2.57	0.42
1.0.4	Operate and maintain equipment	2.57	0.29
3.0.3	Diagnose malfunctions	2.52	0.46
12.0.3	Maintain transmission	2.48	0.38
2.0.1	Use service and operator's manuals	2.48	0.46
1.0.2	Recognize environmental issues	2.45	0.34
12.0.1	Repair clutch	2.43	0.42
3.0.4	Determine equipment repair procedures	2.41	0.45
11.0.4	Service charging system	2.39	0.45
12.0.2	Service power takeoff (PTO)	2.39	0.34
10.0.2	Service diesel fuel system	2.39	0.42
3.0.1	Use measuring devices	2.39	0.48
12.0.4	Repair transmission	2.35	0.45
7.0.1	Service engine block	2.35	0.48
8.0.1	Maintain lubrication system	2.35	0.45
11.0.3	Service starting system	2.30	0.44
7.0.2	Service piston assembly	2.30	0.53
	Grand Mean (66 competencies)	2.05	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table 13

Twenty Most Important Competencies as Rated by Animal Management Technicians(n = 29)

Number	Competency	<u>M</u>	<u>SD</u>
1.0.2	Demonstrate safe work habits	2.54	0.46
1.0.1	Maintain safe work environment	2.54	0.50
7.0.2	Handle animals	2.46	0.55
3.0.2	Maintain facilities	2.38	0.73
10.0.3	Maintain company image	2.22	0.75
7.0.4	Restrain animals	2.12	0.61
9.0.1	Examine animals	2.08	0.81
1.0.3	Operate and maintain equipment	2.04	0.53
12.0.2	Perform general office duties	1.90	0.66
5.0.2	Feed and water animals	1.86	0.82
7.0.5	Confine animal	1.86	0.55
2.0.4	Demonstrate knowledge of anatomical and physiological systems	1.86	0.56
7.0.1	Identify animals	1.85	0.67
9.0.6	Administer medication	1.82	0.91
6.0.3	Bathe animal	1.79	0.82
9.0.2	Treat injuries	1.79	0.88
12.0.1	Use and maintain price lists and catalogs	1.79	0.64
12.0.7	Order merchandise and animals	1.75	0.78
9.0.3	Perform emergency treatment	1.64	0.96
12.0.6	Control inventory	1.61	0.73
	Grand Mean (61 competencies)	1.36	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

(\underline{M} = 2.54). Of these 20 competencies, four were from the handling, health care, and business management units, three were from the general safety precautions unit, and one competency each from the housing, marketing and sales, feeding, animal care industry, and grooming units.

Table 14 lists the 20 most important competencies as rated by floriculture and greenhouse workers (\underline{n} = 25) who responded to the survey. A mean of 2.56 was found for the highest rated competency: determine customer needs and services. Eight of the top 20 most important competencies were from the marketing and sales unit. Another four of the top 20 competencies were from the greenhouse plant production unit. Three of the competencies were from both the general safety precautions and business management units, and the remaining competencies were one each from equipment maintenance and merchandise handling units.

The 20 most important competencies as rated by forest industry workers who responded to the survey (\underline{n} = 12) are listed in Table 15. The highest rated competency was: maintain safe work environment (\underline{M} = 2.91). Of these 20 competencies, three competencies were each from the general safety precautions, forestry equipment operation, forest establishment, and forestry equipment maintenance units, two competencies were from both the forest industry operations and forest measurements units, and one each from the forest management, forest nursery operations, construction skills, and business management units.

The 20 most important competencies as rated by meat processors (\underline{n} = 12) who responded to the survey are listed in Table 16. Clean and sanitize facility, was the competency rated the highest (\underline{M} = 3.00). Of the 20 most important competencies rated by meat processors, five were from the product handling unit, four were from the wholesale cutting unit, and three others were competencies from the general safety precautions unit, two were competencies from both the tools and equipment and miscellaneous meat

Table 14

Twenty Most Important Competencies as Rated by Floriculture and Greenhouse Workers

(n = 25)

Number	Competency	<u>M</u>	<u>SD</u>
3.0.1	Determine customer needs and services	2.56	0.49
3.0.5	Maintain company image	2.52	0.49
1.0.2	Demonstrate safe work habits	2.50	0.65
3.0.3	Conduct sale	2.48	0.58
1.0.1	Maintain safe work environment	2.46	0.65
3.0.7	Maintain customer relations	2.40	0.53
3.0.2	Provide technical assistance	2.24	0.45
3.0.4	Demonstrate presale skills	2.17	0.78
5.0.1	Perform general office duties	1.96	0.80
7.0.5	Handle and care for plants	1.92	0.87
5.0.3	Control inventory	1.92	0.75
2.0.2	Maintain greenhouse equipment and facilities	1.91	0.84
1.0.3	Operate and maintain equipment	1.88	0.85
3.0.8	Display merchandise	1.84	0.71
3.0.6	Price merchandise	1.79	0.62
7.0.8	Plan pest-control program	1.71	0.99
7.0.9	Harvest greenhouse plants	1.71	0.96
4.0.5	Process container plants	1.71	0.83
5.0.2	Keep customer accounts	1.67	0.89
7.0.6	Fertilize plants in greenhouse operation	1.67	0.92
	Grand Mean (42 competencies)	1.58	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table 15

Twenty Most Important Competencies as Rated by Forest Industry Workers (n = 12)

Number	Competency	M	SD
1.0.1	Maintain safe work environment	2.91	0.12
1.0.2	Demonstrate safe work habits	2.82	0.16
6.0.1	Improve timber stand	2.50	0.20
10.0.3	Operate chain saw	2.40	0.32
2.0.2	Identify common trees and associated plants	2.36	0.32
1.0.3	Operate and maintain equipment	2.36	0.27
5.0.5	Plant trees	2.30	0.31
10.0.2	Operate equipment and vehicles	2.30	0.31
9.0.1	Maintain equipment	2.30	0.31
9.0.2	Maintain chain saw	2.20	0.35
5.0.4	Prepare to plant trees	2.20	0.39
4.0.3	Cruise timber	2.00	0.54
4.0.1	Interpret maps	2.00	0.48
3.0.4	Handle and care for seedlings and cuttings	2.00	0.40
11.0.1	Use and maintain hand, power, and pneumatic tools	2.00	0.25
12.0.11	Perform public relations work	1.90	0.46
5.0.2	Evaluate soil characteristics	1.90	0.22
10.0.1	Perform equipment prestart functions	1.80	0.39
2.0.1	Evaluate forest industry	1.73	0.36
9.0.10	Clean and store equipment	1.60	0.32
	Grand Mean (62 competencies)	1.34	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table 16

Twenty Most Important Competencies as Rated by Meat Processors (n = 12)

Number	Competency	M	SD
2.0.1	Clean and sanitize facility	3.00	0.00
1.0.1	Maintain safe work environment	2.88	0.12
1.0.3	Operate and maintain equipment	2.75	0.16
14.0.5	Conduct sale	2.67	0.36
1.0.2	Demonstrate safe work habits	2.63	0.17
15.0.3	Display products	2.63	0.17
16.0.1	Package products	2.50	0.18
16.0.2	Store refrigerated/frozen products	2.50	0.18
16.0.6	Ship products	2.38	0.25
7.0.2	Cut beef carcass (hanging)	2.25	0.35
13.0.2	Operate equipment	2.25	0.35
7.0.1	Locate wholesale cuts	2.13	0.38
16.0.5	Receive shipments	2.13	0.28
7.0.3	Box beef carcass	2.00	0.36
12.0.3	Prepare sausages	1.89	0.42
16.0.3	Control dry goods inventory	1.88	0.22
7.0.4	Cut pork carcass	1.78	0.43
8.0.7	Merchandise short loin cuts	1.78	0.50
12.0.1	Process meat cuts	1.78	0.43
13.0.1	Use hand and power tools	1.75	0.35
	Grand Mean (62 competencies)	1.31	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

merchandising units, and one competency was each from the sanitation, customer service, marketing, and retail beef cutting units.

The 20 most important competencies as rated by nursery and garden center workers who responded to the survey ($n = 25$) are listed in Table 17. The highest rated competency was: maintain company image ($M = 2.96$). Of these 20 competencies, six were competencies from both the nursery and garden center operations and marketing and sales units, three were competencies from the general safety precautions unit, two were from the equipment maintenance unit, and one competency was from the business management, equipment operation, and product handling units.

Table 18 lists the 20 most important competencies as rated by resource conservation workers ($n = 18$) who responded to the survey. Maintain safe work environment ($M = 2.60$), was the competency rated the highest. Five of the top 20 most important competencies were from the resource conservation industry unit. Another four of the top 20 competencies were from the general safety precautions unit. Three of the competencies were from the equipment maintenance unit. Two of the competencies were from the soil conservation and mapping units, and the remaining four competencies were each from the equipment operation, groundskeeping, business management, and water quality management units.

The 20 most important competencies as rated by turf and landscape workers who responded to the survey ($n = 21$) are listed in Table 19. A mean of 2.90 was found for the highest rated competency: enhance company image. Of these 20 competencies, seven were competencies from the turf and landscape operations unit, five were competencies from the equipment maintenance, three were competencies from the general safety precautions and marketing and sales units, and one competency each from the construction skills and business management units.

Table 17

Twenty Most Important Competencies as Rated by Nursery and Garden Center Workers(n = 25)

Number	Competency	<u>M</u>	<u>SD</u>
6.0.5	Maintain company image	2.96	0.15
6.0.1	Determine customer needs and services	2.83	0.35
1.0.1	Maintain safe work environment	2.80	0.27
2.0.13	Maintain plants	2.78	0.30
2.0.1	Demonstrate understanding of nursery and garden center industry	2.70	0.40
1.0.2	Demonstrate safe work habits	2.67	0.39
6.0.4	Conduct sale	2.64	0.55
6.0.3	Demonstrate selling skills	2.61	0.60
6.0.7	Market products and services	2.52	0.42
6.0.2	Provide technical assistance	2.50	0.47
2.0.4	Identify and classify plants	2.48	0.61
2.0.10	Fertilize plants	2.48	0.48
8.0.5	Supervise and manage labor	2.35	0.59
2.0.14	Prune plants	2.35	0.51
1.0.3	Operate and maintain equipment	2.33	0.62
2.0.3	Examine plant requirements and value	2.30	0.50
3.0.2	Use and maintain hand and power tools	2.30	0.40
4.0.3	Operate vehicles	2.27	0.62
7.0.2	Deliver products and load customer vehicles	2.22	0.57
3.0.3	Lubricate equipment	2.22	0.65
	Grand Mean (43 competencies)	2.14	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table 18

Twenty Most Important Competencies as Rated by Resource Conservation Workers(n = 18)

Number	Competency	<u>M</u>	<u>SD</u>
1.0.1	Maintain safe work environment	2.60	0.33
1.0.2	Demonstrate safe work habits	2.40	0.41
1.0.3	Operate and maintain equipment	2.20	0.49
4.0.2	Conserve soil	2.13	0.51
2.0.4	Follow legal regulations	2.06	0.5
1.0.4	Respond to critical incidents	2.00	0.42
2.0.1	Demonstrate understanding of industry	1.94	0.53
2.0.3	Identify and classify plants	1.82	0.55
5.0.2	Interpret topographic maps	1.81	0.57
10.0.4	Operate chain saw	1.76	0.53
8.0.6	Maintain trees, shrubs, and hedges	1.76	0.61
9.0.14	Maintain chain saw	1.71	0.51
2.0.2	Examine plant physiology and growth	1.71	0.56
5.0.3	Orient to field position	1.69	0.56
9.0.2	Use and maintain equipment	1.69	0.51
4.0.1	Identify soil characteristics	1.69	0.44
9.0.1	Clean and store equipment	1.63	0.66
2.0.6	Examine interdependency of ecosystem	1.53	0.52
12.0.1	Perform general office duties	1.50	0.57
3.0.2	Determine water quality parameters	1.50	0.57
	Grand Mean (68 competencies)	1.26	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table 19

Twenty Most Important Competencies as Rated by Turf and Landscape Workers (n = 21)

Number	Competency	M	SD
5.0.1	Enhance company image	2.90	0.19
1.0.3	Operate and maintain equipment	2.78	0.43
3.0.9	Operate equipment and vehicles	2.75	0.49
1.0.2	Demonstrate safe work habits	2.72	0.44
2.0.7	Prepare landscape and turfgrass area	2.70	0.46
2.0.6	Prepare for landscape and turf installation	2.70	0.46
3.0.10	Operate power equipment	2.65	0.54
2.0.3	Identify and classify plants	2.65	0.30
5.0.3	Prepare estimate	2.60	0.47
2.0.11	Maintain landscape plants	2.60	0.59
2.0.1	Demonstrate understanding of turf and landscape industry	2.60	0.31
1.0.1	Maintain safe work environment	2.56	0.46
2.0.9	Establish turf and landscape	2.50	0.52
5.0.4	Conduct sale	2.50	0.52
6.0.1	Perform general office duties	2.50	0.43
2.0.4	Plan landscape designs	2.50	0.43
3.0.1	Maintain equipment	2.50	0.52
4.0.2	Construct with stone and pavers	2.42	0.55
3.0.12	Use and maintain hand, power, and pneumatic tools	2.35	0.62
3.0.11	Clean and store equipment	2.30	0.50
	Grand Mean (49 competencies)	2.03	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Objective Two: To Identify the Relative Time Spent on the Core Occupational
Competencies in 10 Agricultural Occupations

To meet the research objective, agricultural industry workers were asked to rate the relative time spent on each competency on a four point scale. A value of three was assigned to a response of "Large," a value of two was assigned to a response of "Medium," a value of one was assigned to a response of "Small," and a value of zero was assigned to a response of "Not Part of the Job." Descriptive statistics (means, standard deviations) were calculated on each competency in 10 agricultural occupations. The competencies were ranked from highest to lowest, with the highest overall mean rating receiving the highest rank. This ranking was performed on each agricultural occupation. Tables C11 through C20 in Appendix C contain a complete listing of the means and standard deviations for the competencies not in the top 20 for each agricultural occupation.

Table 20 lists the top 20 competencies with the most relative time spent as rated by agricultural production workers ($n = 21$) who responded to the survey. The highest rated competency was: operate equipment and vehicles ($M = 2.53$). Six of the top 20 competencies with the most relative time spent were from the crop and forage production unit. Another five of the top 20 competencies were from the agricultural mechanics unit. Four of the competencies were from the business management unit, three of the competencies were from the general safety precautions unit, and the remaining two competencies were from the dairy production unit.

The top 20 competencies with the most relative time spent as rated by agricultural sales and service workers who responded to the survey ($n = 35$) are listed in Table 21. Interact with customer, was the competency rated the highest ($M = 2.79$). Of these 20 competencies, seven were from the fertilizer/chemical sales and service worker unit, three were from both the general safety precautions and sales skills units, two were from the

Table 20

Top Twenty Competencies With the Most Relative Time Spent as Rated by Agricultural Production Workers (n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
3.0.11	Operate equipment and vehicles	2.53	0.27
1.0.3	Operate and maintain equipment and facilities	2.42	0.29
2.0.4	Plant and till crops	2.35	0.29
2.0.13	Harvest and manage forages	2.25	0.27
2.0.12	Harvest grain crops	2.10	0.31
2.0.10	Control weeds	2.05	0.24
1.0.2	Apply safe work habits	2.00	0.28
3.0.13	Operate material-handling equipment	2.00	0.29
3.0.4	Lubricate equipment	1.94	0.27
3.0.21	Use and maintain hand and power tools	1.89	0.25
5.0.6	Complete financial and tax records	1.84	0.24
5.0.7	Complete general and production records	1.79	0.22
8.1.3	Milk cows	1.76	0.35
2.0.2	Plan crop planting	1.75	0.20
5.0.8	Summarize and analyze business records	1.74	0.23
1.0.1	Maintain safe work environment	1.74	0.21
3.0.20	Install and maintain fencing	1.74	0.28
2.0.14	Store crops	1.70	0.28
5.0.1	Perform general office work	1.68	0.24
8.5.4	Feed animals	1.65	0.34
	Grand Mean (137 competencies)	1.08	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table 21

Top Twenty Competencies With the Most Relative Time Spent as Rated by Agricultural Sales and Service Workers (n = 35)

Number	Competency	<u>M</u>	<u>SD</u>
2.0.2	Interact with customer	2.79	0.35
3.0.2	Perform customer relations activities	2.41	0.42
2.0.3	Conduct sale	2.23	0.56
3.0.1	Provide technical assistance	2.15	0.48
10.2.2	Provide technical assistance	2.03	0.50
10.2.1	Determine customer needs	2.00	0.50
10.2.3	Conduct sale	1.97	0.54
2.0.1	Plan sales procedure	1.97	0.47
10.2.4	Perform customer relations activities	1.88	0.47
1.0.2	Apply safe work habits	1.82	0.47
1.0.1	Maintain safe work environment	1.67	0.45
10.4.2	Formulate fertilizer and chemical mixtures	1.61	0.60
10.4.4	Inspect fields for weed, disease, insect, or other damage	1.61	0.59
10.4.1	Collect field data	1.61	0.56
4.0.1	Perform general office duties	1.58	0.52
5.0.4	Merchandise products and services	1.47	0.56
1.0.3	Operate and maintain equipment	1.47	0.49
4.0.6	Determine costs and revenues of conducting business	1.46	0.54
10.1.1	Maintain safe work environment	1.44	0.44
10.3.1	Operate and maintain equipment	1.38	0.56
	Grand Mean (78 competencies)	1.06	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

customer service unit, and one competency each from the inventory and business management units.

The top 20 competencies with the most relative time spent as rated by agricultural/industrial mechanical technicians ($n = 24$) who responded to the survey are listed in Table 22. The highest rated competency was: maintain hydraulic systems ($M = 2.39$). Of the top 20 competencies with the most relative time spent rated by agricultural/industrial mechanical technicians, four were competencies from the drivetrain unit, and three others were from the general repair procedures, electrical systems, general safety precautions, and engine block units, two from the hydraulics unit, and one competency from the fuel and air systems and heat and air-conditioning (AC) units.

The top 20 competencies with the most relative time spent as rated by animal management technicians who responded to the survey ($n = 29$) are listed in Table 23. Handle animals, was the competency rated the highest ($M = 2.15$). Of these 20 competencies, four were from the handling unit, three were from the general safety precautions, health care, and grooming units, two competencies each from the housing and animal care industry units, and one competency each from the marketing and sales, feeding, business management units.

Table 24 lists the top 20 competencies with the most relative time spent as rated by floriculture and greenhouse workers ($n = 25$) who responded to the survey. A mean of 2.36 was found for the highest rated competency: determine customer needs and services. Eight of the top 20 competencies with the most relative time spent were from the marketing and sales unit. Another four of the top 20 competencies were from the greenhouse plant production unit. three of the competencies were from both the general safety precautions and business management units, and the remaining competencies were one each from the equipment maintenance and merchandise handling units.

Table 22

Top Twenty Competencies With the Most Relative Time Spent as Rated by
Agricultural/Industrial Mechanical Technicians (n = 24)

Number	Competency	<u>M</u>	<u>SD</u>
16.0.1	Maintain hydraulic systems	2.39	0.48
16.0.2	Repair hydraulic systems	2.35	0.46
12.0.1	Repair clutch	2.26	0.34
11.0.4	Service charging system	2.17	0.45
11.0.3	Service starting system	2.13	0.47
12.0.2	Service power takeoff (PTO)	2.13	0.35
12.0.4	Repair transmission	2.09	0.45
3.0.3	Diagnose malfunctions	2.00	0.42
10.0.2	Service diesel fuel system	2.00	0.42
1.0.1	Maintain safe work environment	1.96	0.55
1.0.4	Operate and maintain equipment	1.96	0.39
15.0.1	Service air-conditioning system	1.96	0.45
1.0.3	Demonstrate safe work habits	1.95	0.46
7.0.2	Service piston assembly	1.91	0.40
12.0.3	Maintain transmission	1.91	0.45
7.0.1	Service engine block	1.91	0.43
7.0.3	Service crankshaft assembly	1.83	0.44
3.0.5	Use general mechanical techniques	1.83	0.49
11.0.2	Service batteries	1.83	0.47
3.0.4	Determine equipment repair procedures	1.82	0.34
	Grand Mean (66 competencies)	1.64	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table 23

Top Twenty Competencies With the Most Relative Time Spent as Rated by Animal Management Technicians (n = 29)

Number	Competency	M	SD
7.0.2	Handle animals	2.15	0.53
3.0.2	Maintain facilities	2.08	0.54
1.0.2	Demonstrate safe work habits	2.04	0.58
1.0.1	Maintain safe work environment	1.93	0.51
1.0.3	Operate and maintain equipment	1.93	0.57
9.0.1	Examine animals	1.73	0.55
10.0.3	Maintain company image	1.67	0.55
7.0.4	Restrain animals	1.62	0.58
5.0.2	Feed and water animals	1.46	0.57
6.0.4	Clip and scissor dogs	1.45	0.68
7.0.5	Confine animal	1.41	0.45
12.0.2	Perform general office duties	1.38	0.45
6.0.3	Bathe animal	1.34	0.46
2.0.4	Demonstrate knowledge of anatomical and physiological systems	1.32	0.44
3.0.1	Plan animal housing requirements	1.21	0.51
2.0.3	Identify common animal types	1.19	0.46
6.0.6	Finish grooming	1.17	0.66
7.0.1	Identify animals	1.15	0.38
9.0.6	Administer medication	1.14	0.53
9.0.2	Treat injuries	1.14	0.48
	Grand Mean (61 competencies)	0.99	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table 24

Top Twenty Competencies With the Most Relative Time Spent as Rated by Floriculture and Greenhouse Workers (n = 25)

Number	Competency	<u>M</u>	<u>SD</u>
3.0.1	Determine customer needs and services	2.36	0.59
3.0.3	Conduct sale	2.32	0.56
3.0.5	Maintain company image	2.32	0.62
3.0.7	Maintain customer relations	2.24	0.60
3.0.2	Provide technical assistance	1.88	0.49
3.0.4	Demonstrate presale skills	1.83	0.60
7.0.5	Handle and care for plants	1.83	0.64
5.0.1	Perform general office duties	1.79	0.67
5.0.3	Control inventory	1.79	0.63
3.0.8	Display merchandise	1.72	0.56
1.0.1	Maintain safe work environment	1.67	0.57
2.0.2	Maintain greenhouse equipment and facilities	1.65	0.61
1.0.2	Demonstrate safe work habits	1.63	0.58
3.0.6	Price merchandise	1.63	0.63
7.0.9	Harvest greenhouse plants	1.58	0.67
7.0.8	Plan pest-control program	1.50	0.66
5.0.2	Keep customer accounts	1.50	0.63
4.0.2	Prepare and load merchandise	1.46	0.64
7.0.6	Fertilize plants in greenhouse operation	1.42	0.61
1.0.3	Operate and maintain equipment	1.42	0.57
	Grand Mean (42 competencies)	1.37	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

The top 20 competencies with the most relative time spent as rated by forest industry workers who responded to the survey ($n = 12$) are listed in Table 25. The highest rated competency was: improve timber stand ($M = 2.60$). Of these 20 competencies, three competencies were each from the general safety precautions, forestry equipment operation, forest establishment, and forestry equipment maintenance units, two were competencies were from both the forest industry operations and forest measurements units, and one each from the forest management, forest nursery operations, construction skills, and business management units.

The 20 relative time spent relative time spent competencies as rated by meat processors ($n = 12$) who responded to the survey are listed in Table 26. Clean and sanitize facility, was the competency rated the highest ($M = 2.75$). Of the top 20 competencies with the most relative time spent rated by meat processors, five were from the product handling unit, four were from the wholesale cutting unit, and three others were competencies from the general safety precautions and miscellaneous meat merchandising units, two were competencies from the tools and equipment unit, and one competency was each from the sanitation, customer service, and marketing units.

The top 20 competencies with the most relative time spent as rated by nursery and garden center workers who responded to the survey ($n = 25$) are listed in Table 27. The highest rated competency was: maintain plants ($M = 2.57$). Of these 20 competencies, seven were competencies from the nursery and garden center operations unit, six were from the marketing and sales unit, four were competencies from the general safety precautions unit, and one competency each was from the business management, equipment operation, equipment maintenance, and product handling units.

Table 28 lists the top 20 competencies with the most relative time spent as rated by resource conservation workers ($n = 18$) who responded to the survey. Maintain safe work environment ($M = 2.00$), was the competency rated the highest. Five of the top 20

Table 25

Top Twenty Competencies With the Most Relative Time Spent as Rated by Forest Industry Workers ($n = 12$)

Number	Competency	<u>M</u>	<u>SD</u>
6.0.1	Improve timber stand	2.60	0.25
10.0.3	Operate chain saw	2.40	0.36
1.0.2	Demonstrate safe work habits	2.27	0.34
5.0.5	Plant trees	2.20	0.38
10.0.2	Operate equipment and vehicles	2.10	0.37
2.0.2	Identify common trees and associated plants	2.09	0.41
1.0.3	Operate and maintain equipment	2.09	0.26
1.0.1	Maintain safe work environment	2.00	0.37
4.0.3	Cruise timber	2.00	0.36
9.0.1	Maintain equipment	2.00	0.29
9.0.2	Maintain chain saw	2.00	0.35
5.0.4	Prepare to plant trees	1.80	0.35
3.0.4	Handle and care for seedlings and cuttings	1.73	0.32
4.0.1	Interpret maps	1.70	0.35
12.0.11	Perform public relations work	1.70	0.35
2.0.1	Evaluate forest industry	1.64	0.28
10.0.1	Perform equipment prestart functions	1.60	0.33
11.0.1	Use and maintain hand, power, and pneumatic tools	1.60	0.22
9.0.10	Clean and store equipment	1.50	0.28
5.0.2	Evaluate soil characteristics	1.40	0.21
	Grand Mean (62 competencies)	1.19	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table 26

Top Twenty Competencies With the Most Relative Time Spent as Rated by Meat Processors (n = 12)

Number	Competency	M	SD
2.0.1	Clean and sanitize facility	2.75	0.16
14.0.5	Conduct sale	2.33	0.32
1.0.3	Operate and maintain equipment	2.25	0.19
16.0.1	Package products	2.25	0.32
16.0.2	Store refrigerated/frozen products	2.25	0.27
1.0.1	Maintain safe work environment	2.13	0.15
15.0.3	Display products	2.13	0.24
1.0.2	Demonstrate safe work habits	2.00	0.28
7.0.3	Box beef carcass	2.00	0.24
13.0.2	Operate equipment	2.00	0.35
16.0.6	Ship products	1.88	0.30
12.0.3	Prepare sausages	1.78	0.33
13.0.1	Use hand and power tools	1.75	0.35
16.0.5	Receive shipments	1.75	0.32
7.0.1	Locate wholesale cuts	1.50	0.27
7.0.2	Cut beef carcass (hanging)	1.50	0.27
7.0.4	Cut pork carcass	1.44	0.28
12.0.1	Process meat cuts	1.44	0.28
12.0.2	Cure primal meat cuts	1.38	0.28
16.0.3	Control dry goods inventory	1.38	0.19
	Grand Mean (62 competencies)	1.04	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table 27

Top Twenty Competencies With the Most Relative Time Spent as Rated by Nursery and Garden Center Workers (n = 25)

Number	Competency	<u>M</u>	<u>SD</u>
2.0.13	Maintain plants	2.57	0.42
6.0.5	Maintain company image	2.52	0.54
6.0.1	Determine customer needs and services	2.43	0.60
8.0.5	Supervise and manage labor	2.39	0.51
6.0.4	Conduct sale	2.27	0.53
6.0.3	Demonstrate selling skills	2.22	0.65
2.0.1	Demonstrate understanding of nursery and garden center industry	2.22	0.61
6.0.2	Provide technical assistance	2.14	0.54
4.0.3	Operate vehicles	2.09	0.61
2.0.14	Prune plants	2.09	0.53
2.0.3	Examine plant requirements and value	2.00	0.61
1.0.1	Maintain safe work environment	1.95	0.57
1.0.2	Demonstrate safe work habits	1.95	0.58
7.0.2	Deliver products and load customer vehicles	1.91	0.58
3.0.2	Use and maintain hand and power tools	1.91	0.56
2.0.4	Identify and classify plants	1.87	0.70
6.0.7	Market products and services	1.87	0.61
2.0.10	Fertilize plants	1.83	0.59
2.0.8	Prepare planting area	1.83	0.66
1.0.3	Operate and maintain equipment	1.81	0.54
	Grand Mean (43 competencies)	1.72	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table 28

Top Twenty Competencies With the Most Relative Time Spent as Rated by ResourceConservation Workers (n = 18)

Number	Competency	<u>M</u>	<u>SD</u>
1.0.1	Maintain safe work environment	2.00	0.41
4.0.2	Conserve soil	1.94	0.37
1.0.2	Demonstrate safe work habits	1.80	0.39
1.0.3	Operate and maintain equipment	1.80	0.41
10.0.4	Operate chain saw	1.76	0.44
2.0.4	Follow legal regulations	1.71	0.41
5.0.3	Orient to field position	1.63	0.40
5.0.2	Interpret topographic maps	1.56	0.41
9.0.2	Use and maintain equipment	1.56	0.38
8.0.6	Maintain trees, shrubs, and hedges	1.53	0.46
9.0.14	Maintain chain saw	1.53	0.39
12.0.1	Perform general office duties	1.50	0.45
4.0.1	Identify soil characteristics	1.50	0.35
2.0.1	Demonstrate understanding of industry	1.47	0.32
2.0.3	Identify and classify plants	1.47	0.36
9.0.1	Clean and store equipment	1.44	0.47
2.0.2	Examine plant physiology and growth	1.41	0.37
2.0.6	Examine interdependency of ecosystem	1.41	0.41
1.0.4	Respond to critical incidents	1.40	0.35
8.0.5	Maintain landscape plants	1.31	0.46
	Grand Mean (68 competencies)	1.11	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

competencies with the most relative time spent were from the resource conservation industry unit. Another four of the top 20 competencies were from the general safety precautions unit. three of the competencies were from the equipment maintenance unit. Two of the competencies were from the soil conservation, groundskeeping, and mapping units, and the remaining two competencies were one each from the equipment operation and business management, units.

The top 20 competencies with the most relative time spent as rated by turf and landscape workers who responded to the survey ($n = 21$) are listed in Table 29. A mean of 2.55 was found for the highest rated competency: prepare landscape and turfgrass area. Of these 20 competencies, nine were competencies from the turf and landscape operations unit, four were competencies from the marketing and sales unit, three were competencies from the equipment maintenance unit, two were from the business management unit and one competency each from the construction skills and general safety precautions units.

Objective Three: To Determine the Critical Core Of Occupational Competencies in Each of the 10 Agricultural Occupations

In order to meet this research objective, an analytical technique known as the quadrant method (Witkin, 1984) was employed. For each competency the mean scores for importance (horizontal axis) and for relative time spent (vertical axis) were plotted as a point. The grand means of all importance ratings and relative time spent ratings for each agricultural occupation were plotted to determine the "critical coordinates." The distribution of importance and relative time spent ratings were graphically divided into four "quadrants" by these lines. Those competencies that fell in the upper right quadrant were of relatively high importance and relative time spent (i.e., both the importance and the relative time spent ratings were above the overall mean ratings for each scale) and were identified as the critical core competencies for each agricultural occupation. The process was repeated for each

Table 29

Top Twenty Competencies With the Most Relative Time Spent as Rated by Turf and Landscape Workers (n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
2.0.7	Prepare landscape and turfgrass area	2.55	0.44
3.0.9	Operate equipment and vehicles	2.45	0.40
2.0.6	Prepare for landscape and turf installation	2.45	0.44
5.0.3	Prepare estimate	2.45	0.53
3.0.10	Operate power equipment	2.40	0.50
2.0.9	Establish turf and landscape	2.40	0.50
5.0.1	Enhance company image	2.35	0.53
5.0.4	Conduct sale	2.30	0.39
2.0.11	Maintain landscape plants	2.25	0.55
6.0.1	Perform general office duties	2.25	0.57
2.0.4	Plan landscape designs	2.25	0.49
1.0.3	Operate and maintain equipment	2.22	0.41
2.0.3	Identify and classify plants	2.15	0.49
2.0.1	Demonstrate understanding of turf and landscape industry	2.10	0.43
4.0.2	Construct with stone and pavers	2.05	0.52
5.0.2	Demonstrate presale skills	2.05	0.52
2.0.12	Maintain turfgrasses	1.95	0.58
3.0.1	Maintain equipment	1.95	0.52
6.0.2	Control inventory	1.95	0.55
3.0.12	Use and maintain hand, power, and pneumatic tools	1.90	0.51
	Grand Mean (49 competencies)	1.70	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

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agricultural occupation. Figures D3 through D13 in Appendix D show the plot of the critical core competencies for each agricultural occupation.

Figure D1 shows the plot of the critical core competencies for the agricultural production workers who responded to the survey ($n = 21$). The grand mean of all importance ratings (1.54) and the relative time spent grand mean (1.08) originated the X- and Y-axes. In all, 62 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 30.

Examination of the 62 critical core competencies listed in Table 30 showed 20 agricultural mechanics competencies and 17 competencies were from the business management unit. Additionally, 14 critical core competencies were from the crop and forage production unit and four were from the marketing unit. Four critical core competencies were from the general safety precautions and three were from the dairy production unit.

Figure D2 shows the plot of the critical core competencies for agricultural sales and service workers who responded to the survey ($n = 35$). The grand mean of all importance ratings (1.27) and the relative time spent grand mean (1.06) originated the X- and Y-axes. In all, 31 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 31.

Ten of the critical core competencies in Table 31 were from the fertilizer/chemical sales and service worker unit. Another five critical core competencies were from the inventory unit and four of the critical core competencies were from the business management unit. Three of the critical core competencies were from the sale skills and general safety precautions units. Two of the critical core competencies were from the customer service and merchandise delivery units and one critical core competency each from the agricultural mechanics and agricultural business feed and grain worker units.



Table 30

List of Competencies With Both High Importance and Relative Time Spent Ratings for Agricultural Production Workers (n = 21)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Apply safe work habits
1.0.3	Operate and maintain equipment and facilities
1.0.4	Follow emergency response procedures
2.0.1	Evaluate and manage soil
2.0.2	Plan crop planting
2.0.3	Practice soil and water conservation
2.0.4	Plant and till crops
2.0.6	Determine fertilization needs
2.0.7	Develop fertilization plan
2.0.8	Fertilize crops
2.0.9	Control insects and diseases
2.0.10	Control weeds
2.0.11	Apply pesticides
2.0.12	Harvest grain crops
2.0.13	Harvest and manage forages
2.0.14	Store crops
2.0.15	Maintain quality of stored crops
3.0.1	Operate and maintain small engines
3.0.2	Service cooling systems for large engines
3.0.3	Service lubrication systems for large engines
3.0.4	Lubricate equipment
3.0.5	Service fuel and air systems for large engines
3.0.7	Service belt and drive chain assemblies
3.0.8	Repair and service wheels, tires, and tracks

(table continues)

Table 30 (continued)

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Agricultural Production Workers (n = 21)

Number	Competency
3.0.9	Service hydraulic systems
3.0.10	Hitch equipment to power units
3.0.11	Operate equipment and vehicles
3.0.12	Recognize components of material-handling equipment
3.0.13	Operate material-handling equipment
3.0.14	Clean and store equipment
3.0.15	Plan construction of farm structures
3.0.17	Construct with wood
3.0.19	Install and maintain water systems
3.0.20	Install and maintain fencing
3.0.21	Use and maintain hand and power tools
3.0.23	Weld with electric arc and MIG
3.0.26	Apply protective coatings
4.0.1	Analyze market
4.0.2	Establish marketing plans
4.0.3	Market products
4.0.4	Ship products
5.0.1	Perform general office work
5.0.2	Perform general banking procedures
5.0.4	Supervise and manage labor
5.0.5	Maintain supplies
5.0.6	Complete financial and tax records
5.0.7	Complete general and production records
5.0.8	Summarize and analyze business records
5.0.9	Apply time-management skills

(table continues)

Table 30 (continued)

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Agricultural Production Workers (n = 21)

Number	Competency
5.0.10	Finance business
5.0.12	Prepare and file tax forms
5.0.13	Plan insurance coverage
5.0.14	Follow legal requirements
5.0.15	Obtain land
5.0.17	Manage equipment program
5.0.18	Purchase livestock
5.0.19	Enter, establish, and expand business
5.0.20	Plan retirement and estate
8.1.3	Milk cows
8.4.2	Handle and dispose of waste
8.5.4	Feed animals

Table 31

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Agricultural Sales and Service Workers (n = 35)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Apply safe work habits
1.0.3	Operate and maintain equipment
2.0.1	Plan sales procedure
2.0.2	Interact with customer
2.0.3	Conduct sale
3.0.1	Provide technical assistance
3.0.2	Perform customer relations activities
4.0.1	Perform general office duties
4.0.4	Keep sales records
4.0.6	Determine costs and revenues of conducting business
4.0.7	Manage business finance
5.0.1	Inventory business
5.0.2	Complete general records
5.0.3	Order merchandise
5.0.4	Merchandise products and services
5.0.6	Receive merchandise
6.0.1	Prepare and load merchandise
6.0.2	Deliver merchandise
7.0.8	Operate equipment and vehicles
9.4.1	Interact with customer
10.1.1	Maintain safe work environment
10.1.2	Follow emergency response procedures
10.2.1	Determine customer needs
10.2.2	Provide technical assistance

(table continues)

Table 31 (continued)

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Agricultural Sales and Service Workers (n = 35)

Number	Competency
10.2.3	Conduct sale
10.2.4	Perform customer relations activities
10.3.1	Operate and maintain equipment
10.4.1	Collect field data
10.4.2	Formulate fertilizer and chemical mixtures
10.4.4	Inspect fields for weed, disease, insect, or other damage

Figure D3 shows the plot of the critical core competencies for the agricultural/industrial mechanical technicians who responded to the survey ($n = 24$). The grand mean of all importance ratings (2.05) and the relative time spent grand mean (1.64) originated the X- and Y-axes. In all, 33 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 32.

Of these 33 critical core competencies, five were competencies from the general repair procedures and drivetrain units; four were competencies from the general safety precautions unit; three were competencies from the general equipment maintenance and engine block units; two were from the equipment operation, electrical systems, hydraulics, and cylinder head units; and one competency each from the lubrication system, cooling system, suspension and steering, heating and air-conditioning (AC), and fuel and air system units.

Figure D4 shows the plot of the critical core competencies for the animal management technicians who responded to the survey ($n = 29$). The grand mean of all importance ratings (1.36) and the relative time spent grand mean (0.99) originated the X- and Y-axes. In all, 29 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 33.

Examination of the 29 critical core competencies listed in Table 33 showed five competencies from the grooming and business management units and four competencies from the handling and health care units. Additionally, three critical core competencies were from the general safety precautions unit and two critical core competencies each from the animal care industry, feeding, marketing and sales, and housing units.

Figure D5 shows the plot of the critical core competencies for the floriculture and greenhouse workers who responded to the survey ($n = 25$). The grand mean of all

Table 32

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Agricultural/Industrial Mechanical Technicians ($n = 24$)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Recognize environmental issues
1.0.3	Demonstrate safe work habits
1.0.4	Operate and maintain equipment
2.0.1	Use service and operator's manuals
2.0.2	Assemble equipment
2.0.4	Lubricate equipment
3.0.1	Use measuring devices
3.0.2	Use and maintain hand and power tools
3.0.3	Diagnose malfunctions
3.0.4	Determine equipment repair procedures
3.0.5	Use general mechanical techniques
5.0.1	Perform prestart functions
5.0.3	Operate equipment and vehicles
6.0.1	Service cylinder head
6.0.2	Service valve assembly
7.0.1	Service engine block
7.0.2	Service piston assembly
7.0.3	Service crankshaft assembly
8.0.1	Maintain lubrication system
9.0.1	Maintain cooling system
10.0.2	Service diesel fuel system
11.0.3	Service starting system
11.0.4	Service charging system
12.0.1	Repair clutch

(table continues)

Table 32 (continued)

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Agricultural/Industrial Mechanical Technicians (n = 24)

Number	Competency
12.0.2	Service power takeoff (PTO)
12.0.3	Maintain transmission
12.0.4	Repair transmission
12.0.7	Repair drive axle
14.0.2	Service power steering units
15.0.1	Service air-conditioning system
16.0.1	Maintain hydraulic systems
16.0.2	Repair hydraulic systems

Table 33

List of Competencies With Both High Importance and Relative Time Spent Ratings for Animal Management Technicians (n = 29)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Demonstrate safe work habits
1.0.3	Operate and maintain equipment
2.0.3	Identify common animal types
2.0.4	Demonstrate knowledge of anatomical and physiological systems
3.0.1	Plan animal housing requirements
3.0.2	Maintain facilities
5.0.1	Select feeds
5.0.2	Feed and water animals
6.0.1	Prepare for grooming
6.0.2	Conduct maintenance grooming
6.0.3	Bathe animal
6.0.4	Clip and scissor dogs
6.0.6	Finish grooming
7.0.1	Identify animals
7.0.2	Handle animals
7.0.4	Restrain animals
7.0.5	Confine animal
9.0.1	Examine animals
9.0.2	Treat injuries
9.0.3	Perform emergency treatment
9.0.6	Administer medication
10.0.1	Provide technical assistance
10.0.3	Maintain company image
12.0.1	Use and maintain price lists and catalogs

(table continues)

Table 33 (continued)

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Animal Management Technicians (n = 29)

Number	Competency
12.0.2	Perform general office duties
12.0.6	Control inventory
12.0.7	Order merchandise and animals
12.0.8	Store merchandise

importance ratings (1.58) and the relative time spent grand mean (1.37) originated the X- and Y-axes. In all, 21 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 34.

Eight of the critical core competencies were from the marketing and sales unit. Another four of the critical core competencies were from the greenhouse plant production unit. Three of the competencies were from the general safety precautions and business management units, two were from the merchandise handling unit and the remaining competency was from equipment maintenance unit.

Figure D6 shows the plot of the critical core competencies for the forest industry workers who responded to the survey ($n = 12$). The grand mean of all importance ratings (1.34) and the relative time spent grand mean (1.19) originated the X- and Y-axes. In all, 22 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 35.

Three of the critical core competencies in Table 35 were from the general safety precautions, forest industry operations, forestry equipment maintenance, forestry equipment operation, and forest establishment units. Another two of the critical core competencies were from the forest measurement and business management units and one OCAP core competency was each from the forest nursery operations, construction skills, and forest management units.

Figure D7 shows the plot of the critical core competencies for the meat processors who responded to the survey ($n = 12$). The grand mean of all importance ratings (1.31) and the relative time spent grand mean (1.04) originated the X- and Y-axes. In all, 28 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 36.

Table 34

List of Competencies With Both High Importance and Relative Time Spent Ratings for Floriculture and Greenhouse Workers (n = 25)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Demonstrate safe work habits
1.0.3	Operate and maintain equipment
2.0.2	Maintain greenhouse equipment and facilities
3.0.1	Determine customer needs and services
3.0.2	Provide technical assistance
3.0.3	Conduct sale
3.0.4	Demonstrate presale skills
3.0.5	Maintain company image
3.0.6	Price merchandise
3.0.7	Maintain customer relations
3.0.8	Display merchandise
4.0.2	Prepare and load merchandise
4.0.5	Process container plants
5.0.1	Perform general office duties
5.0.2	Keep customer accounts
5.0.3	Control inventory
7.0.5	Handle and care for plants
7.0.6	Fertilize plants in greenhouse operation
7.0.8	Plan pest-control program
7.0.9	Harvest greenhouse plants

Table 35

List of Competencies With Both High Importance and Relative Time Spent Ratings for Forest Industry Workers (n = 12)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Demonstrate safe work habits
1.0.3	Operate and maintain equipment
2.0.1	Evaluate forest industry
2.0.2	Identify common trees and associated plants
2.0.3	Examine plant processes
3.0.4	Handle and care for seedlings and cuttings
4.0.1	Interpret maps
4.0.3	Cruise timber
5.0.2	Evaluate soil characteristics
5.0.4	Prepare to plant trees
5.0.5	Plant trees
6.0.1	Improve timber stand
9.0.1	Maintain equipment
9.0.2	Maintain chain saw
9.0.10	Clean and store equipment
10.0.1	Perform equipment prestart functions
10.0.2	Operate equipment and vehicles
10.0.3	Operate chain saw
11.0.1	Use and maintain hand, power, and pneumatic tools
12.0.3	Analyze marketing and sales opportunities
12.0.11	Perform public relations work

Table 36

List of Competencies With Both High Importance and Relative Time Spent Ratings for Meat Processors ($n = 12$)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Demonstrate safe work habits
1.0.3	Operate and maintain equipment
2.0.1	Clean and sanitize facility
3.0.1	Evaluate economic aspects
7.0.1	Locate wholesale cuts
7.0.2	Cut beef carcass (hanging)
7.0.3	Box beef carcass
7.0.4	Cut pork carcass
8.0.1	Locate beef cuts
8.0.2	Merchandise chuck cuts
8.0.5	Merchandise rib cuts
8.0.7	Merchandise short loin cuts
8.0.9	Merchandise sirloin cuts
8.0.10	Merchandise round cuts
9.0.5	Merchandise loin cuts
12.0.1	Process meat cuts
12.0.2	Cure primal meat cuts
12.0.3	Prepare sausages
13.0.1	Use hand and power tools
13.0.2	Operate equipment
14.0.5	Conduct sale
15.0.3	Display products
16.0.1	Package products
16.0.2	Store refrigerated/frozen products

(table continues)

Table 36 (continued)

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Meat Processors (n = 12)

Number	Competency
16.0.3	Control dry goods inventory
16.0.5	Receive shipments
16.0.6	Ship products

The 29 critical core competencies as rated by meat processors ($n = 12$) who responded to the survey are listed in Table 36. Of the 28 critical core competencies rated by meat processors; six were from the retail beef cutting unit, five were from the product handling unit, and four were from the wholesale cutting unit. Three others were competencies from the general safety precautions and miscellaneous meat merchandising units, two were competencies from the tools and equipment unit; and one competency was each from the sanitation, meat processing industry, retail pork cutting, customer service, and marketing units.

Figure D8 shows the plot of the critical core competencies for the nursery and garden center workers who responded to the survey ($n = 25$). The grand mean of all importance ratings (2.14) and the relative time spent grand mean (1.72) originated the X- and Y-axes. In all, 21 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 37.

Examination of the 21 critical core competencies listed in Table 37 showed seven critical core competencies from the marketing and sales unit and six competencies from the nursery and garden center operations unit. Additionally, three critical core competencies were from the general safety precautions unit and one critical core competency each from the equipment maintenance, facility maintenance, product handling, business management, and equipment operation units.

Figure D9 shows the plot of the critical core competencies for the resource conservation workers who responded to the survey ($n = 18$). The grand mean of all importance ratings (1.26) and the relative time spent grand mean (1.11) originated the X- and Y-axes. In all, 29 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 38.

Table 37

List of Competencies With Both High Importance and Relative Time Spent Ratings for Nursery and Garden Center Workers (n = 25)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Demonstrate safe work habits
1.0.3	Operate and maintain equipment
2.0.1	Demonstrate understanding of nursery and garden center industry
2.0.3	Examine plant requirements and value
2.0.4	Identify and classify plants
2.0.10	Fertilize plants
2.0.13	Maintain plants
2.0.14	Prune plants
3.0.2	Use and maintain hand and power tools
4.0.3	Operate vehicles
5.0.4	Maintain nursery and greenhouse equipment and facilities
6.0.1	Determine customer needs and services
6.0.2	Provide technical assistance
6.0.3	Demonstrate selling skills
6.0.4	Conduct sale
6.0.5	Maintain company image
6.0.6	Price merchandise
6.0.7	Market products and services
7.0.2	Deliver products and load customer vehicles
8.0.5	Supervise and manage labor

Table 38

List of Competencies With Both High Importance and Relative Time Spent Ratings for Resource Conservation Workers (n = 18)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Demonstrate safe work habits
1.0.3	Operate and maintain equipment
1.0.4	Respond to critical incidents
2.0.1	Demonstrate understanding of industry
2.0.2	Examine plant physiology and growth
2.0.3	Identify and classify plants
2.0.4	Follow legal regulations
2.0.6	Examine interdependency of ecosystem
3.0.1	Identify and assess stream dynamics
3.0.2	Determine water quality parameters
4.0.1	Identify soil characteristics
4.0.2	Conserve soil
5.0.1	Conduct a basic survey
5.0.2	Interpret topographic maps
5.0.3	Orient to field position
7.0.8	Identify wildlife management techniques
8.0.5	Maintain landscape plants
8.0.6	Maintain trees, shrubs, and hedges
9.0.1	Clean and store equipment
9.0.2	Use and maintain equipment
9.0.7	Lubricate equipment
9.0.8	Service engine cooling systems
9.0.9	Service lubrication systems
9.0.10	Service engine fuel and air systems

(table continues)

Table 38 (continued)

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Resource Conservation Workers (n = 18)

Number	Competency
9.0.11	Service engine electrical systems
9.0.14	Maintain chain saw
10.0.4	Operate chain saw
12.0.1	Perform general office duties

Eight of the critical core competencies were from the equipment maintenance unit. Another five of the critical core competencies were from the resource conservation industry unit. Four of the competencies were from the general safety precautions unit and three of the competencies were from the mapping unit. Two of the competencies were from the water quality management, groundskeeping, and soil conservation units and the remaining three competencies were one each from the fish and wildlife management awareness, equipment operation, and business management units.

Figure D10 shows the plot of the critical core competencies for the resource conservation workers who responded to the survey ($n = 21$). The grand mean of all importance ratings (2.03) and the relative time spent grand mean (1.70) originated the X- and Y-axes. In all, 30 competencies were identified as having both high importance and relative time spent ratings. The list of these critical core competencies is presented in Table 39.

Ten of the critical core competencies were from the turf and landscape operations unit. Another eight of the critical core competencies were from the equipment maintenance unit. Four competencies were from the marketing and sales unit, three of the competencies were from the general safety precautions and business management units, and two were from the construction skills unit.

Objective Four: To Determine the Common Core of Critical Occupational Competencies

Across all 10 Agricultural Occupations

For the purposes of the study, the common core competencies are the occupational competencies included in five or more of the critical core competency lists. The critical core competencies identified in Tables 30 through 39 were cross matrixed to determine the number of times that a particular competency was included in the critical core competency

Table 39

List of Competencies With Both High Importance and Relative Time Spent Ratings for Turf and Landscape Workers (n = 21)

Number	Competency
1.0.1	Maintain safe work environment
1.0.2	Demonstrate safe work habits
1.0.3	Operate and maintain equipment
2.0.1	Demonstrate understanding of turf and landscape industry
2.0.2	Examine plant physiology and growth
2.0.3	Identify and classify plants
2.0.4	Plan landscape designs
2.0.6	Prepare for landscape and turf installation
2.0.7	Prepare landscape and turfgrass area
2.0.9	Establish turf and landscape
2.0.10	Fertilize plants
2.0.11	Maintain landscape plants
2.0.12	Maintain turfgrasses
3.0.1	Maintain equipment
3.0.3	Service engine lubrication systems
3.0.6	Service wheels and tires
3.0.8	Perform predeparture functions
3.0.9	Operate equipment and vehicles
3.0.10	Operate power equipment
3.0.11	Clean and store equipment
3.0.12	Use and maintain hand, power, and pneumatic tools
4.0.2	Construct with stone and pavers
4.0.3	Construct with wood
5.0.1	Enhance company image
5.0.2	Demonstrate presale skills

(table continues)

Table 39 (continued)

List of Competencies With Both High Importance and Relative Time Spent Ratings for
Turf and Landscape Workers (n = 21)

Number	Competency
5.0.3	Prepare estimate
5.0.4	Conduct sale
6.0.1	Perform general office duties
6.0.2	Control inventory
6.0.3	Receive merchandise

lists. Table 40 shows those critical core competencies that were included in five or more critical core competency lists.

Demonstrate safe work habits, maintain safe work environment, and operate and maintain equipment were critical core competencies in all 10 agricultural occupations. Operate equipment and vehicles was a critical core competency in eight agricultural occupations, while use and maintain hand and power tools was a critical core competency in seven agricultural occupations. Conduct sale and perform general office duties were critical core competencies in six occupations; and clean and store equipment, control inventory, and fertilize plants were critical core competencies in five agricultural occupations.

Table 40

List of Common Core Competencies

Competency	No. of critical core competency lists
Demonstrate safe work habits	10
Maintain safe work environment	10
Operate and maintain equipment	10
Operate equipment and vehicles	8
Use and maintain hand and power tools	7
Conduct sale	6
Perform general office duties	6
Clean and store equipment	5
Control inventory	5
Fertilize plants	5

Chapter 5

Summary, Conclusions, and Recommendations

Business and industry rely on human resources to survive and prosper. Regardless of the industry in question, money and equipment are not sufficient to bring about growth and prosperity. Human beings are critical to all productive work.

Agricultural education plays an important role in preparing individuals for productive employment in a diverse group of agricultural occupations. (Ohio Department of Education, 1993, p. 1)

This section of the study contains a review of the methodology, a summary of the study and major findings, a statement of the conclusions of the research, lists of recommendations for practice and research, and a discussion of the findings and conclusions. The summary of findings contains a synopsis of each research objective.

The review of literature revealed that importance and relative time spent are essential components in determining the essential competencies necessary for any occupational program. Also, the development of core or common competencies for vocational training programs allows educators and administrators to focus their efforts in areas that are highly important and frequently performed on the job.

The purpose of this study was to determine the critical core occupational competencies for secondary agricultural education programs as identified by Ohio agricultural business and industry. The method used to generate this information was an item analysis of the competencies that industry experts identified as core competencies in the Ohio Competency Analysis Profile (OCAP) process. OCAPs are a source of competencies that agricultural educators use to teach the essential skills needed for employment in agricultural careers. The specific objectives of the study were:

1. To identify the importance of the core occupational competencies in 10 agricultural occupations.
2. To identify the relative time spent on the core occupational competencies in 10 agricultural occupations.
3. To determine the critical core of occupational competencies in each of the 10 agricultural occupations.
4. To determine the common core of critical occupational competencies across all 10 agricultural occupations.

Methodology

To address the objectives of this study in an orderly and logical manner; the researcher conducted an extensive review of literature to develop the conceptual framework. In developing the conceptual framework, the researcher considered importance, relative time spent, and core competency identification processes. The review of literature helped the author to identify issues related to the identification of competencies for agricultural education programs. The literature review also provided the basis for identifying the factors, importance and relative time spent that relate to core competency development.

This study used a comprehensive and employer-verified competency list. Ohio Competency Analysis Profile (OCAP) lists evolved from a modified DACUM (Developing A CurriulUM) process involving business, industry, labor, and community agency representatives from throughout Ohio. The researcher used the criticality process of the American College Testing Program (1994) as the method of collecting importance and relative time spent data. Subject matter experts (SMEs), usually incumbent employees, for the job determined the most critical competencies for their occupation.

The researcher along with the Vocational Instructional Materials Laboratory (VIML), Center on Education and Training for Education (CETE), The Ohio State University, developed the survey procedures and instrument according to guidelines by the American College Testing Program. Between January and June 1994, the VIML mailed the survey instrument to collect data.

The researcher used descriptive statistics (means and standard deviations) to analyze data related to research objectives one and two. Importance was based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance), 1 = minor importance, 2 = average importance, and 3 = major importance. Relative time spent was based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent), 1 = small relative time spent, 2 = medium relative time spent, and 3 = large relative time spent.

The quadrant method (Witkin, 1984; Woolsey & Bula, 1973) was used to analyze the third objective. For each competency the mean scores for importance (horizontal axis) and for relative time spent (vertical axis) were plotted as a point. The grand means of all importance ratings and relative time spent ratings for each agricultural occupation were plotted to determine the "critical coordinates." The distribution of importance and relative time spent ratings were graphically divided into four "quadrants" by these lines. Those competencies that fell into the upper right quadrant were rated relatively high in importance and relatively high in time spent (i.e., both the importance and the relative time spent ratings were above the overall mean ratings for each scale) and were identified as the critical core competencies for the occupation. The process was repeated for each agricultural occupation.

The common core of critical occupational competencies (objective four) was determined by counting the number of times that a competency was included in the critical core competencies of objective three. Those competencies that were in the critical core of

five or more of the agricultural occupations were considered to be the common core of critical occupational competencies for all 10 agricultural occupations.

Summary of Findings

The Importance of the Core Occupational Competencies in 10 Agricultural Occupations

Maintaining safe work environment was rated the most important competency in three of the 10 agricultural occupations: agricultural/industrial mechanical technicians, forest industry workers, and resource conservation workers. Applying safe work habits was rated the most important competency in two of the 10 agricultural occupations: animal management technician and agricultural production workers. Interact with customer, determine customer needs, clean and sanitize facility, maintain company image, and enhance company image were the most important competencies in the agricultural sales and service, floriculture and greenhouse worker, meat processor, nursery and garden center worker, and turf and landscape worker OCAPs.

The Relative Time Spent on the Core Occupational Competencies in 10 Agricultural Occupations

No single competency was rated the most relative time spent competency in more than one agricultural occupation. Operate equipment and vehicles, interact with customer, maintain hydraulic systems, handle animals, determine customer needs and services, improve timber stand, clean and sanitize facility, maintain plants, maintain safe work environment, and prepare landscape and turfgrass area were the most relative time spent rated competencies in agricultural production worker, agricultural sales and service worker, agricultural/industrial mechanical technician, animal management technician, floriculture and greenhouse worker, forest industry worker, meat processor, nursery and garden center worker, resource conservation worker, and turf and landscape worker occupations.

The Critical Core of Occupational Competencies in 10 Agricultural Occupations.

Those competencies that fell into the upper right quadrant were rated relatively high in importance and relatively high in time spent (i.e., both the importance and the relative time spent ratings were above the overall mean ratings for each scale) and were identified as the critical core competencies for the occupation. The number of critical core competencies identified for objective three ranged from 21 critical core competencies for both floriculture and greenhouse worker and nursery and garden center worker to 62 for agricultural production worker.

The Common Core of Critical Occupational Competencies in Agricultural Occupations

Ten critical core competencies were included in five or more of the 10 agricultural occupational lists: demonstrate safe work habits, maintain safe work environment, operate and maintain equipment, operate equipment and vehicles, use and maintain hand and power tools, conduct sale, perform general office duties, clean and store equipment, control inventory, and fertilize plants.

Conclusions

1. Competencies in the general safety precautions unit: demonstrate safe work habits, maintain safe work environment, and operate equipment and vehicles were ranked among the 20 most important competencies in all 10 agricultural occupations.
2. One competency in the general safety precautions unit, operate equipment and vehicles, was the only competency ranked among the top 20 competencies on relative time spent in all 10 agricultural occupations.
3. A critical core of occupational competencies was identified for each agricultural occupation.

4. Each agricultural occupation is so highly specialized that a substantial common core of critical occupational competencies in agricultural occupations could not be identified.

Recommendations

1. Given that the competencies in the general safety precautions unit are the most important competencies in all agricultural occupations, agricultural educators should concentrate on preparing workers with general safety precaution competencies.

2. Because a critical core of occupational competencies can be identified, agricultural education programs that need to determine the occupational content for the program should concentrate on the critical core competencies for the occupational focus of that agricultural education program.

3. Because the common core of critical occupational competencies across all 10 agricultural occupations is not substantial, agricultural education programs cannot be generic agricultural education programs with a common core of critical occupational competencies for program content. Agricultural education programs should be occupationally specific.

4. Given that the four quadrant method produced a critical core competency list, other occupational training programs may want to consider adopting this method of determining the critical core competencies.

5. Additional research is needed to determine the critical core competencies for other agricultural occupations.

Implications for Knowledge

When the new OCAP curriculum was introduced for Ohio secondary agricultural education programs in 1991, some teachers were already implementing the OCAP competencies while others were teaching traditional vocational agriculture competencies

from old model courses of study. For this curriculum to gain acceptance on a large scale, teachers need the necessary skills and materials to teach the necessary occupational competencies.

Technical inservice programs for agricultural educators need to concentrate on developing the subject matter knowledge to teach the critical core of occupational competencies. Too many times we ask agricultural educators to identify their technical training needs. Why not ask agricultural business and industry workers, "In what competencies do you need more training?" The competencies that agricultural business and industry workers need more training in are the program content areas in which agricultural educators need to become competent.

An alternative to this would be pedagogical inservice for teachers to gain the skills necessary to take advantage of the technical skills agricultural business and industry workers already have in their communities. When appropriate, agricultural business and industry workers should be the instructors for some technical competencies in agricultural education programs.

The lack of resources such as the type of equipment or facility availability, degree of instructor expertise, or amount of time available are not acceptable reasons for deleting a competency from a course of study. Our agricultural business and industry employers are given a faulty product when our students are ill-prepared or under-prepared for work.

Curriculum development centers need to concentrate on preparing materials for the critical core competencies. When priorities for taxpayer dollars are at stake, developing teaching materials for the critical core competencies uses these resources the most effectively. Having high quality instructional materials for the critical core competencies should provide agricultural educators with a better environment for successful classroom instruction and subsequent student employment.

Discussion

Precautions

The researcher studied occupational competencies needed in each particular agricultural occupation, but not the academic and employability competencies needed. Therefore, the lists of critical core of occupational competencies identified in this study do not constitute a complete content of a comprehensive agricultural education program. A comprehensive agricultural education program includes all the following:

1. Academic competencies -- The knowledge necessary to prepare for and secure a career, facilitate lifelong learning, and assure success in a global economy.
2. Employability competencies -- Those personal development and leadership abilities essential for increased productivity, economic self-sufficiency, career flexibility, business ownership, and effective management of work and family commitments.
3. Occupational competencies -- Those technical abilities used to perform required workplace tasks, including problem solving and critical thinking. (Vocational Instructional Materials Laboratory, 1991e, p. 3A)

The reader would need to conduct similar research to identify the critical core of the academic and employability competencies to develop a comprehensive agricultural education program.

"While the Work Keys job profiling procedure identifies the skills and skill levels required to adequately perform a specific job in a specific company" (American College Testing Program, 1994, p. 3-2), the process used in this study identified the occupational competencies that are critical for entry-level positions in agricultural occupations. Therefore, it does not meet the content validation standards set by the Equal Employment Opportunity Commission (EEOC) and "cannot be used to (1) screen job applicants for a

position in any company, (2) hire job applicants for a position in any company, (3) select employees for training, [or] (4) evaluate employees in terms of training performance" (American College Testing Program, 1994, p. 3-2). As a result, human resource applications in businesses such as personnel selection and training are not appropriate uses of this study. However, it is very effective in determining criticality of competencies for instructional purposes only (American College Testing Program, 1994).

For this study, the researcher and state supervisors in the Agricultural Education Service, Division of Vocational and Career Education, Ohio Department of Education, asked teachers, state and local advisory committee members, and trade and business organization officers to help identify individuals who were employees of agricultural firms in Ohio working full time in an occupation that would require initial entry with a vocational education high school training background. Ninety-six percent of the respondents actually worked in the agricultural occupation for which they responded to the OCAP survey.

Because the results of this research are applicable to everyone who performs each of the 10 agricultural occupations, the reader should take special note of Tables 4 through 9. These tables show the gender; age; racial/ethnic group of the respondents; size of the company for which the respondents worked; the highest degree, certificate, or diploma that the respondents held; and number of years the respondents have been employed full-time in their occupation. The reader should determine if the description provided in Tables 4 through 9 accurately describes the employees of agricultural firms working full time in an occupation that would require initial entry with a vocational education high school training background for which the reader is using the data.

The researcher was involved in the identification of the participants; however, because data had been already collected by the Vocational Instructional Materials Laboratory (VIML), follow-up of non-respondents to increase the response rate was not

possible. Therefore, the reader should use data from the agricultural occupations with low response rates with caution.

Reliability measures such as test-retest reliability were not available to the researcher. The researcher was involved in the preparation of the instrument; however, because data had been already collected by the Vocational Instructional Materials Laboratory (VIML), it was impossible to conduct a test-retest survey. Therefore, for reliability of the instrument, the researcher can only state that the items on the instrument were clear to the respondents and that American College Testing Program has used this type of instrument in the past.

Observations

Those competencies that fell into the upper right quadrant were rated relatively high in importance and relatively high in time spent (i.e., both the importance and the relative time spent ratings were above the overall mean ratings for each scale) and were identified as the critical core competencies for the occupation. The quadrant process can also be used to identify those competencies that were of little importance and low relative time spent. As agricultural occupations expand and new technologies within these occupations increase, competencies that fell into the low importance and low relative time spent quadrant need to be analyzed before agricultural educators incorporate these competencies in agricultural education programs.

Competencies in the agricultural mechanics unit such as install and maintain electrical systems, apply protective coatings, and construct with concrete were some of the lowest rated competencies for turf and landscape workers. This could imply that few turf and landscape workers perform these competencies. Also, those turf and landscape workers who did perform these competencies gave low ratings to the importance of and relative time spent on these core competencies.

Many Ohio farmers are converting pastures to crop land. This trend may have resulted in crop production competencies being rated higher than livestock production competencies for agricultural production workers. Therefore, agricultural production teachers need to consider increasing the number of crop production competencies as they revise courses of study.

Agricultural educators could use the quadrant method to identify the low importance and high relative time spent competencies. As with the low importance and low relative time spent competencies, identification of these competencies was not an objective of this study. Perform general office duties, a competency rated low importance and high relative time spent by forest industry workers, needs a different emphasis than a competency that fell into another quadrant.

Competencies that fell into the low importance and high relative time spent quadrant need attention in agricultural education programs, but with less emphasis than competencies in the upper right quadrant. Teachers of agricultural education need to recognize that competencies that rate low on the importance scale and high on the time spent scale still need special attention. These competencies probably will not enhance a worker's performance rating. A new employee might perform them so frequently that, without appropriate training, the employee may spend too much time on these duties while neglecting other duties.

The last quadrant that competencies could fall into is the high importance and low relative time spent quadrant. A competency such as perform emergency treatment by an animal management technician fell into this quadrant. An employer might expect an employee to perform this competency to a higher degree of accuracy than one from the low importance and high relative time spent quadrant. These competencies may make or break an entry-level employee, because these competencies may not require large amounts of time but will be of high importance to the employer. Agricultural educators should teach the

competencies in this quadrant to the point that the student would be able to act with little hesitation to perform the competency.

This researcher would like to suggest that it is necessary for agricultural educators to determine the critical core competencies within all agricultural occupations. In addition, determining which quadrant the other competencies fell within can provide valuable teaching information in preparing students for employment. Knowing which competencies fell into which quadrants will assist agricultural educators in determining the necessary emphases for competencies in their classroom, laboratory, or place of employment.

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Appendix A.
Sample Cover Letter

January 14, 1994

Dear Survey Participant:

You were recommended to participate in a very important survey to gather data to determine which occupational competencies listed in the Ohio Competency Analysis Profiles (OCAP) are important to overall job performance and to assess the amount of time spent on each competency relative to other competencies. Your input is very important to the Ohio Department of Education and vocational education throughout Ohio.

Your answers to this survey will help determine the top 20 competencies in your occupation to ascertain the applied academic competency needs to be successful at entry level (during the first year of employment) into your occupation. Results will be reported as a whole, without identifying specific respondents. Confidentiality of your responses will be maintained.

We have enclosed a postage-paid envelope for your convenience in returning your survey to the Vocational Instructional Materials Laboratory. This survey is sponsored by the Division of Vocational and Career Education of the Ohio Department of Education. If you have any questions feel free to call at (614) 292-5001 or 1-800-848-4815.

Again, your input in this effort is highly valued, and we thank you in advance for your assistance. Please take time to fill out the survey today.

Sincerely,

Ginger A. Rose, Ph.D.
Curriculum Consultant

Appendix B.

Sample OCAP Survey Instrument

OCAP

OHIO COMPETENCY ANALYSIS PROFILE

**Survey of
Agricultural Sales and Service's
OCAP Competencies**



Division of Vocational and
Career Education
Ohio Department of Education

Vocational Instructional Materials Laboratory
Center on Education and Training
for Employment



The Ohio Competency Analysis Profiles (OCAPs) were developed to provide a comprehensive and verified employer competency list for each vocational program. OCAP lists evolved from a modified DACUM process involving business, industry, labor, and community agency representatives from throughout Ohio. This questionnaire is part of a statewide initiative to determine the importance of each competency to overall job performance and the amount of time spent on each competency relative to other competencies. The study is being conducted by the Vocational Instructional Materials Laboratory of The Ohio State University for the Division of Vocational and Career Education of The Ohio Department of Education.

Your answers will be kept confidential and your individual responses to the questions will not be released. (The code number on the back of your questionnaire is for follow-up mailing purposes only.)

Section 1: Background Information

Instructions: For each of the multiple choice questions, mark the **ONE** answer that best applies to you.

1. Indicate your gender.

- Male
 Female

2. Indicate your age.

- Under 21
 21 to 30
 31 to 40
 41 to 50
 51 to 64
 65 or over

3. Size of the company for which you work.

Number of full-time employees
 Number of part-time employees

4. Racial/Ethnic Group

- Afro-American or Black
 Native American (Indian, Alaskan, Hawaiian)
 Caucasian or White
 Mexican-American, Mexican Origin
 Asian American, Oriental, Pacific Islander
 Puerto Rican, Cuban, Other Latino or Hispanic
 Other
 I prefer not to respond.

5. Indicate the highest degree, certificate, or diploma you now hold.

- High School Diploma
 Technical Program Certificate or Diploma
 Associate's Degree
 Bachelor's Degree
 Master's Degree
 Doctor's Degree
 Professional Degree
 Other

6. Number of years you have been employed full-time in the field of Agricultural Sales and Service.

- less than one year
 1 to 2 years
 3 to 5 years
 6 to 10 years
 11 to 15 years
 16 to 20 years
 21 to 30 years
 More than 30 years

Section 2: Competencies Performed by Agricultural Sales and Service Workers

Instructions: This section contains a list of competencies from the Ohio Competency Analysis Profile for Agricultural Sales and Service. Do not be surprised if some activities do not apply to your current position or to your company.

- Read the competency described in each item.
- Decide how **important** the competency is to **overall job performance** and then darken that box in the *left-hand* set of boxes.
- Next, decide how much **time** is spent on that competency **relative to the time spent on other competencies** and then darken that box in the *right-hand* set of boxes.
- If the competency is not one associated with the job, darken the box in the far left-hand column.
- If you do not understand a competency, mark no box and skip to the next item. A complete OCAP has been included in your packet for you to reference competency builders to assist clarification on any given competency.

Sample Items									
Unit 100: Wash Car									
Not Part of the Job ↓	IMPORTANCE			Competency	AMOUNT OF TIME				
	Minor	Average	Major		Small	Medium	Large		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 100.1: Clean and buff hubcaps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 100.2: Wash and rinse car body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 100.3: Sweep garage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 100.4: Strip harzenglufer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Not Part of the Job ↓	IMPORTANCE			Competency	AMOUNT OF TIME				
	Minor	Average	Major		Small	Medium	Large		
				Unit 1: General Safety Precautions					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 1.0.1: Maintain safe work environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 1.0.2: Apply safe work habits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 1.0.3: Operate and maintain equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
				Unit 2: Sales Skills					
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 2.0.1: Plan sales procedure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 2.0.2: Interact with customer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 2.0.3: Conduct sale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Not Part of the Job ↓				Unit 3: Customer Service	AMOUNT OF TIME		
IMPORTANCE			Small		Medium	Large	
<input type="checkbox"/>	Minor	Average	Major				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 3.0.1: Provide technical assistance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 3.0.2: Perform customer relations activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not Part of the Job ↓				Unit 4: Business Management	AMOUNT OF TIME		
IMPORTANCE			Small		Medium	Large	
<input type="checkbox"/>	Minor	Average	Major				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 4.0.1: Perform general office duties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 4.0.2: Conduct general banking procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 4.0.3: Keep customer accounts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 4.0.4: Keep sales records	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 4.0.5: Safeguard business documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 4.0.6: Determine costs and revenues of conducting business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 4.0.7: Manage business finance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not Part of the Job ↓				Unit 5: Inventory	AMOUNT OF TIME		
IMPORTANCE			Small		Medium	Large	
<input type="checkbox"/>	Minor	Average	Major				
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 5.0.1: Inventory business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 5.0.2: Complete general records	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 5.0.3: Order merchandise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 5.0.4: Merchandise products and services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 5.0.5: Store merchandise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 5.0.6: Receive merchandise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Not Part of the Job				Unit 6: Merchandise Delivery	AMOUNT OF TIME		
Minor	Average	Major	Small		Medium	Large	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 6.0.1: Prepare and load merchandise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 6.0.2: Deliver merchandise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not Part of the Job				Unit 7: Agricultural Mechanics	AMOUNT OF TIME		
Minor	Average	Major	Small		Medium	Large	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.1: Service engine cooling systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.2: Service engine lubrication systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.3: Service engine fuel and air systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.4: Maintain and service engine electrical systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.5: Service wheels and tires	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.6: Service hydraulic systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.7: Perform prestart functions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.8: Operate equipment and vehicles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.9: Clean and store equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.10: Install and maintain electrical systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.11: Use and maintain hand and power tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.12: Apply protective coatings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 7.0.13: Maintain water systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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<input type="checkbox"/> Not Part of the Job IMPORTANCE Minor Average Major				Unit 9: Agricultural Business Feed and Grain Worker Subunit 9.1: Grain	AMOUNT OF TIME Small Medium Large
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.1.1: Handle grain	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.1.2: Analyze grain quality	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.1.3: Manage and care for grain storage	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/> Not Part of the Job IMPORTANCE Minor Average Major				Unit 9: Agricultural Business Feed and Grain Worker Subunit 9.2: Feed	AMOUNT OF TIME Small Medium Large
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.2.1: Formulate feeds for livestock	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.2.2: Use manufacturer's mixing and feeding charts	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.2.3: Prepare feed mixtures in feed mill	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.2.4: Mix and blend feeds	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.2.5: Control feed quality	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.2.6: Deliver feeds	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/> Not Part of the Job IMPORTANCE Minor Average Major				Unit 9: Agricultural Business Feed and Grain Worker Subunit 9.3: Maintenance of Facilities and Grounds	AMOUNT OF TIME Small Medium Large
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.3.1: Maintain storage facilities	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.3.2: Maintain grounds	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/> Not Part of the Job IMPORTANCE Minor Average Major				Unit 9: Agricultural Business Feed and Grain Worker Subunit 9.4: Store Sales	AMOUNT OF TIME Small Medium Large
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.4.1: Interact with customer	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.4.2: Receive feedstuffs and supplies	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
				<i>Unit 9 Continued on Page 8</i>	

<input type="checkbox"/> Not Part of the Job IMPORTANCE Minor Average Major				Unit 9: Agricultural Business Feed and Grain Worker <i>cont'd.</i> Subunit 9.5: Agricultural Mechanics	AMOUNT OF TIME Small Medium Large		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.5.1: Maintain mill equipment and vehicles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.5.2: Operate equipment and vehicles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Not Part of the Job IMPORTANCE Minor Average Major				Unit 9: Agricultural Business Feed and Grain Worker Subunit 9.6: Marketing	AMOUNT OF TIME Small Medium Large		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.6.1: Analyze market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.6.2: Perform promotional activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.6.3: Market products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Not Part of the Job IMPORTANCE Minor Average Major				Unit 9: Agricultural Business Feed and Grain Worker Subunit 9.7: Business Management	AMOUNT OF TIME Small Medium Large		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.7.1: Perform general office duties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.7.2: Inventory business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.7.3: Complete general records	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.7.4: Manage elevator operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.7.5: Follow legal requirements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.7.6: Safeguard business documents	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 9.7.7: Protect business assets from damage or loss	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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<input type="checkbox"/> Not Part of the Job <input type="checkbox"/> IMPORTANCE <input type="checkbox"/> Minor <input type="checkbox"/> Average <input type="checkbox"/> Major	Unit 10: Fertilizer/Chemical Sales and Service Worker Subunit 10.1: General Safety Precautions			AMOUNT OF TIME Small Medium Large			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.1.1: Maintain safe work environment	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.1.2: Follow emergency response procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Not Part of the Job <input type="checkbox"/> IMPORTANCE <input type="checkbox"/> Minor <input type="checkbox"/> Average <input type="checkbox"/> Major	Unit 10: Fertilizer/Chemical Sales and Service Worker Subunit 10.2: Customer Service			AMOUNT OF TIME Small Medium Large			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.2.1: Determine customer needs	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.2.2: Provide technical assistance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.2.3: Conduct sale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.2.4: Perform customer relations activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Not Part of the Job <input type="checkbox"/> IMPORTANCE <input type="checkbox"/> Minor <input type="checkbox"/> Average <input type="checkbox"/> Major	Unit 10: Fertilizer/Chemical Sales and Service Worker Subunit 10.3: Agricultural Mechanics			AMOUNT OF TIME Small Medium Large			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.3.1: Operate and maintain equipment	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.3.2: Service engine cooling systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.3.3: Maintain bearings and drives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.3.4: Service engine fuel and air systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.3.5: Maintain spray equipment and applicators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.3.6: Operate welders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.3.7: Maintain facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Unit 10 Continued on Page 10</i>							

<input type="checkbox"/> Not Part of the Job <input type="checkbox"/> IMPORTANCE <input type="checkbox"/> Minor <input type="checkbox"/> Average <input type="checkbox"/> Major	Unit 10: Fertilizer/Chemical Sales and Service Worker <i>cont'd.</i> Subunit 10.4: Fertilizer/Chemical Formulation and Application			AMOUNT OF TIME Small Medium Large			
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.4.1: Collect field data	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.4.2: Formulate fertilizer and chemical mixtures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.4.3: Apply fertilizers and chemicals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Competency 10.4.4: Inspect fields for weed, disease, insect, or other damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 3: Rank of Unit Areas

- Review the 9 unit areas listed below.
- Rank the areas from 1-9 according to their **importance for success as an Agricultural Sales and Service worker.**
- Write a 1 beside the most important area, a 2 beside the second most important area, and so-on, down to a 9 beside the least important area.
- Do not use any number more than once.
 - ___ **General Safety Precautions** (Unit 1, page 4)
 - ___ **Sales Skills** (Unit 2, page 4)
 - ___ **Customer Service** (Unit 3, page 5)
 - ___ **Business Management** (Unit 4, page 5)
 - ___ **Inventory** (Unit 5, page 5)
 - ___ **Merchandise Delivery** (Unit 6, page 6)
 - ___ **Agricultural Mechanics** (Unit 7, page 6)
 - ___ **Agricultural Business Feed and Grain Worker** (Unit 9, page 7)
 - ___ **Fertilizer/Chemical Sales and Service Worker** (Unit 10, page 9)

Section 4: Comments and Suggestions

If you have any comments or suggestions, please write them in the space that follows.

Thank you for helping us with this important project!

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Appendix C.

Supporting Materials: Supplemental Tables

Table C1

Mean Importance Ratings of Competencies as Rated by Agricultural Production Workers(Ranks 21 through 137) ($n = 21$)

Number	Competency	<u>M</u>	<u>SD</u>
2.0.8	Fertilize crops	2.35	0.25
5.0.1	Perform general office work	2.32	0.30
4.0.3	Market products	2.32	0.40
1.0.4	Follow emergency response procedures	2.32	0.24
2.0.3	Practice soil and water conservation	2.30	0.27
4.0.1	Analyze market	2.26	0.40
2.0.7	Develop fertilization plan	2.25	0.32
2.0.1	Evaluate and manage soil	2.25	0.34
3.0.13	Operate material-handling equipment	2.24	0.35
5.0.19	Enter, establish, and expand business	2.22	0.35
2.0.11	Apply pesticides	2.20	0.31
2.0.9	Control insects and diseases	2.20	0.31
2.0.6	Determine fertilization needs	2.20	0.37
5.0.4	Supervise and manage labor	2.16	0.42
5.0.17	Manage equipment program	2.16	0.28
5.0.5	Maintain supplies	2.16	0.28
5.0.14	Follow legal requirements	2.16	0.37
3.0.14	Clean and store equipment	2.11	0.24
5.0.2	Perform general banking procedures	2.11	0.36
5.0.20	Plan retirement and estate	2.11	0.36
5.0.12	Prepare and file tax forms	2.05	0.35
3.0.23	Weld with electric arc and MIG	2.05	0.37
3.0.10	Hitch equipment to power units	2.05	0.28
3.0.17	Construct with wood	2.05	0.19
5.0.13	Plan insurance coverage	2.05	0.31
5.0.9	Apply time-management skills	2.00	0.40
5.0.15	Obtain land	2.00	0.40
5.0.16	Plan structures	2.00	0.38
3.0.20	Install and maintain fencing	1.95	0.35
3.0.9	Service hydraulic systems	1.95	0.28
2.0.5	Test soil and plant tissues	1.95	0.33
3.0.7	Service belt and drive chain assemblies	1.89	0.29
5.0.3	Inventory business	1.84	0.37
3.0.12	Recognize components of material-handling equipment	1.83	0.39
3.0.26	Apply protective coatings	1.79	0.31
3.0.15	Plan construction of farm structures	1.74	0.43
3.0.8	Repair and service wheels, tires, and tracks	1.74	0.38
5.0.18	Purchase livestock	1.74	0.38
3.0.2	Service cooling systems for large engines	1.74	0.32
3.0.6	Maintain and service electrical systems for large engines	1.74	0.34
8.1.3	Milk cows	1.71	0.51

(table continues)

Table C1 (continued)

Mean Importance Ratings of Competencies as Rated by Agricultural Production Workers(Ranks 21 through 137) (n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
8.5.4	Feed animals	1.71	0.51
5.0.11	Contribute to industry growth	1.68	0.36
8.4.2	Handle and dispose of waste	1.65	0.50
4.0.4	Ship products	1.63	0.35
3.0.19	Install and maintain water systems	1.63	0.39
3.0.24	Fabricate with metal	1.58	0.44
3.0.1	Operate and maintain small engines	1.58	0.33
3.0.18	Install and maintain electrical systems	1.58	0.37
8.1.2	Implement sanitation program	1.53	0.51
8.3.1	Demonstrate knowledge of genetics and reproduction	1.53	0.51
8.2.1	Perform general animal care procedures	1.47	0.50
8.3.5	Care for newborn animals, mothers, and young animals	1.47	0.50
8.6.2	Follow sanitation program	1.47	0.47
8.6.1	Monitor health	1.47	0.50
8.2.2	Restrain or pen animals	1.47	0.47
8.1.1	Implement maintenance program	1.47	0.50
8.6.7	Manage medications and chemicals	1.47	0.47
3.0.16	Construct with concrete	1.47	0.30
7.1.1	Perform general animal care procedures	1.44	0.50
8.6.5	Control nutritional problems	1.41	0.48
8.6.4	Treat minor health problems	1.29	0.43
8.6.3	Follow parasite-control program	1.29	0.45
8.6.6	Control bacterial, viral, and fungal diseases	1.29	0.46
3.0.22	Weld with gas	1.26	0.42
7.1.2	Restrain, handle, or move animals	1.25	0.46
8.2.3	Haul animals	1.18	0.40
3.0.25	Solder	1.11	0.38
7.2.6	Care for newborn animals, mothers, and young animals	1.00	0.47
7.3.2	Handle and dispose of waste	1.00	0.42
10.2.4	Care for newborn piglets	0.94	0.48
10.4.4	Feed and water animals	0.94	0.48
10.5.1	Treat health problems	0.94	0.48
7.5.1	Monitor health	0.93	0.44
10.5.2	Prevent health problems	0.88	0.45
7.4.4	Feed animals	0.87	0.38
7.3.1	Evaluate, use, and maintain waste handling and disposal system	0.87	0.38
7.2.4	Select animals	0.87	0.42
7.2.5	Breed animals	0.87	0.42
10.2.1	Select animals	0.81	0.42
7.5.7	Perform basic herd and flock practices	0.80	0.39
7.5.4	Treat minor health problems	0.80	0.39

(table continues)

Table C1 (continued)

Mean Importance Ratings of Competencies as Rated by Agricultural Production Workers(Ranks 21 through 137) (n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
10.1.1	Perform general animal care procedures	0.75	0.39
10.2.5	Care for mothers	0.75	0.39
10.2.3	Breed animals	0.75	0.39
10.5.3	Manage medications, chemicals, and instruments	0.75	0.39
7.2.1	Demonstrate knowledge of genetics and reproduction	0.73	0.37
7.2.3	Plan breeding program	0.73	0.37
7.5.2	Follow sanitation program	0.73	0.31
7.5.3	Follow preventive parasite-control program	0.73	0.35
10.1.2	Restrain, handle, or move animals	0.69	0.36
10.4.5	Maintain feeding area	0.69	0.38
10.2.2	Plan breeding program	0.69	0.36
7.5.6	Manage medications, chemicals, and instruments	0.67	0.33
10.3.2	Handle and dispose of waste	0.63	0.34
7.5.5	Control bacterial, viral, and fungal diseases	0.60	0.29
7.4.1	Compare nutrient requirements	0.60	0.34
7.4.2	Determine nutritive value of feedstuffs	0.53	0.32
9.1.1	Operate and maintain waste handling and disposal system	0.21	0.25
9.1.2	Handle and dispose of waste	0.21	0.25
7.1.3	Shear sheep	0.06	0.08
9.2.1	Provide for physical needs	0.00	0.00
9.2.2	Prepare housing	0.00	0.00
9.2.3	Care for birds	0.00	0.00
9.2.4	Prepare for bird removal	0.00	0.00
9.2.5	Care for eggs	0.00	0.00
9.2.6	Market products	0.00	0.00
9.3.1	Determine nutritive value of feedstuffs	0.00	0.00
9.3.2	Feed birds	0.00	0.00
9.4.1	Monitor health	0.00	0.00
9.4.2	Follow sanitation program	0.00	0.00
9.4.3	Follow parasite-control program	0.00	0.00
9.4.4	Treat minor health problems	0.00	0.00
9.4.5	Control pests	0.00	0.00
9.5.1	Operate and maintain brooding equipment	0.00	0.00
9.5.2	Operate and maintain environmental controls	0.00	0.00
9.5.3	Maintain grounds around buildings	0.00	0.00
	Grand Mean (137 competencies)	1.54	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C2

Mean Importance Ratings of Competencies as Rated by Agricultural Sales and ServiceWorkers (Ranks 21 through 78) (n = 35)

Number	Competency	<u>M</u>	<u>SD</u>
5.0.4	Merchandise products and services	1.62	0.80
4.0.4	Keep sales records	1.62	0.83
5.0.3	Order merchandise	1.59	0.74
10.3.1	Operate and maintain equipment	1.53	0.80
6.0.1	Prepare and load merchandise	1.52	0.72
4.0.7	Manage business finance	1.49	0.90
4.0.5	Safeguard business documents	1.49	0.85
5.0.2	Complete general records	1.41	0.70
6.0.2	Deliver merchandise	1.36	0.68
9.7.5	Follow legal requirements	1.33	0.92
9.4.1	Interact with customer	1.32	0.90
7.0.8	Operate equipment and vehicles	1.29	0.87
5.0.6	Receive merchandise	1.29	0.69
9.7.7	Protect business assets from damage or loss	1.21	0.84
4.0.3	Keep customer accounts	1.20	0.78
10.4.3	Apply fertilizers and chemicals	1.15	0.89
5.0.5	Store merchandise	1.15	0.68
9.7.6	Safeguard business documents	1.09	0.84
9.7.2	Inventory business	1.06	0.78
10.3.7	Maintain facilities	1.06	0.70
9.6.3	Market products	1.03	0.82
9.5.2	Operate equipment and vehicles	1.03	0.79
9.7.3	Complete general records	1.03	0.72
10.3.5	Maintain spray equipment and applicators	1.00	0.86
9.7.1	Perform general office duties	0.97	0.69
9.6.1	Analyze market	0.91	0.74
7.0.9	Clean and store equipment	0.91	0.74
7.0.2	Service engine lubrication systems	0.86	0.82
7.0.7	Perform prestart functions	0.86	0.79
10.3.4	Service engine fuel and air systems	0.84	0.75
9.1.3	Manage and care for grain storage	0.83	0.84
7.0.3	Service engine fuel and air systems	0.83	0.78
9.3.1	Maintain storage facilities	0.79	0.78
9.3.2	Maintain grounds	0.79	0.68
10.3.3	Maintain bearings and drives	0.78	0.76
9.1.1	Handle grain	0.77	0.82
9.2.5	Control feed quality	0.77	0.85
7.0.6	Service hydraulic systems	0.77	0.77
7.0.5	Service wheels and tires	0.77	0.77
9.6.2	Perform promotional activities	0.76	0.60
9.1.2	Analyze grain quality	0.74	0.81

(table continues)

Table C2 (continued)

Mean Importance Ratings of Competencies as Rated by Agricultural Sales and Service

Workers (Ranks 21 through 78) ($n = 35$)

Number	Competency	<u>M</u>	<u>SD</u>
9.2.2	Use manufacturer's mixing and feeding charts	0.74	0.82
9.4.2	Receive feedstuffs and supplies	0.74	0.72
7.0.11	Use and maintain hand and power tools	0.71	0.67
9.5.1	Maintain mill equipment and vehicles	0.70	0.78
9.2.1	Formulate feeds for livestock	0.69	0.78
7.0.4	Maintain and service engine electrical systems	0.69	0.73
7.0.1	Service engine cooling systems	0.69	0.71
10.3.2	Service engine cooling systems	0.69	0.71
9.2.4	Mix and blend feeds	0.66	0.80
4.0.2	Conduct general banking procedures	0.63	0.62
9.7.4	Manage elevator operations	0.61	0.64
9.2.3	Prepare feed mixtures in feed mill	0.60	0.75
10.3.6	Operate welders	0.59	0.60
9.2.6	Deliver feeds	0.54	0.61
7.0.12	Apply protective coatings	0.54	0.61
7.0.13	Maintain water systems	0.53	0.63
7.0.10	Install and maintain electrical systems	0.49	0.65
	Grand Mean (78 competencies)	1.27	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C3

Mean Importance Ratings of Competencies as Rated by Agricultural/Industrial Mechanical Technicians (Ranks 21 through 66) (n = 24)

Number	Competency	<u>M</u>	<u>SD</u>
7.0.3	Service crankshaft assembly	2.30	0.56
3.0.5	Use general mechanical techniques	2.30	0.47
5.0.3	Operate equipment and vehicles	2.22	0.42
15.0.1	Service air-conditioning system	2.17	0.54
6.0.2	Service valve assembly	2.17	0.48
9.0.1	Maintain cooling system	2.17	0.45
14.0.2	Service power steering units	2.14	0.44
2.0.2	Assemble equipment	2.13	0.44
12.0.7	Repair drive axle	2.13	0.50
6.0.1	Service cylinder head	2.13	0.47
3.0.2	Use and maintain hand and power tools	2.13	0.47
5.0.1	Perform prestart functions	2.13	0.40
2.0.4	Lubricate equipment	2.09	0.34
11.0.1	Service ignition system	2.05	0.41
14.0.1	Service steering mechanism	2.05	0.48
14.0.3	Service steering linkage	2.05	0.44
11.0.2	Service batteries	2.04	0.41
8.0.2	Repair lubrication system	2.04	0.48
6.0.3	Service camshaft assembly	2.04	0.54
9.0.2	Repair cooling system	2.04	0.51
13.0.2	Repair mechanical components	2.00	0.43
3.0.6	Service bearings, seats, and seals	2.00	0.43
13.0.4	Repair brake hydraulics	1.96	0.51
13.0.3	Repair differential brakes	1.96	0.44
10.0.4	Service air-induction system	1.96	0.48
11.0.8	Service electrical accessories	1.91	0.49
3.0.7	Service belt and drive chain assemblies	1.91	0.46
10.0.1	Service gasoline fuel systems	1.87	0.40
11.0.7	Service gauges	1.83	0.45
5.0.2	Hitch equipment to power units	1.83	0.45
2.0.3	Clean equipment	1.78	0.30
12.0.6	Repair drive shaft assembly	1.74	0.43
4.0.2	Weld with electric arc	1.74	0.43
11.0.6	Service light controls	1.70	0.44
11.0.5	Service lights	1.70	0.44
10.0.3	Service governor system	1.70	0.44
5.0.4	Operate small engines	1.68	0.44
14.0.4	Align wheels	1.64	0.51
15.0.2	Service heating systems	1.61	0.42
10.0.6	Service exhaust system	1.57	0.45
14.0.5	Service wheels, tires, and tracks	1.41	0.48

(table continues)

Table C3 (continued)

Mean Importance Ratings of Competencies as Rated by Agricultural/Industrial Mechanical Technicians (Ranks 21 through 66) (n = 24)

Number	Competency	<u>M</u>	<u>SD</u>
4.0.1	Weld with gas	1.39	0.42
4.0.4	Fabricate with metal	1.35	0.48
4.0.5	Solder	1.26	0.40
4.0.3	Identify properties of metals	1.22	0.35
10.0.5	Service emission control system	1.00	0.55
	Grand Mean (66 competencies)	2.05	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C4

Mean Importance Ratings of Competencies as Rated by Animal Management Technicians(Ranks 21 through 61) (n = 29)

Number	Competency	<u>M</u>	<u>SD</u>
2.0.3	Identify common animal types	1.59	0.73
5.0.1	Select feeds	1.59	0.77
3.0.1	Plan animal housing requirements	1.57	0.82
6.0.2	Conduct maintenance grooming	1.57	0.84
6.0.1	Prepare for grooming	1.55	0.84
10.0.1	Provide technical assistance	1.48	0.82
6.0.4	Clip and scissor dogs	1.45	0.93
6.0.6	Finish grooming	1.45	0.93
12.0.8	Store merchandise	1.38	0.61
10.0.2	Conduct sale	1.33	0.83
2.0.1	Analyze animal care industry	1.26	0.76
2.0.2	Classify animals	1.26	0.72
10.0.5	Market products and services	1.23	0.82
4.0.5	Care for newborns	1.22	0.91
12.0.4	Keep customer accounts	1.21	0.86
9.0.5	Dispense medicine and supplies	1.19	0.92
11.0.1	Receive merchandise	1.19	0.68
12.0.3	Conduct general banking procedures	1.18	0.87
12.0.5	Manage business finance	1.17	0.99
4.0.4	Care for females	1.15	0.78
10.0.4	Price merchandise	1.14	0.86
6.0.5	Groom cats	1.10	0.86
9.0.4	Perform laboratory tests	1.07	0.85
10.0.6	Advertise products and services	1.03	0.80
4.0.1	Select animals	1.00	0.83
9.0.11	Examine euthanasia	0.96	0.84
4.0.2	Plan breeding program	0.93	0.85
9.0.10	Prepare animal for surgery	0.93	0.89
4.0.3	Breed animals	0.89	0.78
9.0.7	Assist with X ray of animal	0.89	0.86
9.0.9	Prepare facilities and equipment for surgery	0.88	0.87
11.0.2	Prepare and load merchandise and animals	0.86	0.76
7.0.3	Obedience-train dogs	0.85	0.74
9.0.8	Process X-ray film	0.56	0.73
11.0.3	Deliver merchandise	0.50	0.64
8.0.1	Select and operate equipment	0.48	0.69
8.0.4	Manage aquarium	0.44	0.71
8.0.2	Identify fish and plants	0.41	0.66
8.0.3	Create aquarium habitat	0.41	0.66

(table continues)

Table C4 (continued)

Mean Importance Ratings of Competencies as Rated by Animal Management Technicians
(Ranks 21 through 61) ($n = 29$)

Number	Competency	<u>M</u>	<u>SD</u>
4.0.7	Breed fish	0.22	0.38
4.0.6	Incubate eggs	0.19	0.36
	Grand Mean (61 competencies)	1.36	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C5

Mean Importance Ratings of Competencies as Rated by Floriculture and GreenhouseWorkers (Ranks 21 through 42) (n = 25)

Number	Competency	<u>M</u>	<u>SD</u>
4.0.2	Prepare and load merchandise	1.67	0.86
4.0.1	Receive merchandise	1.67	0.78
7.0.4	Plant and propagate plants	1.52	0.97
7.0.7	Regulate greenhouse environment	1.42	1.00
5.0.4	Store merchandise	1.35	0.68
4.0.4	Process cut flowers and greens	1.32	0.99
4.0.3	Deliver merchandise	1.28	0.86
6.0.2	Prepare materials for arrangements	1.25	1.01
7.0.3	Prepare for propagation	1.25	0.85
2.0.5	Operate delivery vehicles	1.24	0.82
2.0.3	Maintain floral shop equipment and facilities	1.21	0.90
6.0.2	Prepare live plant groupings	1.20	1.02
7.0.2	Prepare media mixes	1.13	0.80
2.0.9	Use and maintain hand and power tools	1.13	0.67
7.0.1	Test soil, water, and plant tissues	1.08	0.87
6.0.1	Plan designs and arrangements	0.96	0.80
2.0.8	Service water systems	0.92	0.72
2.0.4	Perform prestart functions of delivery vehicles	0.83	0.71
2.0.7	Construct with wood	0.83	0.60
2.0.10	Apply protective coatings	0.77	0.65
2.0.1	Compare greenhouse structures	0.68	0.63
2.0.6	Construct with concrete	0.54	0.65
	Grand Mean (42 competencies)	1.58	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C6

Mean Importance Ratings of Competencies as Rated by Forest Industry Workers (Ranks
21 through 62) (n = 12)

Number	Competency	<u>M</u>	<u>SD</u>
12.0.3	Analyze marketing and sales opportunities	1.60	0.41
4.0.4	Scale pulpwood and sawlogs	1.40	0.51
2.0.3	Examine plant processes	1.36	0.32
9.0.3	Maintain spraying equipment	1.33	0.36
9.0.5	Service engine lubrication systems	1.30	0.40
6.0.3	Apply pest-control principles	1.30	0.26
7.0.1	Harvest nonforest trees	1.22	0.39
12.0.7	Manage business finance	1.22	0.43
6.0.6	Shear Christmas trees	1.20	0.59
12.0.1	Perform general office duties	1.20	0.43
12.0.8	Control inventory	1.20	0.43
6.0.4	Apply chemical pest-control treatments	1.20	0.30
5.0.3	Prepare for plant and soil testing	1.20	0.24
9.0.9	Service hydraulic systems	1.11	0.33
4.0.5	Grade sawlogs	1.10	0.46
6.0.5	Apply nonchemical pest control	1.10	0.38
12.0.6	Minimize loss	1.10	0.42
8.0.1	Practice wildland fire safety	1.10	0.38
9.0.6	Service engine fuel and air systems	1.10	0.38
9.0.8	Service wheels and tires	1.10	0.28
3.0.1	Prepare nursery site	1.00	0.48
9.0.4	Service engine cooling systems	1.00	0.36
13.0.1	Prune trees	0.90	0.49
12.0.4	Ship merchandise	0.80	0.39
13.0.4	Dispose of debris	0.80	0.47
3.0.7	Operate irrigation systems	0.73	0.36
13.0.3	Remove tree parts	0.70	0.40
12.0.10	Receive merchandise	0.70	0.31
9.0.7	Service engine electrical systems	0.70	0.26
6.0.2	Fertilize trees	0.70	0.18
11.0.2	Install and maintain fencing	0.70	0.26
12.0.9	Order merchandise	0.67	0.31
3.0.5	Regulate nursery environment	0.64	0.41
3.0.6	Service water systems	0.64	0.37
8.0.2	Suppress fires	0.60	0.20
12.0.2	Conduct general banking procedures	0.60	0.37
3.0.3	Propagate tree seedlings and cuttings	0.55	0.33
13.0.2	Climb trees	0.50	0.37
12.0.5	Keep customer accounts	0.50	0.27
3.0.2	Prepare for propagation	0.45	0.28

(table continues)

Table C6 (continued)

Mean Importance Ratings of Competencies as Rated by Forest Industry Workers (Ranks 21 through 62) (n = 12)

Number	Competency	<u>M</u>	<u>SD</u>
8.0.3	Practice mop-up operations	0.40	0.20
8.0.5	Identify weather conditions	0.40	0.20
	Grand Mean (62 competencies)	1.34	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C7

Mean Importance Ratings of Competencies as Rated by Meat Processors (Ranks 21 through 62) (n = 12)

Number	Competency	<u>M</u>	<u>SD</u>
3.0.1	Evaluate economic aspects	1.67	0.31
8.0.1	Locate beef cuts	1.67	0.48
8.0.5	Merchandise rib cuts	1.56	0.48
9.0.5	Merchandise loin cuts	1.50	0.44
8.0.9	Merchandise sirloin cuts	1.44	0.44
8.0.10	Merchandise round cuts	1.44	0.44
12.0.2	Cure primal meat cuts	1.38	0.44
9.0.6	Merchandise ham cuts	1.25	0.39
3.0.2	Assess employment opportunities	1.22	0.24
8.0.2	Merchandise chuck cuts	1.22	0.39
5.0.2	Kill livestock	1.22	0.47
9.0.1	Locate pork cuts	1.13	0.33
9.0.2	Merchandise Boston butt cuts	1.13	0.33
5.0.3	Prepare beef/sheep carcass	1.11	0.42
5.0.1	Handle livestock	1.11	0.42
6.0.1	Examine carcasses	1.00	0.31
9.0.4	Merchandise belly cuts	1.00	0.31
5.0.4	Prepare hog carcass	0.89	0.42
7.0.5	Cut veal carcass	0.89	0.33
9.0.3	Merchandise picnic cuts	0.88	0.28
7.0.6	Cut lamb and mutton carcasses	0.78	0.30
8.0.3	Merchandise shank cuts	0.78	0.30
8.0.8	Merchandise flank cuts	0.78	0.30
8.0.11	Merchandise beef variety meats	0.78	0.24
9.0.7	Merchandise pork variety meats	0.78	0.24
11.0.7	Merchandise leg cuts	0.78	0.47
8.0.4	Merchandise brisket cuts	0.67	0.25
8.0.6	Merchandise plate cuts	0.67	0.25
10.0.3	Merchandise breast cuts	0.67	0.36
10.0.4	Merchandise rack cuts	0.67	0.36
10.0.5	Merchandise loin cuts	0.67	0.36
11.0.1	Locate lamb and mutton cuts	0.67	0.31
11.0.5	Merchandise loin cuts	0.67	0.40
10.0.1	Locate veal and beef-calf cuts	0.56	0.26
10.0.6	Merchandise leg cuts	0.56	0.26
11.0.3	Merchandise breast cuts	0.56	0.36
11.0.4	Merchandise rack cuts	0.56	0.32
11.0.6	Merchandise sirloin cuts	0.56	0.36
10.0.2	Merchandise shoulder cuts	0.44	0.19
10.0.7	Merchandise veal and beef-calf variety meats	0.44	0.19

(table continues)

Table C7 (continued)

Mean Importance Ratings of Competencies as Rated by Meat Processors (Ranks 21 through 62) ($n = 12$)

Number	Competency	<u>M</u>	<u>SD</u>
11.0.2	Merchandise shoulder cuts	0.44	0.26
11.0.8	Merchandise lamb variety meats	0.33	0.18
	Grand Mean (62 competencies)	1.31	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C8

Mean Importance Ratings of Competencies as Rated by Nursery and Garden CenterWorkers (Ranks 21 through 43) (n = 25)

Number	Competency	<u>M</u>	<u>SD</u>
6.0.6	Price merchandise	2.21	0.75
5.0.4	Maintain nursery and greenhouse equipment and facilities	2.17	0.70
2.0.2	Examine plant physiology and growth	2.17	0.51
3.0.1	Clean and store equipment	2.17	0.67
2.0.8	Prepare planting area	2.13	0.69
7.0.1	Receive products	2.09	0.57
8.0.3	Control inventory	2.04	0.70
2.0.11	Evaluate pest-control program	2.00	0.65
4.0.1	Perform prestart functions	1.96	0.73
2.0.15	Harvest plants	1.91	0.96
2.0.12	Apply chemical treatments for pest control	1.87	0.76
4.0.2	Hitch equipment to power unit	1.86	0.62
8.0.1	Perform general office duties	1.79	0.78
5.0.3	Operate irrigation systems	1.78	0.83
3.0.5	Service wheels and tires	1.70	0.63
2.0.16	Regulate greenhouse environment	1.65	0.88
2.0.6	Prepare media mixes	1.59	0.83
2.0.9	Propagate plants	1.52	0.96
2.0.7	Prepare for propagation	1.52	0.89
5.0.2	Install and maintain water delivery systems	1.48	0.83
3.0.6	Service hydraulic systems	1.46	0.78
2.0.5	Test soil, water, and plant tissues	1.43	0.68
3.0.4	Service engine electrical systems	1.35	0.70
	Grand Mean (43 competencies)	2.14	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C9

Mean Importance Ratings of Competencies as Rated by Resource Conservation Workers(Ranks 21 through 68) (n = 18)

Number	Competency	<u>M</u>	<u>SD</u>
9.0.9	Service lubrication systems	1.47	0.62
3.0.1	Identify and assess stream dynamics	1.44	0.57
5.0.1	Conduct a basic survey	1.44	0.51
9.0.7	Lubricate equipment	1.38	0.64
7.0.8	Identify wildlife management techniques	1.38	0.57
9.0.10	Service engine fuel and air systems	1.35	0.59
9.0.8	Service engine cooling systems	1.35	0.64
9.0.11	Service engine electrical systems	1.31	0.59
8.0.5	Maintain landscape plants	1.31	0.59
6.0.1	Demonstrate interpretive abilities	1.25	0.56
8.0.8	Utilize pest-control program	1.25	0.53
12.0.2	Control inventory	1.25	0.53
6.0.2	Develop interpretive skills	1.25	0.58
8.0.4	Fertilize plants	1.19	0.55
10.0.3	Operate vehicles and boats	1.19	0.49
10.0.1	Perform prestart functions	1.19	0.57
8.0.3	Establish landscape	1.13	0.48
8.0.7	Maintain turfgrasses	1.13	0.59
2.0.5	Identify and classify common animal species	1.13	0.51
8.0.2	Prepare landscape area	1.13	0.51
12.0.3	Receive merchandise	1.13	0.57
8.0.9	Apply chemical pest-control treatments	1.13	0.51
8.0.11	Establish and maintain trails	1.12	0.51
9.0.12	Service wheels and tires	1.12	0.57
7.0.5	Identify firearm safety materials and methods	1.00	0.59
9.0.6	Service belt and drive chain assemblies	1.00	0.51
11.0.5	Install and maintain fencing	1.00	0.57
7.0.4	Evaluate wildlife populations	0.94	0.53
10.0.2	Hitch equipment to power unit	0.94	0.53
8.0.12	Maintain roadways and sidewalks	0.94	0.50
9.0.13	Service hydraulic systems	0.94	0.53
7.0.2	Identify fish management techniques	0.88	0.59
8.0.13	Supervise and maintain camping area	0.88	0.59
11.0.1	Construct with wood	0.81	0.57
7.0.1	Identify angling materials and methods	0.81	0.52
7.0.3	Identify aquatic vegetative management	0.81	0.52
8.0.1	Prepare media mixes	0.81	0.39
11.0.2	Maintain electrical systems	0.75	0.58
7.0.7	Apply animal-control techniques	0.75	0.56
12.0.4	Ship merchandise	0.75	0.53
7.0.6	Trap mammals	0.69	0.51

(table continues)

Table C9 (continued)

Mean Importance Ratings of Competencies as Rated by Resource Conservation Workers

(Ranks 21 through 68) (n = 18)

Number	Competency	<u>M</u>	<u>SD</u>
11.0.6	Apply protective coatings	0.69	0.51
11.0.3	Install and maintain water system	0.67	0.53
11.0.4	Operate sprinkler system	0.63	0.51
9.0.3	Weld with gas	0.56	0.51
9.0.4	Weld with electric arc and MIG	0.56	0.51
9.0.5	Fabricate with metal	0.56	0.51
8.0.10	Operate aquatic recreation	0.44	0.42
	Grand Mean (68 competencies)	1.26	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C10

Mean Importance Ratings of Competencies as Rated by Turf and Landscape Workers(Ranks 21 through 49) (n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
5.0.2	Demonstrate presale skills	2.26	0.57
6.0.2	Control inventory	2.25	0.49
2.0.12	Maintain turfgrasses	2.20	0.77
3.0.8	Perform predeparture functions	2.16	0.58
2.0.10	Fertilize plants	2.15	0.54
6.0.3	Receive merchandise	2.15	0.46
4.0.3	Construct with wood	2.11	0.49
3.0.3	Service engine lubrication systems	2.10	0.75
2.0.2	Examine plant physiology and growth	2.05	0.32
3.0.6	Service wheels and tires	2.05	0.62
2.0.8	Receive and deliver landscape and turfgrass products	1.95	0.59
3.0.4	Service small-engine fuel and air systems	1.95	0.68
2.0.13	Plan integrated pest management (IPM) control program	1.75	0.60
6.0.4	Ship merchandise	1.70	0.73
3.0.16	Maintain and service spreaders	1.65	0.62
3.0.2	Service engine cooling systems	1.65	0.74
2.0.14	Apply chemical pest-control treatments	1.60	0.71
3.0.5	Maintain and service small-engine electrical systems	1.55	0.71
3.0.7	Service hydraulic systems	1.55	0.68
3.0.15	Maintain and service spraying equipment	1.50	0.71
4.0.7	Install and maintain fencing	1.37	0.61
2.0.5	Test soil and plant tissues	1.35	0.46
4.0.5	Install and maintain water delivery systems	1.26	0.75
4.0.6	Operate and maintain sprinkler systems	1.21	0.80
3.0.13	Apply protective coatings	1.00	0.57
3.0.14	Fabricate with metal	0.79	0.59
4.0.1	Construct with concrete	0.79	0.43
4.0.4	Install and maintain electrical systems	0.74	0.44
4.0.8	Apply protective coatings	0.74	0.49
	Grand Mean (49 competencies)	2.03	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no importance); 1 = minor importance; 2 = average importance; and 3 = major importance.

Table C11

Mean Relative Time Spent Ratings of Competencies as Rated by Agricultural ProductionWorkers (Ranks 21 through 137) (n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
2.0.8	Fertilize crops	1.65	0.26
4.0.1	Analyze market	1.63	0.29
3.0.14	Clean and store equipment	1.61	0.19
5.0.10	Finance business	1.58	0.22
4.0.2	Establish marketing plans	1.58	0.25
5.0.17	Manage equipment program	1.58	0.26
5.0.19	Enter, establish, and expand business	1.56	0.28
2.0.3	Practice soil and water conservation	1.55	0.26
2.0.11	Apply pesticides	1.55	0.23
5.0.12	Prepare and file tax forms	1.53	0.28
3.0.3	Service lubrication systems for large engines	1.50	0.23
2.0.7	Develop fertilization plan	1.50	0.23
2.0.9	Control insects and diseases	1.50	0.20
8.2.1	Perform general animal care procedures	1.47	0.36
4.0.3	Market products	1.47	0.26
5.0.5	Maintain supplies	1.47	0.23
3.0.10	Hitch equipment to power units	1.47	0.23
3.0.5	Service fuel and air systems for large engines	1.42	0.23
3.0.17	Construct with wood	1.42	0.23
4.0.4	Ship products	1.42	0.26
8.4.2	Handle and dispose of waste	1.41	0.33
3.0.12	Recognize components of material-handling equipment	1.39	0.26
5.0.4	Supervise and manage labor	1.37	0.26
3.0.23	Weld with electric arc and MIG	1.37	0.23
2.0.1	Evaluate and manage soil	1.35	0.20
5.0.9	Apply time-management skills	1.32	0.20
5.0.2	Perform general banking procedures	1.32	0.20
1.0.4	Follow emergency response procedures	1.32	0.18
3.0.26	Apply protective coatings	1.32	0.19
2.0.6	Determine fertilization needs	1.30	0.23
8.6.2	Follow sanitation program	1.29	0.30
8.3.5	Care for newborn animals, mothers, and young animals	1.24	0.34
5.0.14	Follow legal requirements	1.21	0.19
3.0.15	Plan construction of farm structures	1.21	0.24
3.0.9	Service hydraulic systems	1.21	0.17
3.0.7	Service belt and drive chain assemblies	1.21	0.17
2.0.15	Maintain quality of stored crops	1.20	0.17
8.1.2	Implement sanitation program	1.18	0.34
8.6.1	Monitor health	1.18	0.30
5.0.18	Purchase livestock	1.16	0.23
3.0.1	Operate and maintain small engines	1.16	0.21

(table continues)

Table C11 (continued)

Mean Relative Time Spent Ratings of Competencies as Rated by Agricultural ProductionWorkers (Ranks 21 through 137) (n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
3.0.2	Service cooling systems for large engines	1.16	0.16
5.0.15	Obtain land	1.11	0.22
5.0.20	Plan retirement and estate	1.11	0.21
5.0.13	Plan insurance coverage	1.11	0.15
3.0.8	Repair and service wheels, tires, and tracks	1.11	0.22
3.0.19	Install and maintain water systems	1.11	0.23
3.0.16	Construct with concrete	1.11	0.18
8.3.1	Demonstrate knowledge of genetics and reproduction	1.06	0.33
5.0.11	Contribute to industry growth	1.05	0.19
5.0.3	Inventory business	1.05	0.15
3.0.6	Maintain and service electrical systems for large engines	1.05	0.17
3.0.18	Install and maintain electrical systems	1.05	0.21
7.1.1	Perform general animal care procedures	1.00	0.30
8.6.5	Control nutritional problems	1.00	0.28
8.2.2	Restrain or pen animals	1.00	0.26
3.0.24	Fabricate with metal	1.00	0.22
2.0.5	Test soil and plant tissues	1.00	0.13
5.0.16	Plan structures	0.95	0.10
8.6.7	Manage medications and chemicals	0.94	0.26
8.6.4	Treat minor health problems	0.94	0.26
3.0.22	Weld with gas	0.89	0.25
8.1.1	Implement maintenance program	0.88	0.27
7.4.4	Feed animals	0.87	0.31
10.2.4	Care for newborn piglets	0.81	0.38
7.1.2	Restrain, handle, or move animals	0.81	0.26
7.2.6	Care for newborn animals, mothers, and young animals	0.80	0.34
8.6.3	Follow parasite-control program	0.76	0.22
8.6.6	Control bacterial, viral, and fungal diseases	0.76	0.22
10.4.4	Feed and water animals	0.75	0.35
7.3.2	Handle and dispose of waste	0.73	0.27
8.2.3	Haul animals	0.71	0.18
10.5.2	Prevent health problems	0.69	0.32
10.2.1	Select animals	0.69	0.32
10.1.1	Perform general animal care procedures	0.69	0.32
10.2.5	Care for mothers	0.69	0.32
3.0.25	Solder	0.68	0.15
7.3.1	Evaluate, use, and maintain waste handling and disposal system	0.67	0.26
10.5.1	Treat health problems	0.63	0.32
10.1.2	Restrain, handle, or move animals	0.63	0.29
10.2.3	Breed animals	0.56	0.28
10.5.3	Manage medications, chemicals, and instruments	0.56	0.28

(table continues)

Table C11 (continued)

Mean Relative Time Spent Ratings of Competencies as Rated by Agricultural ProductionWorkers (Ranks 21 through 137) (n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
10.4.5	Maintain feeding area	0.56	0.28
10.2.2	Plan breeding program	0.56	0.25
10.3.2	Handle and dispose of waste	0.56	0.28
7.5.1	Monitor health	0.53	0.23
7.2.4	Select animals	0.53	0.23
7.5.7	Perform basic herd and flock practices	0.53	0.23
7.2.1	Demonstrate knowledge of genetics and reproduction	0.53	0.23
7.2.3	Plan breeding program	0.47	0.20
7.5.6	Manage medications, chemicals, and instruments	0.47	0.20
7.5.2	Follow sanitation program	0.47	0.17
7.2.5	Breed animals	0.40	0.17
7.5.5	Control bacterial, viral, and fungal diseases	0.40	0.17
7.5.4	Treat minor health problems	0.33	0.13
7.5.3	Follow preventive parasite-control program	0.33	0.13
7.4.1	Compare nutrient requirements	0.27	0.13
7.4.2	Determine nutritive value of feedstuffs	0.27	0.13
9.1.1	Operate and maintain waste handling and disposal system	0.14	0.16
9.1.2	Handle and dispose of waste	0.14	0.16
7.1.3	Shear sheep	0.06	0.08
9.2.1	Provide for physical needs	0.00	0.00
9.2.2	Prepare housing	0.00	0.00
9.2.3	Care for birds	0.00	0.00
9.2.4	Prepare for bird removal	0.00	0.00
9.2.5	Care for eggs	0.00	0.00
9.2.6	Market products	0.00	0.00
9.3.1	Determine nutritive value of feedstuffs	0.00	0.00
9.3.2	Feed birds	0.00	0.00
9.4.1	Monitor health	0.00	0.00
9.4.2	Follow sanitation program	0.00	0.00
9.4.3	Follow parasite-control program	0.00	0.00
9.4.4	Treat minor health problems	0.00	0.00
9.4.5	Control pests	0.00	0.00
9.5.1	Operate and maintain brooding equipment	0.00	0.00
9.5.2	Operate and maintain environmental controls	0.00	0.00
9.5.3	Maintain grounds around buildings	0.00	0.00
	Grand Mean (137 competencies)	1.08	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job

(interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table C12

Mean Relative Time Spent Ratings of Competencies as Rated by Agricultural Sales and Service Workers (Ranks 21 through 78) (n = 35)

Number	Competency	<u>M</u>	<u>SD</u>
9.4.1	Interact with customer	1.35	0.68
10.1.2	Follow emergency response procedures	1.34	0.48
4.0.4	Keep sales records	1.32	0.55
5.0.1	Inventory business	1.32	0.52
6.0.1	Prepare and load merchandise	1.30	0.49
5.0.2	Complete general records	1.29	0.50
4.0.7	Manage business finance	1.26	0.66
7.0.8	Operate equipment and vehicles	1.21	0.65
5.0.3	Order merchandise	1.21	0.44
5.0.6	Receive merchandise	1.15	0.51
6.0.2	Deliver merchandise	1.09	0.39
4.0.5	Safeguard business documents	1.06	0.55
4.0.3	Keep customer accounts	1.06	0.54
10.4.3	Apply fertilizers and chemicals	1.03	0.67
9.6.3	Market products	1.00	0.64
5.0.5	Store merchandise	0.97	0.46
9.5.2	Operate equipment and vehicles	0.94	0.56
9.7.1	Perform general office duties	0.94	0.52
9.7.3	Complete general records	0.91	0.57
9.7.2	Inventory business	0.88	0.57
10.3.7	Maintain facilities	0.88	0.43
9.7.5	Follow legal requirements	0.85	0.56
9.7.7	Protect business assets from damage or loss	0.85	0.49
9.1.3	Manage and care for grain storage	0.83	0.71
9.6.1	Analyze market	0.82	0.55
10.3.5	Maintain spray equipment and applicators	0.81	0.60
9.6.2	Perform promotional activities	0.76	0.48
9.1.1	Handle grain	0.74	0.70
9.1.2	Analyze grain quality	0.74	0.70
7.0.3	Service engine fuel and air systems	0.74	0.57
9.2.5	Control feed quality	0.71	0.69
7.0.2	Service engine lubrication systems	0.71	0.60
9.3.1	Maintain storage facilities	0.71	0.58
7.0.9	Clean and store equipment	0.69	0.47
7.0.6	Service hydraulic systems	0.66	0.59
7.0.11	Use and maintain hand and power tools	0.66	0.52
9.3.2	Maintain grounds	0.65	0.48
9.7.6	Safeguard business documents	0.64	0.46
9.2.2	Use manufacturer's mixing and feeding charts	0.63	0.65
9.2.4	Mix and blend feeds	0.63	0.66
9.2.1	Formulate feeds for livestock	0.63	0.65

(table continues)

Table C12 (continued)

Mean Relative Time Spent Ratings of Competencies as Rated by Agricultural Sales and Service Workers (Ranks 21 through 78) ($n = 35$)

Number	Competency	<u>M</u>	<u>SD</u>
7.0.5	Service wheels and tires	0.63	0.55
9.2.3	Prepare feed mixtures in feed mill	0.60	0.65
7.0.7	Perform prestart functions	0.60	0.50
10.3.4	Service engine fuel and air systems	0.59	0.49
9.4.2	Receive feedstuffs and supplies	0.59	0.49
9.5.1	Maintain mill equipment and vehicles	0.55	0.57
7.0.4	Maintain and service engine electrical systems	0.54	0.53
9.7.4	Manage elevator operations	0.52	0.51
7.0.1	Service engine cooling systems	0.51	0.46
9.2.6	Deliver feeds	0.51	0.51
4.0.2	Conduct general banking procedures	0.51	0.41
10.3.3	Maintain bearings and drives	0.47	0.44
7.0.13	Maintain water systems	0.47	0.50
10.3.6	Operate welders	0.47	0.47
10.3.2	Service engine cooling systems	0.44	0.42
7.0.10	Install and maintain electrical systems	0.40	0.48
7.0.12	Apply protective coatings	0.40	0.37
	Grand Mean (78 competencies)	1.06	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table C13

Mean Relative Time Spent Ratings of Competencies as Rated by Mechanical Technicians(Ranks 21 through 66) (n = 24)

Number	Competency	<u>M</u>	<u>SD</u>
14.0.2	Service power steering units	1.82	0.40
2.0.1	Use service and operator's manuals	1.78	0.43
8.0.1	Maintain lubrication system	1.78	0.45
6.0.2	Service valve assembly	1.78	0.39
2.0.2	Assemble equipment	1.78	0.39
1.0.2	Recognize environmental issues	1.77	0.48
12.0.7	Repair drive axle	1.74	0.48
6.0.1	Service cylinder head	1.74	0.41
11.0.1	Service ignition system	1.73	0.45
9.0.1	Maintain cooling system	1.70	0.39
13.0.2	Repair mechanical components	1.70	0.37
14.0.1	Service steering mechanism	1.68	0.39
3.0.2	Use and maintain hand and power tools	1.65	0.42
11.0.7	Service gauges	1.65	0.40
8.0.2	Repair lubrication system	1.61	0.43
13.0.4	Repair brake hydraulics	1.61	0.42
11.0.8	Service electrical accessories	1.61	0.40
11.0.6	Service light controls	1.61	0.36
14.0.3	Service steering linkage	1.59	0.36
3.0.1	Use measuring devices	1.57	0.43
5.0.3	Operate equipment and vehicles	1.57	0.39
13.0.3	Repair differential brakes	1.57	0.39
6.0.3	Service camshaft assembly	1.52	0.36
11.0.5	Service lights	1.52	0.36
3.0.6	Service bearings, seats, and seals	1.48	0.36
10.0.4	Service air-induction system	1.48	0.36
10.0.1	Service gasoline fuel systems	1.48	0.36
2.0.3	Clean equipment	1.48	0.36
5.0.4	Operate small engines	1.45	0.39
5.0.1	Perform prestart functions	1.43	0.40
9.0.2	Repair cooling system	1.43	0.32
2.0.4	Lubricate equipment	1.43	0.36
3.0.7	Service belt and drive chain assemblies	1.43	0.36
12.0.6	Repair drive shaft assembly	1.43	0.36
4.0.2	Weld with electric arc	1.30	0.30
10.0.3	Service governor system	1.30	0.29
15.0.2	Service heating systems	1.30	0.34
10.0.6	Service exhaust system	1.22	0.33
5.0.2	Hitch equipment to power units	1.17	0.26
14.0.4	Align wheels	1.14	0.32
14.0.5	Service wheels, tires, and tracks	1.09	0.27

(table continues)

Table C13 (continued)

Mean Relative Time Spent Ratings of Competencies as Rated by Agricultural/Industrial

Mechanical Technicians (Ranks 21 through 66) ($n = 24$)

Number	Competency	<u>M</u>	<u>SD</u>
4.0.4	Fabricate with metal	1.09	0.32
4.0.1	Weld with gas	1.04	0.22
4.0.5	Solder	1.04	0.22
4.0.3	Identify properties of metals	1.00	0.19
10.0.5	Service emission control system	0.78	0.33
	Grand Mean (66 competencies)	1.64	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table C14

Mean Relative Time Spent Ratings of Competencies as Rated by Animal ManagementTechnicians (Ranks 21 through 61) (n = 29)

Number	Competency	<u>M</u>	<u>SD</u>
6.0.2	Conduct maintenance grooming	1.14	0.46
12.0.6	Control inventory	1.14	0.49
12.0.7	Order merchandise and animals	1.11	0.46
12.0.1	Use and maintain price lists and catalogs	1.10	0.38
10.0.1	Provide technical assistance	1.07	0.50
10.0.2	Conduct sale	1.00	0.58
5.0.1	Select feeds	1.00	0.44
6.0.5	Groom cats	0.97	0.62
6.0.1	Prepare for grooming	0.97	0.47
12.0.8	Store merchandise	0.97	0.38
2.0.2	Classify animals	0.96	0.39
12.0.4	Keep customer accounts	0.93	0.53
2.0.1	Analyze animal care industry	0.93	0.44
4.0.5	Care for newborns	0.89	0.58
11.0.1	Receive merchandise	0.89	0.43
9.0.4	Perform laboratory tests	0.85	0.64
9.0.5	Dispense medicine and supplies	0.81	0.58
4.0.4	Care for females	0.81	0.49
10.0.5	Market products and services	0.81	0.47
7.0.3	Obedience-train dogs	0.81	0.58
9.0.3	Perform emergency treatment	0.79	0.42
4.0.1	Select animals	0.78	0.57
12.0.5	Manage business finance	0.76	0.54
10.0.4	Price merchandise	0.75	0.51
10.0.6	Advertise products and services	0.72	0.49
12.0.3	Conduct general banking procedures	0.71	0.46
4.0.2	Plan breeding program	0.63	0.51
11.0.2	Prepare and load merchandise and animals	0.61	0.49
4.0.3	Breed animals	0.59	0.43
9.0.11	Examine euthanasia	0.58	0.50
9.0.9	Prepare facilities and equipment for surgery	0.54	0.54
9.0.10	Prepare animal for surgery	0.52	0.48
9.0.7	Assist with X ray of animal	0.48	0.42
8.0.1	Select and operate equipment	0.41	0.56
8.0.4	Manage aquarium	0.37	0.56
11.0.3	Deliver merchandise	0.36	0.44
9.0.8	Process X-ray film	0.33	0.44
8.0.2	Identify fish and plants	0.30	0.47
8.0.3	Create aquarium habitat	0.30	0.44

(table continues)

Table C14 (continued)

Mean Relative Time Spent Ratings of Competencies as Rated by Animal Management

Technicians (Ranks 21 through 61) (n = 29)

Number	Competency	<u>M</u>	<u>SD</u>
4.0.7	Breed fish	0.15	0.22
4.0.6	Incubate eggs	0.11	0.20
	Grand Mean (61 competencies)	0.99	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table C15

Mean Relative Time Spent Ratings of Competencies as Rated by Floriculture and Greenhouse Workers (Ranks 21 through 42) (n = 25)

Number	Competency	<u>M</u>	<u>SD</u>
7.0.4	Plant and propagate plants	1.39	0.69
4.0.5	Process container plants	1.38	0.61
4.0.1	Receive merchandise	1.33	0.53
5.0.4	Store merchandise	1.30	0.56
4.0.3	Deliver merchandise	1.24	0.62
6.0.2	Prepare materials for arrangements	1.21	0.79
7.0.3	Prepare for propagation	1.17	0.62
6.0.4	Prepare live plant groupings	1.12	0.75
7.0.7	Regulate greenhouse environment	1.08	0.64
4.0.4	Process cut flowers and greens	1.00	0.65
2.0.3	Maintain floral shop equipment and facilities	1.00	0.65
2.0.5	Operate delivery vehicles	1.00	0.48
2.0.9	Use and maintain hand and power tools	1.00	0.50
7.0.2	Prepare media mixes	0.96	0.61
6.0.1	Plan designs and arrangements	0.88	0.62
7.0.1	Test soil, water, and plant tissues	0.83	0.58
2.0.8	Service water systems	0.83	0.49
2.0.7	Construct with wood	0.71	0.34
2.0.10	Apply protective coatings	0.68	0.49
2.0.4	Perform prestart functions of delivery vehicles	0.61	0.37
2.0.1	Compare greenhouse structures	0.59	0.47
2.0.6	Construct with concrete	0.46	0.46
	Grand Mean (42 competencies)	1.37	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table C16

Mean Relative Time Spent Ratings of Competencies as Rated by Forest Industry Workers(Ranks 21 through 62) (n = 12)

Number	Competency	M	SD
12.0.1	Perform general office duties	1.30	0.36
2.0.3	Examine plant processes	1.27	0.22
12.0.3	Analyze marketing and sales opportunities	1.20	0.29
6.0.3	Apply pest-control principles	1.20	0.20
7.0.1	Harvest nonforest trees	1.11	0.24
9.0.3	Maintain spraying equipment	1.11	0.18
4.0.4	Scale pulpwood and sawlogs	1.10	0.37
12.0.8	Control inventory	1.10	0.31
9.0.5	Service engine lubrication systems	1.10	0.28
6.0.4	Apply chemical pest-control treatments	1.10	0.21
5.0.3	Prepare for plant and soil testing	1.10	0.18
3.0.1	Prepare nursery site	1.09	0.43
6.0.6	Shear Christmas trees	1.00	0.41
4.0.5	Grade sawlogs	1.00	0.37
12.0.7	Manage business finance	1.00	0.30
6.0.5	Apply nonchemical pest control	1.00	0.23
13.0.1	Prune trees	0.90	0.41
12.0.6	Minimize loss	0.90	0.25
8.0.1	Practice wildland fire safety	0.90	0.21
9.0.8	Service wheels and tires	0.90	0.16
9.0.9	Service hydraulic systems	0.89	0.16
3.0.7	Operate irrigation systems	0.82	0.36
12.0.4	Ship merchandise	0.80	0.33
9.0.6	Service engine fuel and air systems	0.80	0.18
9.0.4	Service engine cooling systems	0.80	0.18
13.0.3	Remove tree parts	0.70	0.34
12.0.10	Receive merchandise	0.70	0.25
9.0.7	Service engine electrical systems	0.70	0.19
6.0.2	Fertilize trees	0.70	0.11
3.0.5	Regulate nursery environment	0.64	0.36
3.0.6	Service water systems	0.64	0.31
13.0.4	Dispose of debris	0.60	0.32
11.0.2	Install and maintain fencing	0.60	0.13
8.0.2	Suppress fires	0.60	0.13
12.0.9	Order merchandise	0.56	0.21
13.0.2	Climb trees	0.50	0.33
12.0.5	Keep customer accounts	0.50	0.22
3.0.3	Propagate tree seedlings and cuttings	0.45	0.23
3.0.2	Prepare for propagation	0.45	0.23
12.0.2	Conduct general banking procedures	0.40	0.16

(table continues)

Table C16 (continued)

Mean Relative Time Spent Ratings of Competencies as Rated by Forest Industry Workers

(Ranks 21 through 62) (n = 12)

Number	Competency	<u>M</u>	<u>SD</u>
8.0.3	Practice mop-up operations	0.40	0.15
8.0.5	Identify weather conditions	0.40	0.15
	(62 competencies)	1.19	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table C17

Mean Relative Time Spent Ratings of Competencies as Rated by Meat Processors (Ranks 21 through 62) (n = 12)

Number	Competency	<u>M</u>	<u>SD</u>
3.0.1	Evaluate economic aspects	1.33	0.21
3.0.2	Assess employment opportunities	1.33	0.20
5.0.2	Kill livestock	1.22	0.32
5.0.3	Prepare beef/sheep carcass	1.11	0.32
8.0.5	Merchandise rib cuts	1.11	0.31
8.0.9	Merchandise sirloin cuts	1.11	0.30
8.0.10	Merchandise round cuts	1.11	0.30
8.0.7	Merchandise short loin cuts	1.00	0.30
9.0.5	Merchandise loin cuts	1.00	0.30
5.0.1	Handle livestock	1.00	0.32
5.0.4	Prepare hog carcass	0.89	0.34
8.0.1	Locate beef cuts	0.89	0.28
8.0.2	Merchandise chuck cuts	0.89	0.28
9.0.6	Merchandise ham cuts	0.88	0.28
7.0.5	Cut veal carcass	0.78	0.23
8.0.11	Merchandise beef variety meats	0.78	0.17
9.0.7	Merchandise pork variety meats	0.78	0.17
9.0.1	Locate pork cuts	0.75	0.18
9.0.3	Merchandise picnic cuts	0.75	0.18
7.0.6	Cut lamb and mutton carcasses	0.67	0.19
8.0.3	Merchandise shank cuts	0.67	0.19
8.0.4	Merchandise brisket cuts	0.67	0.19
8.0.8	Merchandise flank cuts	0.67	0.19
9.0.2	Merchandise Boston butt cuts	0.63	0.12
9.0.4	Merchandise belly cuts	0.63	0.12
6.0.1	Examine carcasses	0.56	0.13
8.0.6	Merchandise plate cuts	0.56	0.13
10.0.1	Locate veal and beef-calf cuts	0.56	0.21
10.0.2	Merchandise shoulder cuts	0.56	0.21
10.0.4	Merchandise rack cuts	0.56	0.21
10.0.5	Merchandise loin cuts	0.56	0.21
10.0.3	Merchandise breast cuts	0.44	0.15
10.0.6	Merchandise leg cuts	0.44	0.14
10.0.7	Merchandise veal and beef-calf variety meats	0.44	0.14
11.0.1	Locate lamb and mutton cuts	0.44	0.14
11.0.2	Merchandise shoulder cuts	0.22	0.14
11.0.3	Merchandise breast cuts	0.22	0.14
11.0.4	Merchandise rack cuts	0.22	0.14
11.0.5	Merchandise loin cuts	0.22	0.14
11.0.6	Merchandise sirloin cuts	0.22	0.14

(table continues)

Table C17 (continued)

Mean Relative Time Spent Ratings of Competencies as Rated by Meat Processors (Ranks 21 through 62) ($n = 12$)

Number	Competency	<u>M</u>	<u>SD</u>
11.0.7	Merchandise leg cuts	0.22	0.14
11.0.8	Merchandise lamb variety meats	0.22	0.14
	Grand Mean (62 competencies)	1.04	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table C18

Mean Relative Time Spent Ratings of Competencies as Rated by Nursery and Garden

Center Workers (Ranks 21 through 43) (n = 25)

Number	Competency	<u>M</u>	<u>SD</u>
6.0.6	Price merchandise	1.75	0.56
5.0.4	Maintain nursery and greenhouse equipment and facilities	1.74	0.54
2.0.2	Examine plant physiology and growth	1.70	0.54
8.0.3	Control inventory	1.70	0.59
7.0.1	Receive products	1.65	0.57
2.0.15	Harvest plants	1.61	0.61
3.0.1	Clean and store equipment	1.61	0.43
3.0.3	Lubricate equipment	1.52	0.59
5.0.3	Operate irrigation systems	1.52	0.61
8.0.1	Perform general office duties	1.50	0.50
4.0.1	Perform prestart functions	1.43	0.55
2.0.11	Evaluate pest-control program	1.43	0.45
2.0.9	Propagate plants	1.39	0.68
2.0.12	Apply chemical treatments for pest control	1.39	0.46
4.0.2	Hitch equipment to power unit	1.32	0.44
2.0.6	Prepare media mixes	1.23	0.48
3.0.5	Service wheels and tires	1.22	0.43
2.0.16	Regulate greenhouse environment	1.13	0.55
5.0.2	Install and maintain water delivery systems	1.13	0.53
2.0.7	Prepare for propagation	1.04	0.55
2.0.5	Test soil, water, and plant tissues	1.04	0.35
3.0.6	Service hydraulic systems	1.00	0.45
3.0.4	Service engine electrical systems	1.00	0.42
	Grand Mean (43 competencies)	1.72	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job

(interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table C19

Mean Relative Time Spent Ratings of Competencies as Rated by Resource ConservationWorkers (Ranks 21 through 68) (n = 18)

Number	Competency	<u>M</u>	<u>SD</u>
5.0.1	Conduct a basic survey	1.31	0.37
3.0.2	Determine water quality parameters	1.25	0.38
6.0.2	Develop interpretive skills	1.25	0.46
3.0.1	Identify and assess stream dynamics	1.25	0.38
8.0.3	Establish landscape	1.20	0.42
6.0.1	Demonstrate interpretive abilities	1.19	0.43
8.0.4	Fertilize plants	1.19	0.41
7.0.8	Identify wildlife management techniques	1.19	0.42
8.0.8	Utilize pest-control program	1.13	0.36
10.0.3	Operate vehicles and boats	1.13	0.38
9.0.9	Service lubrication systems	1.12	0.36
9.0.10	Service engine fuel and air systems	1.12	0.40
9.0.7	Lubricate equipment	1.06	0.38
9.0.11	Service engine electrical systems	1.06	0.40
8.0.11	Establish and maintain trails	1.06	0.34
8.0.2	Prepare landscape area	1.06	0.31
8.0.7	Maintain turfgrasses	1.00	0.41
9.0.8	Service engine cooling systems	1.00	0.38
12.0.2	Control inventory	1.00	0.33
9.0.6	Service belt and drive chain assemblies	1.00	0.37
2.0.5	Identify and classify common animal species	1.00	0.35
7.0.5	Identify firearm safety materials and methods	0.94	0.48
10.0.1	Perform prestart functions	0.94	0.35
7.0.4	Evaluate wildlife populations	0.94	0.39
8.0.9	Apply chemical pest-control treatments	0.94	0.30
12.0.3	Receive merchandise	0.88	0.36
10.0.2	Hitch equipment to power unit	0.88	0.38
8.0.12	Maintain roadways and sidewalks	0.88	0.38
9.0.12	Service wheels and tires	0.82	0.35
9.0.13	Service hydraulic systems	0.82	0.37
7.0.2	Identify fish management techniques	0.81	0.46
11.0.1	Construct with wood	0.81	0.49
8.0.1	Prepare media mixes	0.81	0.30
11.0.5	Install and maintain fencing	0.76	0.36
8.0.13	Supervise and maintain camping area	0.75	0.45
7.0.3	Identify aquatic vegetative management	0.75	0.39
11.0.2	Maintain electrical systems	0.69	0.46
7.0.7	Apply animal-control techniques	0.69	0.43
12.0.4	Ship merchandise	0.69	0.44
7.0.1	Identify angling materials and methods	0.69	0.40
11.0.3	Install and maintain water system	0.67	0.46

(table continues)

Table C19 (continued)

Mean Relative Time Spent Ratings of Competencies as Rated by Resource Conservation

Workers (Ranks 21 through 68) (n = 18)

Number	Competency	M	SD
9.0.3	Weld with gas	0.56	0.46
9.0.4	Weld with electric arc and MIG	0.56	0.46
9.0.5	Fabricate with metal	0.56	0.46
11.0.4	Operate sprinkler system	0.56	0.40
7.0.6	Trap mammals	0.56	0.36
11.0.6	Apply protective coatings	0.56	0.36
8.0.10	Operate aquatic recreation	0.44	0.38
	Grand Mean (68 competencies)	1.11	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job (interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Table C20

Mean Relative Time Spent Ratings of Competencies as Rated by Turf and LandscapeWorkers (Ranks 21 through 49) (n = 21)

Number	Competency	<u>M</u>	<u>SD</u>
6.0.3	Receive merchandise	1.85	0.50
1.0.2	Demonstrate safe work habits	1.83	0.47
2.0.10	Fertilize plants	1.80	0.57
2.0.8	Receive and deliver landscape and turfgrass products	1.80	0.51
1.0.1	Maintain safe work environment	1.72	0.35
3.0.11	Clean and store equipment	1.70	0.51
4.0.3	Construct with wood	1.63	0.38
3.0.3	Service engine lubrication systems	1.60	0.55
2.0.2	Examine plant physiology and growth	1.58	0.44
3.0.8	Perform predeparture functions	1.47	0.49
3.0.4	Service small-engine fuel and air systems	1.45	0.54
2.0.14	Apply chemical pest-control treatments	1.45	0.53
3.0.6	Service wheels and tires	1.40	0.50
3.0.15	Maintain and service spraying equipment	1.40	0.58
3.0.16	Maintain and service spreaders	1.40	0.54
3.0.5	Maintain and service small-engine electrical systems	1.35	0.55
2.0.13	Plan integrated pest management (IPM) control program	1.35	0.46
6.0.4	Ship merchandise	1.30	0.51
3.0.7	Service hydraulic systems	1.30	0.51
3.0.2	Service engine cooling systems	1.25	0.47
4.0.7	Install and maintain fencing	1.21	0.47
2.0.5	Test soil and plant tissues	1.10	0.28
4.0.6	Operate and maintain sprinkler systems	1.05	0.57
4.0.5	Install and maintain water delivery systems	0.95	0.48
3.0.13	Apply protective coatings	0.95	0.43
3.0.14	Fabricate with metal	0.84	0.53
4.0.4	Install and maintain electrical systems	0.74	0.39
4.0.8	Apply protective coatings	0.63	0.32
4.0.1	Construct with concrete	0.63	0.19
	Grand Mean (49 competencies)	1.70	

Note. Ratings based upon a four point rating scale where: 0 = not part of the job

(interpreted as no relative time spent); 1 = small relative time spent; 2 = medium relative time spent; and 3 = large relative time spent.

Appendix D.

Supporting Materials: Supplemental Figures

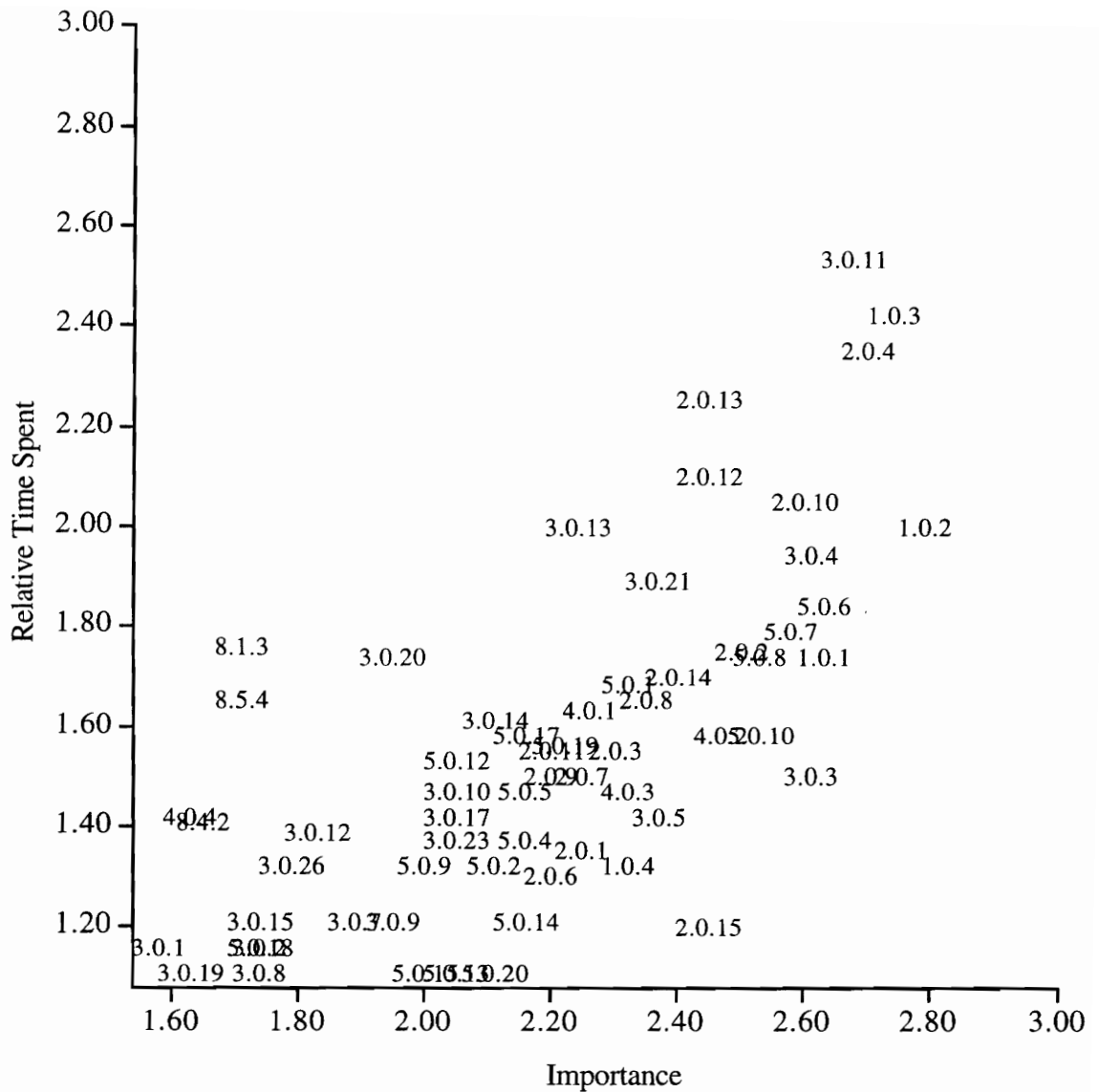


Figure D1. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Agricultural Production Workers ($n = 21$). The grand mean of all importance ratings (1.54) and the relative time spent grand mean (1.08) originated the X- and Y-axes.

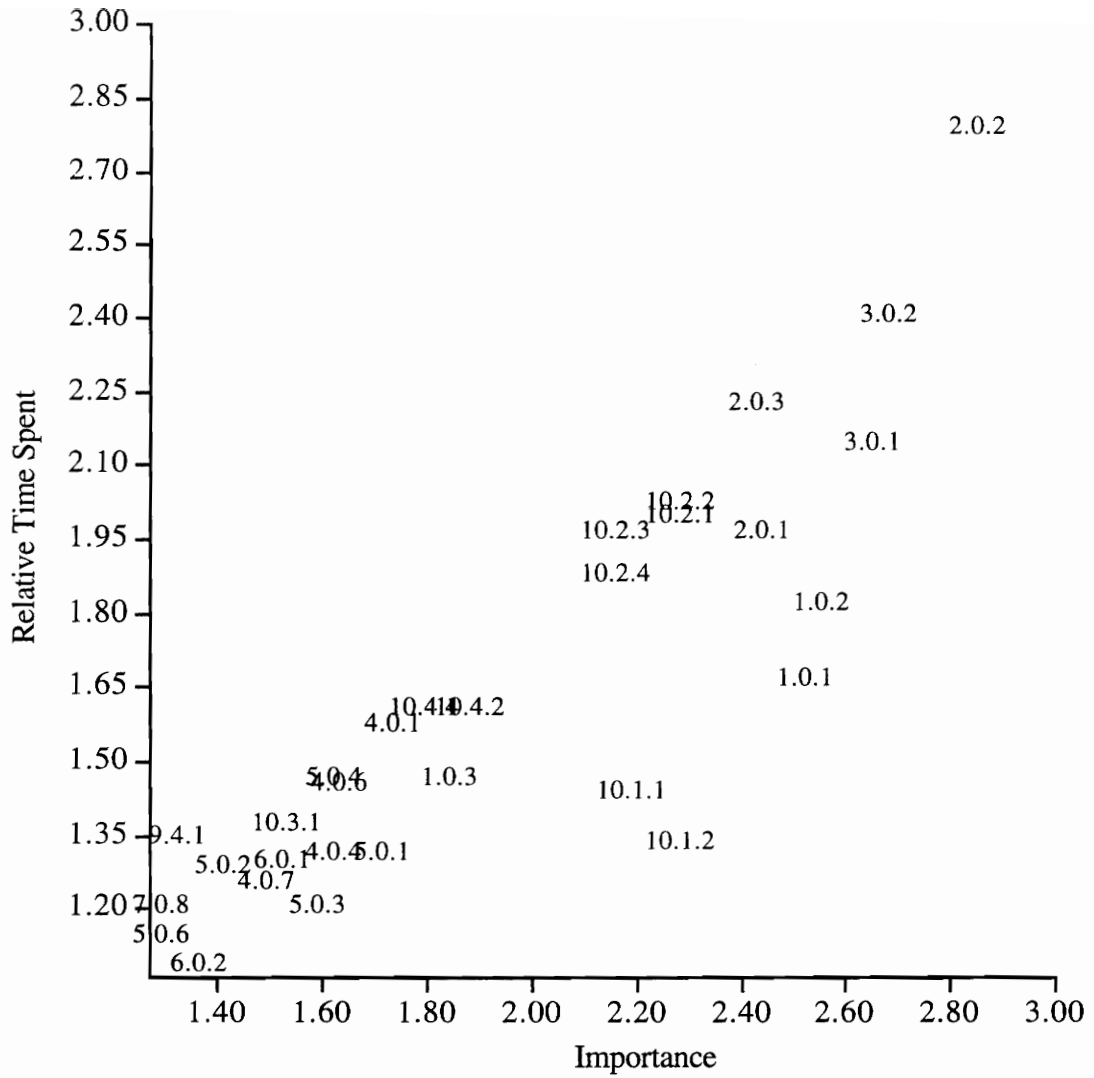


Figure D2. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Agricultural Sales and Service Workers ($n = 35$). The grand mean of all importance ratings (1.27) and the relative time spent grand mean (1.06) originated the X- and Y-axes.

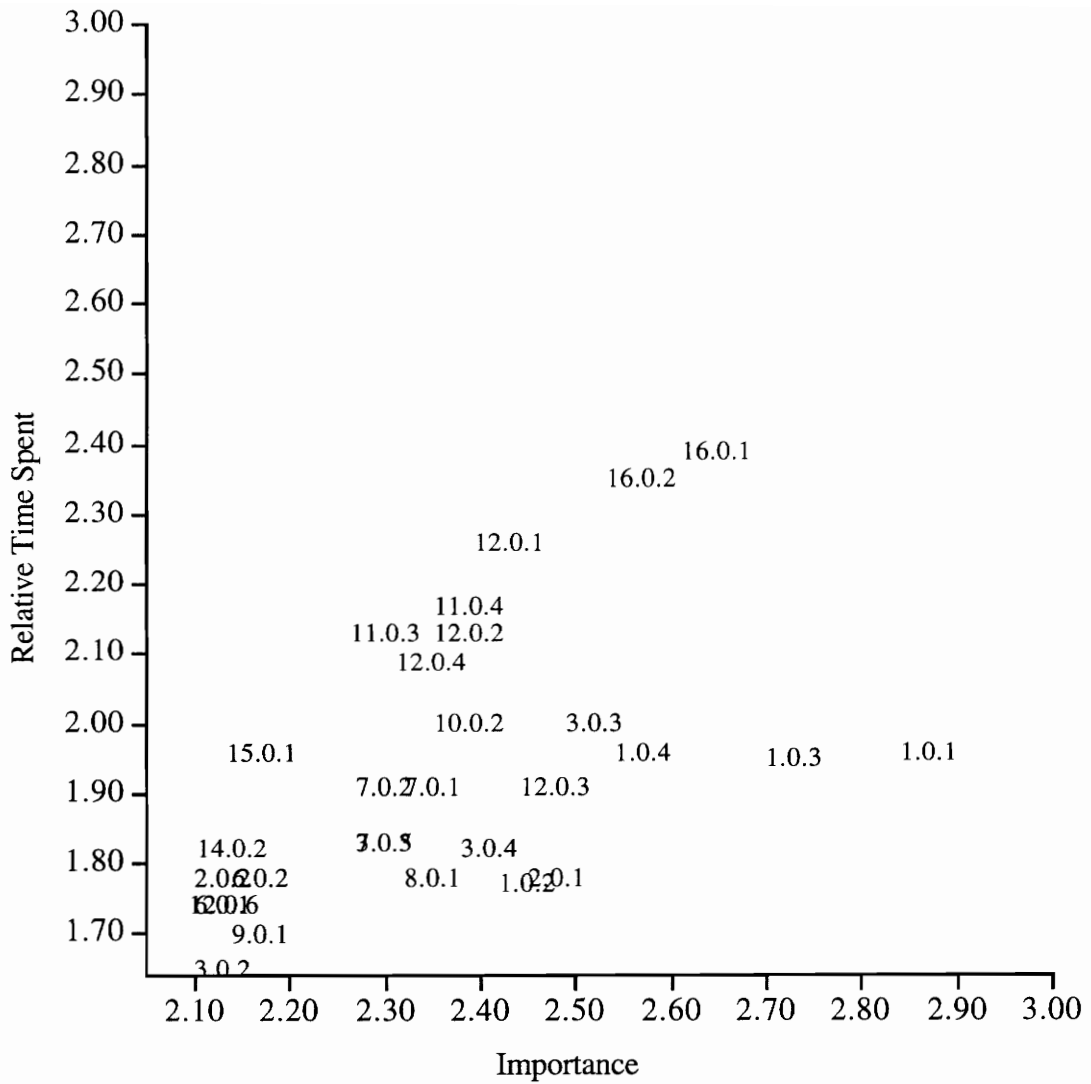


Figure D3. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Agricultural/Industrial Mechanical Technicians ($n = 24$). The grand mean of all importance ratings (2.05) and the relative time spent grand mean (1.64) originated the X- and Y-axes.

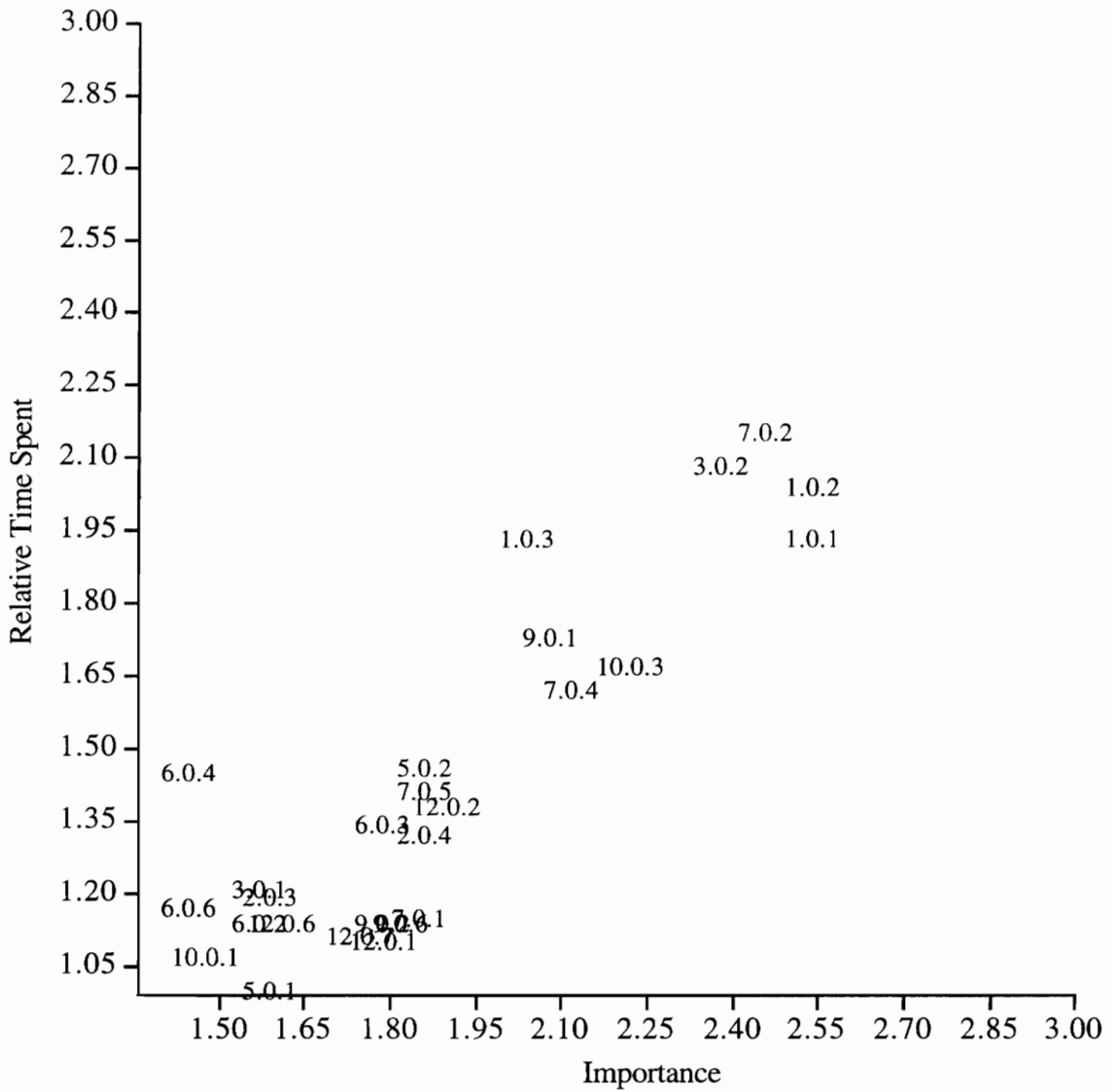


Figure D4. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Animal Management Technicians ($n = 29$). The grand mean of all importance ratings (1.36) and the relative time spent grand mean (0.99) originated the X- and Y-axes.

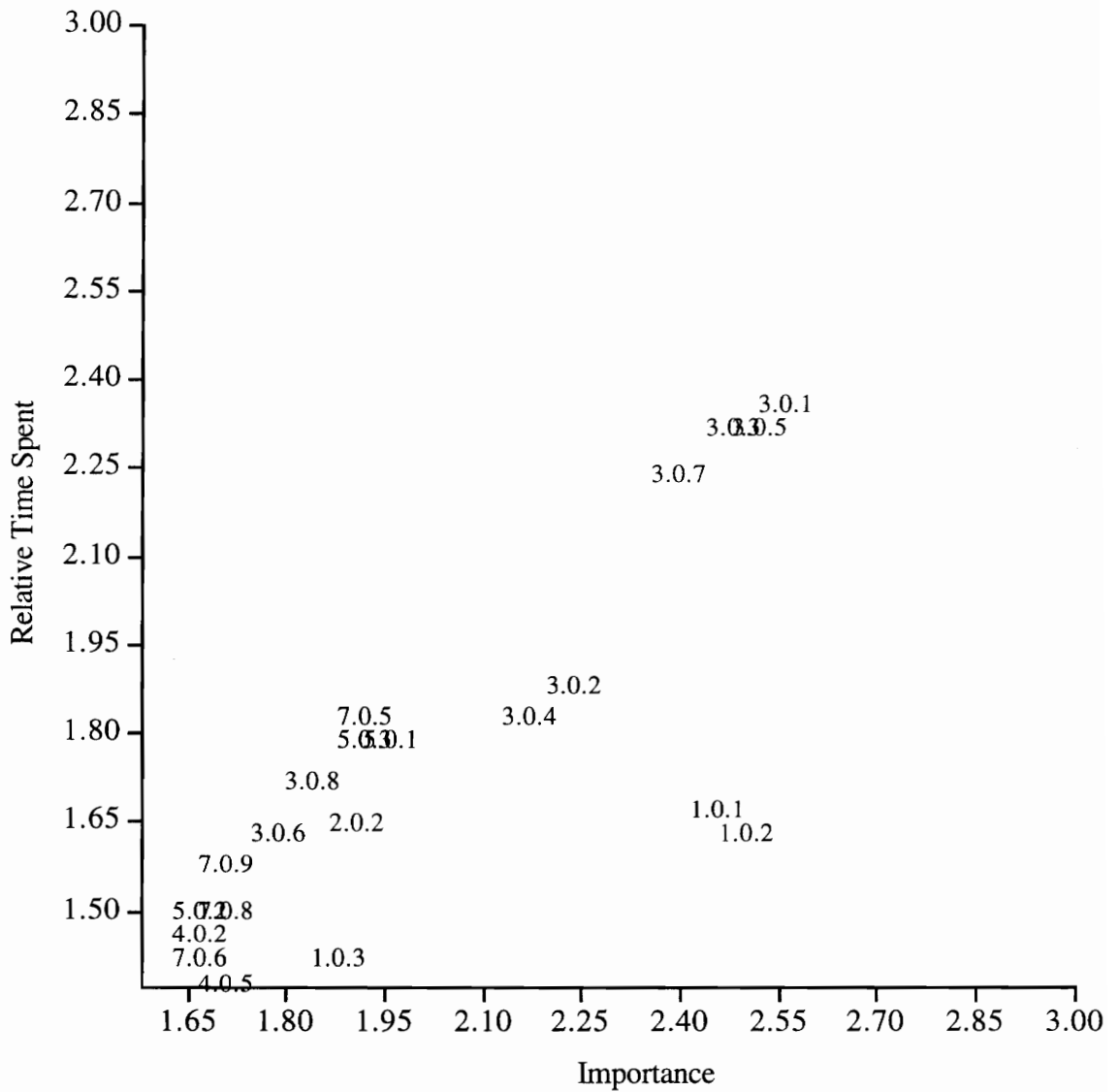


Figure D5. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Floriculture and Greenhouse Workers ($n = 25$). The grand mean of all importance ratings (1.58) and the relative time spent grand mean (1.37) originated the X- and Y-axes.

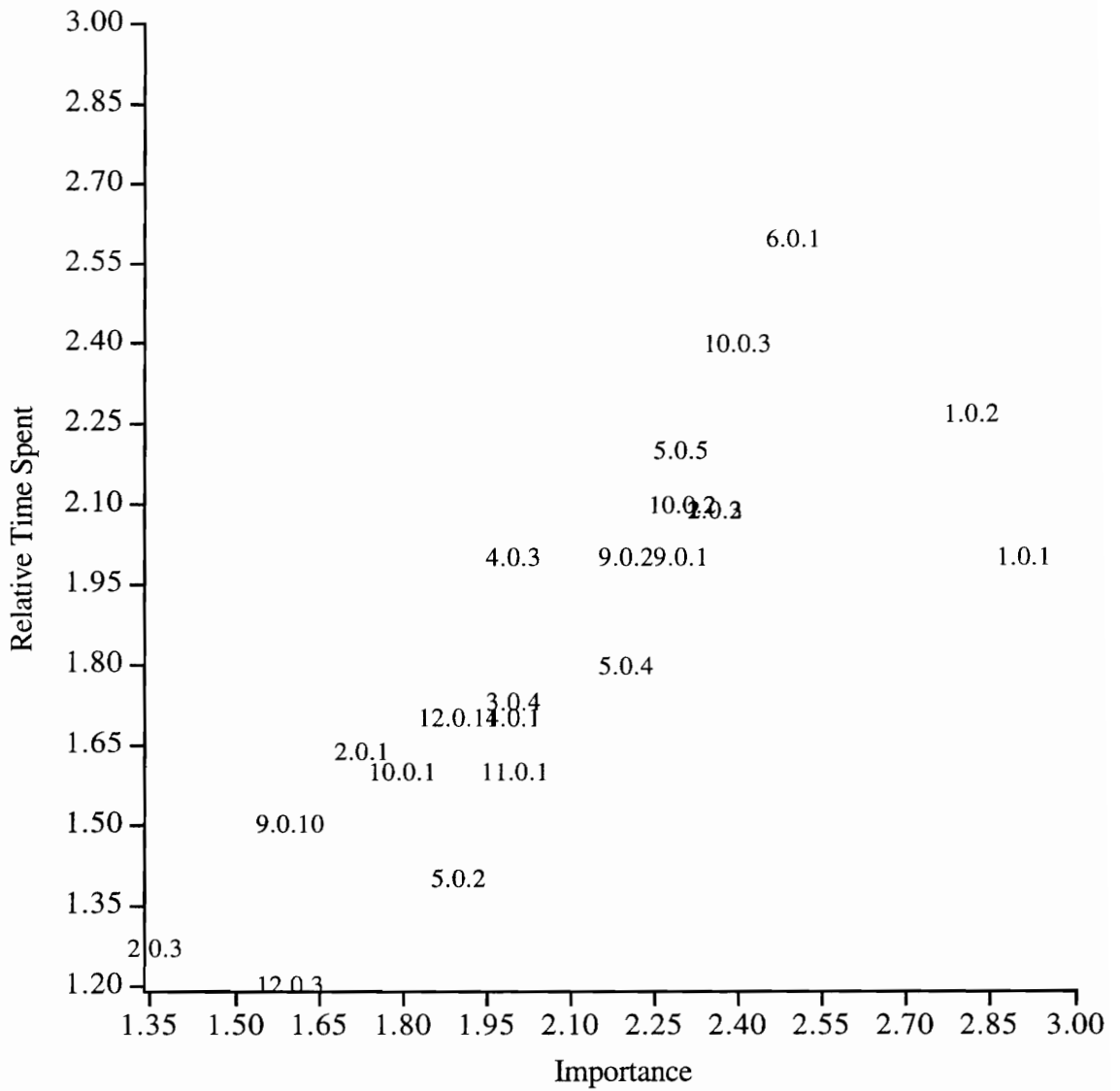


Figure D6. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Forest Industry Workers ($n = 12$). The grand mean of all importance ratings (1.34) and the relative time spent grand mean (1.19) originated the X- and Y-axes.

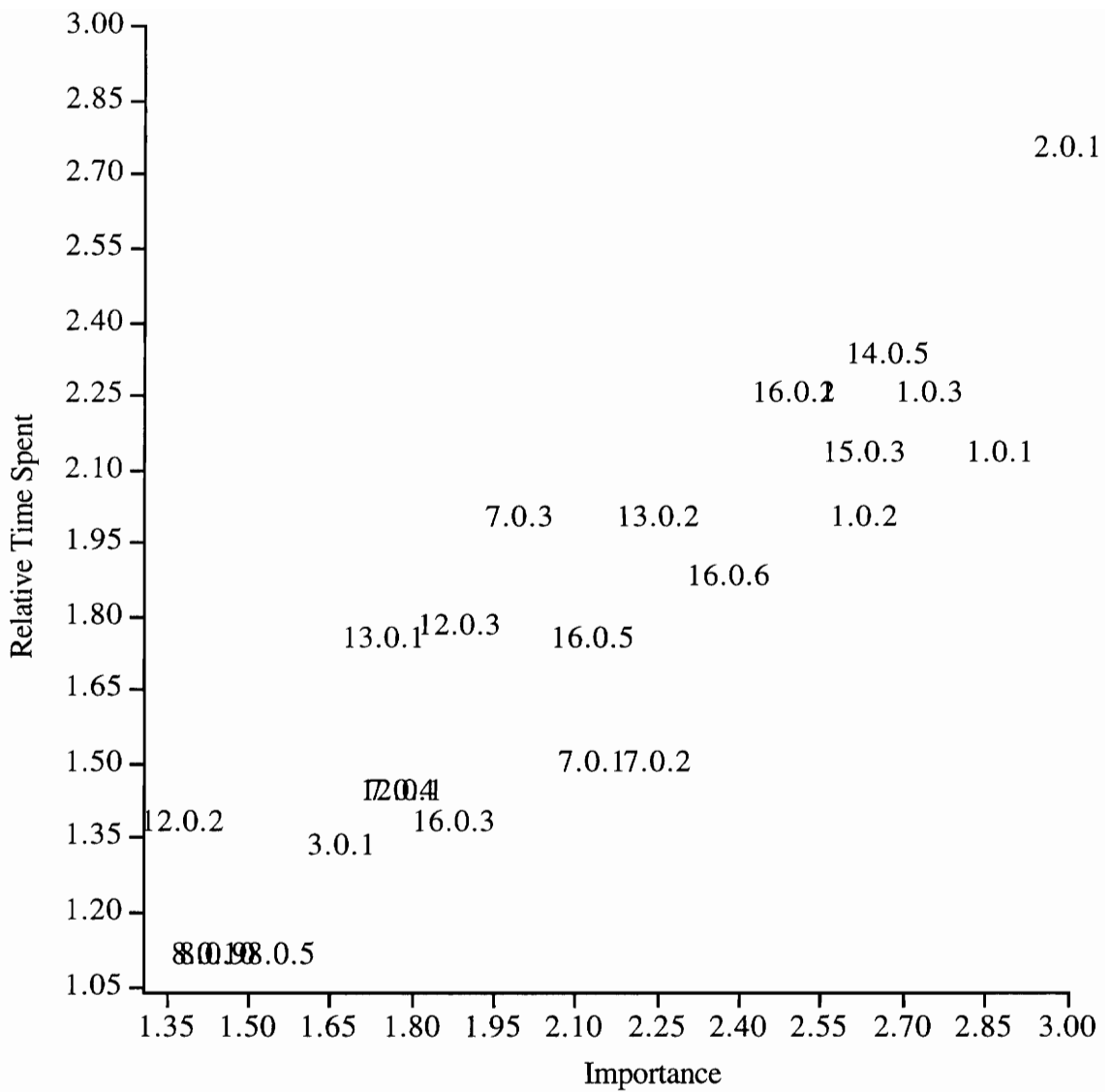


Figure D7. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Meat Processors ($n = 12$). The grand mean of all importance ratings (1.31) and the relative time spent grand mean (1.04) originated the X- and Y-axes.

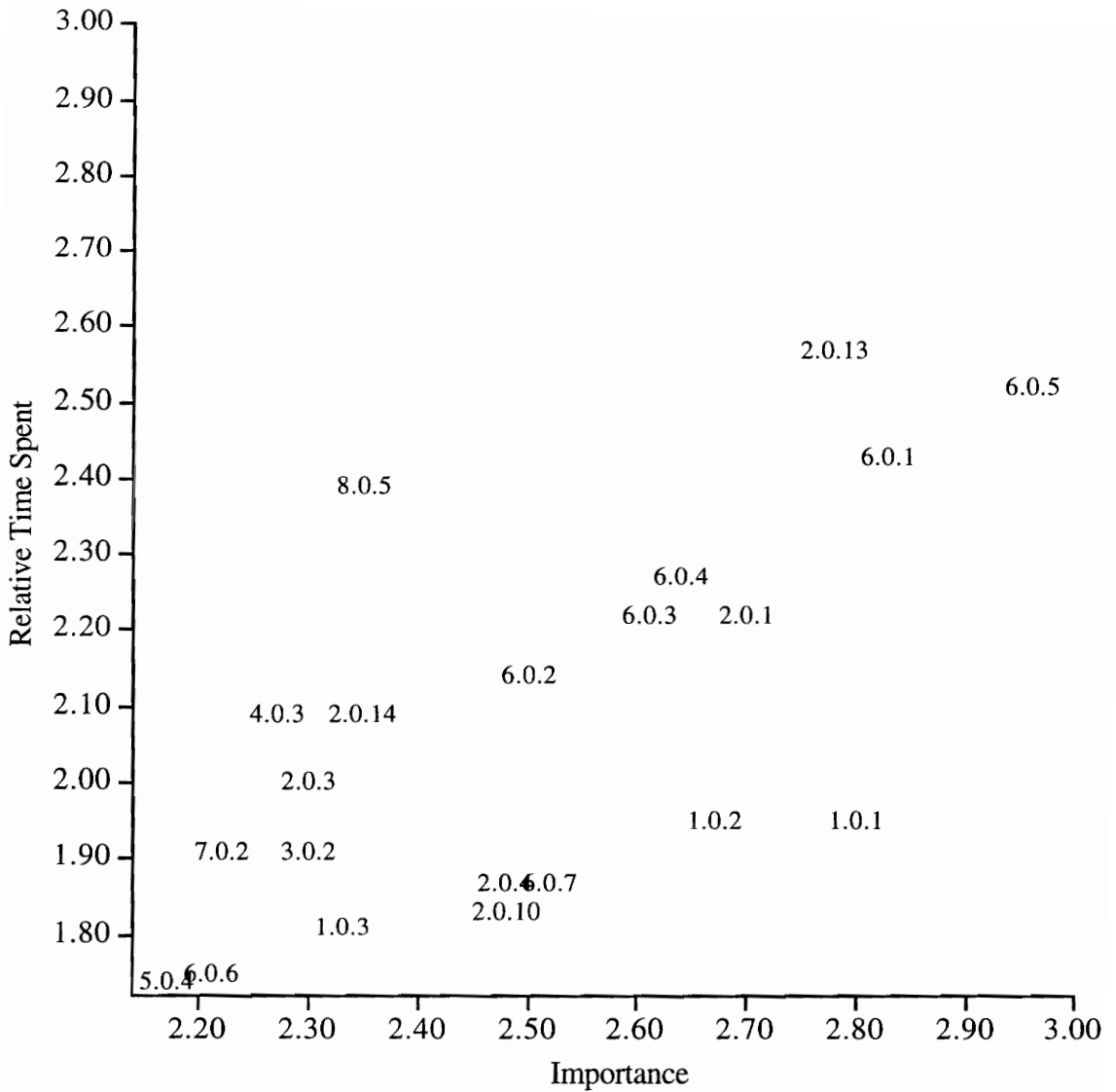


Figure D8. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Nursery and Garden Center Workers ($n = 25$). The grand mean of all importance ratings (2.14) and the relative time spent grand mean (1.72) originated the X- and Y-axes.

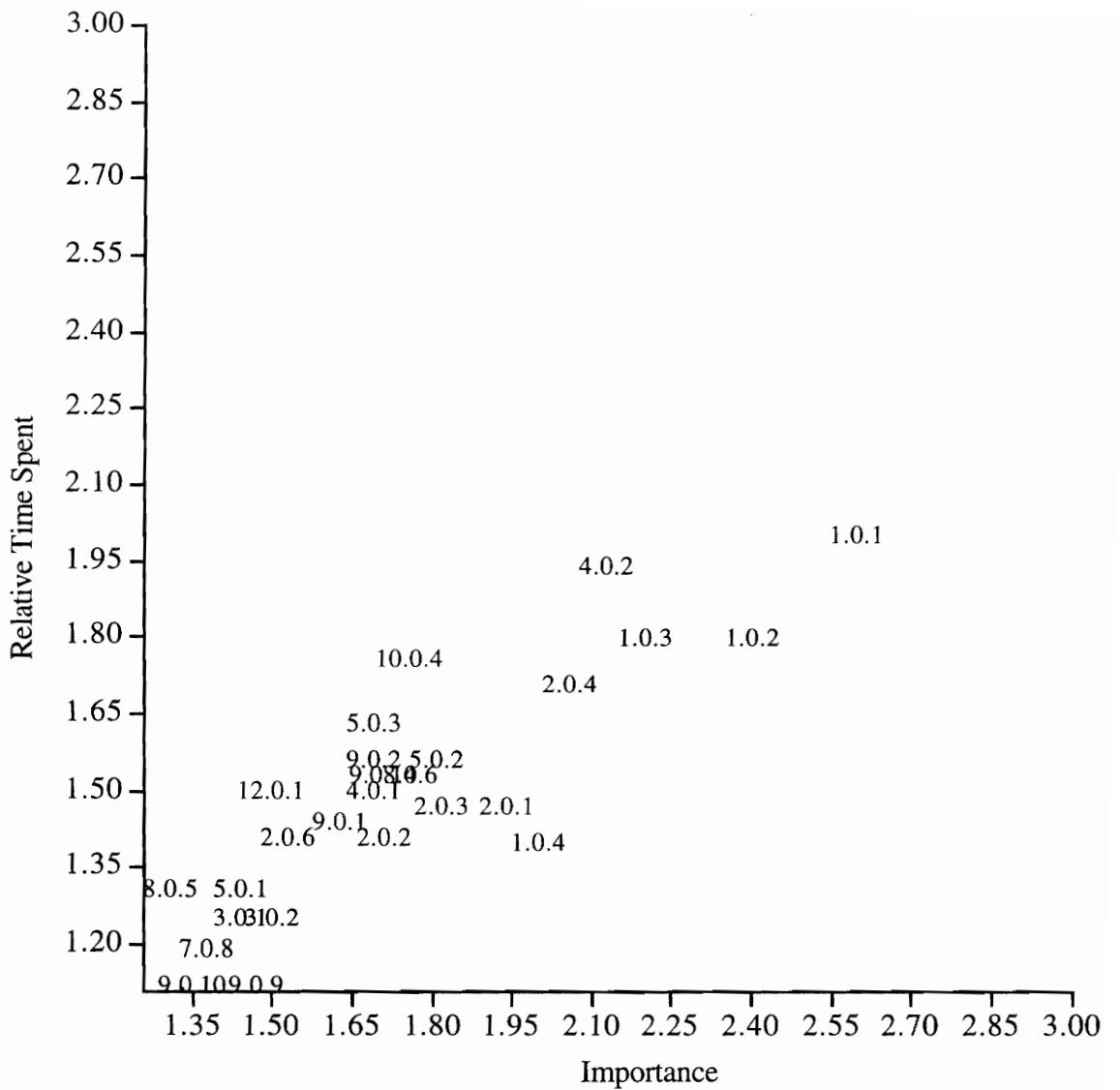


Figure D9. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Resource Conservation Workers ($n = 18$). The grand mean of all importance ratings (1.26) and the relative time spent grand mean (1.11) originated the X- and Y-axes.

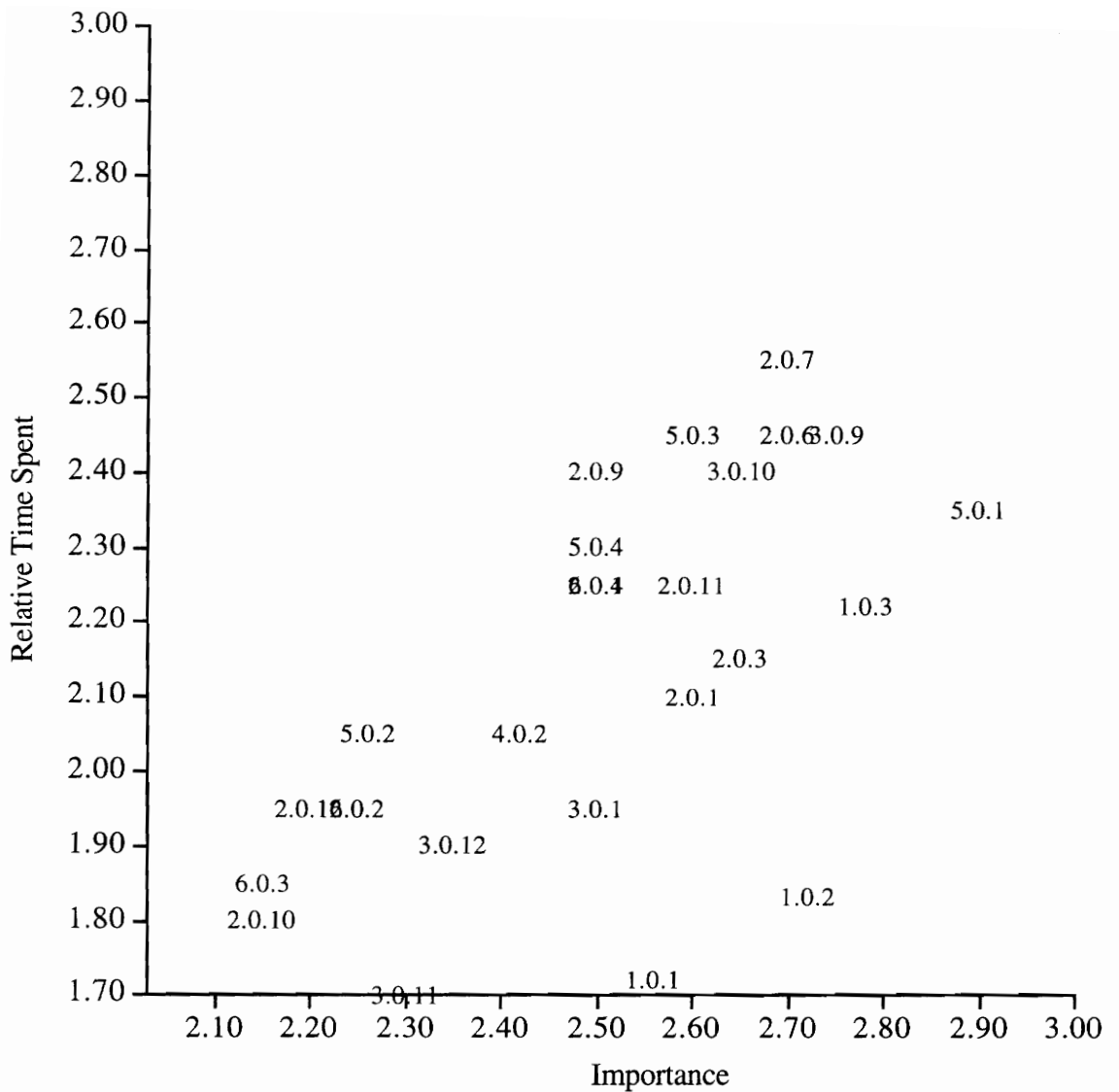
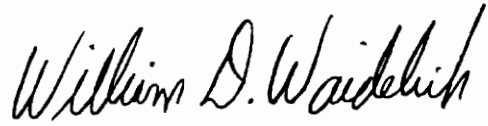


Figure D10. Plot of the Competencies with High Importance and High Relative Time Spent Ratings for Turf and Landscape Workers ($n = 21$). The grand mean of all importance ratings (2.03) and the relative time spent grand mean (1.70) originated the X- and Y-axes.

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Experience in agricultural educational leadership and curriculum development

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- **Business Management**
- **Curriculum design**
- **Curriculum development**
- **Computer experience**
- **Educational research**
- **Financial management**
- **Staff development**
- **Educational leadership**
- **Professional group facilitator**

- **Curriculum development and design experience**
 - A troubleshooter and **problem solver**
 - **Successfully** initiated **new curriculum** designs
 - Expert in situations requiring **dynamic** curriculum
 - Strong hands-on **educational manager, planner, and leader**
 - **Manage** and control major development projects
- **Administrator and business manager** of non-profit agricultural education organizations
- **Leadership** for new and emerging technologies
 - Extensive background in **computerized curriculum design and development**
 - Provide **leadership** for statewide secondary vocational education curriculum affecting 20,000 students annually
- **Desktop publishing** experience
 - **Editor** of five publications with **circulation exceeding 15,000**
 - **Design** news letters, pamphlets, and other publications for statewide youth organizations, teacher education institutions, and curriculum center
 - Extensive experience with both Macintosh® and MS-DOS® computer systems
- Strong **presentation skills**
 - **Highly experienced and successful** in organizing educational meetings, activities, and programs
 - Ability to cooperate with **various and diverse** industries, agencies, and individuals
- Strong strategic vision coupled with an **attention to details**

Director

1992-present

Ohio Agricultural Education Curriculum Materials Service, The Ohio State University

- **Manage** the Ohio Agricultural Education Curriculum Materials Service
 - **Prepare** the annual operating **budget** in excess of \$800,000
 - **Supervise** twelve full-time and part-time staff
 - Plan for the sale and **distribution of instructional materials** to teachers of agricultural education and in foreign countries
 - Purchase supplies, instructional materials for resale and services needed for the **production of instructional materials**
 - Coordinate the activities of the Curriculum Materials Service with the Department of Agricultural Education and other University units
 - Supervise development of instructional materials; edit; determine needs and evaluate materials
 - Organize and use a formal advisory committee for formulating operating policy and for determining the needs for curriculum and instructional materials and media
 - Work with other units in the College of Food, Agricultural, and Environmental Sciences including The Ohio State University Extension, subject matter departments, and the Ohio Agricultural Research and Development Center in planning, preparing, reviewing, and producing instructional materials and media
-

Curriculum Consultant

Ohio Agricultural Education Curriculum Materials Service

1992

Vocational Instructional Materials Laboratory, The Ohio State University

1991

- Designed and developed new curriculum course outlines for Division of Vocational Education using Macintosh® computers
 - Cross correlated over 5000 competencies into a **new agricultural production, agricultural supplies, and diversified health occupations curriculums** using Microsoft® Excel
 - **Updated and revised statewide agricultural educational curriculums** with the latest technologies and strategies affecting over 15,000 Ohio students and 600 teachers
 - Served on the national action force for the Agriscience Institute and Outreach Program sponsored by The W.K. Kellogg Foundation
 - Facilitate workshops for the Ohio Competency Analysis Profile (A process used to **analyze occupations** at the professional, technical, skilled, and semi-skilled levels)
-

Christa McAuliffe Fellow

1988-present

Christa McAuliffe Institute for Educational Pioneering, National Foundation for the Improvement of Education

- Chosen in a **nationwide** competition as one of 20 teachers selected in 1988
- Exploring ways of increasing public school use of **technology to enhance teaching and improve learning**
 - Participated in a three-week in-depth study at Stanford University of **instructional technologies** (video, laser disc, multimedia presentations, and **desktop publishing**)
- Present workshops on **integrating technology**
 - Presented a workshop at the **Institute for the Transfer of Technology to Education** of The National School Board Association, Dallas, Texas

FFA Organization Specialist

1989-1991

Division of Adolescent Education, State Department of Education, Commonwealth of Virginia, Richmond, Virginia

- Provided **technical assistance** to agricultural educators in 200 secondary programs
 - **Developed and executed in-service programs** for educational personnel on a **statewide basis**
 - **Developed curriculum activities** necessary to integrate leadership development skills into the educational curriculum
- **Managed three financial accounts** with assets totaling \$750,000 (Virginia FFA Association, Virginia FFA Foundation, Inc., and Virginia FFA/FHA-HERO Camp Association, Inc.)
- **Administered statewide FFA leadership and competitive events programs** for over 12,000 students in Virginia
- **Designed, edited and desktop published** state FFA magazine, *Chapter Chats*, using WordPerfect® (Circulation, 15,000)

Curriculum Material Developer

1988-1992

for the Ohio Agricultural Education Curriculum Materials Service, Department of Agricultural Education, The Ohio State University, Columbus, Ohio

- **Develop, design and publish** computer data files
 - Computerized job placement record book
 - Computerized parliamentary procedure test file
 - Computerized **newspaper releases**
- Designed computerized lesson plan template

Graduate Assistant

1988-1989

Division of Vocational and Technical Education, College of Education, Virginia Polytechnic Institute and State University, Blacksburg, Virginia

- **Designed, edited and desktop published** statewide professional agricultural education publication, *Agricultural Education News*, using WordPerfect® (Circulation, 800 nationally)
- Co-advised Agricultural Education Society
- Worked with faculty members on research projects
- Taught undergraduate course

Secondary Agricultural Educator

1982-1988

Southeastern High School, Scioto Valley Local School District, Richmond Dale, Ohio

- **Chaired** county teachers' in-service **workshop**
- **Coordinated** activities with hundreds of local school administrators and instructional staffs (Kindergarten-12th grade)
- **Scheduled** dozens of educational specialists for the one-day **workshop**
- Taught agricultural education in grades 9, 10, 11, 12
- **Updated, revised and developed curriculum materials**

Education

1982-present

- Ed.D., Vocational and Technical Education, Virginia Polytechnic Institute and State University, 1995
- C.A.G.S., Vocational Education, Virginia Polytechnic Institute and State University, 1989
- M.S., Agricultural Education, The Ohio State University, 1986
- B.S., Agricultural Education, The Ohio State University, 1982