

THE UTILITY OF COST ACCOUNTING SKILLS TO AAS ACCOUNTING GRADUATES
FOR EMPLOYMENT IN SELECTED VIRGINIA MANUFACTURING PLANTS

by

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Chapter i

INTRODUCTION

Community College Accounting Programs

Seventeen of the 23 community colleges in the Commonwealth of Virginia offer programs of study in accounting or in business with emphasis in accounting. Each program leads toward a two-year (six quarter) associate in applied science (AAS) degree. The purposes of the accounting programs at the respective institutions are similar. An example of such a purpose is cited below:

With the rapid development of business and industry in Virginia, there is a great demand for qualified personnel to assist business management in this economic growth. The Associate in Applied Science Degree curriculum in Accounting is designed primarily for persons who seek full-time employment in the accounting field immediately upon completion of the community college curriculum. Both persons who are seeking their first employment in an accounting position and those presently in accounting who are seeking promotion may benefit from this curriculum. (New River Community College Catalog, 1976-1977:50; Danville Community College Catalog, 1977-1978:45; and Lord Fairfax Community College Catalog, 1976-1977:60).

As evidenced by their purposes, Virginia community college accounting programs are designed to supply needed manpower and to afford the accounting graduates opportunities to locate employment in the Commonwealth.

Cost accounting is one subject area included in Virginia community college accounting programs. Sixteen of the community colleges require at least one quarter of cost accounting, and one

requires one quarter of managerial accounting.¹ Seven of these colleges require two quarters of cost accounting in their programs, and two colleges require three quarters. As shown by its inclusion in all 17 programs, cost accounting is considered an important subject in the Virginia Community College System.

The same opinion of the worth of cost accounting has been expressed by community colleges throughout the United States. In a national survey of 145 community college accounting programs, 124 offered either cost accounting or managerial accounting. (Gordon, et al., 1973).

Cost accounting, as evidenced by the course description included in the Virginia Community College System Policy Manual and cost accounting textbooks (Horngren, 1972; Anton and Firmin, 1972; Shillinglaw, 1972; Neuner, 1973; Schmiedicke and Nagy, 1973; and Matz and Usry, 1976), focuses on manufacturing industries. The importance of cost accounting in manufacturing industries was also determined by Yankow. Although his research had four-year college implications, his findings are pertinent. Yankow concluded that "cost accounting is the backbone of the accounting in the manufacturing industry." (Yankow, 1954:234). Since the Gordon Committee (1973) in a national survey determined that 69 percent of two-year accounting

¹For this Dissertation, managerial accounting and cost accounting are considered synonymous course titles. The literature review contains details regarding this issue.

graduates were employed by industry and since "manufacturing is one of the most important segments of the Virginia economy" (Ware, 1976:5), cost accounting would appear to be a relevant subject in the 17 AAS accounting programs in the Commonwealth. However, this apparent need for cost accounting courses was not truly supported by any of the four studies that have been conducted relative to the skills needed by two-year college accounting graduates for employment. These studies by Ozzello (1967), Kelly (1970), Yandoh (1971), and King (1976) did not focus on cost accounting and contained only limited data regarding the subject.

The works of Ozzello and Kelly showed that accountants in the manufacturing sector of the Kelly sample--but not the total sample--and manufacturing accountants in the Ozzello study did have moderate use of some cost accounting skills. Both the King research of selected Virginia community college accounting graduates and the Yandoh study of selected upstate New York community college accounting graduates found that cost accounting was the least beneficial accounting course for these graduates. Yandoh recommended that two-year colleges consider the exclusion or revision of cost accounting courses in their programs, and King suggested that "... perhaps the cost accounting offerings should be reviewed, keeping local needs in view." (King, 1976:100). The Yandoh and King findings did appear incomplete since the design of these studies precluded extensive exploration of manufacturing sectors.

There appeared to be general agreement among community colleges that cost accounting is an integral part of two-year accounting programs. However, except for the Yankow four-year college study, limited prior research generally indicated that the subject area is of very little to perhaps moderate value.

This conflicting evidence and information gap suggested the need for a study focusing on cost accounting to determine its utility for manufacturing plants in the Commonwealth. Virginia community colleges may be teaching a subject area which is not valuable to the graduates; but prior research was not conclusive because of (1) the lack of central focus on cost accounting, (2) the design of some studies which precluded extensive exploration of the manufacturing sector, (3) the age and location of most of the studies, and (4) conflicting results. Since available literature indicated that cost accounting may or may not be useful for two-year accounting graduates, this study was conducted to provide an answer for the Virginia Community College System.

Purpose

The purpose of this research was to determine the utility of cost accounting skills to AAS accounting graduates for employment in selected Virginia manufacturing plants. Proficiency levels of various cost accounting skills needed in these plants and the places for acquiring such skills were explored. The cost accounting systems used and hiring preferences for non-supervisory accounting positions were

also ascertained. Additionally, the distributions of these plants when classified by employment levels, types of products, and usage of separate cost accounting sections were determined. Relationships between some of the above named variables were also explored.

Research Questions

Specifically, the study answered the following questions about selected Virginia manufacturing plants that employed at least 100 persons.

1. What proficiency levels of cost accounting skills are needed by AAS accounting graduates for employment in these plants?

2. Where should these cost accounting skills be acquired--in school, on the job, or through a combination of school and job training?

3. For non-supervisory accounting positions, do these plants prefer to hire (a) unskilled employees and train them on the job, (b) high school graduates who have taken a bookkeeping class, (c) two-year community/junior college accounting graduates, or (d) four-year college accounting graduates?

4. What are the distributions of these plants when classified by (a) employment levels, (b) types of products, and (c) usage of separate cost accounting sections?

5. Do these plants use (a) computerized, (b) standard, and/or (c) job order or process cost accounting systems?

6. Are there relationships between (a) employment levels,

(b) usage of standard cost accounting systems, (c) usage of job order and process cost accounting systems, and/or (d) usage of computerized cost accounting systems and usage of separate cost accounting sections?

7. Are there relationships between (a) employment levels, (b) types of products, (c) hiring preferences, (d) usage of standard cost accounting systems, and/or (e) usage of job order and process cost accounting systems and usage of computerized cost accounting systems?

Significance

Studies of the training two-year accounting graduates need for employment should be conducted. These studies are useful in determining appropriate content for two-year accounting programs.

According to Dowding, "before establishing any system of training, it is imperative to study each occupation to determine precisely what skills and knowledge are required by the tasks it involves." (Dowding, 1973:554). This same need was expressed by Hankin in regard to on-going business education programs. Hankin contended that business curriculum content should be "... related to the requirements of prospective employers." (Hankin, 1972:1).

From studies conducted between 1950 and 1960, Devine compiled research findings relative to bookkeeping and accounting. He found that "the research indicated that improvements in teaching in this area could be accomplished if more were known about the jobs, the

requirements for employment, and the deficiencies observed by employers." (Devine, 1962:112). Similarly, Ozzello stated that "there appears to be an ever present need to evaluate continually the content and scope of the accounting courses in a terminal accounting program." (Ozzello, 1967:147). Additionally, Tyra noted:

Despite various claims concerning the need for paraprofessionals in accounting, little is currently known about job opportunities, knowledge and skills required, and rates of compensation. The role of paraprofessionals in both public and private accounting needs to be clarified. (Tyra, 1972:36).

In partial response to these needs, the present study was undertaken to provide current information regarding training in cost accounting, one subject area included in Virginia Community College System accounting programs. Accounting faculties, accounting advisory committees, and curriculum builders in these colleges can use these findings as a basis for improvements in the cost accounting elements of these programs. Students enrolling in these accounting programs and their future employers will also benefit. The research provides information for accounting program improvements which will enable students to receive more relevant training in their programs and thereby become more prepared for accounting positions in manufacturing. In turn, the manufacturing employers will be provided with more appropriately trained accounting graduates.

Relevant education should be of utmost concern for all individuals associated with Virginia community college accounting programs. Studies of this nature should be conducted to insure that such programs

meet the needs both of the graduates and of the employers who depend on the Virginia Community College System for trained manpower.

Definitions

The study included the following definitions:

AAS Accounting Program--A two-year occupational-technical program (curriculum) of study in accounting leading toward an associate in applied science (AAS) degree.

Accountant--One who performs at least some accounting tasks in the course of his employment.

Accounting--"... The art of recording, classifying, and summarizing, in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character and interpreting the results thereof." (Accounting Terminology Bulletin No. 1, 1953:9).

Accounting Graduate--One who has completed an AAS accounting program.

Accounting Technician--"One who performs accounting-type activities for which training in accounting beyond high school is a requisite, but for which a baccalaureate degree in accounting is not a prerequisite for employment." (Ozzello, 1967:12).

Bookkeeper--One who performs at least some bookkeeping tasks in the course of his employment.

Bookkeeping--"The act or process of keeping a systematic record

of business transactions and preparing financial statements." (Good, 1973:68). Bookkeeping is narrower in scope, but constitutes a segment of accounting and is thus considered an accounting-type activity.

Cost Accounting Courses--"Studies in accounting systems, methods and statements involved in process and job cost accounting; use of standards and cost controls." (VCCS Policy Manual, 1976:20).

Cost Accounting Skills--Skills which can be acquired in cost accounting courses or through comparable training on the job.

First-line Accounting Supervisor--An accountant whose position is the first level of promotability in a manufacturing plant and who directs the activities of at least one accounting technician.

Managerial Accounting Courses--Same as cost accounting courses.

Manufacturing Industry--"A basic division of industry which is concerned with the transformation of organic and inorganic substances, according to an organized plan and with division of labor, into new products, which may be finished or semi-finished." (Good, 1973:299).

Manufacturing Plant--A manufacturing company or one of its component parts located on a particular site in the Commonwealth of Virginia and listed in the Directory of Virginia Manufacturing, 1976-1977 as employing at least 100 persons.

Non-supervisory Accounting Position--A position which involves accounting or bookkeeping activities but does not include directing the activities of other employees.

Proficiency Levels--Steps of skill achievement including

elementary (basic), intermediate (average), and advanced (high) levels of proficiency.

Skill--"Anything that the individual has learned to do with ease and precision; may be either a physical or a mental performance." (Good, 1973:536). A skill includes proficiencies in the cognitive and/or psychomotor, but not affective domains.

VCC--A Virginia Community College (VCC) is an "... institution of higher education offering programs of instruction generally extending not more than two years beyond the high school level, which shall include, but not be limited to, courses in occupational and technical fields, the liberal arts and sciences, general education, continuing adult education, pre-college and pre-technical preparatory programs, special training programs to meet the economic needs of the region in which the college is located, and other services to meet the cultural and educational needs of the region." (VCCS Policy Manual, 1976:1).

VCCS--The Virginia Community College System (VCCS) is a state-operated network which includes 23 comprehensive community colleges scattered geographically throughout the Commonwealth with headquarters located in Richmond, Virginia.

Assumption

The study included the following assumption:

The first-line accounting supervisors who responded to the questionnaire were representative of the 480 Virginia manufacturing plants comprising the population.

Limitations

The study contained the following limitations:

1. The research included supervisors only from manufacturing plants; thus, it excluded all other types of employers.

2. The study was limited to plants listed in the Directory of Virginia Manufacturing, 1976-1977. Although this Directory was nearly 100 percent complete when printed--October 1, 1975--the research did not include plants that have subsequently (1) opened or (2) increased their employment levels from less than to at least 100 persons.²

3. The research did not include Virginia manufacturing plants that refused to have their employment levels listed in this above named Directory. However, it was estimated that at least 95 percent of the plants employing 100 or more persons were included in the Directory.³

4. Values and attitudes needed by AAS accounting graduates were not ascertained. Cost accounting skills in the cognitive and/or psychomotor, but not affective domains were included.

²Information obtained by phone from Mr. W. Bruce Wingo, Research Department, Virginia State Chamber of Commerce, Richmond, Virginia, June 6, 1977.

³Wingo, June 6, 1977.

Summary

Seventeen of the 23 community colleges in the Commonwealth of Virginia offer two-year programs of study in accounting or in business with emphasis in accounting. The purpose of these programs is to supply Virginia with needed manpower and to afford the accounting graduates opportunities to locate employment in the Commonwealth.

Prior writers indicated a need for careful assessment of the demands of employers of two-year accounting graduates and demonstrated that comparatively little research has been undertaken relative to these graduates. Contradictory and insufficient research regarding cost accounting, a subject area usually included in two-year accounting programs, suggested a need for extensive exploration to determine the utility of cost accounting skills. Thus, the purpose of this research was to determine the utility of cost accounting skills to AAS accounting graduates for employment in selected Virginia manufacturing plants. Proficiency levels of various cost accounting skills needed in these plants and the places for acquiring such skills were explored. The cost accounting systems used and hiring preferences for non-supervisory accounting positions were also ascertained. Additionally, the distributions of these plants when classified by employment levels, types of products, and usage of separate cost accounting sections were determined. Relationships between some of the above named variables were also explored.

The research has significance for those individuals associated with Virginia community college accounting programs. Studies of this nature should be conducted to insure that such programs meet the needs both of the graduates and of the employers who depend on the Virginia Community College System for trained manpower.

Chapter 2

LITERATURE REVIEW

Introduction

The literature review contains six major sections. Section one discusses various titles used to refer to community college accounting graduates as well as certain titles used for accounting jobs available to them. This discussion is designed to aid the reader in understanding the terminology in succeeding sections. Section two explores some insights regarding the titles and content of cost accounting and managerial accounting courses.

The next three sections include a review of theses, dissertations, and an independent study which provides insight relative to two-year AAS degree accounting programs. Section three summarizes seven studies involving high school bookkeeping and accounting; section four discusses a four-year college study and two works related to accounting principles; and section five reviews four studies concerning skills needed by two-year accounting graduates for employment. Lastly, section six summarizes the entire chapter.

Titles of Accountants

The literature review revealed considerable diversity regarding the appropriate titles for the graduates of two-year accounting programs and/or their respective positions. This section reviews some

of the terms used by prior researchers.

The available positions could be portrayed on a continuum ranging from bookkeeper to accountant including numerous interim job classifications. Research studies relative to community college accounting graduates seldom used the term bookkeeper or accountant but instead chose an interim term such as paraprofessional accountant. Considerable overlap was found on this continuum even between the words bookkeeper and accountant. These terms are considered first, and then the interim job titles are explored.

High school studies which concluded that post-secondary education was necessary for the jobs they described usually referred to the jobholders as bookkeepers. The title of bookkeeper was sometimes used to describe a limited-function accountant, one who performed only certain aspects of what is normally considered accounting; while at other times the definitions of bookkeeper were very similar to those of an accountant. The confusion stemmed from the fact that the bookkeeping and accounting fields have a common base; however, the accountant usually has been trained to perform a larger variety of duties.

According to Stelter (1968) and Yandoh (1971), the duties of a bookkeeper included only the recording, posting, and trial balance phases of accounting. Ozzello (1967) agreed, but added that if the individual prepared statements, designed accounting systems, or supervised the recording phase, then he was an accountant. The Ozzello line of distinction was very small indeed. Conversely, Moon (1970)

stated that some full-charge bookkeepers did prepare financial statements.

The two-year accounting graduates in prior studies usually performed limited accounting functions and were called some type of restricted accountants. However, their duties were usually more closely related to those of bookkeepers than to those of accountants. Several definitions are discussed to illustrate these points.

Ozzello titled the graduates of two-year accounting programs technical accountants or accounting technicians. His definition is cited below:

Technical Accountant. (Same as Accounting Technician) One who performs accounting-type activities for which training in accounting beyond high school is a requisite, but for which a baccalaureate degree in accounting is not a prerequisite for employment. The activities were those usually included in the accounting cycle that dealt with computing, recording, summarizing, classifying, and reporting accounting information such as: computing costs, payroll, etc.; recording information in ledgers and books of original entry; analyzing accounts such as receivables, payables, cost, etc.; classifying information for easy retrieval; and making such financial statements as the balance sheet, income statement, schedules, division of capital, funds statements, etc. (Ozzello, 1967:12).

An American Accounting Association Committee (Royer, et al., 1970) studying two-year college accounting programs adopted Ozzello's definition and term accounting technician.

Kelly referred to the same graduate as a semiprofessional accountant. He used the Dictionary of Education by Carter V. Good (1959) for the following definition:

Semiprofessional: "An occupation ordinarily requiring as preparation a course of training approximately two years in length, with a high school education or its equivalent, as a prerequisite; a middle-level occupation, intermediate between a trade and a profession." (Kelly, 1970:9)

In reference to CPA firms, Carey (1965) called two-year accounting graduates nonprofessional technicians whereas Freedman and Loeb and Rymer (1973) referred to the graduates as para-professionals. Freedman said:

A literal definition of para-professional would be a "near-professional" or "almost-professional." A more idiomatic usage would define such a person as one used in place of a professional to perform tasks for which the full range of professional expertise is not required. He can be classified on the basis of the scope of education and/or training, which might encompass only a small portion of the full range required for professional status. Another characteristic is the absence of a license to practice or other formally recognized professional status. (Freedman, 1971:678).

Barton summarized the situation by saying that

in other studies, the accounting paraprofessional has been referred to as holding an accounting position, [as] being an accounting technician or technical accountant, and as having an accounting-related position. In all instances the paraprofessionals have something in common--they have received training above the high school level but have not earned a baccalaureate degree or received a professional license. (Barton, 1975:10).

The opinions and definitions by Kelly, Carey, Freedman, Loeb and Rymer, and Barton were not centered on the duties of the graduates but on their educational background. This was probably due to the diversity of tasks performed by the two-year accounting graduates.

The 17 Virginia community colleges that offer accounting or business with accounting emphasis programs listed a variety of

occupational titles in their catalogs. The top three titles included in 16 of these catalogs were accounting technician, accounting trainee, and junior accountant. (17 VCC catalogs).

The term accounting technician was selected by this researcher for the present study. Accounting technician was one of the most frequently used titles in Virginia community college catalogs; it was employed by Ozzello in regard to manufacturing accountants; and it was adopted by an American Accounting Association Committee chaired by Royer. However, the terms technical accountant, semiprofessional accountant, and paraprofessional accountant are considered synonyms.

The first part of Ozzello's definition for accounting technician was adopted for this study. Thus, an accounting technician is

one who performs accounting-type activities for which training in accounting beyond high school is a requisite, but for which a baccalaureate degree in accounting is not a prerequisite for employment. (Ozzello, 1967:12).

The latter part of Ozzello's definition was not used due to its restrictiveness of accounting activities and because it was more appropriate for manual rather than computerized systems.

Accounting technicians could be either bookkeepers or accountants since both bookkeepers and accountants, as defined in this study, performed accounting-type activities. Thus, the chosen definition for an accounting technician included the entire continuum from bookkeeper to accountant when post-secondary training but not a baccalaureate degree was necessary for employment in the field.

Relationship of Cost Accounting and Managerial Accounting

A study of the utility of cost accounting to accounting technicians was included as a major part of the present research. Some insights regarding the titles and content of cost accounting and managerial accounting courses are explored in this section.

During the 1960's, cost accounting and managerial accounting were two separate fields of study. Cost accounting was viewed as being "... strongly directed to manufacturing situations" (Tyra, 1965:66) and as occupying "... a unique position by virtue of its extensive use in the broad domain of production." (Roy and MacNeill, 1967:210-211). The applicability of the subject area was generally restricted to manufacturing industries. Kohler, in 1963, defined cost accounting with restricted applicability and further stated that managerial accounting, a separate subject area, did not have any precise coverage.

During the 1970's, the distinction between cost accounting and managerial accounting seemed to disappear in accounting literature and in many textbooks. (Pullis and Edwards, 1971; Lawrence, et al., 1972; Schoenfeld, 1972; Horngren, 1972; Anton and Firmin, 1972; and Matz and Usry, 1976). Cost accounting was no longer

... considered and discussed as being applicable only to manufacturing operations. ... Every type and kind of activity, regardless of size, in which monetary value is involved should consider the use of cost accounting concepts and techniques. (Matz and Usry, 1976:11).

The content of the subject area was still not entirely consistent; however, it generally included traditional cost accounting and

assorted other topics. Anton and Firmin stated:

In most professional disciplines, acceptance of new concepts and tools comes at a torturously slow pace. New concepts and tools must be tested and proven. Especially in a practical discipline like managerial accounting, usefulness and payoff must be demonstrated. (Anton and Firmin, 1972:viii).

Some dissent has been presented in journal literature relative to the expanded subject area. Mayer, for example, noted that

as management increased its demand for more meaningful cost data, more cost accountants began to reach back on the shelf for allocation techniques that had long been idle. The lost art of cost finding was reborn, and in a much more advanced form than ever before. (Mayer, 1975:17).

Anthony added that

... the time has come to think about developing new courses in straight cost accounting, emphasizing the concepts and techniques of cost measurement without the distraction of performance measurement or relevant cost analysis.

... Cost accounting is about to experience a rebirth. In colleges and universities, it will again become a respectable subject. This means a renewed interest in cost accounting courses as well as a new interest in research. (Anthony, 1975:16).

High School Studies

Numerous studies concerning high school bookkeeping courses have been conducted. This section highlights the findings in seven of these works regarding educational requirements for entry-level bookkeeping and accounting positions and usage of computers.

Based on the responses of 100 persons responsible for hiring office workers, Buckley (1971) concluded that although high school graduates could obtain bookkeeping positions, experience was more valuable in obtaining such positions than were high school bookkeeping

courses.

In another survey including 87 bookkeepers in 15 businesses, Watts (1974) determined that only seven bookkeepers had had post-secondary schooling and that a majority of the employers did not provide on-the-job training. Additionally, Watts found that 80 percent of the businesses did not use computers.

Stelter (1968) surveyed 111 employers and 154 employees in rural Minnesota businesses. He found that two-thirds of the businesses would hire high school graduates for bookkeeping positions, but that three-fourths required some college accounting courses for accounting positions. Stelter also concluded that data processing was not required for over 80 percent of the bookkeepers and almost 75 percent of the accountants.

Clow surveyed the personnel directors and 182 bookkeepers and accountants in 14 manufacturing plants and found that 23 percent of the bookkeepers and 76 percent of the accountants had taken post-secondary accounting courses. Additionally, almost 40 percent of the accountants and less than 1 percent of the bookkeepers possessed college degrees. Clow also found that 80 percent of the accountants and 33 percent of the bookkeepers "... used bookkeeping principles when working with automated data processing equipment" (Clow, 1967:122) but that the majority had obtained their data processing training on the job.

Most of the 100 full-charge bookkeepers interviewed by Moon

had taken post-secondary bookkeeping or accounting courses; however, high school graduates who had taken bookkeeping and acquired some experience also qualified for these positions. Additionally, Moon found that "automated data processing equipment is not prevalent in firms that employ full-charge bookkeepers ... [and] not all firms that could and should use automated data processing equipment are making use of the service." (Moon, 1970:376). Based on his work, Moon recommended further research regarding larger firm bookkeepers as well as different types of businesses as "... a basis for improvements in textbook materials." (Moon, 1970:378).

Research involving 107 high school bookkeeping graduates and 32 employers was undertaken by Luxner. She found:

The study of two years of manual bookkeeping in high school, in and of itself, meets neither the job requirements for accounting clerks nor for accountants. With the present large percentage of high school graduates enrolling for post-secondary education and the reluctance of business to hire the youthful high school graduate for any responsible bookkeeping position, preparation for an accounting career should be deferred until the post-graduate level. (Luxner, 1970:146).

Luxner also discovered that 41 percent of the businesses surveyed had computerized accounting systems.

West directed an extensive research study involving 237 interviews and 597 questionnaire responses from bookkeeping employees. He concluded:

The job-responsibility levels of bookkeepers are largely determined by experience, general intellectual ability, and post-high school job relevant schooling--not by high school bookkeeping training. (West, 1973:52).

West also found that as the size of the firms increase, more specialization occurs, resulting in less need for comprehensive accounting skills. Additionally, he determined that about 10 percent of the smallest firms as compared with 87 percent of the largest firms used computerized accounting systems and that payroll, accounts receivable, and accounts payable were the accounting areas most often computerized. Based on his research, West recommended that "... the services of accounting supervisors in industry ..." (West, 1973:197) be enlisted for aid in curriculum revision.

Related College Studies

Three studies related to post-secondary accounting education are reviewed in this section. The first involved manufacturing accountants with four-year college implications, and the latter two considered accounting principles textbooks.

Eighty-six officials in 60 manufacturing concerns were interviewed by Yankow. Although the study was directed toward four-year college accounting majors, Yankow found that "a four-year college degree was not considered mandatory for prospective accountants, though desirable." (Yankow, 1954:228). Three conclusions and implications of his research were pertinent to the present study. First, Yankow determined:

Cost accounting is the backbone of the accounting in the manufacturing industry. Throughout this study, costs and cost accounting were mentioned frequently in connection with trends, problems, needs, weaknesses, and recent changes. Its

importance is further illustrated by the fact that accounting executives in manufacturing concerns belong to professional cost associations more than to any other professional organization. (Yankow, 1954:234).

Second, Yankow discovered that standard, job order, process, and, to a lesser extent, direct costing were all used in the manufacturing firms. "Implications are that schools should expand and improve their cost accounting programs." (Yankow, 1954:234). Third, Yankow found that the most often mentioned weakness in accounting education was the lack of practical accounting training. Based on his research, Yankow recommended that instructional improvements should be made in cost, industrial, and machine accounting; that colleges should have specialized programs for industrial accountants; and that "in teaching the basic courses in accounting, emphasis should be placed upon principles and procedures which are determined by studies of current practices in industry." (Yankow, 1954:247).

Over 300 high school and college accounting principles teachers were asked if they taught the 81 accounting concepts compiled by Smiley (1972). He found that 44 of the concepts were emphasized by a majority of high school teachers, while 73 concepts were emphasized by a majority of post-secondary educators. These findings depicted the common accounting base taught in both high school bookkeeping classes and post-secondary accounting principles courses as well as the additional coverage on the post-secondary level. The present investigator reviewed the 81 concepts and found that nine of them were related to cost accounting; and in all nine cases, the concepts were emphasized

by a majority of post-secondary instructors but not by high school teachers. The percentages of post-secondary and high school teachers that included and emphasized these nine concepts are presented in Table I.

In another study, topics included in the 10 most often used textbooks in two-year college accounting principles courses were evaluated by 50 two-year college educators. Based on the results of this survey, Kaliski proposed an accounting principles textbook outline. This researcher determined that 90 percent of the most often used textbooks contained some cost accounting topics and that three of the 11 units in the proposed textbook outline involved cost accounting or managerial accounting. Based on his research, Kaliski recommended:

Studies of textbooks and other teaching materials used in other accounting courses at the two-year college level should be made. The goal would be to provide materials for accounting education at this level. Textbook materials might be developed for such courses as Intermediate or Cost Accounting [sic]. (Kaliski, 1974:100).

Two-Year College Accounting Skill Studies

This section contains studies by Ozzello (1967), Kelly (1970), Yandoh (1971), and King (1976). These were the only dissertations located by this investigator relative to the skills needed by two-year accounting graduates for employment. Such lack of studies, especially when combined with the age of three of them, is indicative of the need for extensive research by numerous investigators.

Ozzello interviewed 99 technical accountants employed by

TABLE I

NINE COST ACCOUNTING CONCEPTS INCLUDED AND EMPHASIZED
BY HIGH SCHOOL AND POST-SECONDARY TEACHERS IN
TEACHING FIRST-YEAR ACCOUNTING COURSES^a

Statement of Concept	Percent of Teachers That Included and Emphasized Concept in Their Teaching	
	Post- Secondary	High School
1. A relationship exists between the statement of cost of goods manufactured and the income statement in that the total cost of manufacturing goods appears in the cost of goods sold section of the income statement.	100	41
2. Cost accounting serves two important managerial objectives: determining product costs and controlling the cost of business operations.	83	10
3. The basic objective of standard costing is to compare standard costs (what costs should be) with actual costs (what costs were) to isolate variances as a basis for study and remedial action.	71	5
4. The relationship of job order costing to process costing is that both are methods of assigning costs to manufactured goods.	71	2
5. The cost of materials, cost of labor, and the amount of factory overhead are the three elements that determine the cost of goods manufactured.	69	10

^aExtracted from Smiley (1972:195-200)

TABLE I (continued)

Statement of Concept	Percent of Teachers That Included and Emphasized Concept in Their Teaching	
	Post-Secondary	High School
6. The flow of cost in a manufacturing business includes costs of raw materials, labor and overhead becoming costs of manufacturing through work in process; work in process costs becoming finished goods costs; and finished goods costs becoming cost of goods sold.	67	18
7. In controlling costs, it is important to know how costs behave in response to changes in the level of business activity. For instance, an increase in volume may decrease fixed costs per unit but increase variable cost per unit.	67	9
8. A relationship exists between the method used to assign costs to goods produced and the amount of net income reported. For instance, variable costing or direct costing may result in an income figure different from that obtained when using full or absorption costing.	61	7
9. In job order costing, each specific lot of product must be identifiable through each step of the manufacturing operation.	60	8

durable goods manufacturing firms. He had difficulty distinguishing between bookkeeping and accounting positions due to their inconsistent and overlapping job duties and titles; however, he found:

Many individuals, though called bookkeepers or accountants, were performing accounting tasks on the fringe area normally considered between the two positions--they are actually technical accountants. (Ozzello, 1967:140).

Ozzello compiled and ranked a list of various types of accounting tasks employed by these technical accountants. A review of this list by the present investigator revealed that at least 25 percent of the technical accountants surveyed performed 21 cost accounting tasks. Of these 21 tasks, 13 were used by at least 31 percent of the accountants, while two were employed by at least 42 percent of them. Table II contains the 21 tasks and the percentage of technical accountants that used each one. These tasks were among those employed in developing the list of cost accounting skills contained in the questionnaire for this dissertation. Relative to cost accounting tasks, Ozzello found that these tasks were more frequently performed in firms employing 100 to 749 persons than by larger or smaller firms. He also concluded that "there appears to be an ever present need to evaluate continually the content and scope of the accounting courses in a terminal accounting program." (Ozzello, 1967:147).

Kelly (1970) studied accounting tasks performed by 108 semi-professional accountants. Included in his sample were 27 accountants in each of four business types--manufacturing, retailing, finance, and service. Based on his work, Kelly determined that semiprofessional

TABLE II
 TWENTY-ONE COST ACCOUNTING ACTIVITIES^a

Activity	Percent
Use Worksheets for Work in Process (Cost Sheets)	43
Making Materials Consumed Schedules	42
Making Cost of Goods Manufactured Schedules	38
Record the Purchase of Materials	35
Handle "Payroll" Job Tickets	34
Maintain Job Cost Sheets	33
Use Worksheets for Allocating Costs	33
Computations for Allocation of Costs to Jobs	32
Prepare Entries for Direct and Indirect Costs	32
Analyze Material Cost Variance	32
Prepare Entries for the Purchases of Materials	31
Computations Using Cost Standards	31
Analyze Labor Cost Variances	31
Analyze Indirect Costs	29
Maintain Cost Ledger	28
Compare Costs with the Budget	28
Record the Return of Materials to Stores	27
Making Efficiency Reports	27
Prepare Entries to Record Waste and Scrap Materials	27
Analyze Distribution Costs	25
Making Production Budgets (Manufacturing)	25

^aExtracted from Ozzello (1967:197-200)

accountant positions having various titles were available and that 81 percent of these positions required post-secondary training.

Kelly presented a comprehensive task list for all 108 semi-professionals as well as individual lists for each of the four business types. By analyzing the complete list as determined by Kelly, this researcher located the 24 most often used cost accounting tasks. By comparing responses from the 27 manufacturing accountants to those of all 108 semiprofessional accountants, this researcher determined that 56 percent of the manufacturing accountants and 19 percent of all of the semiprofessionals employed the most frequently used cost accounting task in the list. Twenty-six percent of the manufacturing accountants and only 7 percent of the total group performed the least used of the 24 tasks. A much higher usage of cost accounting was found in the manufacturing group; however, this usage by manufacturing accountants was still only moderate. These comparisons of tasks are presented in Table III. The 24 cost accounting tasks located by this investigator were used as a basis to determine the skills in cost accounting for this dissertation questionnaire.

Because "... relatively little research and writing had been done with specific concern for the community college career accounting graduate," Yandoh (1971:30) sought information useful for community college accounting curricular revisions by interviewing 35 accounting graduates, interviewing 5 of their employers, and analyzing 207 questionnaires received from upstate New York community college

TABLE III

PERFORMANCE OF COST ACCOUNTING TASKS--A COMPARISON OF MANUFACTURING ACCOUNTANTS AND ALL CLASSIFICATIONS SURVEYED^a

Cost Accounting Task	Percent Performing Task	
	Manufacturing	All Classifications
Materials Consumed	56	19
Manufacturing Expenses, Abstracts	56	17
Cost of Goods Manufactured, Abstracts	56	16
Raw Materials Inventory	45	14
Work-in-Process Inventory	41	16
Materials	41	18
Finished Goods Inventory	41	12
Cost of Goods Manufactured Statements	37	13
Direct Labor	33	18
Adjustments of Physical and Book Inventories of Materials	33	16
Cost and Production Reports	33	15
Finished Goods	33	11
Job Order Cost Accounting Procedures	33	11
Direct Materials	30	15
Sales and Cost (Job Costing) Journal	30	14
Completed Production and Work-in-Process Ending Inventory Statement	30	13
Entries to Record Waste and Scrap Materials	30	10
Cost of Goods Manufactured Adjusting Entries	30	8
Entries for Direct and Indirect Costs	30	18
Indirect Labor	30	13
Labor Cost Flow	26	11
Factory Ledger	26	8
Production Cost Flow	26	7
Responsible for Classification of Indirect Manufacturing Costs	26	7

^aExtracted from Kelly (1970:301-306)

accounting graduates. Fifty percent of these graduates holding accounting-related positions were employed by service businesses, while the next largest group, about 20 percent, were employed in manufacturing. It is the opinion of this investigator that the lower rating for manufacturing was caused by a limitation in the research. Yandoh had concluded that the two-year accounting graduates in his study generally found positions in the same geographic area of their training and had previously stated that upstate New York community colleges are "... located in non-urban areas and ... do not have a major concentration of business and industry which would offer a great variety of job openings for accounting graduates." (Yandoh, 1971:12). Thus, the area of the study contained a limitation regarding industrial employment.

Yandoh experienced variations in the titles of the positions held by accounting-employed graduates and noted that this finding was in agreement with the prior works of Ozzello (1967) and Kelly (1970). Additionally, he determined that these graduates performed a variety of both bookkeeping and accounting duties; however, the bookkeeping duties were employed more often. The study also showed that a majority of the accounting-employed graduates had received some type of training on the job.

In discussing program improvements, the graduates surveyed in the Yandoh study recommended more practical training and increased data processing instruction. Yandoh decided that this latter

recommendation

... could be viewed as a reflection of what graduates feel the need for data processing will be in the future, especially when less than one-third of them indicated that they had used such procedures in the accounting positions they had held. (Yandoh, 1971:141).

He also stated that:

There appears to be a need to examine further the desirability of increased instruction in electronic data processing techniques based on the somewhat contradictory evidence obtained from accounting-employed graduates. (Yandoh, 1971:146).

The research also contained findings and conclusions relative to cost accounting. Yandoh determined that "the cost accounting course was deemed to be of least benefit of the typical accounting courses included in the career accounting curriculum" (Yandoh, 1971:138) and said:

Consideration should be given to the recommendations made ... by accounting-employed graduates for improving the career accounting program and to the possible exclusion or revision of courses deemed by these graduates to be of little or no benefit. (Yandoh, 1971:146-147).

The King (1976) study included an evaluation of three Virginia community college accounting programs. In addition to other information, the research contained opinions of both graduates and certified public accountants regarding 20 general accounting, 8 cost accounting, 13 auditing, and 7 tax accounting tasks. Her eight cost accounting tasks were among those employed in developing the list of skills contained in the questionnaire for this dissertation. These eight cost accounting tasks and findings are presented in Table IV. Relative to

TABLE IV
 COST ACCOUNTING TASKS USED BY CAREER ACCOUNTING
 GRADUATES SINCE GRADUATION^a

Cost Accounting Task	Rank Order ^b	N ^c	Percent
Compute and analyze budget variances	19	46	51.7
Prepare budgets	19	46	51.7
Prepare cost reports for management decision making	24	45	50.6
Evaluate capital expenditures employing capital budgeting techniques	41	37	41.6
Cost inventories	43	36	40.4
Determine standard costs	43	36	40.4
Analyze standard cost variances	46	35	39.3
Maintain cost ledgers	47	33	37.1

^aExtracted from King (1976:64-65)

^bRank Order = 1 to 47

^cN = 89

cost accounting, King determined:

The performance of cost accounting tasks ... was not cited by accountants [certified public accountants] as frequently required duties of program graduates. In addition, graduates of the two-year accounting programs indicated a lower frequency of performance of cost accounting tasks as well as placing a relatively low value on this portion of the curriculum ... In light of these data, perhaps the cost accounting offerings should be reviewed, keeping local needs in view. (King, 1976:100).

Details of the study revealed that 139 responses from accounting graduates were received and that the majority of the graduates considered the AAS degree necessary for their present positions. Additionally, the graduates thought that cost accounting was the least beneficial accounting course in their programs. Eighty-nine of the 139 graduates were employed in accounting. Of the 89, 19 had been employed in small business, 16 in government, 12 in industry, 11 in CPA firms, 7 in banks, and 6 in non-profit or educational institutions. The remaining 18 were sparsely scattered among five other categories.

Industry had employed only 13 percent of the 89 graduates involved in King's study. This fact could have affected their low ranking of cost accounting. The depressed industrial employment rate was also contradictory to the Gordon (et al., 1973) Committee's national survey which concluded that 69 percent of two-year accounting graduates were employed by industry. It is the opinion of this researcher that the study did contain limitations which would decrease the industrial employment rates. Sixty-five percent of King's total sample was composed of former students of Northern Virginia Community College which is geographically located in an area that

" ... generally is dominated by agricultural, commercial, and Government activity; consequently, this area offers relatively little in the way of manufacturing job opportunities." (Ennis and Jones, 1973:44-45). Additionally, the King sample was limited to 1973, 1974, and 1975 accounting graduates. During the latter two years, 1974 and 1975, a recession took place in manufacturing employment in Virginia. (Ware, 1976). This decline in the manufacturing labor force may have made employment in this sector difficult for two of the three graduating classes.

The limited manufacturing opportunities in Northern Virginia, coupled with a recession in manufacturing employment during two years when the King graduates were seeking positions, restricted the exploration of the industrial sector. This present study complemented and expanded the information obtained from the King research. The sample was composed of manufacturing employers rather than graduate employees and explored the topic of cost accounting in much greater detail. Together, the two works represented a more complete view of two-year accounting program needs in the Commonwealth.

Summary

The literature review contained discussions relative to two-year community college accounting programs. These discussions included (1) titles of accountants, (2) relationship of cost accounting and managerial accounting, and (3) findings of research studies.

Each topic is considered.

Titles of accountants. Numerous titles were used to refer to community college accounting graduates as well as numerous titles used to refer to accounting positions they might obtain. The titles included: bookkeeper, accountant, accounting technician, accounting trainee, junior accountant, semiprofessional accountant, paraprofessional accountant, and technical accountant. The titles were explored, showing that they could be portrayed on a continuum ranging from bookkeeper to accountant with the remaining titles having interim job classification. Further discussions revealed that the bookkeeping and accounting fields have a common base; however, the accountant usually has been trained to perform a larger variety of duties.

Relationship of cost accounting and managerial accounting. In the 1960's, cost accounting and managerial accounting were separate course areas, with cost accounting applicability generally restricted to manufacturing industries. During the 1970's, the distinction between cost accounting and managerial accounting seemed to disappear in accounting literature and in many textbooks. Some disagreement with this expanded subject was found in current journal articles, and suggestions were being made to reverse the swing of the pendulum back toward traditional cost accounting. Whether this current plea for traditional cost accounting courses will prevail is unknown at the present time.

Findings of research studies. Fourteen research studies, four of which involved the employment aspects of two-year accounting graduates, were presented. The studies are summarized in five topical areas:

(1) schooling and job training requirements, (2) utility of cost accounting, (3) cost systems and computer systems, (4) relationships between variables, and (5) implications for further research.

1. Schooling and job training requirements. The research revealed that post-secondary schooling was necessary for most accounting and part of the bookkeeping positions although some bookkeeping jobs were available for high school graduates, especially those with prior experience. Clow (1967), Stelter (1968), Buckley (1971), and Watts (1974) concluded that bookkeeping positions were available for high school graduates. However, Buckley also noted that experience was helpful in obtaining such positions, while Clow and Stelter concluded that post-secondary education was necessary for a majority of accounting positions. Conversely, Yankow (1954), Moon (1970), Luxner (1970), Kelly (1970), West (1973), and King (1976) found that post-secondary schooling was necessary for a majority of bookkeeping and/or accounting positions. Thus, the literature showed a majority of accounting positions and a portion of bookkeeping jobs required some post-secondary schooling.

The studies also indicated that some skills were being taught on the job. Yandoh (1971) determined that the majority of two-year accounting graduates had received on-the-job training. Clow (1967) added that the majority of manufacturing accountants and bookkeepers

had acquired data processing skills after employment. However, Watts (1974) found that the majority of employers did not provide on-the-job training. Thus, the studies showed that at least some employers provided job training for at least a portion of the required duties.

2. Utility of cost accounting. Kaliski (1974) recommended that a study regarding cost accounting be conducted. Prior research had contained little detailed information about this subject area. The available data relative to cost accounting were contradictory, recommending both a need for increased cost accounting courses and their elimination; however, limitations in some of these studies were noted as possible reasons for the conflicting results.

Cost accounting was considered by Yankow (1954) as being the backbone of the manufacturing industry and by Yandoh (1971) as being of little or no benefit. Participants in the Yankow, Smiley (1972), and Kaliski surveys presented favorable opinions relative to cost accounting. All of the accountants in the Ozzello (1967) study and the manufacturing accountant group of the Kelly (1970) work had only moderate use of the subject. The remaining Kelly accountants, the accounting graduates in the King (1976) research, and especially the accounting graduates in the Yandoh study had little use for cost accounting.

The literature revealed a need for further study regarding the utility of cost accounting skills.

3. Cost systems and computer systems. Yankow (1954) found that standard, job order, process, and, to a lesser extent, direct costing

were all used in manufacturing firms. West (1973) and Clow (1967) determined that computers were used in larger firms. However, at least two-thirds of each sample in the following studies did not use computers: Stelter (1968), Moon (1970), Yandoh (1971), Watts (1974), and the smaller business sector in West. Yandoh experienced mixed reaction from his sample of two-year accounting graduates. Although the usage of data processing by these graduates was not extensive, they proposed increased instruction in the field. Thus, Yandoh recommended further research regarding data processing in two-year programs.

The literature revealed a need to determine if cost accounting and computerized cost accounting systems were being used in Virginia manufacturing plants.

4. Relationships between variables. Prior research indicated that there were relationships between certain variables. The Kelly (1970) study showed that cost accounting skills were more important for manufacturing than for other types of firms. There appeared to be a relationship between needed skills and the types of firms. Ozzello (1967) found that cost accounting tasks were more frequently performed in firms employing 100 to 749 persons than by larger or smaller firms. West (1973) determined that firm size and needed skills were related. He concluded that as the size of the firm increases, more specialization occurs, resulting in less need for comprehensive accounting skills. West also found a relationship between computerized systems

and firm size--namely, as the firms increased in size, their usage of computerized accounting systems also increased.

The literature suggested that when studying skills, the investigator should analyze the data not only in their total effect but in relationships between variables.

5. Implications for further research. The literature indicated that further studies regarding accounting should be conducted. Further research was recommended by Moon (1970) in order to improve textbook materials. Kaliski (1974) also recommended a study of cost accounting for the purpose of developing textbook materials. Ozzello (1967) concluded that two-year accounting courses should be continually evaluated. Yandoh (1971) suggested additional research regarding the usage of computer skills by two-year accounting graduates. West (1973) suggested that industrial accounting supervisors should be used to aid in curricular revision, while Yankow (1954) recommended further research to determine the current industrial practices.

The literature revealed a need for further study of two-year accounting programs. Only four studies regarding the skills needed by two-year accounting graduates for employment were located. Three of these studies were at least six years old, were not conducted in Virginia, and did not focus on cost accounting. The fourth study was conducted in Virginia but did not focus on cost accounting or manufacturing. Thus, in order to (1) improve textbook materials, as

recommended by Moon; (2) study cost accounting, as recommended by Kaliski; (3) evaluate the need for cost accounting courses in two-year programs, as implied by Ozzello; (4) study computer skills needed by these graduates, as suggested by Yandoh; (5) use industrial accounting supervisors, as suggested by West; and (6) determine current industrial practices, as recommended by Yankow, the present study was undertaken.

Conclusion. The literature revealed a need for further study of two-year accounting programs. Cost accounting skills in manufacturing industries were one aspect of these programs for which further research was indicated. In a study involving cost accounting, prior researchers suggested that important factors were cost systems and computer systems, schooling and job training requirements, and the relationships between variables. Thus, the purpose of this research was to determine the utility of cost accounting skills to AAS accounting graduates for employment in selected Virginia manufacturing plants. Proficiency levels of various cost accounting skills needed in these plants and the places for acquiring such skills were explored. The cost accounting systems used and hiring preferences for non-supervisory accounting positions were also ascertained. Additionally, the distributions of these plants when classified by employment levels, types of products, and usage of separate cost accounting sections were determined. Relationships between some of the above named variables were also explored.

Chapter 3

METHODOLOGY

Introduction

The methodology used in the present research is explored in this chapter. It includes the purpose of the study and the research questions. The population and survey procedures, instrumentation, and statistical design are also discussed.

Purpose

The purpose of this research was to determine the utility of cost accounting skills to AAS accounting graduates for employment in selected Virginia manufacturing plants. Proficiency levels of various cost accounting skills needed in these plants and the places for acquiring such skills were explored. The cost accounting systems used and hiring preferences for non-supervisory accounting positions were also ascertained. Additionally, the distributions of these plants when classified by employment levels, types of products, and usage of separate cost accounting sections were determined. Relationships between some of the above named variables were also explored.

Research Questions

Specifically, the study answered the following questions about selected Virginia manufacturing plants that employed at least 100 persons.

1. What proficiency levels of cost accounting skills are needed by AAS accounting graduates for employment in these plants?
2. Where should these cost accounting skills be acquired--in school, on the job, or through a combination of school and job training?
3. For non-supervisory accounting positions, do these plants prefer to hire (a) unskilled employees and train them on the job, (b) high school graduates who have taken a bookkeeping class, (c) two-year community/junior college accounting graduates, or (d) four-year college accounting graduates?
4. What are the distributions of these plants when classified by (a) employment levels, (b) types of products, and (c) usage of separate cost accounting sections?
5. Do these plants use (a) computerized, (b) standard, and/or (c) job order or process cost accounting systems?
6. Are there relationships between (a) employment levels, (b) usage of standard cost accounting systems, (c) usage of job order and process cost accounting systems, and/or (d) usage of computerized cost accounting systems and usage of separate cost accounting sections?
7. Are there relationships between (a) employment levels, (b) types of products, (c) hiring preferences, (d) usage of standard cost accounting systems, and/or (e) usage of job order and process cost accounting systems and usage of computerized cost accounting systems?

Population and Survey Procedures

The population for this research was comprised of the 480

manufacturing plants that employed at least 100 persons in the Commonwealth of Virginia and whose employment level was listed in the Directory of Virginia Manufacturing, 1976-1977. Original and follow-up mailings to the 480 plants were undertaken with expectations of a minimum return rate of 25 percent.

The respondent in each plant was a first-line accounting supervisor selected by the plant's chief executive. A questionnaire (Appendix A), two cover letters with Virginia Polytechnic Institute and State University letterheads (Appendix B), and a self-addressed, stamped return envelope were mailed to each of the 480 plants. The first cover letter was written to the chief executive requesting that he select a first-line accounting supervisor to complete and return the questionnaire. The second cover letter was addressed to the accounting supervisor and requested his aid.

A follow-up was conducted two weeks after the original mailing. This second mailing to nonresponding plants included the same materials as the original mailing and an additional cover letter (Appendix B) written to the chief executives.

Instrumentation

The questionnaire method was employed in this research as a means of obtaining data from a geographically dispersed population. The original instrument was developed by the investigator using a combination of the findings of prior researchers and cost accounting textbooks. The limited cost accounting skills contained in the works

of Ozzello (1967), Kelly (1970), and King (1976) and the more prevalent skills included in six cost accounting textbooks were selected, consolidated, and condensed. The resulting original draft of the questionnaire contained four multiple-choice questions and 40 cost accounting skills to be rated on two scales.

The questionnaire was validated by a panel of experts consisting of 10 manufacturing accountants. These accountants represented eight of the more important types of Virginia industries classified by product. Of these 10 accountants, eight were able to attend the content validation meeting. At this meeting, the group first determined the criteria for evaluation of the accounting skills and related questions on the questionnaire. The criteria that were established by the panel with assistance from the researcher were as follows:

1. A skill was to be included on the questionnaire when it was:

(a) used in the cost accounting systems of two manufacturing plants which employed panel members;

(b) recommended by two panel members;

(c) used regularly (at least once a month) in two manufacturing plants which employed these accountants;

(d) employed in non-supervisory positions in two of these manufacturing plants; and

(e) used in positions which required some college training or comparable experience, but not a four-year degree.

2. In cases of alternate description of a skill, the majority of the panel was to rule.

3. The skills were to be stated in general manufacturing terms, such as, work-in-process rather than furniture-in-process so the skills were potentially applicable to more industrial types.

4. The questionnaire was to include no more than 60 skills. This limit was considered maximum for a reasonable response rate.

5. The panel was to confine the skill list to 40 or 50 skills. This number provided good coverage, but did not require an excessive amount of the respondents' time.

6. The panel was to consider additional multiple-choice questions which might produce meaningful relationships.

7. The final questionnaire was to be approved by a majority of the panel of experts, and preferably by all of them.

Using these criteria, the questionnaire was amended. The multiple-choice section was expanded from four to six questions. The panel also changed the original 40 cost accounting skills by combining some skills, dividing others, adding new skills, and changing individual descriptions, but without completely eliminating any of the original 40 skills. The resulting list consisting of 45 skills was within the ideal number range. The amended questionnaire was then unanimously approved.

The original and final draft of the questionnaire contained two scales to be used by respondents when rating the cost accounting skills. One scale was designed to determine the level of proficiency

needed in each skill (proficiency scale), and the other scale was designed to determine the place where each skill should be acquired (training scale).

The proficiency scale contained four levels: (1) elementary, (2) intermediate, and (3) advanced levels of proficiency, and (4) skill not needed. Harrow, in her book called A Taxonomy of the Psychomotor Domain, referred to "levels of skill-mastery ... [and said that] this continuum is called Levels of Proficiency." (Harrow, 1972:76). Additionally, she divided the continuum into four levels entitled "beginner, intermediate, advanced, [and] highly skilled." (Harrow, 1972:77). The highly skilled level was reserved for nationally renowned individuals and thus did not appear appropriate for this study. The remaining levels of proficiency were employed, but the lowest one was changed from beginner to elementary. The manufacturing accountants comprising the panel of experts felt that the chosen scale was more appropriate for the present study.

These panel members also approved the training scale that contained the following three alternatives: (1) in school, (2) on the job, and (3) a combination of school and job training. This scale was a variation of scales employed by other researchers, such as, Kelly (1970), Clow (1967), Shook (1967), and Stelter (1968).

After the questionnaire was revised, it was submitted to the eight panel members who attended the validation meeting and to the two panel members who were unable to attend the meeting. No additional changes were recommended and the 10 panel members signed statements

approving the final questionnaire.

The validity of the instrument was then determined by submitting the revised questionnaire to a second panel consisting of nine CPA's. Kerlinger (1973) entitled this type of validation as content validity. The CPA's were asked to assess the representativeness of the instrument and to document their opinions by signing statements. All nine CPA's signed the statements.

Next, the questionnaire was field-tested, using at least five manufacturing plants in the Commonwealth of Virginia. Questionnaires were mailed to 10 plants not included in the population since their employment levels were not listed in the Directory of Virginia Manufacturing, 1976-1977. Eight returned the questionnaires, and no problems were ascertained with the field-tested questionnaire. The instruments were then distributed to the population.

Statistical Design

The analyses used by prior researchers were employed as a basis for the design of this study. These analyses included absolute frequencies, percentage frequencies, and chi square tests of significance. Each of these analytical techniques, prior users, and supportive literature are discussed in this section. The design of the present study is also detailed.

Hill (1954), Yankow (1954), Baumgartner (1971), Buckley (1971), and West (1973) used absolute and percentage frequencies exclusively in their designs. Kerlinger stated that

it is, of course, possible to analyze data and to draw inferences about relations among variables without statistics. Sometimes, for example, data are so obvious that a statistical test is not really necessary. (Kerlinger, 1973:285).

Absolute and percentage frequencies were used, though not exclusively in this study.

Chi square tests of significance were also employed. Stelter (1968), Moon (1970), Luxner (1970), Ozzello (1967), and Yandoh (1971) used absolute and percentage frequencies and established significance with chi square tests. Roscoe supported this usage of chi square saying "chi-square tests of significance are by far the most valuable of the nonparametric procedures available to the behavioral scientist." (Roscoe, 1969:203). Kerlinger (1973), McNemar (1969), and Siegel (1956) agreed that chi square tests of significance are the best type of analyses for nominal data.

When one uses chi square, the expected frequencies in each cell can not be too small; however, authorities disagree regarding the exact minimum cell size. Roscoe stated that "... at least 80 percent of the cells in the table [should] have expected frequencies equal to five or more." (Roscoe, 1969:203). Siegel said that chi square could be used meaningfully "... if fewer than 20 percent of the cells have an expected frequency of less than 5 and if no cell has an expected frequency of less than 1." (Siegel, 1956:110).

Averill, Hadley (1969), Guilford (1965), Langley, Hoel, and Neter, Wasserman, and Whitmore stated that each expected frequency should be at least five. Averill noted that "... one tries to have an

expected value of 5, or more, in each cell ..." (Averill, 1972:203). Langley said that "in all cases, the expected number should be 5 or more in each class or category." (Langley, 1971:269). Hoel noted that "experience and theory indicate that the approximation is usually satisfactory provided that the expected frequencies in all the cells are at least as large as 5." (Hoel, 1966:239-40). Neter, Wasserman, and Whitmore added that "one commonly used rule is that the sample size can be considered large if each expected frequency ... is 5 or greater." (Neter, Wasserman, and Whitmore, 1973:419).

Ostle summarized the opinions saying that

... if some expected numbers are too small, the chi-square statistic will be a poor indicator of the validity of the hypotheses under test. Some authors say that "too small" means less than 3; others say less than 5. Since not everyone is agreed on the interpretation of what is too small, you should feel free to use any reasonable definition. (Ostle, 1963:127).

In the present study, the minimum required expected frequency of five was selected. This minimum was supported by more of the authorities reviewed and was the most conservative of all the rules mentioned, making the validity of the results of the chi square tests of significance more certain and less subject to question.

Also, the present study used the .05 level for all chi square tests of significance. Kerlinger stated:

The .05 level was originally chosen--and has persisted with researchers--because it is considered a reasonably good gamble. It is neither too high nor too low for most social scientific research. (Kerlinger, 1973:170).

Following the instructions contained in the Statistical

Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner, and Bent, 1975) and using data obtained both from the questionnaires for the present study and from the Directory of Virginia Manufacturing, 1976-1977, a computer program was prepared to generate desired statistics. Data contained on the computer print-out and data compiled manually were used to answer the seven research questions. Totals from crosstab tables generated by the computer were used to determine absolute and percentage frequencies needed to help answer the first five research questions as well as to serve as a basis for the variables for research questions six and seven. Table V shows that 97 variables were defined by these first five research questions. To help answer research questions six and seven, the investigator employed some of the crosstabs, chi square values, and chi square exact probabilities generated by the computer. These crosstabs were manually checked to determine the expected frequencies in the smallest cells. The chi square analyses included only comparisons with expected frequencies of at least five in those cells.

Since the computer print-out included chi square probabilities rounded to four decimal places, the range from .0500 to .0000 was deemed significant. The .0000 level should not be interpreted as a perfect relationship. Calculations including more decimal places would have likely resulted in the appearance of greater than zero numerals beyond the fourth decimal place.

TABLE V
 VARIABLES CONTAINED IN RESEARCH QUESTIONS ONE THROUGH FIVE

Research Question Number	Name of Variables	Number of Variables
1.	Proficiency levels of 45 cost accounting skills	45
2.	Corresponding places for acquiring the 45 cost accounting skills	45
3.	Hiring preferences	1
4.	Distributions of Virginia manu- facturing plants when classified by (a) employment levels, (b) types of products, and (c) usage of separate cost accounting sections	3
5.	Usage of cost accounting systems: (a) computerized, (b) standard, and (c) job order and process	3
	Total	97

Summary

The purpose of this research was to determine the utility of cost accounting skills to AAS accounting graduates for employment in selected Virginia manufacturing plants. Proficiency levels of various cost accounting skills needed in these plants and the places for acquiring such skills were explored. The cost accounting systems used and hiring preferences for non-supervisory accounting positions were also ascertained. Additionally, the distributions of these plants when classified by employment levels, types of products, and usage of separate cost accounting sections were determined. Relationships between some of the above named variables were also explored. Seven research questions were employed to fulfill the purpose of the study.

The population was comprised of the 480 manufacturing plants that employed at least 100 persons in the Commonwealth of Virginia and whose employment level was listed in the Directory of Virginia Manufacturing, 1976-1977. The entire population was surveyed. The respondent in each plant was a first-line accounting supervisor chosen by the plant's chief executive. The questionnaire method was employed to obtain the data. The questionnaire was validated by two panels of experts and was also field-tested prior to large-scale mailings.

The analyses used by prior researchers were also employed as a basis for the design of this study. These analytical techniques included absolute frequencies, percentage frequencies, and chi square

tests of significance. The .05 level of significance was used for chi square tests, and the chi square analyses included only comparisons with expected frequencies of at least five in their smallest cells. The results of this research are presented in the succeeding chapter.

Chapter 4

RESULTS

Introduction

This chapter contains the results of this study. It includes the presentation and analyses of the survey response rates categorized by identifiable groups and the presentation and analyses of each of the seven research questions.

Survey Response Rates

Table VI shows that the 303 returns from the 480 manufacturing plants comprising the population included (1) 58 questionnaires--12.1 percent--not coded for computer analyses, (2) 37 partially completed questionnaires--7.7 percent--coded for computer analyses, and (3) 208 completed questionnaires--43.3 percent--coded for computer analyses. Thus, a total of 245 questionnaires, 51.0 percent of the population, was coded for computer analyses. Each of these three categories is discussed.

Questionnaires not coded for computer analyses. Of the 58 questionnaires not coded for computer analyses, six were returned by the post office and 52 were returned by manufacturing accountants. As shown in Table VI, these 58 questionnaires comprised 19.1 percent of the survey response. The researcher obtained explanations from the Research Department of the Virginia State Chamber of Commerce regarding the six

TABLE VI
SURVEY RESPONSE RATES

Response Category	Survey Response Number	Percent of	
		Survey Response	Population ^a
Questionnaires not coded for computer analyses	58	19.1	12.1
Partially completed question- naires coded for computer analyses	37	12.2	7.7
Completed questionnaires coded for computer analyses	208	68.6	43.3
Total	303	100.0	63.1

^a480 plants

questionnaires returned by the post office while the questionnaires returned by manufacturing accountants usually contained written explanations. These explanations are presented in Table VII. Although 49 of these questionnaires were from plants still in operation, there appeared to be little employment opportunities for cost accountants in most of these because the majority had accounting services performed at other locations. Since none of the questions in this group of questionnaires were answered, this group could not be used in the analyses of the research questions.

Partially completed questionnaires coded for computer analyses.

Thirty-seven respondents did not complete the entire questionnaire. As shown in Table VI, these 37 questionnaires comprised 12.2 percent of the survey response. Table VIII contains the number of variables omitted by these respondents. The respondents who omitted the fewer number of variables may have omitted them in error or for other reasons not ascertainable by the researcher, while those respondents who omitted the higher number of variables generally gave reasons for not completing the questionnaires. The reason most often given for omitting variables was that these variables were performed at the company's central accounting office located at another plant.

Since these 37 questionnaires contained responses for many variables, they were coded for computer analyses. The omitted variables were coded as missing values. For this reason, the numbers of responses in the tables vary throughout the study.

TABLE VII
EXPLANATIONS GIVEN FOR NOT COMPLETING QUESTIONNAIRES

Explanation	Survey Response Number	Percent of Survey Response ^a
Out-of-state home offices performed most or all of the accounting for these Virginia plants	21	6.9
Other Virginia plants--which were also surveyed--performed most or all of the accounting for these Virginia plants	16	5.3
Plants had gone out of business	9	3.0
Plants used few, if any, cost accounting skills. These plants included a newspaper publisher, a tobacco processor, a soft drink bottler, a retailer who performed very limited manufacturing functions, and a plant which could not be identified	5	1.7
Small plants refused response since they employed only one or two accountants	3	1.0
Plants refused response because of company policy	2	.7
Plant's accounting was performed by a local CPA firm	1	.3
Plant did not give reason for refusing response	1	.3
Total	58	19.1

^a303 plants

TABLE VIII
MISSING VARIABLES IN QUESTIONNAIRES
CODED FOR COMPUTER ANALYSES

Number of Missing Variables ^a	Survey Response Number
1	11
2	2
3	2
4 - 6	3
7 - 10	3
11 - 30	3
31 - 50	4
51 - 70	1
71 - 97	8
	<hr/>
	Total 37

^a97 variables in study

Completed questionnaires coded for computer analyses. Completed questionnaires were obtained from 208 respondents. As shown in Table VI, these 208 questionnaires comprised 68.6 percent of the survey response. These respondents were most cooperative and many not only supplied the data requested on the questionnaires but also offered additional supportive comments regarding the study in general as well as specific comments concerning various parts of the questionnaires. Some of the general comments received from these and other respondents are summarized below. Some of the remaining comments are included with the analyses of the related research questions.

The chief executives and first-line accounting supervisors appeared to be interested in the present study. One accountant said that the survey should be informative and two others requested copies of the completed work. Additionally, three accountants added supportive comments regarding Virginia colleges.

Research Question One

What proficiency levels of cost accounting skills are needed by AAS accounting graduates for employment in these plants?

To resolve this research question, the manufacturing accountants were asked to determine the proficiency level needed in each of 45 cost accounting skills. The absolute and percentage frequencies and the number of respondents for each of the 45

questions are contained in Table IX. Data indicated that all 45 skills were needed in at least 77.2 percent of the responding plants.

The 45 cost accounting skills included on the questionnaire were divided into seven categories:¹

- (1) Journals
- (2) Ledgers
- (3) Payroll
- (4) Statements, reports, and worksheets
- (5) Standards and variances
- (6) Inventories
- (7) Computerized cost procedures

The data contained in Table IX regarding each category and applicable comments by the manufacturing accountants are discussed.

Journals. The questionnaire included nine cost accounting journal skills. All nine skills were needed in at least 90.2 percent of the plants. The data indicated that an intermediate level of proficiency in seven skills and an advanced level of proficiency in two skills were needed. The preferred levels of proficiency in these journal skills are listed below.

¹Some of these categories, such as payroll and inventories, involved both financial accounting and cost accounting. These categories were included to determine the emphasis that should be placed on their application to manufacturing situations.

TABLE IX

PROFICIENCY LEVELS OF COST ACCOUNTING SKILLS

Cost Accounting Skills	Proficiency Levels								Total N
	Elementary		Intermediate		Advanced		Skill Not Needed		
	N	%	N	%	N	%	N	%	
<u>Journals</u>									
1. Prepare journal entries from source documents	48	20.4	128	54.5	48	20.4	11	4.7	235
2. Prepare journal entries for purchases of materials	58	24.7	131	55.7	27	11.5	19	8.1	235
3. Prepare journal entries for issuance of materials to production	50	21.3	132	56.2	30	12.8	23	9.8	235
4. Prepare journal entries to record waste and scrap materials	48	20.4	130	55.3	35	14.9	22	9.2	235
5. Prepare journal entries to record payrolls	41	17.4	122	51.9	59	25.1	13	5.5	235
6. Prepare journal entries to apply factory overhead	20	8.5	102	43.6	97	41.5	15	6.4	234
7. Prepare journal entries to transfer goods from work-in-process to finished goods	36	15.5	98	42.1	82	35.2	17	7.3	233
8. Prepare journal entries to transfer goods from finished goods to cost of goods sold	30	12.9	93	39.9	96	41.2	14	6.0	233
9. Calculate and prepare journal entries to record accruals	22	9.6	86	37.4	113	49.1	9	3.9	230

TABLE IX (continued)

Cost Accounting Skills	Proficiency Levels								Total N
	Elementary		Intermediate		Advanced		Skill Not Needed		
	N	%	N	%	N	%	N	%	
<u>Ledgers</u>									
1. Maintain materials or finished goods ledgers	38	16.4	116	50.0	56	24.1	22	9.5	232
2. Maintain factory overhead ledgers	25	10.8	110	47.6	68	29.4	28	12.1	231
3. Maintain work-in-process ledgers	24	10.3	120	51.5	59	25.3	30	12.9	233
4. Compute the allocation of costs	5	2.2	69	29.9	142	61.5	15	6.5	231
<u>Payroll</u>									
1. Calculate total pay for factory workers	62	26.4	114	48.5	36	15.3	23	9.8	235
2. Calculate payroll taxes	47	20.3	126	54.3	35	15.1	24	10.3	232
3. Calculate fringe benefits	33	14.2	120	51.7	55	23.7	24	10.3	232
4. Prepare payroll reports required by government and others	23	10.0	105	45.7	88	38.3	14	6.1	230
<u>Statements, Reports, and Worksheets</u>									
1. Prepare cost of goods manufactured statements	6	2.6	74	31.6	144	61.5	10	4.3	234
2. Prepare cost and production reports and forms	9	3.8	99	41.9	114	48.3	14	5.9	236
3. Prepare direct costing statements	1	.4	64	27.6	134	57.8	33	14.2	232

TABLE IX (continued)

Cost Accounting Skills	Proficiency Levels								
	Elementary		Intermediate		Advanced		Skill Not Needed		Total
	N	%	N	%	N	%	N	%	N
<u>Statements, Reports, and Worksheets</u>									
(Continued)									
4. Prepare full absorption statements	1	.4	54	23.3	145	62.5	32	13.8	232
5. Prepare production budgets	4	1.7	40	17.1	174	74.4	16	6.8	234
6. Write and report cost accounting procedures	3	1.3	24	10.3	193	83.2	12	5.2	232
7. Calculate and report ratios	14	6.0	84	35.9	121	51.7	15	6.4	234
8. Prepare worksheets	20	8.5	113	48.1	87	37.0	15	6.4	235
9. Be able to complete cost analyses	4	1.7	37	15.6	187	78.9	9	3.8	237
10. Type cost reports and statements	97	41.3	63	26.8	27	11.5	48	20.4	235
<u>Standards and Variances</u>									
1. Calculate standard costs	6	2.6	73	31.7	127	55.2	24	10.4	230
2. Use standards	18	7.8	114	49.1	76	32.8	24	10.3	232
3. Compute material, labor, and overhead variances	7	3.0	101	43.9	104	45.2	18	7.8	230
4. Analyze material, labor, and overhead variances	3	1.3	44	19.0	168	72.4	17	7.3	232
5. Compute budget variances	12	5.2	95	41.3	101	43.9	22	9.6	230
6. Analyze budget variances	3	1.3	34	14.7	176	75.9	19	8.2	232

TABLE IX (continued)

Cost Accounting Skills	Proficiency Levels									
	Elementary		Intermediate		Advanced		Skill Not Needed		Total	
	N	%	N	%	N	%	N	%	N	
<u>Inventories</u>										
1. Calculate inventories using first-in, first-out method	23	9.8	105	44.9	64	27.4	42	17.9	234	
2. Calculate inventories using last-in, first-out method	21	9.0	90	38.5	73	31.2	50	21.4	234	
3. Calculate inventories using the average method	23	9.7	103	43.6	63	26.7	47	19.9	236	
4. Employ perpetual inventory procedures	38	16.0	134	56.5	45	19.0	20	8.4	237	
5. Employ physical inventory procedures	31	13.1	132	55.9	62	26.3	11	4.7	236	
6. Calculate raw materials and work-in-process inventories	24	10.1	132	55.7	63	26.6	18	7.6	237	
7. Calculate finished goods inventories	29	12.2	128	54.0	61	25.7	19	8.0	237	
8. Analyze inventory fluctuations and discrepancies	3	1.3	52	22.2	170	72.6	9	3.8	234	
<u>Computerized Cost Procedures</u>										
1. Understand computer concepts	17	7.3	65	27.8	119	50.9	33	14.1	234	
2. Prepare cost data for computer processing	32	13.7	104	44.4	64	27.4	34	14.5	234	
3. Perform data entry functions (such as key punching, etc.)	79	34.1	80	34.5	20	8.6	53	22.8	232	
4. Communicate cost system requirements to computer programmers	2	.9	33	14.2	162	69.5	36	15.5	233	

Intermediate Level of Proficiency:

Prepare journal entries from source documents

Prepare journal entries for purchases of materials

Prepare journal entries for issuance of materials to
production

Prepare journal entries to record waste and scrap materials

Prepare journal entries to record payrolls

Prepare journal entries to apply factory overhead

Prepare journal entries to transfer goods from work-in-process
to finished goods

Advanced Level of Proficiency:

Prepare journal entries to transfer goods from finished goods
to cost of goods sold

Calculate and prepare journal entries to record accruals

Additionally, regarding journal skills, four accountants noted
that some journal skills were computerized and/or performed at home
offices.

Ledgers. The questionnaire included four cost accounting ledger
skills. All four skills were needed in at least 87.1 percent of the
plants. The data indicated that an intermediate level of proficiency
in three skills and an advanced level of proficiency in one skill
were needed. The preferred levels of proficiency in these ledger
skills are listed below.

Intermediate Level of Proficiency:

Maintain materials or finished goods ledgers

Maintain factory overhead ledgers

Maintain work-in-process ledgers

Advanced Level of Proficiency:

Compute the allocation of costs

With regard to ledger skills, one accountant noted that ledgers were a "bookkeeping machine function." Five other accountants remarked that some of their ledgers were computerized and/or prepared at home offices.

Payroll. The questionnaire included four cost accounting payroll skills. All four skills were needed in at least 89.7 percent of the plants. The data indicated that an intermediate level of proficiency in all four skills was needed. The preferred level of proficiency in these payroll skills is listed below.

Intermediate Level of Proficiency:

Calculate total pay for factory workers

Calculate payroll taxes

Calculate fringe benefits

Prepare payroll reports required by government and others

Also, seven accountants noted that some or all of their payroll skills were computerized and/or prepared at home offices. Two smaller plants commented that a computer service prepared their payrolls.

Statements, reports, and worksheets. The questionnaire included 10 cost accounting statement, report, and worksheet skills. All 10 skills were needed in at least 79.6 percent of the plants. The data indicated that an elementary level of proficiency in one skill, an intermediate level of proficiency in one skill, and an advanced level of proficiency in eight skills were needed. The preferred levels of proficiency in these statement, report, and worksheet skills are listed below.

Elementary Level of Proficiency:

Type cost reports and statements

Intermediate Level of Proficiency:

Prepare worksheets

Advanced Level of Proficiency:

Prepare cost of goods manufactured statements

Prepare cost and production reports and forms

Prepare direct costing statements

Prepare full absorption statements

Prepare production budgets

Write and report cost accounting procedures

Calculate and report ratios

Be able to complete cost analyses

However, one accountant noted that some statements were computerized; and two others remarked that some statements were prepared at their home offices.

Standards and variances. The questionnaire included six cost accounting standard and variance skills. All six skills were needed in at least 89.6 percent of the plants. The data indicated that an intermediate level of proficiency in one skill and an advanced level of proficiency in five skills were needed. The preferred levels of proficiency in these standard and variance skills are listed below.

Intermediate Level of Proficiency:

Use standards

Advanced Level of Proficiency:

Calculate standard costs

Compute material, labor, and overhead variances

Analyze material, labor, and overhead variances

Compute budget variances

Analyze budget variances

Additionally, one accountant remarked: "We do not have a standard cost system yet--will in 1-2 yrs." Five other accountants noted that some of these skills were computerized and/or performed at home offices.

Inventories. The questionnaire included eight cost accounting inventory skills. All eight skills were needed in at least 78.6 percent of the plants. The data indicated that an intermediate level of proficiency in seven skills and an advanced level of proficiency in one skill were needed. The preferred levels of proficiency in these

inventory skills are listed below.

Intermediate Level of Proficiency:

Calculate inventories using first-in, first-out method

Calculate inventories using last-in, first-out method

Calculate inventories using the average method

Employ perpetual inventory procedures

Employ physical inventory procedures

Calculate raw materials and work-in-process inventories

Calculate finished goods inventories

Advanced Level of Proficiency:

Analyze inventory fluctuations and discrepancies

Also, five accountants noted that some inventory skills were computerized and/or performed at home offices.

A higher negative response rate was registered regarding the three inventory method skills than for other inventory skills. The responses indicated that some plants exclusively used one of the three methods. However, other respondents considered all three skills necessary even though they were not all used at their respective plants at the present time. For example, one accountant remarked that his plant used "only first-in, first-out," but then he indicated that first-in, first-out; last-in, first-out; and the average methods were all needed skills.

Computerized cost procedures. The questionnaire included four computerized cost accounting procedure skills. All four skills were

needed in at least 77.2 percent of the plants. The data indicated that an intermediate level of proficiency in two skills and an advanced level of proficiency in two skills were needed. The preferred levels of proficiency in these computerized cost procedure skills are listed below.

Intermediate Level of Proficiency:

Prepare cost data for computer processing

Perform data entry functions (such as key punching, etc.)

Advanced Level of Proficiency:

Understand computer concepts

Communicate cost system requirements to computer programmers

Research Question Two

Where should these cost accounting skills be acquired--in school, on the job, or through a combination of school and job training?

To resolve this research question, respondents were asked to rate the 45 skills on a scale to determine the places where these 45 skills should be acquired. The scale included the choices of in school, on the job, and a combination of school and job training. Of the 45 skills included on the questionnaire, a majority of manufacturing accountants denoted that 43 of the 45 cost accounting skills should be acquired through a combination of school and job training. A plurality of these accountants also indicated the same response for the remaining two skills. These data are presented in Table X.

TABLE X
PLACES WHERE COST ACCOUNTING SKILLS SHOULD BE ACQUIRED

Cost Accounting Skills	Places Where Cost Accounting Skills Should Be Acquired						Total N
	In School		On the Job		Combination of School and Job Training		
	N	%	N	%	N	%	
<u>Journals</u>							
1. Prepare journal entries from source documents	32	14.0	51	22.4	145	63.6	228
2. Prepare journal entries for purchases of materials	26	11.9	63	28.9	129	59.2	218
3. Prepare journal entries for issuance of materials to production	21	9.8	62	28.8	132	61.4	215
4. Prepare journal entries to record waste and scrap materials	22	10.2	67	31.2	126	58.6	215
5. Prepare journal entries to record payrolls	28	12.6	41	18.4	154	69.1	223
6. Prepare journal entries to apply factory overhead	19	8.7	31	14.2	169	77.2	219
7. Prepare journal entries to transfer goods from work-in-process to finished goods	25	11.5	32	14.7	160	73.7	217
8. Prepare journal entries to transfer goods from finished goods to cost of goods sold	26	11.9	28	12.8	164	75.2	218
9. Calculate and prepare journal entries to record accruals	21	9.6	24	11.0	174	79.5	219

TABLE X (continued)

Cost Accounting Skills	Places Where Cost Accounting Skills Should Be Acquired						Total N
	In School		On the Job		Combination of School and Job Training		
	N	%	N	%	N	%	
<u>Ledgers</u>							
1. Maintain materials or finished goods ledgers	22	10.4	54	25.5	136	64.2	212
2. Maintain factory overhead ledgers	20	9.7	40	19.4	146	70.9	206
3. Maintain work-in-process ledgers	17	8.3	47	22.8	142	68.9	206
4. Compute the allocation of costs	21	9.7	22	10.1	174	80.2	217
<u>Payroll</u>							
1. Calculate total pay for factory workers	18	8.5	74	34.7	121	56.8	213
2. Calculate payroll taxes	23	11.0	62	29.5	125	59.5	210
3. Calculate fringe benefits	16	7.6	63	30.0	131	62.4	210
4. Prepare payroll reports required by government and others	17	7.8	52	24.0	148	68.2	217
<u>Statements, Reports, and Worksheets</u>							
1. Prepare cost of goods manufactured statements	28	12.5	14	6.3	182	81.3	224
2. Prepare cost and production reports and forms	23	10.4	32	14.4	167	75.2	222
3. Prepare direct costing statements	27	13.4	13	6.4	162	80.2	202
4. Prepare full absorption statements	23	11.3	12	5.9	168	82.8	203

TABLE X (continued)

Cost Accounting Skills	Places Where Cost Accounting Skills Should Be Acquired						Total N
	In School		On the Job		Combination of School and Job Training		
	N	%	N	%	N	%	
<u>Statements, Reports, and Worksheets</u> (Continued)							
5. Prepare production budgets	19	8.7	19	8.7	180	82.6	218
6. Write and report cost accounting procedures	19	8.6	18	8.2	183	83.2	220
7. Calculate and report ratios	38	17.3	32	14.5	150	68.2	220
8. Prepare worksheets	28	12.6	40	18.0	154	69.4	222
9. Be able to complete cost analyses	25	11.1	11	4.9	190	84.1	226
10. Type cost reports and statements	67	33.3	58	28.9	76	37.8	201
<u>Standards and Variances</u>							
1. Calculate standard costs	25	12.1	16	7.8	165	80.1	206
2. Use standards	21	10.0	42	19.9	148	70.1	211
3. Compute material, labor, and overhead variances	21	9.9	26	12.2	166	77.9	213
4. Analyze material, labor, and overhead variances	17	7.9	12	5.6	187	86.6	216
5. Compute budget variances	27	12.8	29	13.7	155	73.5	211
6. Analyze budget variances	19	8.8	9	4.2	187	87.0	215

TABLE X (continued)

Cost Accounting Skills	Places Where Cost Accounting Skills Should Be Acquired						Total N
	In School		On the Job		Combination of School and Job Training		
	N	%	N	%	N	%	
<u>Inventories</u>							
1. Calculate inventories using first-in, first-out method	41	20.8	29	14.7	127	64.5	197
2. Calculate inventories using last-in, first-out method	41	21.8	19	10.1	128	68.1	188
3. Calculate inventories using the average method	40	20.8	24	12.5	128	66.7	192
4. Employ perpetual inventory procedures	26	11.9	56	25.6	137	62.6	219
5. Employ physical inventory procedures	23	10.3	57	25.4	144	64.3	224
6. Calculate raw materials and work-in- process inventories	16	7.3	50	22.8	153	69.9	219
7. Calculate finished goods inventories	22	10.1	48	22.1	147	67.7	217
8. Analyze inventory fluctuations and discrepancies	12	5.4	13	5.8	198	88.8	223
<u>Computerized Cost Procedures</u>							
1. Understand computer concepts	59	29.4	9	4.5	133	66.2	201
2. Prepare cost data for computer processing	21	10.4	51	25.2	130	64.4	202
3. Perform data entry functions (such as key punching, etc.)	60	32.6	35	19.0	89	48.4	184
4. Communicate cost system requirements to computer programmers	20	10.1	16	8.0	163	81.9	199

An additional factor involving Table X needs to be explained. The survey response numbers included in this table are less than those in Table IX. When respondents denoted that a skill was not needed for employment in their plants, they were instructed not to select a place for acquiring the skill.

Research Question Three

For non-supervisory accounting positions, do these plants prefer to hire (a) unskilled employees and train them on the job, (b) high school graduates who have taken a bookkeeping class, (c) two-year community/junior college accounting graduates, or (d) four-year college accounting graduates?

As shown in Table XI, the highest number of respondents preferred to hire two-year community/junior college accounting graduates for non-supervisory accounting positions; however, a substantial number of the total respondents had other hiring preferences. Of the 240 respondents to this question, (a) 12 (5.0 percent) preferred to hire unskilled employees and train them on the job, (b) 52 (21.7 percent) preferred to hire high school graduates who have taken a bookkeeping class, (c) 91 (37.9 percent) preferred to hire two-year community/junior college accounting graduates, (d) 45 (18.8 percent) preferred to hire four-year college accounting graduates, and (e) 40 (16.7 percent) preferred to hire other persons.

When designating other persons, the 40 respondents were asked

TABLE XI
 MANUFACTURING PLANT HIRING PREFERENCES FOR
 NON-SUPERVISORY ACCOUNTING POSITIONS

Hiring Preference	Number	Percent
Plants which preferred to hire		
Unskilled employees and train them on the job	12	5.0
High school graduates who have taken a book-keeping class	52	21.7
Two-year community/junior college accounting graduates	91	37.9
Four-year college accounting graduates	45	18.8
Other persons	40	16.7
Total	240	100.0

to specify their hiring preferences. Some of these 40 respondents selected combinations of the above listed hiring preferences, while others indicated different preferences. As noted in Table XII, 16 of the 40 respondents who preferred to hire other persons emphasized various levels of schooling in their responses, eight emphasized schooling and experience, three emphasized other combinations of schooling or experience, seven emphasized experience, and six emphasized other miscellaneous preferences.

Tables XI and XII showed that a higher number of respondents preferred to hire two-year community/junior college accounting graduates for non-supervisory accounting positions but that other respondents considered different educational levels and/or experience also to be important. Higher preferences were shown first for two-year community/junior college accounting graduates, second for high school graduates who have taken a bookkeeping class, and third for four-year college accounting graduates. Additionally, only 5.0 percent of the responding accountants preferred to hire unskilled employees and train them on the job.

Research Question Four

What are the distributions of these plants when classified by (a) employment levels, (b) types of products, and (c) usage of separate cost accounting sections?

To resolve this research question, the investigator ascertained the distributions of the plants when classified by

TABLE XII

HIRING PREFERENCES--OTHER PERSONS

Hiring Preference	Number
Responses emphasizing schooling:	
High school graduates--bookkeeping not necessary	3
High school graduates who have taken a bookkeeping class and two-year community/junior college accounting graduates	4
Unskilled employees, high school graduates who have taken a bookkeeping class, two-year community/junior college accounting graduates and four-year college accounting graduates	2
Two-year community/junior college accounting graduates and four-year college accounting graduates	3
Unskilled employees, high school graduates who have taken a bookkeeping class, and four-year college accounting graduates	1
High school graduates who have taken a bookkeeping class, two-year community/junior college accounting graduates, and four-year college accounting graduates	1
Four-year college graduates used for management training	1
Some accounting in college, but degree not necessary	1
Total	16
Responses emphasizing schooling and experience:	
Work experience and bookkeeping class	1
High school graduates with some experience	1
High school or junior college with experience	1
High school graduates with 2 to 4 years college and/or experience	1
Two-year community/junior college accounting graduates or four-year college accounting graduates with 2 years experience	1

TABLE XII (continued)

Hiring Preference	Number
Responses emphasizing schooling and experience (continued):	
Depending on the position, unskilled employees, two-year community/junior college accounting graduates and four-year college accounting graduates are used as hiring criteria. Also, we prefer someone with experience	1
Some college and at least 2-3 years experience in accounting	1
Education and experience are considered	1
Total	8
Responses emphasizing other combinations of schooling or experience:	
High school graduates who have taken a book-keeping class, two-year community/junior college accounting graduates or experience	1
Four-year college accounting graduates or experienced people	1
MBA or CPA--professionals; clerical personnel are promoted to accounting	1
Total	3
Responses emphasizing experience:	
Previous on the job training is important as well as experience	1
Experience may be more important than years of formal training	1
Skilled employees regardless of educational background	1
With experience--education can be substituted to some extent for experience	1
Women with experience and families who wish to return to work	1
Combination of experience and training	1
Promote from other jobs in company	1
Total	7

TABLE XII (continued)

Hiring Preference	Number
Answers emphasizing other miscellaneous preferences:	
Anyone qualified for the position	1
We consider each job or position separately and also each applicant	1
One person does all accounting due to small size of plant	1
Comptroller and one other performs all accounting functions	1
Did not specify	2
Total	6
Grand Total	40

(a) employment levels, (b) types of products, and (c) usage of separate cost accounting sections. Each of these distributions is discussed.

Since the survey was limited to plants that employed at least 100 persons, findings regarding only these larger employment levels summarized in Table XIII were explored. The data indicated that plants of many different employment levels are located in the Commonwealth. These employment levels were used as a variable in the chi square tests of significance in research questions six and seven.

The classification of Virginia manufacturing plants by types of products is contained in Table XIV. This table shows the population, the survey response coded for computer analyses, the survey response not coded for computer analyses as well as the total survey response classified by types of products. The types of products manufactured by these plants were obtained from their industrial classifications included in the Directory of Virginia Manufacturing, 1976-1977. Table XIV shows that the three more important types of manufacturing products in Virginia are (a) apparel and other finished products made from fabrics and similar materials, (b) food and kindred products, and (c) textile mill products. The survey response coded for computer analyses included at least 12 accountants representing each of the 12 more important types of Virginia manufacturing industries. This classification by types of products was used as a variable in the chi square tests of significance in research question seven.

TABLE XIII
DISTRIBUTION OF VIRGINIA MANUFACTURING PLANTS
CLASSIFIED BY EMPLOYMENT LEVELS

Employment Level	Number	Percent
Number of Employees:		
100 - 139	51	20.8
140 - 249	45	18.4
250 - 399	46	18.8
400 - 699	51	20.8
700 - 25,000	52	21.2
Total	245	100.0

TABLE XIV
 DISTRIBUTION OF VIRGINIA MANUFACTURING PLANTS
 CLASSIFIED BY TYPES OF PRODUCTS

Types of Products Manufactured (i.e., Industrial Classification)	Survey Response							
	Population		Coded for Computer Analyses		Not Coded for Computer Analyses		Total	
	N	%	N	%	N	%	N	%
Apparel and other finished products made from fabrics and similar materials	66	13.8	15	6.1	21	36.2	36	11.9
Food and kindred products	42	8.8	16	6.5	5	8.6	21	6.9
Textile mills products	40	8.3	22	9.0	6	10.3	28	9.2
Fabricated metal products, except machinery and transportation equipment	37	7.7	21	8.6	2	3.4	23	7.6
Lumber and wood products, except furniture	35	7.3	17	6.9	1	1.7	18	5.9
Electrical and electronic machinery, equipment, and supplies	34	7.1	24	9.8	3	5.2	27	8.9
Furniture and fixtures	31	6.5	15	6.1	2	3.4	17	5.6
Machinery, except electrical	29	6.0	17	6.9	5	8.6	22	7.3
Paper and allied products	28	5.8	13	5.3	1	1.7	14	4.6
Printing, publishing, and allied industries	26	5.4	14	5.7	4	6.9	18	5.9
Stone, clay, glass, and concrete products	22	4.6	14	5.7			14	4.6
Rubber and miscellaneous plastic products	20	4.2	12	4.9	1	1.7	13	4.3
Other	70	14.6	45	18.4	6	10.3	51	16.8
Unknown					1	1.7	1	.3
Total	480	100.0	245	100.0	58	100.0	303	100.0

Table XV shows that 62.3 percent of the manufacturing plants maintained separate cost accounting sections. Since the majority of the plants used cost accounting skills extensively enough to maintain separate cost accounting sections, this was an additional indicator of the need for persons trained in cost accounting. This classification by usage of separate cost accounting sections was employed as a variable in the chi square test of significance in research question six.

Research Question Five

Do these plants use (a) computerized, (b) standard, and/or (c) job order or process cost accounting systems?

To resolve this research question, the instrument contained three questions regarding usages of cost accounting systems. The usages of (a) computerized, (b) standard, and (c) job order and process cost accounting systems were all included. The responses to these three questions are contained in Table XVI. The analyses of the usages of these three systems are discussed below.

Table XVI depicts the usage of computerized cost accounting systems. It shows that 53.5 percent of the plants normally used computerized cost accounting systems while the remaining 46.5 percent did not normally use such systems.

As displayed also in Table XVI, standard cost accounting systems were used in 62.4 percent of the responding plants and an additional 9.0 percent used standard cost accounting systems only for

TABLE XV

DISTRIBUTION OF VIRGINIA MANUFACTURING PLANTS CLASSIFIED
BY USAGE OF SEPARATE COST ACCOUNTING SECTIONS

Usage of Separate Cost Accounting Sections	Number	Percent
Plants which		
Had separate cost accounting sections	152	62.3
Did not have separate cost accounting sections	92	37.7
Total	244	100.0

TABLE XVI
 USAGE OF COST ACCOUNTING SYSTEMS BY
 VIRGINIA MANUFACTURING PLANTS

Usage of Cost Accounting Systems	Number	Percent
Computerized Systems:		
Plants which		
Normally used computerized cost accounting systems	131	53.5
Did not normally use computerized cost accounting systems	114	46.5
Total	245	100.0
Standard Systems:		
Plants which		
Used standard cost accounting systems	153	62.4
Used standard cost accounting systems only for certain products	22	9.0
Did not use standard cost accounting systems	70	28.6
Total	245	100.0
Job Order and Process Systems:		
Plants which		
Used job order cost accounting systems	61	25.6
Used process cost accounting systems	105	44.1
Used job order and process cost accounting systems	44	18.5
Used neither job order nor process cost accounting systems	28	11.8
Total	238	100.0

certain products. Thus, 71.4 percent of the respondents indicated that their plants used standard cost accounting systems at least for certain products; and only 28.6 percent indicated that they did not use such systems.

Table XVI also shows that 25.6 percent of the plants used job order cost accounting systems, 44.1 percent used process cost accounting systems, 18.5 percent used job order and process cost accounting systems, and only 11.8 percent indicated that they used neither job order nor process cost accounting systems. The 11.8 percent--28 respondents--were asked to explain what types of systems they did use. Their responses are presented in Table XVII. The explanations indicated that 22 of the 28 plants did use some types of cost accounting systems. The analyses of the total responses regarding job order and process cost accounting systems indicated that at least 88.2 percent of the plants used job order and/or process cost accounting systems.

Research Question Six

Are there relationships between (a) employment levels, (b) usage of standard cost accounting systems, (c) usage of job order and process cost accounting systems, and/or (d) usage of computerized cost accounting systems and usage of separate cost accounting sections?

To resolve this research question, the investigator explored the relationships between (a) employment levels, (b) usage of

TABLE XVII

TYPES OF SYSTEMS EMPLOYED IN PLANTS NOT USING JOB ORDER
OR PROCESS COST ACCOUNTING SYSTEMS

Types of Systems	Number
Responses emphasizing cost accounting systems:	
Standard cost accounting	6
In process of setting up standard cost	1
Modified standard cost accounting	1
Standard direct costing	1
Direct costing	1
Standard cost principally with some job and process cost	1
Estimating job and process	1
Will go to job order system	1
Very loose process costing	1
Modified process cost accounting	1
Absorption cost accounting	1
Average cost	1
Completed contract method	1
Engineered estimates	1
Cost each style	1
No formal system--use actual cost for material, labor and predetermined overhead	1
Our cost department is located in our out-of-state home office	1
Total	22
Miscellaneous responses:	
Company is relatively new and has no formal cost system	1
Not using complete cost accounting system	1
Did have standard cost, do not at present	1
Does not use cost accounting [newspaper publisher]	2
Did not explain response	1
Total	<u>6</u>
Grand Total	28

standard cost accounting systems, (c) usage of job order and process cost accounting systems, and (d) usage of computerized cost accounting systems and usage of separate cost accounting sections. Each of these four relationships is discussed.

Table XVIII details the relationships between employment levels and usage of separate cost accounting sections. This relationship had a chi square value of 41.45651 and was significant not only at the .05 level, but also at the .0000 level. The usage of separate cost accounting sections increased directly with an increase in employment levels.

Table XIX details the relationship between usage of standard cost accounting systems and usage of separate cost accounting sections. This relationship had a chi square value of 32.79384 and was significant not only at the .05 level, but also at the .0000 level. Proportionately more plants with separate cost accounting sections used standard cost accounting systems than did those without such sections.

Table XX details the relationship between usage of job order and process cost accounting systems and usage of separate cost accounting sections. This relationship had a chi square value of 12.45143 and was significant not only at the .05 level, but also at the .0060 level. Plants which maintained separate cost accounting sections, as well as those which did not maintain such sections, used process cost accounting systems more often, with a second preference for job order systems; however, the usages of these systems were

TABLE XVIII

RELATIONSHIP BETWEEN EMPLOYMENT LEVELS AND USAGE OF
SEPARATE COST ACCOUNTING SECTIONS

Employment Levels	Usage of Separate Cost Accounting Sections		Row Total
	Yes	No	
100 - 139 persons	19 ^a	32 ^a	51
	37.3 ^b	62.7 ^b	
	12.5 ^c	34.8 ^c	
	7.8 ^d	13.1 ^d	20.9
140 - 249 persons	19 ^a	26 ^a	45
	42.2 ^b	57.8 ^b	
	12.5 ^c	28.3 ^c	
	7.8 ^d	10.7 ^d	18.4
250 - 399 persons	28 ^a	17 ^a	45
	62.2 ^b	37.8 ^b	
	18.4 ^c	18.5 ^c	
	11.5 ^d	7.0 ^d	18.4
400 - 699 persons	41 ^a	10 ^a	51
	80.4 ^b	19.6 ^b	
	27.0 ^c	10.9 ^c	
	16.8 ^d	4.1 ^d	20.9
700 - 25,000 persons	45 ^a	7 ^a	52
	86.5 ^b	13.5 ^b	
	29.6 ^c	7.6 ^c	
	18.4 ^d	2.9 ^d	21.3
Column Total	152	92	244
	62.3	37.7	100.0
Chi Square = 41.45651		Significance = .0000	

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

TABLE XIX

RELATIONSHIP BETWEEN USAGE OF STANDARD COST ACCOUNTING SYSTEMS
AND USAGE OF SEPARATE COST ACCOUNTING SECTIONS

Usage of Standard Cost Accounting Systems	Usage of Separate Cost Accounting Sections		Row Total
	Yes	No	
Yes	112 ^a	40 ^a	152
	73.7 ^b	26.3 ^b	
	73.7 ^c	43.5 ^c	
	45.9 ^d	16.4 ^d	62.3
No	24 ^a	46 ^a	70
	34.3 ^b	65.7 ^b	
	15.8 ^c	50.0 ^c	
	9.8 ^d	18.9 ^d	28.7
Only for certain products	16 ^a	6 ^a	22
	72.7 ^b	27.3 ^b	
	10.5 ^c	6.5 ^c	
	6.6 ^d	2.5 ^d	9.0
Column Total	152	92	244
	62.3	37.7	100.0
Chi Square = 32.79384		Significance = .0000	

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

TABLE XX

RELATIONSHIP BETWEEN USAGE OF JOB ORDER AND PROCESS COST ACCOUNTING
SYSTEMS AND USAGE OF SEPARATE COST ACCOUNTING SECTIONS

Usage of Job Order and Process Cost Accounting Systems	Usage of Separate Cost Accounting Sections		Row Total
	Yes	No	
Job order	40 ^a 66.7 ^b 27.4 ^c 16.9 ^d	20 ^a 33.3 ^b 22.0 ^c 8.4 ^d	60 25.3
Process	66 ^a 62.9 ^b 45.2 ^c 27.8 ^d	39 ^a 37.1 ^b 42.9 ^c 16.5 ^d	105 44.3
Job order and process	31 ^a 70.5 ^b 21.2 ^c 13.1 ^d	13 ^a 29.5 ^b 14.3 ^c 5.5 ^d	44 18.6
Neither job order nor process	9 ^a 32.1 ^b 6.2 ^c 3.8 ^d	19 ^a 67.9 ^b 20.9 ^c 8.0 ^d	28 11.8
Column Total	146 61.6	91 38.4	237 100.0
Chi Square = 12.45143		Significance = .0060	

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

higher in plants which maintained separate cost accounting sections than in those which did not maintain such sections. Additionally, proportionately more plants without separate cost accounting sections used neither job order nor process cost accounting systems than did those with such sections.

Table XXI details the relationship between usage of computerized cost accounting systems and usage of separate cost accounting sections. This relationship had a chi square value of 26.69861 and was significant not only at the .05 level, but also at the .0000 level. Proportionately more plants with separate cost accounting sections used computerized cost accounting systems than did those without such sections.

Research Question Seven

Are there relationships between (a) employment levels, (b) types of products, (c) hiring preferences, (d) usage of standard cost accounting systems, and/or (e) usage of job order and process cost accounting systems and usage of computerized cost accounting systems?

To resolve this research question, the investigator explored the relationships between (a) employment levels, (b) types of products, (c) hiring preferences, (d) usage of standard cost accounting systems, and (e) usage of job order and process cost accounting systems and usage of computerized cost accounting systems. Each of these five relationships is discussed.

TABLE XXI

RELATIONSHIP BETWEEN USAGE OF COMPUTERIZED COST ACCOUNTING SYSTEMS
AND USAGE OF SEPARATE COST ACCOUNTING SECTIONS

Usage of Computerized Cost Accounting Systems	Usage of Separate Cost Accounting Sections		Row Total
	Yes	No	
Yes	101 ^a 77.7 ^b 66.4 ^c 41.4 ^d	29 ^a 22.3 ^b 31.5 ^c 11.9 ^d	130 53.3
No	51 ^a 44.7 ^b 33.6 ^c 20.9 ^d	63 ^a 55.3 ^b 68.5 ^c 25.8 ^d	114 46.7
Column Total	152 62.3	92 37.7	244 100.0
Chi Square = 26.69861		Significance = .0000	

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

Table XXII details the relationship between employment levels and usage of computerized cost accounting systems. This relationship had a chi square value of 39.84082 and was significant not only at the .05 level, but also at the .0000 level. As plants increased in employment levels, their usage of computerized cost accounting systems also increased.

Table XXIII details the relationship between types of products and usage of computerized cost accounting systems. This relationship had a chi square value of 22.97954 and was significant not only at the .05 level, but also at the .0279 level. Proportionately more plants manufacturing electrical and electronic machinery, equipment, and supplies; machinery, except electrical; paper and allied products; and stone, clay, glass, and concrete products used computerized cost accounting systems than did those manufacturing textile mill products and lumber and wood products, except furniture.

Table XXIV details the relationship between hiring preferences and usage of computerized cost accounting systems. This relationship had a chi square value of 15.77451 and was significant not only at the .05 level, but also at the .0033 level. The table shows that for non-supervisory accounting positions, two-year community/junior college accounting graduates and then four-year college accounting graduates were preferred by plants which had computerized cost accounting systems, while two-year community/junior college and then high school graduates who have taken a bookkeeping class were preferred by plants

TABLE XXII

RELATIONSHIP BETWEEN EMPLOYMENT LEVELS AND USAGE OF
COMPUTERIZED COST ACCOUNTING SYSTEMS

Employment Levels	Usage of Computerized Cost Accounting Systems		Row Total
	Yes	No	
100 - 139 persons	14 ^a 27.5 ^b 10.7 ^c 5.7 ^d	37 ^a 72.5 ^b 32.5 ^c 15.1 ^d	51 20.8
140 - 249 persons	17 ^a 37.8 ^b 13.0 ^c 6.9 ^d	28 ^a 62.2 ^b 24.6 ^c 11.4 ^d	45 18.4
250 - 399 persons	22 ^a 47.8 ^b 16.8 ^c 9.0 ^d	24 ^a 52.2 ^b 21.1 ^c 9.8 ^d	46 18.8
400 - 699 persons	37 ^a 72.5 ^b 28.2 ^c 15.1 ^d	14 ^a 27.5 ^b 12.3 ^c 5.7 ^d	51 20.8
700 - 25,000	41 ^a 78.8 ^b 31.3 ^c 16.7 ^d	11 ^a 21.2 ^b 9.6 ^c 4.5 ^d	52 21.2
Column Total	131 53.5	114 46.5	245 100.0
Chi Square = 39.84082		Significance = .0000	

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

TABLE XXIII

RELATIONSHIP BETWEEN TYPES OF PRODUCTS AND USAGE OF
COMPUTERIZED COST ACCOUNTING SYSTEMS

Types of Products Manufactured	Usage of Computerized Cost Accounting Systems		Row Total
	Yes	No	
Apparel and other finished products made from fabrics and similar materials	6 ^a 42.9 ^b 4.6 ^c 2.4 ^d	8 ^a 57.1 ^b 7.0 ^c 3.3 ^d	14 5.7
Food and kindred products	7 ^a 43.8 ^b 5.3 ^c 2.9 ^d	9 ^a 56.3 ^b 7.9 ^c 3.7 ^d	16 6.5
Textile mills products	7 ^a 31.8 ^b 5.3 ^c 2.9 ^d	15 ^a 68.2 ^b 13.2 ^c 6.1 ^d	22 9.0
Fabricated metal products, except machinery and transportation equipment	9 ^a 42.9 ^b 6.9 ^c 3.7 ^d	12 ^a 57.1 ^b 10.5 ^c 4.9 ^d	21 8.6
Lumber and wood products, except furniture	5 ^a 29.4 ^b 3.8 ^c 2.0 ^d	12 ^a 70.6 ^b 10.5 ^c 4.9 ^d	17 6.9

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

TABLE XXIII (continued)

Types of Products Manufactured	Usage of Computerized Cost Accounting Systems		Row Total
	Yes	No	
Electrical and electronic machinery, equipment, and supplies	20 ^a	4 ^a	24
	83.3 ^b	16.7 ^b	
	15.3 ^c	3.5 ^c	
	8.2 ^d	1.6 ^d	9.8
Furniture and fixtures	7 ^a	8 ^a	15
	46.7 ^b	53.3 ^b	
	5.3 ^c	7.0 ^c	
	2.9 ^d	3.3 ^d	6.1
Machinery, except electrical	11 ^a	6 ^a	17
	64.7 ^b	35.3 ^b	
	8.4 ^c	5.3 ^c	
	4.5 ^d	2.4 ^d	6.9
Paper and allied products	10 ^a	4 ^a	14
	71.4 ^b	28.6 ^b	
	7.6 ^c	3.5 ^c	
	4.1 ^d	1.6 ^d	5.7
Printing, publishing, and allied industries	8 ^a	6 ^a	14
	57.1 ^b	42.9 ^b	
	6.1 ^c	5.3 ^c	
	3.3 ^d	2.4 ^d	5.7

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

TABLE XXIII (continued)

Types of Products Manufactured	Usage of Computerized Cost Accounting Systems		Row Total
	Yes	No	
Stone, clay, glass, and concrete products	9 ^a	5 ^a	14
	64.3 ^b	35.7 ^b	
	6.9 ^c	4.4 ^c	
	3.7 ^d	2.0 ^d	5.7
Rubber and miscellaneous plastic products	6 ^a	6 ^a	12
	50.0 ^b	50.0 ^b	
	4.6 ^c	5.3 ^c	
	2.4 ^d	2.4 ^d	4.9
Other	26 ^a	19 ^a	45
	57.8 ^b	42.2 ^b	
	19.8 ^c	16.7 ^c	
	10.6 ^d	7.8 ^d	18.4
Column Total	131	114	245
	53.5	46.5	100.0
Chi Square = 22.97954		Significance = .0279	

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

TABLE XXIV
 RELATIONSHIP BETWEEN HIRING PREFERENCES AND USAGE OF
 COMPUTERIZED COST ACCOUNTING SYSTEMS

Hiring Preferences for Non-Supervisory Accounting Positions	Usage of Computerized Cost Accounting Systems		Row Total
	Yes	No	
Unskilled employees and train them on the job	4 ^a	8 ^a	12
	33.3 ^b	66.7 ^b	
	3.1 ^c	7.2 ^c	
	1.7 ^d	3.3 ^d	5.0
High school graduates who have taken a bookkeeping class	18 ^a	34 ^a	52
	34.6 ^b	65.4 ^b	
	14.0 ^c	30.6 ^c	
	7.5 ^d	14.2 ^d	21.7
Two-year community/junior college accounting graduates	52 ^a	39 ^a	91
	57.1 ^b	42.9 ^b	
	40.3 ^c	35.1 ^c	
	21.7 ^d	16.2 ^d	37.9
Four-year college accounting graduates	32 ^a	13 ^a	45
	71.1 ^b	28.9 ^b	
	24.8 ^c	11.7 ^c	
	13.3 ^d	5.4 ^d	18.8
Other persons	23 ^a	17 ^a	40
	57.5 ^b	42.5 ^b	
	17.8 ^c	15.3 ^c	
	9.6 ^d	7.1 ^d	16.7
Column Total	129	111	240
	53.8	46.3	100.0
Chi Square = 15.77451		Significance = .0033	

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

which did not have computerized cost accounting systems. However, proportionately more plants with computerized cost accounting systems than without them preferred two-year community/junior college accounting graduates.

Table XXV details the relationship between usage of standard cost accounting systems and usage of computerized cost accounting systems. This relationship had a chi square value of 12.63936 and was significant not only at the .05 level, but also at the .0018 level. Plants both with and without computerized cost accounting systems tended to use standard cost accounting systems; however, proportionately more plants with computerized cost accounting systems used standard cost accounting systems than did those without computerized cost accounting systems.

Table XXVI details the relationship between usage of job order and process cost accounting systems and usage of computerized cost accounting systems. This relationship had a chi square value of only 6.99795 and was not significant at the .05 level.

Summary

This chapter contained the results of this study. It included the presentation and analyses of the survey response rates and the presentation and analyses of the seven research questions. This chapter is summarized below.

Of the 303 returned questionnaires, the six returned by the post office and the 52 not filled in but usually containing written

TABLE XXV

RELATIONSHIP BETWEEN USAGE OF STANDARD COST ACCOUNTING SYSTEMS AND
USAGE OF COMPUTERIZED COST ACCOUNTING SYSTEMS

Usage of Standard Cost Accounting Systems	Usage of Computerized Cost Accounting Systems		Row Total
	Yes	No	
Yes	95 ^a 62.1 ^b 72.5 ^c 38.8 ^d	58 ^a 37.9 ^b 50.9 ^c 23.7 ^d	153 62.4
No	26 ^a 37.1 ^b 19.8 ^c 10.6 ^d	44 ^a 62.9 ^b 38.6 ^c 18.0 ^d	70 28.6
Only for certain products	10 ^a 45.5 ^b 7.6 ^c 4.1 ^d	12 ^a 54.5 ^b 10.5 ^c 4.9 ^d	22 9.0
Column Total	131 53.5	114 46.5	245 100.0
Chi Square = 12.63936		Significance = .0018	

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

TABLE XXVI

RELATIONSHIP BETWEEN USAGE OF JOB ORDER AND PROCESS COST ACCOUNTING SYSTEMS AND USAGE OF COMPUTERIZED COST ACCOUNTING SYSTEMS

Usage of Job Order and Process Cost Accounting Systems	Usage of Computerized Cost Accounting Systems		Row Total
	Yes	No	
Job order	37 ^a 60.7 ^b 29.6 ^c 15.5 ^d	24 ^a 39.3 ^b 21.2 ^c 10.1 ^d	61 25.6
Process	58 ^a 55.2 ^b 46.4 ^c 24.4 ^d	47 ^a 44.8 ^b 41.6 ^c 19.7 ^d	105 44.1
Job order and process	21 ^a 47.7 ^b 16.8 ^c 8.8 ^d	23 ^a 52.3 ^b 20.4 ^c 9.7 ^d	44 18.5
Neither job order nor process	9 ^a 32.1 ^b 7.2 ^c 3.8 ^d	19 ^a 67.9 ^b 16.8 ^c 8.0 ^d	28 11.8
Column Total	125 52.5	113 47.5	238 100.0
Chi Square = 6.99795		Significance = .0720	

^aNumber of observations^cPercent of column total^bPercent of row total^dPercent of total observations

explanations could not be employed in the computer analyses. Although 49 of these questionnaires were from plants still in operation, there appeared to be little employment opportunity for cost accountants in these because the majority had accounting services performed at other locations. The remaining 245 questionnaires used for computer analyses comprised 80.9 percent of the survey response and 51.0 percent of the population. The data contained on these 245 questionnaires completed by first-line accounting supervisors in Virginia manufacturing plants are summarized.

All 45 cost accounting skills included on the questionnaire were needed in at least 77.2 percent of the responding plants. The data indicated that an elementary level of proficiency in one skill, an intermediate level of proficiency in 25 skills, and an advanced level of proficiency in 19 skills were needed in these plants. Additionally, a majority of respondents denoted that 43 and a plurality denoted that 2 of these 45 cost accounting skills should be acquired through a combination of school and job training.

The highest number of respondents preferred to hire two-year community/junior college accounting graduates for non-supervisory accounting positions but other respondents considered different educational levels, and/or experience also to be important. Higher preferences were shown first for two-year community/junior college accounting graduates (37.9 percent), second for high school graduates who have taken a bookkeeping class (21.7 percent), and third for four-year

college accounting graduates (18.8 percent). Additionally, only 5.0 percent of the responding accountants preferred to hire unskilled employees and train them on the job.

The data also indicated that 62.3 percent of the plants had separate cost accounting sections and that 53.5 percent of them normally used computerized cost accounting systems, while the remaining 46.5 percent did not normally use such systems. Additionally, 71.4 percent of the plants used standard cost accounting systems at least for certain products and at least 88.2 percent of them used job order and/or process cost accounting systems.

Chi square tests of significance were employed to test nine relationships. Eight of these nine relationships were significant at the .05 level. The remaining relationship was not significant. There were relationships between (a) employment levels, (b) usage of standard cost accounting systems, (c) usage of job order and process cost accounting systems, and (d) usage of computerized cost accounting systems and usage of separate cost accounting sections. There were also relationships between (a) employment levels, (b) types of products, (c) hiring preferences, and (d) usage of standard cost accounting systems and usage of computerized cost accounting systems. The one relationship between usage of job order and process cost accounting systems and usage of computerized cost accounting systems was not significant at the .05 level.

Chapter 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

The complete study is summarized with a review of the problem situation, literature review, methodology, and discussion of the results. The conclusions and recommendations are then presented.

Problem

Seventeen of the 23 community colleges in the Commonwealth of Virginia offer two-year programs of study in accounting or in business with emphasis in accounting. The purpose of these programs is to supply Virginia with needed manpower and to afford the accounting graduates opportunities to locate employment in the Commonwealth.

Prior writers indicated a need for careful assessment of the demands of employers of two-year accounting graduates and demonstrated that comparatively little research has been undertaken relative to these graduates. Contradictory and insufficient research regarding cost accounting, a subject area usually included in two-year accounting programs, suggested a need for extensive exploration to determine the utility of cost accounting skills. Thus, the purpose of this research was to determine the utility of cost accounting skills to AAS accounting graduates for employment in selected Virginia manufacturing

plants. Proficiency levels of various cost accounting skills needed in these plants and the places for acquiring such skills were explored. The cost accounting systems used and hiring preferences for non-supervisory accounting positions were also ascertained. Additionally, the distributions of these plants when classified by employment levels, types of products, and usage of separate cost accounting sections were determined. Relationships between some of the above named variables were also explored.

Specifically, the study answered the following questions about selected Virginia manufacturing plants that employed at least 100 persons.

1. What proficiency levels of cost accounting skills are needed by AAS accounting graduates for employment in these plants?

2. Where should these cost accounting skills be acquired--in school, on the job, or through a combination of school and job training?

3. For non-supervisory accounting positions, do these plants prefer to hire (a) unskilled employees and train them on the job, (b) high school graduates who have taken a bookkeeping class, (c) two-year community/junior college accounting graduates, or (d) four-year college accounting graduates?

4. What are the distributions of these plants when classified by (a) employment levels, (b) types of products, and (c) usage of separate cost accounting sections?

5. Do these plants use (a) computerized, (b) standard, and/or (c) job order or process cost accounting systems?

6. Are there relationships between (a) employment levels, (b) usage of standard cost accounting systems, (c) usage of job order and process cost accounting systems, and/or (d) usage of computerized cost accounting systems and usage of separate cost accounting sections?

7. Are there relationships between (a) employment levels, (b) types of products, (c) hiring preferences, (d) usage of standard cost accounting systems, and/or (e) usage of job order and process cost accounting systems and usage of computerized cost accounting systems?

The research has significance for those individuals associated with Virginia community college accounting programs. Studies of this nature should be conducted to insure that such programs meet the needs both of the graduates and of the employers who depend on the Virginia Community College System for trained manpower.

Literature Review

The literature review contained discussions relative to two-year community college accounting programs. These discussions included (1) titles of accountants, (2) relationship of cost accounting and managerial accounting, and (3) findings of research studies. Each topic is considered.

Titles of accountants. Numerous titles were used to refer to community college accounting graduates as well as numerous titles used to refer to accounting positions they might obtain. The titles were explored, showing that they could be portrayed on a continuum ranging from bookkeeper to accountant with the remaining titles having interim job classification. Further discussions revealed that the bookkeeping and accounting fields have a common base; however, the accountant usually has been trained to perform a larger variety of duties.

Relationship of cost accounting and managerial accounting. In the 1960's, cost accounting and managerial accounting were separate course areas, with cost accounting applicability generally restricted to manufacturing industries. During the 1970's, the distinction between cost accounting and managerial accounting seemed to disappear in accounting literature and in many textbooks. Some disagreement with this expanded subject was found in current journal articles, and suggestions were being made to reverse the swing of the pendulum back toward traditional cost accounting.

Findings of research studies. Fourteen research studies, four of which involved the employment aspects of two-year accounting graduates, were presented. The studies are summarized in five topical areas: (1) schooling and job training requirements, (2) utility of cost accounting, (3) cost systems and computer systems, (4) relationships between variables, and (5) implications for further research.

1. Schooling and job training requirements. The research revealed that post-secondary schooling was necessary for most accounting and part of the bookkeeping positions although some bookkeeping jobs were available for high school graduates, especially those with prior experience. The studies also indicated that some accounting skills were being taught on the job.

2. Utility of cost accounting. Kaliski (1974) recommended that a study regarding cost accounting be conducted. Prior research had contained little detailed information about this subject area. The available data relative to cost accounting were contradictory, recommending both a need for increased cost accounting courses and their elimination; however, limitations in some studies were noted as possible reasons for the conflicting results. The literature revealed a need for further study regarding the utility of cost accounting skills.

3. Cost systems and computer systems. Yankow (1954) found that cost accounting systems were used in manufacturing industries. West (1973) and Clow (1967) determined that computers were used in larger firms. However, at least two-thirds of each sample in the following studies did not use computers: Stelter (1968), Moon (1970), Yandoh (1971), Watts (1974), and the smaller business sector in West. Yandoh experienced mixed reaction from his sample of two-year accounting graduates. Although the usage of data processing by these graduates was not extensive, they proposed increased instruction in the field.

Thus, Yandoh recommended further research regarding data processing in two-year programs. The literature revealed a need to determine if cost accounting and computerized cost accounting systems were being used in Virginia manufacturing plants.

4. Relationships between variables. Prior research indicated that there were relationships between certain variables. Relationships were found between (1) cost accounting skills and types of firms, (2) cost accounting skills and sizes of firms, (3) levels of skills and sizes of firms, and (4) computerized systems and sizes of firms. The literature suggested that when studying skills, the investigator should analyze the data not only in their total effect but in relationships between variables.

5. Implications for further research. The literature indicated that further studies regarding accounting should be conducted. Further research was recommended by Moon (1970) in order to improve textbook materials. Kaliski (1974) also recommended a study of cost accounting for the purpose of developing textbook materials. Ozzello (1967) concluded that two-year accounting courses should be continually evaluated. Yandoh (1971) suggested additional research regarding the usage of computer skills by two-year accounting graduates. West (1973) suggested that industrial accounting supervisors should be used to aid in curricular revision, while Yankow (1954) recommended further research to determine the current industrial practices.

The literature revealed a need for further study of two-year

accounting programs. Only four studies regarding the skills needed by two-year accounting graduates for employment were located. Three of these studies were at least six years old, were not conducted in Virginia, and did not focus on cost accounting. The fourth study was conducted in Virginia but did not focus on cost accounting or manufacturing. The present study was undertaken to provide needed additional research in regard to cost accounting skills needed by two-year accounting graduates for employment in Virginia manufacturing plants.

Methodology

The population was comprised of the 480 manufacturing plants that employed at least 100 persons in the Commonwealth of Virginia and whose employment level was listed in the Directory of Virginia Manufacturing, 1976-1977. The entire population was surveyed. The respondent in each plant was a first-line accounting supervisor chosen by the plant's chief executive. The questionnaire method was employed to obtain the data. The questionnaire was validated by two panels of experts and was also field-tested prior to large-scale mailings.

The analyses used by prior researchers were also employed as a basis for the design of this study. These analytical techniques included absolute frequencies, percentage frequencies, and chi square tests of significance. The .05 level of significance was used for chi square tests, and the chi square analyses included only comparisons

with expected frequencies of at least five in their smallest cells.

Results

The results of this study included the presentation and analyses of the survey response rates and the presentation and analyses of the seven research questions. These results are summarized below.

Of the 303 returned questionnaires, the six returned by the post office and the 52 not filled in but usually containing written explanations could not be employed in the computer analyses. Although 49 of these questionnaires were from plants still in operation, there appeared to be little employment opportunity for cost accountants in these because the majority had accounting services performed at other locations. The remaining 245 questionnaires used for computer analyses comprised 80.9 percent of the survey response and 51.0 percent of the population. The data contained on these 245 questionnaires completed by first-line accounting supervisors in Virginia manufacturing plants are summarized.

All 45 cost accounting skills included on the questionnaire were needed in at least 77.2 percent of the responding plants. The data indicated that an elementary level of proficiency in one skill, an intermediate level of proficiency in 25 skills, and an advanced level of proficiency in 19 skills were needed in these plants. Additionally, a majority of respondents denoted that 43 and a plurality denoted that 2 of these 45 cost accounting skills should be acquired through a combination of school and job training.

The highest number of respondents preferred to hire two-year community/junior college accounting graduates for non-supervisory accounting positions but other respondents considered different educational levels, and/or experience also to be important. Higher preferences were shown first for two-year community/junior college accounting graduates (37.9 percent), second for high school graduates who have taken a bookkeeping class (21.7 percent), and third for four-year college accounting graduates (18.8 percent). Additionally, only 5.0 percent of the responding accountants preferred to hire unskilled employees and train them on the job.

The data also indicated that 62.3 percent of the plants had separate cost accounting sections and that 53.5 percent of them normally used computerized cost accounting systems, while the remaining 46.5 percent did not normally use such systems. Additionally, 71.4 percent of the plants used standard cost accounting systems at least for certain products and at least 88.2 percent of them used job order and/or process cost accounting systems.

Chi square tests of significance were employed to test nine relationships. Eight of these nine relationships were significant at the .05 level. The remaining relationship was not significant. There were relationships between (a) employment levels, (b) usage of standard cost accounting systems, (c) usage of job order and process cost accounting systems, and (d) usage of computerized cost accounting systems and usage of separate cost accounting sections. There were

also relationships between (a) employment levels, (b) types of products, (c) hiring preferences, and (d) usage of standard cost accounting systems and usage of computerized cost accounting systems. The one relationship between usage of job order and process cost accounting systems and usage of computerized cost accounting systems was not significant at the .05 level.

Conclusions

Employing the 245 usable responses coded for this study, the following conclusions are rendered.

1. Based on the finding that 62.3 percent of the responding accountants indicated that their respective Virginia manufacturing plants used cost accounting skills extensively enough to maintain separate cost accounting sections and based on the finding that all 45 cost accounting skills included on the questionnaire were needed in at least 77.2 percent of these plants, it may be concluded that cost accounting skills are needed in Virginia manufacturing plants.

2. Since the responding accountants indicated that an elementary level of proficiency in one cost accounting skill, an intermediate level of proficiency in 25 cost accounting skills, and an advanced level of proficiency in 19 cost accounting skills were needed in their respective plants, it may be concluded that needed levels of proficiency in cost accounting skills in Virginia manufacturing plants vary with individual skills but that generally intermediate or advanced levels of proficiency in these skills are needed in these

plants.

3. Based on the finding that 71.4 percent of the respondents indicated that their respective Virginia manufacturing plants used standard cost accounting systems at least for certain products and based on the finding that at least 88.2 percent of these plants used job order and/or process cost accounting systems, it may be concluded that standard and job order and/or process cost accounting systems are used in over two-thirds of Virginia manufacturing plants.

4. Since the data indicated that usage of separate cost accounting sections and usage of computerized cost accounting systems increased directly with employment levels, it may be concluded that larger Virginia manufacturing plants generally maintain separate cost accounting sections and use computerized cost accounting systems whereas smaller Virginia manufacturing plants generally do not maintain separate cost accounting sections and usually rely on manual cost accounting systems.

5. Based on the findings that proportionately more plants with separate cost accounting sections used standard, job order and process, and computerized cost accounting systems than did plants without such sections, it may be concluded that Virginia manufacturing plants with separate cost accounting sections have greater usage of standard, job order and process, and computerized cost accounting systems than do those plants without such sections.

6. Because of the finding that for non-supervisory accounting

positions only 5.0 percent of the responding accountants indicated they preferred to hire unskilled employees and train them on the job, it may be concluded that Virginia manufacturing plants prefer to hire trained individuals for these positions.

7. Based on the finding that for non-supervisory accounting positions the responding accountants indicated higher preferences first for two-year community/junior college accounting graduates (37.9 percent), second for high school graduates who have taken a book-keeping class (21.7 percent), and third for four-year college accounting graduates (18.8 percent), it may be concluded that for non-supervisory accounting employees, two-year community/junior college accounting programs are the single most preferred source by Virginia manufacturing plants, with high schools and four-year colleges being the second and third sources respectively.

8. Based on the finding that for non-supervisory accounting positions the data indicated that accounting graduates of two-year community/junior and then four-year colleges were preferred by plants which had computerized cost accounting systems, it may be concluded that Virginia manufacturing plants using computerized cost accounting systems prefer as their first choice to employ two-year community/junior college accounting graduates and then as their second choice four-year college accounting graduates for these positions.

9. The findings of this study also indicated that for non-supervisory accounting positions, two-year community/junior college

accounting graduates and then high school graduates who have taken a bookkeeping class were preferred by plants which did not have computerized cost accounting systems. Therefore, it may be concluded that Virginia manufacturing plants without computerized cost accounting systems prefer as their first choice to employ two-year community/junior college accounting graduates and then as their second choice high school graduates who have taken a bookkeeping class for these positions.

10. The data also indicated that proportionately more plants with computerized cost accounting systems than without them preferred to hire two-year community/junior college accounting graduates for non-supervisory accounting positions even though respondents both in plants with computerized cost accounting systems and in those without such systems indicated that they preferred these two-year graduates for these positions. Thus, it may be concluded that Virginia manufacturing plants prefer two-year community/junior college accounting graduates trained to fill future openings in non-supervisory accounting positions primarily in plants with computerized cost accounting systems and secondarily in plants without computerized cost accounting systems.

Recommendations

The following recommendations based on the findings and conclusions of this study are presented. These recommendations are rendered for Virginia community colleges preparing AAS accounting

graduates for accounting positions in Virginia manufacturing plants.

This research has shown that Virginia manufacturing plants prefer to hire trained individuals for non-supervisory accounting positions and that two-year community/junior college accounting programs are the single most preferred source of this training. Thus, two-year community college accounting programs to prepare graduates for non-supervisory accounting positions in these plants should be offered.

For these non-supervisory accounting positions, cost accounting skills are needed. At least three-fourths of responding Virginia manufacturing plants used each of the 45 cost accounting skills included on the questionnaire and the majority used cost accounting skills extensively enough to maintain separate cost accounting sections. Therefore, Virginia community colleges preparing AAS accounting graduates for accounting positions in Virginia manufacturing plants should include as a part of these accounting programs all of the 45 cost accounting skills contained in this study.

The responding accountants also denoted the needed level of proficiency in each of these 45 cost accounting skills. These data indicated that needed levels of proficiency in cost accounting skills in Virginia manufacturing plants vary with individual skills but that generally intermediate or advanced levels of proficiency in these skills are needed in these plants. The levels of proficiency in these 45 cost accounting skills contained in this study should be used by

Virginia community colleges preparing AAS accounting graduates for accounting positions in these plants to aid in determining the degree of training in the various skills.

Standard and job order and/or process cost accounting systems are also used in over two-thirds of Virginia manufacturing plants. Thus, Virginia community colleges preparing AAS accounting graduates for accounting positions in these plants should include in-depth instruction in standard, job order, and process cost accounting systems in their training of these graduates.

The data also showed that Virginia manufacturing plants prefer two-year community/junior college accounting graduates trained to fill future openings in non-supervisory accounting positions primarily in plants with computerized cost accounting systems and secondarily in plants without computerized cost accounting systems. Therefore, Virginia community colleges preparing AAS accounting graduates for accounting positions in these plants should train their graduates in both computerized cost accounting systems and manual cost accounting systems; however, the former type of preparation should be emphasized.

For non-supervisory accounting positions, higher preferences were shown first for two-year community/junior college accounting graduates, second for high school graduates who have taken a book-keeping class, and third for four-year college accounting graduates. Thus, educational opportunities for all three groups should continue to be provided in the Commonwealth.

Only four prior studies regarding the skills needed by two-year accounting graduates for employment were located. Three of these studies were at least six years old. Since such research is useful in determining appropriate content for two-year accounting programs, additional studies regarding AAS accounting programs should be conducted. Studies focusing on other higher level courses such as intermediate accounting, income taxes, and auditing, are needed. Also needed are studies focusing on other areas of employment for accountants, such as in government, small business, and CPA firms.

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APPENDIX A

INSTRUMENT

QUESTIONNAIRE

Code Number

SECTION I

- 1. Approximately how many people does your company employ at your local plant? _____
- 2. Does your plant have a separate cost accounting section? (Select one answer.)
 - _____ (a) Yes
 - _____ (b) No
- 3. Does your plant use a standard cost accounting system? (Select one answer.)
 - _____ (a) Yes
 - _____ (b) No
 - _____ (c) Only for certain products
- 4. What type of cost accounting system does your plant use? (Select one answer.)
 - _____ (a) Job order cost accounting
 - _____ (b) Process cost accounting
 - _____ (c) Job order and process cost accounting
 - _____ (d) None of the above
 (Explain.) _____

- 5. Does your plant normally use a computerized cost accounting system? (Select one answer.)
 - _____ (a) Yes
 - _____ (b) No

- 6. For non-supervisory accounting positions, does your plant prefer to hire (Select one answer.)
 - _____ (a) Unskilled employees and train them on the job?
 - _____ (b) High school graduates who have taken a bookkeeping class?
 - _____ (c) Two-year community/junior college accounting graduates?
 - _____ (d) Four-year college accounting graduates?
 - _____ (e) Other persons? (Please specify.)

SECTION II

This section relates to accounting and bookkeeping positions in your plant which require some college training or comparable experience but not a four-year degree. Please answer the following questions in regard to these types of positions.

For each cost accounting skill listed on the following pages, first indicate the needed level of proficiency by checking one of the following:

- (1) Elementary level of proficiency needed--ELEM
- (2) Intermediate level of proficiency needed--INT
- (3) Advanced level of proficiency needed--ADV
- (4) Skill not needed--NO

Secondly, for each needed cost accounting skill, indicate the place where the skill should be acquired by checking one of the following:

- (1) In school--SCHOOL
- (2) On the job--JOB
- (3) Combination of school and job training--COMBO

APPENDIX B

QUESTIONNAIRE COVER LETTERS

COLLEGE OF EDUCATION
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY*Blacksburg, Virginia 24061*

DIVISION OF VOCATIONAL & TECHNICAL EDUCATION

June 6, 1977

Dear Chief Executive:

As chief executive of a manufacturing plant in the Commonwealth, you have an opportunity to help the community colleges in Virginia as well as a V.P.I. & S.U. doctoral student. I am conducting a study concerning the cost accounting skills needed by two-year community college accounting graduates for employment in Virginia manufacturing plants.

I would appreciate very much your endorsement of my study by forwarding the contents of this envelope to one of your first-line accounting supervisors, preferably one who directs individuals working in the area of cost accounting. The enclosed questionnaire was coded for the purpose of identifying nonresponding plants. Only summary results of the study will be printed, and no individual plant will be identified.

I sincerely appreciate your assistance, and I hope to have an opportunity to reciprocate your kindness.

Sincerely,

Mrs. Diana H. Clary

Enclosures

Please reply to:

Mrs. Diana H. Clary
105 Ginger Drive
Danville, Virginia 24541

COLLEGE OF EDUCATION
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY*Blacksburg, Virginia 24061*

DIVISION OF VOCATIONAL & TECHNICAL EDUCATION

June 6, 1977

Dear First-Line Accounting Supervisor:

I am conducting a study concerning the cost accounting skills needed by two-year community college accounting graduates for employment in Virginia manufacturing plants. Your chief executive has been supportive of my study by forwarding the contents of this envelope to you.

I would appreciate very much your taking time to complete and return the enclosed questionnaire. A return envelope is provided for your convenience. The questionnaire is coded so that I can determine which plants do not return them; however, individual plant data will not appear in the printed results.

Thank you for your kindness.

Sincerely,

Mrs. Diana H. Clary

Enclosures

Please reply to:

Mrs. Diana H. Clary
105 Ginger Drive
Danville, Virginia 24541

COLLEGE OF EDUCATION
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY*Blacksburg, Virginia 24061*

DIVISION OF VOCATIONAL & TECHNICAL EDUCATION

June 20, 1977

Dear Chief Executive:

About two weeks ago, you were mailed information concerning a research study I am conducting on the cost accounting skills needed by two-year community college accounting graduates for employment in Virginia manufacturing plants. To date I have not received a reply from a first-line accounting supervisor in your plant.

Enclosed is a copy of the information sent to you at that earlier date. I sincerely would appreciate your taking time to follow up my original request. The opinions of your plant's representative are vitally needed for successful completion of this study.

Thank you for your prompt attention to this matter.

Sincerely,

Mrs. Diana H. Clary

Enclosures

Please reply to:

Mrs. Diana H. Clary
105 Ginger Drive
Danville, Virginia 24541

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the scanned document**

THE UTILITY OF COST ACCOUNTING SKILLS TO AAS ACCOUNTING GRADUATES
FOR EMPLOYMENT IN SELECTED VIRGINIA MANUFACTURING PLANTS

by

Diana Hunter Clary

(ABSTRACT)

The purpose of this research was to determine the utility of cost accounting skills to AAS accounting graduates for employment in selected Virginia manufacturing plants. The population of 480 manufacturing plants employing at least 100 persons in the Commonwealth was surveyed. Of the 303 returns--63.1 percent of the population, 58 were not filled in but usually contained explanations, so these returns could not be coded for computer analyses. Although 49 of these questionnaires were from plants still in operation, there appeared to be little employment opportunity for cost accountants in most of these because the majority had accounting services performed at other locations. The remaining 245 returns--51.0 percent of the population--were employed to resolve the seven research questions. Absolute frequencies, percentage frequencies, and chi square tests of significance were used.

Employing the 245 usable responses for this study, the following major conclusions regarding Virginia manufacturing plants were rendered.

1. Cost accounting skills are needed in these plants.
2. Generally intermediate or advanced levels of proficiency in these cost accounting skills are needed.

3. Standard and job order and/or process cost accounting systems are used in over two-thirds of these plants.

4. For non-supervisory accounting positions, these plants prefer to hire trained individuals.

5. For non-supervisory accounting employees, two-year community/junior college accounting programs are the single most preferred source by these plants, with high schools and four-year colleges being the second and third sources respectively.

6. These plants prefer two-year community/junior college accounting graduates trained to fill future openings in non-supervisory accounting positions primarily in plants with computerized cost accounting systems and secondarily in plants without computerized cost accounting systems.

Recommendations rendered for Virginia community colleges preparing AAS accounting graduates for accounting positions in Virginia manufacturing plants were as follows:

1. Two-year community college accounting programs to prepare graduates for employment in non-supervisory accounting positions in these plants should be offered.

2. These community colleges should include as a part of these accounting programs all of the 45 cost accounting skills contained in this study.

3. The levels of proficiency in these 45 cost accounting skills contained in this study should be used to aid in determining

the degree of training in the various skills.

4. These community colleges should train their accounting graduates in both computerized cost accounting systems and manual cost accounting systems; however, the former type of preparation should be emphasized.

5. These community colleges should include in-depth instruction in standard, job order, and process cost accounting systems in their training of these graduates.

6. Since for non-supervisory accounting positions in these plants higher preferences were shown first for two-year community/junior college accounting graduates, second for high school graduates who have taken a bookkeeping class, and third for four-year college accounting graduates, educational opportunities for all three groups should continue to be provided in the Commonwealth.