PROPOSED TOPICS FOR A COMPUTER LITERACY PROGRAM IN VOCATIONAL BUSINESS EDUCATION IN KOREA

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CHAPTER I

THE RESEARCH PROBLEM

Introduction

Over the last two decades, the newly developed country of Korea has achieved a startling economic growth as a result of having thrown her full weight behind industrial development. Being at the threshold of a highly industrialized society, Korea sees a new need looming over the horizon - the human resource development to meet the manpower demand for the burgeoning computer information society.

Like other newly industrialized countries, Korea has stressed the role of education in the production of skilled human resources. Currently, as a result of the shift of industrial structures from intensive labor to technology --caused by rapid development --the educational system of Korea is faced with a need for a new manpower supply of office workers with computer literacy competencies. The new role of educational systems in responding to this need heightens concern for computer literacy programs in vocational business education at the commercial high schools and vocational training institutions.

The computer science program in commerical high schools

in Korea is a newly developing educational program offered since 1984 to meet the requirements of the burgeoning computer information society (Ministry of Education, 1984). The content of the introductory computer course is still undeveloped although a course of some sort is offered.

Statement of the Problem

At this point in time, no vocational secondary school in Korea has become involved in a computer literacy program. In addition, the government plan relates to the imposition of the course rather than its content. Hence, business educators and administrators of Korea are confronted with the following two definite problems:

1. The topics for a computer literacy program in vocational business education are, as yet, undefined.
2. The methods for implementing computer literacy curricula are not yet established.

The two problems have been studied and discussed by many business educators and computer educators in the United States since the late 1970's. Since the modern microcomputer technology and the expansion of the use of microcomputers in all business organizations in the United States are major factors in changing the present-day Korean society into a computer information-oriented society, providing computer literacy instruction to vocational high school students is one of the major new themes in vocational business education in Korea.

The problem of this research study was to identify and evaluate the content of the introductory data processing curriculum recommended by the Mid-America Vocational Curriculum Coordination Center and selected state Department of Vocational and Technical Education in the United States in order to develop guidelines to be used as a basis for proposing topics for a computer literacy program in vocational business education in Korea. As to the methods for implementing a computer literacy curriculum, several problems need to be resolved before carrying out the plan. For example, at what grade level should the course be taught (grade 10, 11, or 12)? What type of computer system is appropriate for the curriculum? And to what extent is the computer literacy education needed?

Purpose of the Study

The principle purpose of the study was to propose the topics for a computer literacy program in vocational business education at the commercial high school level in Korea. Such a proposed curriculum model for computer literacy will contribute in developing computer literate office workers and entry level data processors to meet the clerical manpower supply for the burgeoning computer information society of Korea. The findings of this research study may also provide useful information to assist business educators in developing computer literacy instruction at the commercial high school level.

A secondary purpose of the study was to determine the appropriate methods for implementing the proposed curriculum model for computer literacy at the commercial high school level in Korea.

To accomplish the above purposes, the researcher dealt with the following items. A questionnaire survey method used to evaluate the importance of selected computer literacy topics and to suggest appropriate method of impementing these topics;

1. Evaluate introductory data processing curriculum recommended by the vocational and technical education department of selected states in the United States.
2. Develop the content of a computer literacy curriculum to be proposed based upon the data processing curriculum guideline recommended by Mid-America Vocational Curriculum Coordination Center.
3. Consider a way to fit computer literacy topics into a commercial high school curriculum.
4. Determine the appropriate grade level to teach the proposed computer literacy topics.
5. Determine the extent of the need for the computer literacy curriculum.

Hypotheses

In order to explore the similarities of two groups responses to the questions of the computer literacy topics and the implementation method, the following twelve null hypothe-

ses were tested.

1. There is no significant difference (PR > 0.05) in the mean ratings for each content area between the data processing managers and the computer educators.
2. There is no significant difference (PR > 0.05) in the mean ratings for each topic between the data processing managers and the computer educators.
3. There is no significant difference (PR > 0.05) in the frequency of choice of level of programming skills between the data processing managers and the computer educators.
4. There is no significant difference (PR >0.05) in the frequency of choice of the type of programming language between the data processing managers and the computer educators.
5. There is no significant difference (PR > 0.05) in the frequency of choice of the grade level between the data processing managers and the computer educators.
6. There is no significant difference (PR > 0.05) in the frequency of choice of the type of computer system between the data processing managers and computer educators.
7. There is no significant difference (PR > 0.05) in the mean rating for Aukermans' four aspects of computer programming between the data processing managers and the computer educators.
8. There is no significant difference (PR > 0.05) in the

frequency of choice of the course of typing in English for computer operation between the data processing managers and the computer educators.

9. There is no significant difference (PR > 0.05) in the mean rating for the extent of the need of computer literacy between the data processing managers and the computer educators.
10. There is no significant difference (PR > 0.05) in the frequency of choice of the length of course between the computer educator and the data processing managers.
11. There is no significant difference (PR>0.05) in the frequency choice of the appropriate method for developing computer literate teachers between the computer educators and the data processing managers.
12. There is no significant difference (PR > 0.05) in the frequency choice of the appropriate method of implementing the proposed computer literacy curriculum between the computer educators and the data processing managers.

Assumptions Basic to the Study

For the purpose of the study, the following assumptions are made by the researcher:

1. There is a need for a computer literacy education program at the commercial high school level in Korea.
2. The development of a computer literacy program at the

commercial high school level will contribute to educate future entry level office workers in Korea.

3. Modern microcomputer technology and the data processing curriculum guideline developed by the Vocational Curriculum Coordination Centers in the United States will make some influence in developing introductory data processing curriculum in vocational business education in Korea.
4. The computer literacy program, if it is effective, must be based upon the needs of business, including such areas as manufacturing products, providing services, and dealing with experts.

Delimitations of the Study

The study did not attempt to assess the current introductory data processing curriculum in vocational business education in Korea offered since 1984. Excluded from the study are the analysis of instructional methods of computer literacy, how to measure computer literacy competency, the minimum knowledge-level requirement, and the evaluation of vocational data processing education in the commercial high schools in Korea. The study attempted only to propose an effective computer literacy curriculum at the commercial high school level in Korea based upon the content of the introductory data processing curriculum guidelines recommended by Mid-America Vocational Curriculum Cooperation Center and selected state Vocational and Technical Education Departments

in the United States.

Limitations of the Study

For the purpose of the study, the following limitations exist:

1. All Korean computer educators and data processing managers in the population of this study may or may not agree on the importance of computer literacy in vocational business education for future computer literate office workers.
2. Some Korean computer educators and data processing managers who received computer education/data processing training in the United States may have different viewpoints about the computer literacy topics than the viewpoint of others in the population who received computer education/data processing training in Korea.
3. Some respondents may reply to the questionnaire with no understanding of the importance of computer literacy because computer education in Korea is still in the beginning stage.
4. Korean computer educators and data processing professionals may or may not agree on the definition of computer literacy as stated on the questionnaire.

Definition of Terms

To help clarify and interpret the data, the following

terms are defined as they are used in this study:

Advanced level (computer fluency): Students study more complex computer applications and use the computer as a tool for solving business problems.

Commercial high school: Vocational high school in Korea which offers courses in business such as typing in English, bookkeeping (accounting), management, shorthand in English, and data processing.

Competency: A task (specific activity performed by a worker) that is performed to a certain standard.

Computer awareness level: At the awareness level of computer literacy, students develop a computer vocabulary and become aware of the computer, its development and its effects on society, including its capabilities and limitations.

Computer educators: A group of educators capable of providing leadership in the uses of computers in an educational setting. They are educators who use computers for instructional purposes. Those who are instructors of pure computer science at schools of mathematics and engineering are referred to as computer science educators in this study.

Computer literacy: Whatever understanding, skills and attitudes one needs to function effectively within a given social role that directly or indirectly involves computers (Anderson & KLassen, 1981)

Computer literacy curriculum/program: Curriculum content of computer literacy instruction with emphasis on the basic concept of computer hardware, software and data processing,

the computer operation and application, the social impact of computer, and the fundamental concepts of computer programming and algorithm.

Computer literacy education: Basic computer studies as a discipline of general business education in order that vocational business students may have a knowledge of (1) the development of information processing, (2) the fundamemtal concepts of computer hardware and software, (3) computer applications, (4) microcomputer operation, (5) the social impact of computer usage, and (6) basic concepts of computer programming and algorithm.

Computer literacy topics: The contents of computer literacy course.

Computer literate office worker: Office workers who have the ability to understand the capacity and limitation of computers, operate the microcomputer effectively, use developed computer software, and demonstrate the basic concept of computer systems.

Computer operation level: At the operational level students operate microcomputers and use developed computer software effectively.

Curriculum model/guideline: A standard representation of the curriculum content and the instructional method.

Data processing manager/professional: A person or group of experts who manage data processing centers of business firms and government.

Entry level data processor: Well-trained data processing

workers who have the ability to operate computers, perform data entry, and write simple BASIC programming.

Introductory data processing: Introduction to computers offered at the high school or vocational and technical school level to provide all high school students with a knowledge of computer hardware, software and data processing, computer operation, computer application, social impacts of computers, and minimal computer programming skills.

Software: A computer program that solves systems or application work.

Vocational Training Institutes: Area vocational and technical schools in Korea.

CHAPTER II

REVIEW OF THE LITERATURE

The purpose of this chapter is to present some background information for this study. The review involves research studies, relates developments pertinent to this study and cites opinions of recognized authorities in the related field. The five major areas to be covered are the issue of computer literacy, the need for computer literacy, the computer literacy proposals in the United States, the problem in developing computer literacy, and a brief review of the educational system in Korea with emphasis on vocational high school education.

The Issue of Computer Literacy

One dramatic change in the educational scene is the increasing use of microcomputer technology and instructional microcomputer software. Although microcomputers are only one decade old, they are already being used in secondary school education in many developed countries. With the advent of the low-cost microcomputer, the number of high schools with computers and computer literacy courses is increasing at a geometric rate.

From a national survey of 2,029 public, private and parochial elementary and secondary schools, a Johns Hopkins study (1983) reported that eighty-five percent of the schools surveyed have at least one microcomputer with at least forty percent having five or more microcomputers. Those high schools use their microcomputers to teach computer literacy and/or computer programming (Szymczuk, 1981). The Johns Hopkins data also suggest that as high schools become more experienced with microcomputers, computer literacy courses become a more important facet in the vocational high school curriculum.

Charp (1981) reported that some public school districts in California and Minnesota required that all students take a computer literacy course before graduation. The literature reveals that there is a national movement toward requiring computer literacy for high school graduation (National Council of Teachers of Mathematics, 1978; Molnar, 1978; Klassen,1981). Computer literacy was a novel term ten years ago, but it is today, and will be even more tomorrow, a basic competency needed by students at all educational levels.

There is some debate in the literature concerning what is meant by the term computer literacy. Some educators argue that it implies knowledge about computers, although there is disagreement as to whether this includes such areas as the history of computers, knowledge of the component parts of a computer, or familiarity with the application of computers in modern society.

Other writers use the term synonymously with computer programming. These differing definitions may lead to very different opinions of what topics should be included in a computer literacy course and to different grade levels as to when the topics should be introduced.

The major issues of computer literacy center on what is the precise definition of computer literacy, what is to be taught and when to introduce computer literacy. These issues will continue to be debated.

The Need for Computer Literacy

While the microcomputer became indispensable to the operation of business and government in the late 1970's, a clamor for computer literacy education at the secondary school level also began to burgeon in most developed countries. Generally speaking, its main educational goal was to provide all students with a knowledge and understanding about the nature of computers so that they can understand the rules which computers may play in an information society (Massat, 1981). The term of computer literacy was used to connote a general understanding of computer structure and operation, computer applications, and social impact of computers including minimal computer programming.

During the five years from 1980 to 1985, the tremendously expanding use of microcomputers and the rapidly growing microcomputer software of business applications provided a significant boost to both public and professional

concern over the need for computer literacy. Results from a survey in Minnesota clearly indicated that educators favored the inclusion of instruction to foster computer literacy among high school students (Anderson and Klassen, 1981). Hunter (1981) identified four reasons why computer literacy is needed:

1. Changing economy. The changing economy and society are rooted in new ways of generating, storing, communicating and using information. The people who live in the changing society-computer information society must arm themselves with understanding, skills, knowledge and tools to cope with these changes.

2. Changing jobs and professions. The changing nature of jobs resulting from the shift of society from the industrialized society to the information society required new skills needed to work. The most immediate impact is on office workers. Those office workers who do retain their jobs need new skills because typewriters are replaced with computer word processors; file cabinets are replaced with magnetic disks; mail is replaced with electronic communication networks. The typist no longer works with physical objects like paper files, physical layouts of papers, physical mail.

3. The promotion of equity in access to computers. Those who know how to access and use information and who know how to use computer technology are the people with the power to control industry, economics and social decision making. Those who don't understand the computer technology are increasingly

unemployed and alienated.

4. The need to encourage student skills. Students who have learned these skills in using information, in using computers and communications systems, in solving complex problems, will not only have better placement, but also will be better able to continue their learning, as technology enhances their opportunities regarding new specialities and industries.

Many educators have different reasons for thinking computer literacy is so important. The four reasons why computer literacy is important described above are applicable to the newly developed countries of the world including South Korea. Many observers of the role of microcomputer technology in society believe that if the gap between current technological capacity and the ordinary person's understanding of the technology is allowed to grow too wide the social and political, as well as scientific ramifications, are likely to be very serious (Molnar, 1981). The major objectives of computer literacy education is to produce computer literate persons and to reduce the gap between the microcomputer technology and the ordinary person's understanding of computers in order to develop the computer literate society.

A Region IV (Houston, Texas) Education Service Center mimeograph entitled "Microcomputer: Passing Fad or Educational Revolution?" explained the importance of computer literacy as a basic skill as follows:

> Society has already realized that a person who cannot read is denied access to information and education. In an increasingly technocratic society, a person who cannot interact with a computer will be denied access to information and ultimately to an equal education. Computer literacy will almost certainly become a new literacy skill for the future. Computer literacy will be just as important as reading, writing and arithmetic are today (1978. p. 3).

For the individual, an understanding of computer technology and uses is important because it reduces bewilderment about computers and promotes a balanced view of the computer's role in society. Such understanding also enables people to use and influence the design of computer based social services and to develop informed opinions regarding computer applications which have business and social implications. A lack of understanding and acceptance of computers could seriously impede the use of computers in solving various problems (Anderson and Klassen, 1981).

Understanding and knowing how to use computers-- computer literacy-- has become a fact of life for millions of vocational business students entering the world of work. National Business Education Association Task Force (1984), in their position paper on focus of computer literacy, emphasized the need for computer literacy for all citizens of tomorrow:

> All citizens must understand the capabilities and limitations of computer systems. This knowledge is essential for their participation in our information-oriented society. Business educators are prepared to accept a major role in providing computer literacy courses and programs for all students ... The use of the computer is basic to

the operation of business (P.5).

Computer literacy is an important basic skill needed by workers, particularly office workers, who live in information oriented society. Computer literate workers may be as important to the information society as energy and raw material are to the industrial society.

In what is perhaps the most complete analysis of the national need for computer literacy, Andrew Molnar (1978) concludes that there is:

> ... a national need to foster computer literacy. Further, if we are to meet this need, we must ensure that high school graduates have an understanding of the uses and applications of the computers in society and its effect upon their everyday lives... A nation concerned with its social needs and economic growth cannot be indiffrent to the problems of (computer) literacy. If we are to reap the benefits of science-driven industries, we must develop a computer literate society (p.36)

An important educational goal of computer literacy edcation in the developed countries is to develop a computer literate society. Morales (1977) pointed out that although the information industry in most developing countries is still in beginning stages, the teaching of computer literacy is actually as necessary as in the developed countries.

Korean government recogized recently the importance of computer education for future computer literate office workers by offering an introductory data processing course at the commercial high school in 1984 and by planning to open Vocational Training Centers for computer information process-

ing training in 1988 (Ministry of Education, 1984; Ministry of Labor, 1984).

Computer literacy is necessary for Korean society because the newly developed industrialized society of Korea is rapidly moving into the industrialized computer information society.

Computer Literacy Proposals in the United States

In 1984, the Policies Commission for Business and Economic Education (PCBEE) issued a statement entitled "Computer Literacy". The statement recommended that all students should be computer literate with the ability of understanding the computers capabilities and limitations, demonstrating a fundamental concept of computer, communicating with others using computer vocabulary, operating the computers, accessing information in the computer, performing data entry with speed and accuracy, and using the computer as a tool for solving problems. A position statement of PCBEE also stated that computer literacy is attained in three progressive levels of instruction: Awareness level, operation level, and advanced level. At the same time, it addressed that all business students should know how the use of computers can improve decision making in business. It contends that business educators should be the prime deliverers of computer literacy courses to all students.

National Business Education Association (NBEA) Task

Force on Computer Literacy (1984) recommended that the topics of computer literacy in awareness level are:

1. Historical development of information processing
2. Fundamental computer terminology
3. Overview of data processing cycle
4. The social impact of computer
5. Current status of computer technology
6. The use of computers as management tools
7. Selection, evaluation, and use of appropriate software package
8. Use of microcomputers for household records management, personal correspondance, and similar home applications
9. Operation of computer keyboard
10. Simple program in BASIC or other appropriate language

NBEA Task Force on computer literacy reveals that computer literacy for entry level data processing occupations is attained in two progressive instructional levels-operation and advanced level. The computer literacy topics in these two levels includes:

1. Preparation of input data to a computer system
2. Verification of input data accuracy
3. Interpretation of computer output
4. Use of computers to record, process, communicate, and store and retrieve data - data processing cycle in detail
5. Careers in computers

6. Operation of computer hardware
7. Use of computers to solve problems

Johnson (1980) proposed the topics of computer literacy with emphasis on computer awareness and algorithm for solving problems as follows:

1. Historical development of computer
2. Nontechnical computer vocabulary
3. Computer anatomy
4. Capabilities and limitations of computer
5. Use of computer
6. Business and scientific application
7. Scientific method of problem solving - algorithm for problem solving
8. Computer programming (if computer is available)
9. Problem solving tool
10. Social implications
11. Futuristics

In her computer literacy proposal, Johnson recommended no course prerequisite, low-level technical introductory computer concepts, three-fourths of course content on nonprogramming materials and one-fourth computer programming if computer is available. She suggested that the major objective of a computer literacy course at the high school level is to improve a students level of computer literacy. Many computer educators generally agreed that training computer programmers is not a career objective of the high school. Industry is apt to hire high school graduates as data entry or computer

operators. It is noteworthy that according to Feuer(1985), forty-eight percent of a total of 217,768 American business companies with fifty or more employees offered computer literacy training to their employees. This indicated that industry expects to hire workers who already possess computer literacy and basic computer skills, thus to avoid some of the need to do their own training.

There is some debate in the literature concerning whether or not computer programming should be included in the computer literacy curriculum. Luehrmann (1980) argued that specialized programming skills are needed to be computer literate. He exemplified the view of neglecting to teach programming skills in computer literacy course in the following words: "One who is truly computer literate must be able to 'do computing'- to conceptualize problems algorithmically, to represent them, in the syntax of a computer language, to identify conceptual 'bugs' and to express computational ideas clearly, concisely, and with a high degree of organization and readability" (Johnson, 1980).

Proponents of this view argued that only computer programming gave an essential "hands on" perspective and appreciation of problem-solving procedures and computer limitations that cannot be gained in any other way (Manning, 1981).

Other educators arguing computer literacy is not computer programming say that since the state of the art in computer programming is constantly advancing and since most

people are not going to become professional programmers, time should not be wasted in learning computer programming skills which might be effectively utilized later (Pritchard, 1982).

Barger (1983) proposed, by way of compromise between these two view points, computer literacy curriculum needs to provide the instructional topics for developing a standard of minimal understanding and ability in computer programming including the topics on computer awareness. He also proposed the term computer awareness is an understanding of computer structure and function and computer application and limitations, and the term computer literacy is an understanding of these two previous elements plus a basic concept of computer programming.

In 1982, Minnesota Computing Education Consortum (MCEC) reinforced these thought by proposing five major content areas of computer literacy: (1) Hardware, (2) Software and Data Processing, (3) Application of Computer, (4) Social Impact of Computer, (5) Programming and Algorithm. A survey study of instructional activities in Minnesota conducted by MCEC showed that a total of 2668 specific courses were reported as including the computer or computer topics in some way. Based upon the nature of the instructional computing activities involved, those 2668 courses were classified into four specific categories of instructional computing courses: computer programming, computer appreciation, computer studies, and computer-assisted instruction. These four categories are described as the following:

1. Computer programming-- this category centered around the fundamental concept of computer systems and programming skill. Courses in this category tended to emphasize the technical aspects of computer systems, the computer programming language such as BASIC, and the algorithm for solving problem. Fourteen percent of the 2668 courses were identified in this category.

2. Computer appreciation - this category reflects an effort to develop an understanding of the impact and general use of computers in society. Courses in these categories tended to emphasize the non-technical aspects of computer capabilities, the social, vocational, educational uses of computers, and public attitude toward computers. Ten percent of the 2668 courses were identified in this category.

3. Computer studies - this category contained courses and instructional units that combined computer programming and computer appreciation courses in this category which tended to emphasize computer programming with the instruction on the role and impact of computer in society. Nineteen percent of the 2668 courses were identified in this category.

4. Computer - assisted instruction (CAI) - this category included courses which used computers as instructional tools. It did not include any formal attempt to cover computer topics. It included hands-on experience and topics on how to use CAI for educational subjects.

Twenty percent of computer courses were placed in this category.

A field study was also conducted by MCEC study group to contrast the relative contributions of the above four types of computer courses on the development of computer literacy. The results showed that the students must be based in computer study courses advanced the most and in the following order: the computer programming courses, the CAI courses, and computer appreciation courses. Based upon the research findings, the content of a computer literacy course was outlined by the study group as follows (Anderson, Hanson, Johnson, and Klassen, 1982):

1. History of computers
2. How computers work
3. Control of computers
4. What computers can and cannot do
5. Characteristic of computers
6. The impact of computers on society
7. The application of computers
8. Computers and the future
9. Microcomputer operation
10. System library uses
11. Flowcharting
12. Computer programming in BASIC

At present, the MECC is conducting a project to develop instructional modules for computer literacy. The modules will be designed to be integrated as supplementary units into the

usual science, social studies and mathematics courses in junior and senior high schools. While some contend that the content of a comprehensive computer literacy course would be more effective if distributed across the curriculum (Austing, Cotterman, and Engel, 1977), there are still strong arguments for separate courses in computer literacy. Therefore, the modules will be written by the MECC such that they can be used in sequence as a course. However, the computer literacy modules can be used better to broaden the existing curricula than to be introduced as new courses (Anderson, 1981). The study group also decided that each module will contain computer-based learning activities designed to run on the APPLE II and other selected microcomputers.

Wood (1983) contended that when schools design computer literacy courses and units, they should consider the fact that more than eighty percent of computer use is directly related to business applications, while only twenty percent is science applications. He pointed out that the base of the entire business data system is computer literacy -- the broad, general understanding of data processing history, applications, equipment systems, people, and procedures. Also, he proposed the topics for computer literacy courses with emphasis on business data processing cycle should be as follows:

1. The development of data processing
2. Types of computers
3. The storage of data for reuse

4. Computer systems

5. The data processing cycle--an overview

6. Data processing cycle in detail

7. Careers in the computer world

8. Tomorrow's Computers

In this computer literacy proposal, the fundamental concept of system design, algorithm, flowcharting, and programming are proposed as subunits of the data processing cycle. The proposal also includes three projects: (1) written tasks and simulations for flowcharting, creating source documents, coding data, using numeric identifiers and clerical data handling tasks, (2) Analysis and use of data such as payroll, airline reservation, customer billing, and checking account, (3) Hands-on computer use for word processing, programming in BASIC, and commercial business programs.

Johnson (1982) recommended that flowchart, algorithm, and introductory BASIC, should be included as the units of a computer literacy course. She proposed the instructional units that enable students to conceptualize problems algorithmically and to understand a minimal knowledge of programming languages such as FORTRAN, COBOL, PASCAL, RPG, and PL/I.

The K-12 computer literacy curriculum guideline consisted of two broad topical areas of computer awareness and computer programming. Bitter(1982) proposed simple BASIC statements such as REM, INPUT, LET, PRINT, and GO TO

statement as the computer programming topics at the fourth grade level. All major BASIC statements such as IF, FOR-NEXT, DIM, two dimensional array, and files are the topics of sixth, seventh, and eighth grade level computer programming. He recommended PASCAL as the programming topics of eleventh and twelfth grade levels.

Massat (1981) contends that computer literacy courses are not computer science or computer programming per se, although a first course in computer literacy usually includes fundamental concept of programming, and simple programming experience.

Aukerman (1977) pointed out that business educators should educate their students in data processing principle classes at all educational levels for the intelligent use of data processing information. In other words, business educators should prepare wise consumers of computer output. He recommended the following four basic steps of computer programming that should be included in an introductory computer programming course for business students, regardless of the languages being taught:

1. Define the problem
2. Plan the program (step-by-step procedure in solving the problem)
3. Code the program
4. Debug the program-- correcting the errors in logic and the violations of the programming languages

In order to prepare students for a basic understanding

of the computer, it is essential to include Aukermans' four aspects of computer programming in the computer literacy curriculum as subunits of the topic of fundamental concepts of programming.

The Developmental Issues of Computer Literacy

The foregoing computer literacy proposals described in the previous section might be contributed in developing what topics to be taught in introductory computer literacy course at the high school level.

A knowledge and understanding of computer system and operation and computer application and limitations including the basic concept of computer programming have become a new basic skill needed by all secondary students, particularly vocational business students who are planning on entering the world of work.

The major developmental issues of computer literacy to be described in this section include: (1) Who should be computer literate, (2) Who provides computer literacy, and (3) The problem in developing computer literacy.

Who Should Be Computer Literate?

Many educators agree that all secondary school students should acquire some computer literacy (Monlar, 1978; Klassen, 1981). A growing number of school districts have implemented a computer literacy requirement for high school graduation.

Papert (1980) found that elementary school students can use computers to solve problems. Bitter (1982) proposed that computer awareness topics such as "what a computer is" can be introduced to kindergarten students. He also proposed LOGO as the programming topic for second grade levels. In fact, the trend of who needs computer literacy is directed toward all citizens today to understand the computer system. Particularly, vocational business students who plan to enter the world of work after high school graduation must acquire the practical computer literacy competencies needed by future office workers and entry level data processors.

File cabinets may be replaced with magnetic disks and mail with electronic communication networks. Typewriters are changed from electric to electronic and are acquiring the characteristics of computer terminals. New designs allow for the addition of storage systems, communication facilities, and video display and are linked to high-speed printers. Integration of word processing into an office provides the business organizations new flexibilities in office worker's assignments. The final product of the office worker's assignment is information, the raw material of information is data, and the process through which the raw material must go to become information is data processing. Processed data becomes inventory until needed for decision making within the organization. Office workers and entry level data processing workers are responsible for processing of data. The foundation for processing of data in today's business is rooted to

the computer system. Wood (1983) contended that computer literacy is the base of business data processing. The future office workers and entry level data processors should attain a sound knowledge of computer literacy through their secondary education. They have to update their computer knowledge acquired at high school when the microcomputer technology is advanced. The demand for computer literate office workers is growing in most developed countries. The newly developed country of Korea needs to develop computer literacy program at the commercial high schools to meet the demand of computer literate office workers and entry level data processors for business industries.

Who Should Provide Computer Literacy?

The place of computer literacy in the curriculum may depend on whether it is viewed as general education or a basic skill. In the past, social relevance was used to support the addition of computer science to the mathematic requirement that exists at many secondary schools and universities today. This rationale, besides assuming that practically anything can be justified on the grounds of social relevance, relies on the popular and problematic assumption that computer science, or even computer literacy, is a part of mathematical science. Although mathematics is useful to someone using a computer, language and logic are more useful. Computer scientists and mathematicians are not the only people who use computers. A major misconception is that com-

puter programming, and computer literacy in general, is hallowed and reserved only for computer scientists or mathematicians (Massat, 1981). This kind of misconception is also being dominated in the newly industrialized country of Korea. Clemmense (1985) and other authorities such as Wood (1983) argued that since more than eighty percent of computer use is directly related to business applications, business educators have the responsibility to provide computer literacy programs with emphasis on business applications. A position paper of the Policies Commission for Business and Economic Education (1985) addressed that business educators has a responsiblity to help all high school students develop business, economic, and computer literacy. Computer literacy is the basic knowledge of skills which enable students to become contributing members of an information society.

The position statement of National Council of Teachers of Mathematics (NCTM) entitled "Computers in the Classroom" revealed that computer literacy is not the sole province of mathematics as follows:

> ...an essential outcome of contemporary education is computer literacy. Every student should have first-hand experiences with both the capabilities and the limitations of computers through contemporary applications. Although the study of computers is intrinsically valuable, educators should also develop an awareness of the advantages of computers both in interdisciplinary problem-solving and as an instructional aid (P.408).

Nearly every educator agreed that computer literacy is useful and desirable for the liberally educated individual. Massat (1981) pointed out that since there are staffing prob-

lems in computers at the secondary school level, computer literacy courses are being taught by whichever department can acquire the teachers and the equipment. It was stated primarily by individuals with a background in areas other than computer science, such as business or mathematics (Raltson, 1981; Young, 1980). The literature concerning the place of computer literacy in the curriculum reveals that business education teachers are the prime deliverers of computer literacy courses to all students and have to help students develop computer literacy. Musselman and Smith (1979) indicated that data processing fit well in the business education department because all skills needed to become an efficient data processor are found in the business instructional programs.

The business educators of Korea have the responsibility of providing a sound computer literacy program that can educate their students for the intelligent use of data processing information.

The Problem in Developing Computer Literacy

Major trends have emerged in the development of computer literacy programs and courses. The pressure of modern microcomputer technology has caused an influx of vocational business students. These students as entry level data processors or office workers need to aquire knowledge in computer technology. The major consideration in developing computer literacy course is the notion of preparedness. There is some

agreement that mathematics courses are beneficial as preparation for learning computer systems. Mazlack (1980) reported that there is no significant difference between academic performance and academic discipline on learning computers and programming.

> No significant correlation was found between academic performance and academic disciplines in either actual program production or in test taking on programming topics.... There is no need to segregate students from different academic discipline due to concerns based on learning ability or interdisciplinary competitiveness... No significant difference was found in academic performance between genders... The correlations found between semester in school and academic performance were very low... It is not necessary to construct separate computer courses for those from differing discipline and levels of academic experience as there is no apparent need to be concerned with unequal capability (P.16).

There is no reason why mathematics courses are beneficial in learning computer programming. It may be useful in learning more scientific oriented computer applications.

Massat (1981) pointed out that the single most dominant problem in developing computer literacy program in secondary education is that of finding teachers who are both qualified and interested. The data processing teacher has a considerable responsibility in the success of computer literacy programs in secondary schools.

In a survey to assess the knowledge and attitudes of teachers K-12 toward computers in education, Stevens (1982) reported that a staggering ninety percent of teachers felt inadequate to teach computer literacy. Stevens' data suggest that a major problem in developing computer literacy is the

lack of teacher training in this area. Johnson (1980) described the need of teacher training for developing computer literacy program as follows:

> Regardless of the scope of the program, whether we believe in one approach or several instructional approaches, the teaching staff should have data processing training and practical experience in keypunching, computer concepts, and computer programming, as well as a thorough understanding of how computer applications are designed for business and industry. Without adequate professional background or literature professional seminars, workshops, and courses, the data processing program will not succeed (P.22).

The preceding statements illustrate three major points. First, computer literacy is a base of data processing. Second, computer literacy instructors must have practical experience in data processing and an understanding of computer applications in business and industry, and third, schools can have qualified computer literate teachers through an intensive professional seminar for data processing. Forman (1981) reported that many hardware companies have become deeply involved in developing and producing educational materials and seminars for computer literacy. Educational administrators not only need to understand the importance of computer roles in managing the school, but more importantly to understand the importance and nature of computing in learning and teaching. This computer literacy of educational administrators needs to be made visible, in the form of budget decisions, formal policy statements, and incentives provided for curriculum update and teacher training.

Another major consideration in developing computer

literacy is the teacher's ability to use computer assisted instruction (CAI) programs in teaching computer literacy.

The literature reveals that CAI, through tutorials and drill and practice, can enhance students' learning ability and improve lower level cognitive skills such as memory and comprehension (Dence, 1980; Carney,1986).

Computer literacy instructors must have the ability to select a good CAI program, and also they should structure the learning environment with CAI as the vehicle for students to develop better problem solving skills and individual learning processes.

Brief Review of Current Educational System in Korea with Emphasis on Vocational High School Education.

The modern school system in Korea began with the Education Law of 1949 rooted to the ladder types of American school system of 6-3-3-4. It was gradually evolved through a number of successive modification into the current school system.

The total period of study from kindergarten to graduate school is more than 22 years. This includes two years of preschool education, six years for elementary education, three years of middle school education, and three years of high school education. Higher education includes three to six years of undergraduate studies. two years or more for a masters degree program, and two years or more for earning a

doctoral degree.

The purpose of high school education in Korea is to provide higher common education on the basis of achievement in middle school education. High schools are classified into general high schools, vocational high schools, and other (fine arts, physical education, etc) high schools. Admission is granted to middle school graduates and those adjudged to be similarly qualified. All applicants have to take a high school entrance examination and they are allocated to schools by lottery within school districts of residence in the order of test results. Some eighty-eight percent of all middle school graduates enter high school.

General high schools are those which provide higher general education, and the rate of increase in enrollment has been higher for general high schools than for vocational high schools partly because the latter category of schools cannot accommodate all applicants. From the second year of the general high school, students are divided into courses of the humanities, natural sciences, and vocational training according to their preference and attitude.

Vocational high schools are those which provide specialized education in such fields as agriculture, engineering, commercial, and fishery and marine industry. In order to meet the growing need for skilled manpower in business and industry, efforts have been made to open new vocational high schools as well as to expand existing ones. The total number of vocational high schools is 669 which enroll 891,953

students. (See Table I) These figures are compared with the academic (general) high schools which number 905 and enroll 1,200,488. (See Table II)

The three major vocational high schools in terms of the number of students and manpower supply are commercial, comprehensive, and technical high schools. Commercial high schools have recently offered classes in computer science to meet the requirement of the burgeoning computer information society (Ministry of Education, 1984). These schools offer programs in basic theory and practice of accountancy, management, and clerical work. The major subjects are: book-keeping, business law, management, general business, typing in English, typing in Korean, shorthand in English, shorthand in Korean, data processing, and practice. Commercial high schools are major sources of clerical office workers in Korea.

Comprehensive high schools offer vocational courses in business, home economics, agriculture, and electronic data processing. Technical (engineering) high schools are responsible for training qualified technical personnel to keep pace with the government policy for the development of heavy and chemical industries.

In general, vocational high schools of Korea are classified into two major types of vocational schools-- technical and non-technical schools. Computer literacy programs in commercial high schools of Korea are greatly important to prepare students for a basic understanding of the computer

and to produce future computer literate office workers and entry level data processors.

TABLE I

STATUS OF VOCATIONAL HIGH SCHOOL

Classification	Schools	Boys	Girls	Co-ed	Students
Agricultural	61	13	-	48	55,121
Commercial	237	51	131	55	382,786
Comprehensive	201	37	50	114	198,906
Fishery & Marine	9	6	-	3	10,326
Technical	101	91	-	10	200,794
Vocational	35	4	18	13	44,020
Total	644	202	199	243	891,953

TABLE II

STATUS OF MIDDLE SCHOOLS AND HIGH SCHOOLS

Classification	Schools	Boys	Girls	Co-ed	Students
Middle school	2,325	586	540	1,199	2,735,625
General high school	905	345	296	264	1,200,448
Vocational high school	644	202	199	243	891,953
Others	44	9	3	32	44,619
Total	3,918	1,242	1,038	1,738	4,872,645

Summary

A thorough review of the related literature and research in the computer literacy and introductory vocational data processing area revealed a need for more studies to ascertain the topics to be taught to vocational business students who are future office workers or entry level data processors. Microcomputer technology has become indispensable to the operation of business. It is today, and will be even more tomorrow, the key of the changing business office environment, and therefore of developing data base management system needed by all future workers. As microcomputer technology becomes broadly integrated into all phases of human life, the necessity of computer literacy education becomes more significant. Computer literacy can be attained through the three progressive instructional levels-computer awareness, computer operation, and computer fluency (advanced level). There are many debates in the literature concerning what is meant by the term computer literacy. Generally speaking, there are two major definitional roots for computer literacy. One root is the variety of specialized literacies, e.g., technological literacy and the other root is general language literacy which encompasses reading, writing, and understanding. A definition of computer literacy which incorporates knowledge of computer awareness and operation, computer application and limitation, and minimal computer programming skill for computer fluency seems to receive more appreciation.

The computer literacy proposals described above are

remarkably similar in some respects and fairly different in others. They are similar in that they all emphasize the awareness of hardware, software, computer capability and limitation, social impact, and computer operation. And, they differ in that some of the proposals provide for indoctrination in computer programming topics whereas others do not.

In addition, five more conclusions are obtained from the review of related literature. First, the way to fit computer literacy into the high school curriculum have four different approaches: (1) to be a course in business education, (2) to be part of several courses, (3) to be a general education course and (4) to be a mini-course such as a workshop. Second, the computer programming languages frequently used for computer literacy programs are BASIC, LOGO, and PASCAL. BASIC is the most common programming language taught in secondary schools. Third, microcomputers have the ability to foster minimal computer programming and word processing skills in computer literacy classes and the features of low cost and easy operation and maintenance. It will be the appropriate computer equipment for courses in secondary computer education. Fourth, the major objective of introductory data processing courses is to educate students for the intelligent use of data processing information (Aukerman, 1977). It is essential to teach students about four aspects of computer programming such as define the problem, plan the program, code the program, and debug the program in computer literacy classes in order to enhance the basic understanding

of computers. Finally, an effective computer literacy program in vocational business education at the commercial high school level is greatly important to educate future computer literate office workers and entry level data processing personnel in Korea.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

This study examined introductory data processing curriculum guidelines recommended by the Mid - American Vocational Curriculum Coordination Center (MAVCCC) and by selected state Departments of Vocational and Technical Education (DVTE) in the United States in order to provide information to be used as a basis for proposing topics for a computer literacy program in vocational business education in Korea. The objectives of the study are (1) to propose the topics for a computer literacy program, and (2) to determine the method for implementing the computer literacy curriculum at the commercial high school level in Korea. This chapter contains a discussion of the following major procedures:

1. Development of the Study Instrument
2. Selection of the Population
3. Collection of the Data
4. Analysis of the Questionnaire Responses

Development of the Study Instrument

After evaluation of the introductory data processing curriculum guidelines recommended by MAVCCC and selected

state DVTE in the United States, the topics of computer literacy to be proposed were developed by the researcher. The result was a list of 17 topics under five major categories. The problems with regard to the implementation strategies for the proposed computer literacy curriculum were identified through the comprehensive literture review. A questionnaire was developed from a study of the literature and other research questionnaires concerned with computer literacy and business data processing programs. The research questionnaire was revised and validated through a review by professional computer educators. The questionnaire encompassed three sections including the following:

1. Computer Literacy Topics
2. Programming Knowledge
3. Curriculum Implementation Method

Section one, dealing with the computer literacy topics, contains 17 curriculum topics which are listed under five major areas of computer literacy: hardware; software and data processing; computer applications; social impact; and fundamental concepts of programming.

Section two, the programming knowledge components, covers five topics regarding computer programming.

These five topics are:

1. The need for completing a course of typing in English.
2. The need for teaching the fundamental concept of computer programming.

3. The type of programming languages appropriate for the course.
4. The level of programming knowledge which students should achieve.
5. The importance of Aukerman's four aspects of computer programming.

Section three, the curricular implementation components, asked for the respondents' viewpoints on the strategies for implementing the curriculum.

These six topics covered include:

1. The relative importance of computer literacy for commercial high school students.
2. The type of computer system used for the computer literacy course.
3. The program to develop computer literate teachers.
4. The grade level at which the program should be taught.
5. The course length.
6. The way to fit computer literacy into the commercial high school curriculum.

Section one of the study instrument was designed in such a manner that the computer literacy topics could be rated on a Likert-type scale, with values from one to five. A rating of one indicates that the topic, from the viewpoint of the repondent, is of no importance to the computer literacy program, and, a rating of five indicates that the topic is a highly important part of the computer literacy curriculum.

Section two and section three are designed in a way to get nominal data, with four exceptions which are the fifth question of section two and the first, third, and sixth question of section three. Those four questions used a Likert-type scale.

Selection of the Population

The appropriate representative samples were selected from two groups. Their views toward the importance of selected computer literacy topics and the appropriate implementing strategies are believed imperative. These groups are computer educators and data processing managers classified as follows:

1. Computer educators: This group is composed of instructors of data processing at colleges of business or divisions of business of higher education institutions. Computer science educators at colleges of engineering are not included because the study is concerned with computer literacy education at the non-technical vocational high school level.

2. Data processing managers/professionals: This group is composed of managers of data processing centers in business firms such as manufacturing products, providing services, and dealing with experts.

In general, the computer science educators are considered to have less background in business and management information systems while the computer educators at college

of business and data processing managers in business and industry are recognized as experts in computer information systems. Therefore, computer educators and data processing managers with computer experience in business applications are selected to represent experts' opinion concerning the computer literacy education at the commercial high school level.

To select the sample of computer educators, the researcher requested the list of computer educators at colleges of business from the Higher Education Bureau, Ministry of Education. A total of 45 educators were identified.

A comprehensive list of the business organizations in Korea was compiled from the Directory of Business Firms (1985). The top 45 business firms which have more than ten employees in the computer center were selected. One data processing manager from each firm was asked to participate in the research. Thus, a total population of 90 individuals were identified for this research study.

Collection of the Data

A copy of the survey instrument was distributed to each of the survey participants, together with a cover letter and an addressed, postage paid return envelope. In the cover letter, the purpose of the questionnaire, the need for the study and the importance of the reply from the respondent were explained. The cover letter was reproduced on Oklahoma State University stationery and co-signed by Dr. Richard

Aukerman, major advisor and doctoral committee chairman. If necessary to maximize the response rate, follow-up mailings were initiated to all nonrespondents.

In order to facilitate the data collection, a professor at Seoul National University, Seoul, Korea, served as an agent for this task. After the questionnaire was finalized, the researcher sent the 90 questionnaires to the agent. The agent conducted the mailing and any necessary follow-up.

On June 25, 1986, the researcher received the 77 returned questionnaires from the agent. This is an 85.5 percent response. The percentage of returns of the two groups is reported in Table III.

TABLE III

DISTRIBUTION OF SURVEY RESPONSES FOR THE TWO GROUPS

Groups	Sample Size	First Mailing		Follow-up Mailing		Total	
	A	B	B/A	C	C/A	D	D/A
Computer Educators	45	24	53.3%	13	28.8%	37	82.2%
D.P. Managers	45	30	66.6%	10	22.2%	40	88.8%
Total	90	54	54.6%	23	25.5%	77	85.5%

A : Sample size of each group
B : Total respondents from first mailing
C : Total respondents from follow-up mailing
D : Total respondents in the group

Analysis of the Questionnaire Response

The data gathered from the questionnaires was stored on data diskette by creating a data file for the use of Statistical Processing System (SPS) software developed by DBi Software Product Company.

The statistical analysis of the survey data was computed by using Trajectories Statistical Processing System (SPS) program. For the items using a Likert scale to collect data, the mean rating for each item was calculated, then one-way Analysis of Variance (ANOVA) was performed to test whether or not there was a significant difference among ratings by the two groups. If the result of ANOVA test is significant at the 0.05 level of probability, the value of significant F indicates that the greater mean is significantly larger than the smaller mean because the level of independant variable of the sample is two.

For the remaining items, percentages and frequencies were utilized to analyze data. Then, the Chi-square test was used to test whether or not the frequencies observed in the two groups differed significantly.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

The data gathered from the study instrument sent to selected computer educators and data processing managers in Korea focused on computer literacy topics, the description of teaching computer programming, and strategies for implementing a computer literacy curriculum. The findings of the study are presented from a detailed analysis of the responses to the study instrument.

Plan for Gathering and Analyzing Data

Section I of the study instrument consisted of 17 computer literacy topics in the five major areas-- Hardware, Software and Data Processing, Applications of Computers, Social Impact of Computers, and Fundamental Concepts of Programming. This section was planned to determine the relative importance of computer literacy topics to be pro- posed. The curriculum content of computer literacy in this section was developed through an evaluation of introductory data processing curriculum guidelines recommended by the Mid-American Vocational Curriculum Coordinator Center and by selected State Department of Vocational and Technical Education in the United States.

Section II of the study instrument included questions relevant to the teaching of computer programming to enhance the basic understanding of computers. The particular items selected for inclusion in this section were chosen through a review of related literature and other research questionnaires and suggestions from Oklahoma State University professors concerned with the information system area.

Specifically, section II contained questions asking the level of programming knowledege needed by students and the importance of each of the Aukermans' four aspects of computer programming in terms of how to communicate with computers.

Section III of the study instrument included questions relevant to the implementing strategies for a computer literacy curriculum. This section was designed to obtain responses regarding the grade level for instructing computer literacy, the length of the course, and the appropriate method for developing computer literate teachers.

Allowance was made in Section II and III of the questionnaire for the addition and clarification of "other" responses.

A Trajectories Statistical Processing System (SPS) was utilized to tabulate the responses of each item included in the questionnaire. An Analysis of Variance (ANOVA) was used to analyze the relative importance of computer literacy topics, Aukermans' four aspects for writing computer programs, and computer literacy for commercial high school students. The ordered data of ranking the appropriate method

for developing computer literate teachers and for fitting a computer literacy course in the commercial high school curriculum were derived from score data to apply one way ANOVA test. The other responses of frequency data in Section II and III were tabulated according to frequency of occurrence, percentages, and chi-square anaysis. The specific findings may be found in the various tables in the following discussion.

Data Analysis

Responses were received from the computer educators and the data processing professionals of Korea. The analysis of gathered data is split into three sections: (1) an analysis of the content of a computer literacy curriculum, (2) the description of teaching computer programming, and (3) the strategies for implementing the curriculum.

Section I, dealing with the importance of computer literacy topics, was sub-divided into five content areas: (1) Hardware, (2) Software and Data Processing, (3) Applications of Computers, (4) Social Impact of Computers, and (5) Fundamental Concepts of Programming. Each content area was analyzed by the use of a one-way ANOVA test. If the result of the ANOVA test reveals significant differences at the 0.05 level in the mean rating between the two groups, a significant F-Ratio indicates the greater mean is significantly larger than the smaller mean since the level of independant variable of the sample is two.

Section II, a description of teaching computer programming, was sub-divided into five major parts: (1) the need for taking a course of typing in English for computer operation, (2) the need for teaching computer programming, (3) programming language, (4) the level of programming skill, and (5) the importance of Aukermans' four aspects of computer programming. The first four topics were analyzed using the frequency of occurrence, percentages, and chi-square analysis. The fifth topic was analyzed using the ANOVA test.

Section III, the stategies for implementing the curriculum, was sub-divided into six major parts: (1) the extent of the need for the computer literacy, (2) the type of computer systems, (3) the appropriate method for developing computer literate teachers, (4) the grade level for instructing computer literacy, (5) the length of course, and (6) the way to fit a computer literacy course into the commercial high school curriculum. The first and third topic were analyzed using the ANOVA test. The second, fourth, and fifth topic were analyzed using frequency of occurence, percentages, and chi-square analysis. The sixth topic concerning a question ranking the appropriate method for implementing computer literacy was analyzed by using a one way ANOVA test.

Analysis of the Content of a Computer Literacy Curriculum

The five major content areas for computer literacy identified earlier in this study were: (1) Hardware, (2) Software and Data Processing, (3) Applications of Computers, (4) Social Impact of Computers, and (5) Fundamental Concepts of Programming. These five areas consisted of 4, 5, 2, 3, and 3 topics, respectively. The computer educators and data processing managers in Korea were asked to rate the relative importance of each topic on a one to five Likert-type scale. A rating of one meant the respondents considered this topic of no value or importance for a computer literacy curriculum. A rating of five indicated the topic was very important for a computer literacy curriculum. A rating of two, three, and four indicated that the topic was somewhat important, moderately important, and important for a curriculum content of computer literacy, respectively.

The mean rating of the relative importance for each of the 17 seperate topics was calculated. The value of each topic in each of the five content areas was added to form a content area total. This total was divided to derive a content area mean, then analysis of varience was performed to determine whether the mean was statistically significantly different between the computer educators and the data processing professionals for each separate topic and each of the five content areas. For the five major curriculum content areas, a significant F-Ratio indicated the greater mean is

significantly larger than the smaller mean if the ANOVA test revealed a statistically significant difference between the two groups mean ratings.

Content Area I: Hardware

As presented in TABLE IV, page 59, the computer educators' mean rating was slightly higher than the data processing managers mean rating on Hardware.

The result of ANOVA test for the curriculum content area I is shown in Table V on page 60. It indicates an F-ratio of 0.02 which was not significant at the 0.05 level of probability. This suggests that there was no statistically significant difference in the mean rating for the content on Hardware between the two groups. In other words, the value of importance of proposed topics on Hardware for a computer literacy program was similar.

Table VI on page 61 shows the mean responses for each topic of the content area of Hardware. The four topics with a PR value greater than the value of significant level 0.05 were considered to have no significant differences in the two groups mean. Despite the different importance ratings given to each topic, a similiarity in the responses of the two groups existed. The topic of Historical Development of Computers was given the lowest rating by the data processing professionals and the computer educators. The topic of Major Components of a Computer System was given the highest rating by the data processing professionals. The computer educators

rated the topic of Input/Output Device and Media as the most important topic on Hardware. It is interesting to note that the average mean rating of these two topics concerned with the component of a computer system and the input/output units was different by 0.01 point. It indicates that the respondents in each group had the same viewpoint to the importance of the topic of major components of a computer system and its function.

Content Area II: Software and Data Processing

As presented in Table IV, page 59, the computer educators mean rating was higher than the data processing professionals mean ratings by 0.02 points on the area of Software and Data Processing. The result of ANOVA test in Table VII on page 62 reveals an F-Ratio of 0.07 which was not significant at the 0.05 level of probability. This indicates there was no significant difference in the mean ratings for the curriculum content area of Software and Data Processing between the computer educators and the data processing professionals.

Table VIII, page 63, shows the mean rating for each topic in content area II. An F-Ratio 8.85 of the topic, System Software and its Function, is greater than the table value of 3.81 at the 0.05 level. It indicates the mean rating given by the data processing professionals was significantly larger than that of computer educators. It suggests that the data processing professionals viewed the topic of System

Software and its Function as important for a computer literacy program.

Content Area III: Applications of Computers

As presented in Table IV, page 59, the computer educators mean rating was higher than the data processing professionals mean rating on the content area of Applications of Computers. The ANOVA test depicted in Table IX, page 64, indicates an F-ratio of 9.73 which was significantly different at the 0.05 level between the two groups in their view toward the importance of topics on Applications of Computers for the computer literacy instruction. In other words, the viewpoint of respondents on Applications of Computers was significantly different.

Table X on page 65 shows the mean responses for each topic in content area III. It reveals that the F-Ratio of the topic, The Role of the microcomputer and its operation, was significant at the 0.05 level. The mean ratings given by the computer educators was significantly larger than that of the data processing professionals. It suggests that the computer educators placed more importance on the role of microcomputer and its operation for a computer literacy program.

TABLE IV

MEAN RATINGS FOR THE FIVE CONTENT AREAS

Content Areas	Computer Educator Mean (SD)	Rank	Data Processing Professionals Mean (SD)	Rank	Combined Groups Mean (SD)	Rank
Hardware	3.29 (1.08)	4	3.28 (1.16)	5	3.28 (1.21)	4
Software & data processing	3.56 (0.97)	3	3.54 (0.96)	2	3.55 (1.22)	3
Applications of computers	3.94 (0.84)	2	3.45 (0.79)	3	3.69 (0.94)	2
Social impact of computers	3.11 (0.96)	5	3.42 (1.06)	4	3.26 (0.72)	5
Fundamental concepts of programming	4.00 (1.12)	1	3.84 (0.96)	1	3.92 (0.63)	1

(SD) Standard Deviation

TABLE V

ANALYSIS OF VARIANCE FOR CONTENT AREA I--
HARDWARE

Sourse	DF	Mean Square	F-Ratio	PR
Factor(A)	1	0.15	0.02	0.8828
Error	75	6.79		
Total	76	6.94		

Responses from Computer Educators: 37
Responses from Data Processing Professionals: 40

TABLE VI

MEAN RATINGS FOR EACH TOPIC IN CONTENT AREA I--
HARDWARE

Topic	Computer Educator Mean (SD)	D.P. Managers Mean (SD)	Combined Groups Mean (SD)	ANOVA F-Ratio (PR)
Historical development of computers	2.29 (1.27)	2.40 (0.95)	2.35 (1.11)	0.16 (0.6928)
Major components of a computer	3.49 (1.19)	3.82 (1.06)	3.66 (1.13)	1.74 (0.183)
Data representation & number systems	3.54 (0.98)	3.17 (1.12)	3.51 (1.07)	0.07 (0.788)
I/O devices & media	3.84 (1.13)	3.52 (0.98)	3.67 (1.06)	1.68 (0.196)

ANOVA : Analysis of Variance, (SD): Standard Deviation
(PR): Probability

TABLE VII

ANALYSIS OF VARIANCE FOR CONTENT AREA II--
SOFTWARE AND DATA PROCESSING

Source	DF	Mean Square	F-Ratio	PR
Factor (A)	1	0.83	0.07	0.7881
Error	75	11.87		
Total	76	12.70		

Responses from the computer educators : 37
Responses from the data processing professionals : 40

TABLE VIII

MEAN RATING FOR EACH TOPIC IN CONTENT AREA II--
SOFTWARE AND DATA PROCESSING

Topics	Computer Educators Mean	D.P. Managers Mean	Combined Groups Mean	ANOVA F-Ratio
Methods of storing and retrieving information	4.16 (0.96)	3.97 (0.83)	4.05 (0.89)	0.61 (0.5567)
Distributed data processing network	3.51 (1.07)	3.48 (0.89)	3.51 (0.97)	0.003 (0.9553)
Word processing & electronic mail	3.27 (0.02)	3.07 (0.96)	3.17 (0.58)	1.44 (0.232)
System software & its function	3.38 (0.79)	3.67 (0.50)	3.61 (0.38)	*8.85 (0.0042)
Utilization of packaged software	3.46 (1.30)	3.37 (1.19)	3.40 (1.24)	0.15 (0.7016)

ANOVA : Analysis of variance, (SD) : Standard Deviation
(PR) : Probability
* Significant at the 0.01 level

TABLE IX

ANALYSIS OF VARIANCE FOR CONTENT AREA III--
APPLICATIONS OF COMPUTERS

Source	DF	Mean Square	F-Ratio	PR
Factor (A)	1	25.06	9.73	0.0029*
Error	75	2.57		
Total	76	27.63		

Responses from the computer educators : 37
Responses from the data processing professionals : 40
* Significant at the 0.01 level

TABLE X

MEAN RATINGS FOR EACH TOPIC IN CONTENT AREA III--
APPLICATIONS OF COMPUTERS

Topic	Computer Educators Mean (SD)	D.P. Managers Mean (SD)	Combined Groups Mean (SD)	ANOVA F-Ratio (PR)
The use of computers in business & other organizations	4.00 (1.08)	3.70 (1.32)	3.84 (1.21)	1.17 (0.2826)
The role of the microcomputer & its operation	3.89 (0.96)	3.20 (0.77)	3.53 (0.50)	8.53 *(0.0048)

ANOVA : Analysis of Variance (SD) : Standard Varience
(PR) Prabability
* Significant at the 0.01 level

Content Area IV: Social Impact of Computers

As presented in TABLE IV, page 59, the data processing professionals mean rating was higher than the computer educators mean ratings on the content area of Social Impact of Computers. The analysis of varience in Table XI reveals an F-ratio of 0.03, which was not a significant difference at the 0.05 level in the mean ratings btween the computer educators and the data processing professionals. This suggests that there was no significant difference between the two groups with respect to their opinions toward the importance of the content area of Social Impact of Computers.

TABLE XI

ANALYSIS OF VARIANCE FOR CONTENT AREA IV--
SOCIAL IMPACT OF COMPUTERS

Source	DF	Mean Square	F-Ratio	PR
Factor(A)	1	0.15	0.03	0.8592
Error	75	5.61		
Total	76	5.76		

Responses from the computer educators : 37
Responses from the data processing professionals : 40

Table XII on page 67 shows the mean ratings for each topic in the content area of Social Impact of Computers. It reveals that respondents in each group did not emphasize the

importance of computer security and privacy. It suggests that the computer educators and the data processing professionals of Korea viewed the curricular content of Social Impact of Computers as not important topics for a computer literacy program. The data processing managers mean ratings of the topics concerned with the impact of computers in society was slightly higher than that of the computer educators.

TABLE XII

MEAN RATINGS FOR EACH TOPIC IN CONTENT AREA IV--
SOCIAL IMPACT OF COMPUTERS

Topic	Computer Educators Mean (SD)	D.P. Managers Mean (SD)	Combined Group Mean (SD)	ANOVA F-Ratio (PR)
Careers in data processing	3.40 (0.83)	3.25 (1.10)	3.32 (0.98)	0.48 (0.5024)
The impact of computers on people	3.13 (1.06)	3.35 (1.00)	3.25 (1.03)	0.84 (0.6347)
The impact of computers on organization	3.62 (0.95)	3.65 (1.07)	3.64 (1.01)	0.01 (0.9174)

ANOVA: Analysis of Variance, (SD): Standard Deviation, (PR): Probability.

Content Area V: Fundamental Concepts of Programming

As presented in Table IV, page 59, the computer educators mean ratings was slightly higher than the data processing professionals mean ratings by approximately 0.34 points on the content area of Fundamental Concepts of Programming. The analysis of variance from Table XIII reveals an F-ratio of 0.85 which was significant at the 0.638 level of probability. This indicates that there was no statistically significant difference at the 0.05 level of probability between the two groups with respect to their viewpoint toward the importance of Fundamental Concepts of Programming for a computer literacy program. It suggests that a computer literacy curriculum should include the topics on the basic concepts of computer programming in order to enhance the basic understanding of computers.

TABLE XIII

ANALYSIS OF VARIANCE FOR CONTENT AREA V--
FUNDAMENTAL CONCEPTS OF PROGRAMMING

Source	DF	Mean Square	F-Ratio	PR
Factor(A)	1	4.34	0.85	0.6377
Error	75	5.12		
Total	76	9.46		

Responses from the computer educators : 37
Responses from the data processing professionals : 40

Table XIV shows the mean ratings for each topic in the curriculum content of Fundamental Concepts of Programming. An F-Ratio of 0.0273 of the topic Simple Programming in BASIC shown in Table XIV indicates that the mean value of the computer educators is significantly greater than that of the data processing managers. This statistic shows that the computer educators emphasized the necessity of teaching simple BASIC programming in the computer literacy course.

TABLE XIV

MEAN RATINGS FOR EACH TOPIC IN CONTENT AREA V--
FUNDAMENTAL CONCEPTS OF PROGRAMMING

Topic	Computer Educators Mean (SD)	D.P. Managers Mean (SD)	Combined Groups Mean (SD)	ANOVA F-Ratio (PR)
Understanding programming concepts and computer languages	4.27 (0.99)	4.15 (0.69)	4.21 (0.85)	0.38 (0.5466)
Flowcharting and algorithm	3.97 (1.12)	4.20 (0.68)	4.09 (0.92)	1.17 (0.2826)
Simple programming in BASIC	3.76 (1.21)	3.17 (1.08)	3.45 (1.17)	4.95 *(0.0273)

ANOVA: Analysis of Variance, (SD): Standard Deviation
(PR): Probability
* Significant at the 0.05 level

Summary

The result of the ANOVA test on each curriculum content area of computer literacy, as depicted in Tables V (page 60), VII (page 62), IX (page 64), XI (page 66), and XIII (page 68), indicated that out of five main content areas, the content area of Application of Computers was the only content area with a significant difference in the two groups mean rating. The other four curriculum content areas-- Hardware, Software and Data Processing, Social Impact of Computers, and Fundamental Concepts of Programming-- were the content area with no significant difference at the 0.05 level in the mean ratings between the computer educators and the data processing ng managers.

A comparison of group ratings revealed that the computer educators gave a higher rating on the area of Fundamental Concepts of Programming, Application of Computers, Software and Data Processing, and Hardware, and reported a lower rating on the area of Social Impact of Computers.

As indicated in Table IV, page 59, the five major curricular content areas were rank-ordered by their mean ratings. It can be seen that the rank pattern of the data processing professionals was different than that of the computer educators except the content area of Fundamental Concepts of Programming. The data processing managers ranked Fundamental Concepts of Computer programming, Software and Data Processing, Apllications of Computers, Social Impact of

Computers, and Hardware in that order. The content area of Social Impact of Computers had the lowest rank in the computer educator group. This indicates that computer educators were inclined to pay less attention to the Social Impact of Computers for teaching computer literacy as compared to the other areas.

Table XV on pages 72 and 73 shows the entire list of proposed computer literacy topics rank-ordered by mean score. It reveals that respondents in each group emphasized the topic of Understanding Programming Concepts and Computer Language, Flowcharting and Algorithm, Methods of Storing and Retrieving Information, and the Use of Computers in Business and Other Organizations as the most important topics for a computer literacy program.

A comparison of the rank of each topic shown in Table XV, pages 72 and 73, indicates that the data processing managers placed more importance on the topic of Major Components of a Computer System, Word Processing and Electronic Mail System, and System Software and its Function. The computer educators placed more importance on the topic concerned with the role of microcomputers and the BASIC programming. Respondents in each group gave the same rank to each of four topics, Historical Development of computers, Distributed Data Processing Network, Utilization of Packaged Software, and the Impact of Computers on Organization. It suggests that the viewpoint of respondents toward the importance of these four topics for a computer literacy program was identical.

TABLE XV

RANKINGS OF PROPOSED COMPUTER LITERACY TOPICS

Topics	Computer Educators Mean	Rank	D.P. Managers Mean	Rank	Combined Groups Mean	Rank
Historical development of computers	2.29	17	2.40	17	2.36	17
Major components of a computer	3.49	11	3.82	4	3.66	6
Data representation & number systems	3.54	9	3.47	11	3.51	10
I/O devices and media	3.84	6	3.52	9	3.67	5
Methods of storing and retrieving information	4.16	2	3.97	3	4.05	3
Distributed D.P. networks	3.51	10	3.50	10	3.51	11
W.P.& electranic mail system	3.27	15	3.67	7	3.17	16
Systems software & its function	3.38	14	3.82	5	3.61	8
Utilization of packaged software	3.46	12	3.35	12	3.40	13
The use of computers in business & other organizations	4.00	3	3.70	6	3.84	4

TABLE XV (Continued)

The role of the microcomputer & its operation	3.89	5	3.20	15	3.53	9
Careers in data processing	3.40	16	3.25	14	3.32	14
The impact of computers on people	3.13	16	3.35	13	3.25	15
The impact of computers on organizations	3.62	8	3.65	8	3.64	7
Programming concepts and languages	4.27	1	4.15	2	4.21	1
Flowcharting and algorithm	3.97	4	4.20	1	4.09	2
Programming in BASIC	3.76	7	3.17	16	3.45	12

A Description of the Teaching of Computer Programming to Enhance Basic Understanding of Computers

In Section II of the survey instrument, respondents were asked to describe their viewpoints concerning the necessity of teaching computer programming in the computer literacy course and of taking the course of typing in English for computer operation. It also contained questions concerning the level of programming skill needed by students and the importance of Aukermans' four aspects for writing computer programs.

The Need of Taking the Course of Typing in English

In answering the questions whether or not the commercial high school students should take the course of typing in English for computer operation, a majority of computer educators and data processing professionals strongly agreed that students should to take typing in English. As shown in Table XVI, page 75, an "agree" response was checked by 70.27 percent of the computer educators and 67.50 percent of the data processing professionals. The Table XVI, page 75, also shows the results of chi-square analysis. With a chi-square value of 1.88, which is less than the table value of 3.841 at the 0.05 level, it indicates that there was no statistically significant difference in the frequency of choice of the necessity of taking the course of typing in English for computer

operation.

TABLE XVI

THE NEED FOR TAKING THE COURSE OF TYPING IN ENGLISH

Response	Computer Educators N	%	Data Processing Professionals N	%	Combined Groups N	%
Agree	26	70.27	27	67.50	53	68.83
Disagree	11	29.73	13	32.50	24	31.17
Total	37	100.00	40	100.00	77	100.00

Chi-square value = 1.88; DF = 1 Probability =0.1703

The Need for Teaching Computer Programming

Respondents were asked to answer whether or not computer programming should be taught in a computer literacy course. A positive answer was reported by a majority of computer educators and data processing managers. As shown in Table XVII, page 76, a "yes" response was checked by 97.30 percent of the computer educators and 92.50 percent of data processing managers. Table XVII, page 76, also shows the results of the chi-square analysis with a chi-square value of 0.18, which was significant at the 0.6713 level of probability. It indicates that there was no statistically significant difference at the 0.05 level in the frequency of choice of the necessity of teaching computer programming between the computer educa-

tors and the data processing managers. It suggests that the computer literacy curriculum should include the topics of computer programming.

TABLE XVII

THE NEED FOR TEACHING COMPUTER PROGRAMMING

Response	Computer Educators N	%	Data Processing Professionals N	%	Combined Groups N	%
Yes	36	97.30	37	92.50	73	94.80
No	1	2.70	3	7.50	4	5.19
Total	37	100.00	40	100.00	77	100.00

Chi-square value =0.18 DF = 1 Probability =0.6713

Programming Languages

Respondents were asked to choose a programming language most appropriate for the computer literacy course. The answer choice for the question consisted of six programming languages and "other" option. The six programming languages with a chance of being selected were BASIC, Korean BASIC, COBOL, FORTRAN, PASCAL, and LOGO. Respondents were allowed to select only one of them.

As presented in Table XVIII, page 81, 45.95 percent of computer educators and 42.50 percent of data processing managers selected the BASIC computer programming language for

the computer literacy course. Second in frquency was the COBOL programming language recommended by sixteen, or 40 percent, of data processing managers and only one, or 2.70 percent, of computer educators. Third in frequency was the FORTRAN programming language, selected by nine, or 24.32 percent, of computer educators and two, or 5 percent, of data processing managers. These statistics seem to indicate that the computer educators recommend the scientific programming languages for the computer literacy course while the data processing managers suggest the busines oriented programming languages. Table XVIII, page 81, also shows the result of chi-square analysis with a chi-square value of 18.998 which was significant at the level 0.00192. It indicates that there was a significant difference in the frequency choice of computer programming languages between the data processing managers and the computer educators.

The Level of Programming Skill

In the study, the programming skill was defined as the ability to define the problem, create an algorithm to solve the problem, code the program, and debug the program. The ability represents whether or not students can communicate with the computer and use the software. It was assumed that there were five different levels of programming skills. In order, they were being able to use computer software, to understand program structures, to write simple programs, to debug the program, and modify programs effectively.

Table XIX on page 82 shows that thirty-three, or 89 percent, of computer educators and twenty-three, or 70 percent, of data processing managers supported the level of writing simple computer programs. Second in frequency was the level of understanding program logic, supported by over 70 percent of respondents in each group. It indicates that a majority of respondents were agreed that commercial high school students in a computer literacy class should attain the ability to write a simple computer program and understand program logic. The level of debugging computer errors was supported by 49 percent of computer educators and by 40 percent of data processing managers. The level of being able to modify a computer program was suggested by few respondents. A chi-square value of 0.631 shown in Table XIX, page 82, indicates that there was no significant difference in frequency choice of the level of programming skill between the computer educators and the data processing managers.

The Importance of Aukermans' Four Aspects of Computer Programming

In the review of related literature of this study, Aukerman (1978) recommended that the following four aspects of computer programming be included in an introductory computer programming course for business students, regardless of the language being taught;

1. Define the problem
2. Plan the program

3. Code the program

4. Debug the program

The major issue in computer literacy education is whether or not the course include a topic of computer programming. In this study, computer literacy was defined as whatever understanding, skills, and attitudes one needs to function effectively within a given social role that directly or indirectly involves computers. Some computer educators argue that the computer literacy curriculum at the high school level should include the topic of basic concepts of computer programming. The computer educators and data processing professionals of Korea were asked to determine the importance of Aukermans' four aspects of computer programming in terms of how to communicate with computers.

The result of ANOVA presented in Table XX, page 83, indicates an F-Ratio of 0.08 which was not a significant difference between the two groups.

Table XXI on page 84 shows the mean ratings for each of four aspects of computer programming. The mean rating of the first two aspects-- define the problem and plan the progam-- given by the data processing managers was higher than that of the computer educators. The mean ratings of the other two aspects-- code the program and debug the program-- given by the computer educators was higher than that of the data processing managers. Table XXI on page 84 also shows that the mean responses for each aspect given by the repondents in each group has the same pattern of ranking of mean scores.

Summary

In reviewing the above analysis, it was discovered that the computer educators' viewpoints were consistent with the data processing professionals' perception with regard to the teaching of computer programming in the computer literacy course. More than 82 percent of respondants reported that there was a need to teach computer programming for computer literacy. The programming language recommended for the course was English BASIC. It is worthwhile to note that some of the data processing professionals commented their opinions, recommending the entry-level data processing personnel have a strong knowledge in English.

For the programming skill to be attained by students, respondents in each group recommended the level of writing a simple program and understanding program logic.

For the importance of Aukermans' four aspects of computer programming, respondents in each group rated the first two aspects, define the problem and plan the program, consistently important to very important in over 73 percent of the responses. The mean value of the other two aspects, code the program and debug the program, was much lower than that of defining the problem and planning the program. This statistic seems to indicate that the computer educators and data processing managers in Korea emphasized unanimously the importance of defining the problem and planning the program in communicating with the computers.

TABLE XVIII

THE TYPE OF PROGRAMMING LANGUAGES

Programming Languages	Computer Educators N	%	Data Processing Professionals N	%	Combined Groups N	%
BASIC	17	45.95	17	42.50	34	44.16
Korean BASIC	4	10.81	3	7.50	7	9.09
COBOL	1	2.70	16	40.00	17	22.08
FORTRAN	9	24.32	2	5.00	11	14.28
PASCAL	4	10.81	1	2.50	5	6.49
LOGO	0	0.00	0	0.00	0	0.00
Other	2	5.41	1	2.50	3	3.89
Total	37	100.00%	40	100.00%	77	100.00%

Chi-square value =18.998 DF =5 Probability =0.00192

TABLE XIX

THE LEVEL OF PROGRAMMING SKILLS

Programming Skills	Computer Educators N	%	D.P. Managers N	%	Combined Groups N	%
Write simple program						
YES	33	89.19	29	72.50	62	80.52
NO	4	10.81	11	27.50	15	19.48
Correct errors						
YES	18	48.65	16	40.00	34	44.15
NO	19	51.35	24	60.00	43	55.84
Understand computer logic						
YES	26	70.27	28	70.00	54	70.13
NO	11	29.73	12	30.00	23	29.87
Use computer software						
YES	14	37.84	11	27.50	25	32.47
NO	23	62.16	29	72.50	52	67.53
Modify computer program						
YES	8	21.62	6	15.00	14	18.18
NO	29	78.38	34	85.00	63	81.82

Chi-square value =0.631, DF =4, Probability =0.959

TABLE XX

ANALYSIS OF VARIANCE OF AUKERMANS' FOUR ASPECTS

Sourse	DF	Mean Square	F-Ratio	PR
Factor(A)	1	0.31	0.08	0.7749
Error	75	3.85		
Total	76	4.16		

Responses from the computer educators : 37
Responses from the data processing professionals:40

TABLE XXI

MEAN RATINGS FOR EACH ASPECT OF AUKERMANS' ALGORITHM

Aspects	Computer Educators Mean (SD)	D.P Managers Mean (SD)	Combined Groups Mean (SD)	ANOVA F-Ratio (PR)
Define the problem	4.11 (0.96)	4.35 (0.87)	4.23 (0.88)	1.44 (0.232)
Plan the program	3.97 (1.40)	4.17 (0.77)	4.08 (1.08)	0.67 (0.579)
Code the program	3.43 (0.87)	3.17 (1.14)	3.29 (0.97)	1.35 (0.247)
Debug the program	3.38 (0.95)	3.27 (0.79)	3.32 (0.84)	0.29 (0.597)

The Strategies for Impementing the Curriculum

Section III of the study instrument dealt with the following six topics;

1. The importance of computer literacy for the commercial high school students
2. The type of computer systems for the curriculum
3. The appropriate method for developing computer literate teachers
4. The grade level to instruct computer literacy
5. The length of the computer literacy course
6. The way to fit computer literacy into the commercial high school curriculum

The Importance of Computer Literacy for the Commercial High School Students

Respondents were asked to determine the importance of computer literacy for the commercial high school students. A five point Likert scale was used to represent their perception. Table XXII, page 86, reveals that the mean rating for each group fell above 3.80 points. The results were inclined to favor computer literacy instruction. It can be perceived from a comparision of the two group means that the computer educators had a stronger tendency to promote the computer literacy instruction in contrast to the data processing professionals.

TABLE XXII

MEAN RATING FOR THE IMPORTANCE OF COMPUTER LITERACY

Group	Mean	Standard Deviation
Computer Educators	4.05	0.74
D.P. Professionals	3.82	0.87
Combined Groups	3.93	0.82

The analysis of variance shown in Table XXIII, page 89, indicates an F-ratio of 1.52 which was not significant at the 0.05 level of probability and disclosed that there was no significant difference among the means of the two groups.

Respondents in each group perceived that computer literacy is very important to the commercial high school students for their employment as office workers and entry level data processing personnel.

The Type of Computer System for a Computer Literacy Course

Respondents were asked to determine the appropriate type of computer system for a computer literacy course. In the study, the computer system for a computer literacy program was classified into four categories: (1) Microcomputers, (2) Minicomputers, (3) Central Computer serving several school with individual terminals, and (4) other system specified by respondents.

As depicted in Table XXIV, page 90, the microcomputer was chosen by 37.84 percent of the computer educators and by 34.15 percent of the data processing professionals. Next to the microcomputer, the network system was selected by 35.14 percent of the computer educators and by 34.15 percent of the data processing professionals. Third in frequency was the minicomputer system selected by 21.62 percent of computer educators and by 23.08 percent of data processing managers.

Table XXIV, page 90, reveals a chi-square value of 0.236 with a probability level of 0.971. At the criterion of 0.05, it means that there was no significant difference in the frequency of choice of the type of computers for the computer literacy course between the computer educators and the data processing managers.

The Appropriate Method for Developing Computer Literate Teachers

The third question in Section III of the Questionnaire asked the appropriate method to develop computer literate teachers. The respondents were asked to rank five methods: (1) In-service training, (2) Out-service training, (3) Take courses at universities, (4) Self-study, and (5) other method specified by respondents according to the following scale; Best 5 points; Very good 4 points; Good 3 points; Poor 2 points, and Very Poor 1 point. The ordered data in ranking five methods for developing computer literate teachers was treated as scored data. A one way ANOVA test was performed to

analyze the difference. An examination of the results of the ANOVA test shown in Table XXV, page 91, indicates that there was no significant difference in the mean rating for the method of developing computer literate teachers. Table XXVI on page 92 show the mean ratings for each method for developing computer literate teachers. A majority of respondents recommended the method of in-service training and taking computer courses at universities.

The Grade Level to Instruct Computer Literacy

Since the curricular contents for a computer literacy program in the study was intended for the commercial high school students, the grade level was 10, 11, and 12. As shown in TABLE XXVII on page 93, twenty-two, or 53.66 percent, of the data processing professionals recommended that the computer literacy course should be taught in the tenth grade. Twenty, or 54.05 percent, of the computer educators also supported the tenth grade for instructing the proposed topics for a computer literacy program. Second in frequency was the eleventh grade, supported by 37.84 percent of computer educators and by 25 percent of data processing managers. Only one computer educator selected the twelveth grade in contrast to five data processing managers. TABLE XXVII, page 93, presents the results of the chi-square analysis. It indicates the value of 2.979 which was not significant at the 0.05 level of probability. It indicates respondents agreed that computer

literacy should be taught at the tenth grade.

TABLE XXIII

ANALYSIS OF VARIANCE FOR THE RESPONDENTS' PERCEPTION OF THE IMPORTANCE OF COMPUTER LITERACY

Source	DF	Mean Square	F-Ratio	PR
Factor(A)	1	1.01	1.52	0.219
Error	75	0.66		
Total	76	1.67		

Responses from the computer educator : 37
Responses from the data processing professionals : 40

TABLE XXIV

THE TYPE OF COMPUTER SYSTEM

Type of Computers	Computer Educators		Data Processing Professionals		Combined Group	
	N	%	N	%	N	%
Microcomputers	14	37.84	14	34.15	28	35.89
Minicomputers	8	21.62	10	24.39	18	23.08
Maninframe	2	5.40	3	7.31	5	6.41
Network System	13	35.14	14	34.15	27	34.62
Other	0	0.00	0	0.00	0	0.00
Total	37	100.00%	40	100.00%	77	100.00%

Chi-square value =0.236, DF = 3, Probability =0.971

TABLE XXV

ANALYSIS OF VARIANCE FOR THE METHOD OF DEVELOPING COMPUTER LITERATE TEACHERS

Sourse	DF	Mean Square	F-ratio	PR
Factor(A)	1	6.26	1.01	0.3193
Error	75	6.22		
Total	76	12.48		

Responses from the computer educators : 37
Responses from the data processing managers : 40

TABLE XXVI

MEAN RATINGS FOR EACH METHOD OF DEVELOPING COMPUTER LITERATE TEACHERS

Method	Computer Educators Mean (SD)	D.P. Managers Mean (SD)	Combined Groups Mean (SD)	ANOVA F-Ratio (PR)
In-service training	3.83 (1.01)	3.80 (1.30)	3.82 (1.37)	0.02 (0.883)
Off-service training	2.89 (0.93)	2.50 (1.11)	2.69 (1.09)	2.78 (0.096)
Take computer course at universities	3.70 (1.22)	3.60 (1.45)	3.65 (1.40)	0.11 (0.740)
Self-study	2.51 (1.20)	2.47 (1.34)	2.49 (1.33)	0.17 (0.684)

ANOVA: Analysis of Varience, (SD): Standard Deviation
(PR): Probability

TABLE XXVII

GRADE LEVEL OF COMPUTER LITERACY INSTRUCTION

Grade Level	Computer Educators N	%	D.P. Managers N	%	Combined Groups N	%
Grade 10	20	54.05	22	53.66	42	53.85
Grade 11	14	37.84	11	26.83	25	32.05
Grade 12	1	2.70	5	12.19	6	7.69
Other	2	5.41	2	7.32	4	6.41
Total	37	100.00%	40	100.00%	77	100.00%

Chi-square value =2.979, DF =3, Probability =0.395.

The Length of Computer Literacy Course

Respondents were asked to recommend the appropriate course length for instructing computer literacy. Three choices were listed in the questionnaire. They were one semester, mini-course, and other option specified by respondents. The length of one semester was reported by twenty-three, or 62.16 percent, of the computer educators and twenty-nine, or 70.73 percent, of the data processing professionals. The mini-course was reported by five, or 13.51 percent, of the computer educators and 12.20 percent of the data processing professionals. The analysis shown in Table XXVIII, page 95, reveals a chi-square value of 0.813 which was significant at the 0.666 level of probability. It means that there was no significant difference in the frequency of choice of the course length between the two groups. Sixteen, or 16.67 percent, of the respondents recommended that the length of the computer literacy course should be two semesters or more. They also recommended to teach the basic concepts of BASIC, FORTRAN, and COBOL programming languages in the computer literacy course.

TABLE XXVIII

COURSE LENGTH FOR COMPUTER LITERACY INSTRUCTION

Course Length	Computer Educators		D.P. Managers		Combined Groups	
	N	%	N	%	N	%
One semester	23	62.16	29	70.73	52	66.67
Mini-course	5	13.51	4	12.20	9	12.82
Other	9	24.33	7	17.07	16	20.51
Total	37	100.00%	40	100.00%	77	100.00%

Chi-square value =0.813, DF =2, Probability =0.666

The Way to Fit Computer Literacy into the Commercial High School

Respondents were asked to rank the appropriate method to teach 17 computer literacy topics proposed in Section I of the questionnair. The implementation methods considered were: to be an additional subject of business education; a part of all related course; to be a general business education course required of all students; and, to be an elective course.

TABLE XXIX

ANALYSIS OF VARIANCE FOR IMPLEMENTATION METHOD

Sourse	DF	Mean Square	F-Ratio	PR
Factor(A)	1	0.014	0.029	0.859
Error	75	0.479		
Total	76	0.493		

Responses from the computer educators: 37
Responses from the data processing managers: 40

As presented in Table XXIX, the ANOVA test shows an F-ratio of 0.029 which was not significant at the 0.05 level of probability. It indicates that there was no significant difference between the two groups with respect to their viewpoint toward the appropriate method for implementing the proposed computer literacy curriculum at the commercial high school level.

Table XXX on page 99 shows the mean responses for each

method to offer computer literacy course. An examination of the mean values indicates that the respondents in each group recommended that the proposed computer literacy topics should be offered as an additional subject of general business education required of all students. This suggested that both computer educators and data processing managers were greatly concerned with the need for computer literacy education for future office workers and entry level data processing personnel in the burgeoning computer information society of Korea.

Summary

Of the above six topics related to the implementation strategies, the computer educators had the same opinion as data processing managers on the implementation for the course. Respondents in each group had a stronger inclination to promote the computer literacy for the commercial high school students.

For the type of computer system to be used in the computer literacy curriculum, twenty-eight, or 35.89 percent, of the repondents recommended microcomputers and twenty-seven, or 34.62 percent, of the respondents selected the microcomputer network system. The grade level for instructing computer literacy selected by the computer educators and the data processing professionals was the tenth grade.

For the length of the computer literacy course, a one semes- ter course was most frequently suggested. Fifty-two,

or 66.67 percent, of the respondents recommended the length of one semester. Second in frequency was two semesters, recommended by 16 respondents.

For the way to fit the proposed computer literacy topics into the commercial high school curriculum, a majority of respondents in each group recommended that it should be offered as an additional new subject of general business education required of all commecial high school students.

Some computer educators commented that the high level administrator of Ministry of Education has to provide computer equipment for students and develop the microcomputer network system for secondary computer education.

TABLE XXX

MEAN RATINGS FOR EACH METHOD TO FIT COMPUTER LITERACY INTO COMMERCIAL HIGH SCHOOL CURRICULUM

Method	Computer Educator Mean (SD)	D.P. Managers Mean (SD)	Combined Groups Mean (SD)	ANOVA F-Ratio (PR)
An additional subject of business education	2.70 (0.78)	2.85 (0.95)	2.78 (0.91)	0.55 (0.532)
A part of all related course	2.32 (0.94)	2.55 (0.93)	2.44 (0.98)	1.11 (0.296)
A general business education course required of all students	3.16 (0.81)	2.70 (1.59)	2.92 (1.08)	4.03 (0.045)
An elective course	1.83 (0.87)	1.90 (1.06)	1.87 (1.02)	0.08 (0.775)

ANOVA: Analysis of variance, (SD): Standard Deviation
(PR): Probability

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Secondary vocational business education in the newly indutrialized country of Korea is faced with a need for a new manpower supply of entry level data processing personnel and office workers with computer literacy competencies. The new role of the vocational business education program is to respond to this new need and heightened concern for computer literacy curriculum at the commercial high school level in Korea.

As microcomputer technology advances and the use of microcomputer hardware and software impacts of our daily lives, understanding and knowing how to use computers (computer literacy) has become a fact of life for all high school graduates entering the world of work. Computer educators should attempt to update the computer literacy curriculum to prepare students for the job of the future and to make students better problem solvers.

An introductory computer course at the commercial high schools of Korea was offered in the 1984-85 school year. The curriculum content for a computer literacy program and the implementing method of the curriculum are still

unestablished. The motivation for the study originated as a response to this need.

Purpose and Design of the Study

The purposes of this study were to (1) propose curriculum content for a computer literacy program at the commercial high school level in Korea and to (2) determine an appropriate method for implementing the proposed curriculum. This was accomplished through an interpretative analysis of data obtained from questionnaires which were mailed to the computer educators and the data processing professionals of Korea. By analyzing the relative importance of each computer literacy topic and other questions related to computer literacy curriculum, it was possible to identify a curriculum content of computer literacy and method of implementing the curriculum.

The Study Instrument

In accomplishing the purpose of this study concerning computer literacy curriculum and its implementation at the commercial high school level, a five-page printed questionnaire was designed. The questionnaire formulated to obtain data for this study was designed from a study of the related literature, other research questionnaires concerned with computer literacy curriculum, and consultation with Oklahoma State University faculty members.

In the spring of 1986, this questionnaire was mailed to

45 computer educators and 45 data processing managers in Korea in order to ask their viewpoint about the proposed computer literacy topics and its implementation method. More than 85 percent participated by responding to and returning the questionnaires.

Analysis of the Data

All responses to the questionnaire were analyzed with the aid of Trajectories Statistical Processing System (SPS) program. The Likert-scale data was analyzed by using one-way analysis of variance. The frequency data gathered from the questionnaires was analyzed by using frequency of occurence, percentage, and chi-square analysis. The data of two topics concerning the appropriate method for developing computer literate teachers and for implementing the curriculum was converted to the scored data to apply a one way ANOVA test for significant differences.

Related Literature

The approach taken in this study for the review of related literature was to research those areas which have an impact on computer literacy education: (1) the issue of computer literacy, (2) the need for computer literacy, (3) the computer literacy proposals in the United States, (4) the problem in developing computer literacy, and (5) a brief review of the eductional system in Korea with emphasis on vocational high school education.

As presented in the review of related literature, microcomputer technology has become indispenable to the operation of business. It also is today, and will be even more tomorrow, the key of the changing business office environment, and therefore of developing data base management systems needed by all future office workers. As microcomputer technology becomes broadly integrated into all phases of human life, the necessity of computer literacy education becomes more significant. Computer literacy is the competencies to incorporate knowledge of computer awareness and operation, computer application and limitation, and minimal computer programming skill for computer fluency.

A review of the literature reveals that the computer literacy curriculums are remarkably similar in some aspects and fairly different in others. They are similar in that they all emphasize the awareness of hardware, software, computer capability and limitation, social impact of computers, and computer operation. They differ in that some of the curriculums provide for introduction in computer programming topics whereas others do not. Uniformity and standardization of the computer literacy curriculum is still not established for secondary school computer literacy education.

The major source of manpower supply of computer literate Office workers and entry-level data processing personnel in Korea is to educate vocational high school students to become computer literate and better workers for future business offices.

This study proposed the topics for a computer literacy program at the commercial high school level in Korea. It further extends knowledge of computer literacy education by reporting in detail the opinions of computer educators and data processing managers concerning the curriculum

Findings of the Study

Based on the analysis of the results of the survey, the following factors seem evident:

(1) The viewpoints of computer educators on the topics of the content area of Hardware were similiar to those of the data processing professionals.

(2) The computer literacy topics with significant differences in the mean rating between the two groups were the topics of System Software and its Function, the Role of the Microcomputers and its Operation, and Simple Programming in BASIC.

(3) Both computer educators and data processing professionals placed a higher priority on the area of Fundamental Concepts of Programming. It indicated that computer literacy curriculum at the commercial high schools of Korea should include the topics of computer programming.

(4) The computer educators and data processing managers were inclined to pay less attention to the topics on Social Impact of Computers.

(5) All respondents in each group were inclined to pay less attention to a topic of Historical Development of

Computers.

(6) the computer educators put emphasis on a topic of Understanding Programming Concept and Computer Languages while the data processing managers emphasized the topic of Flowcharting and Algorithm.

(7) Respondents rated the 16 topics out of 17 proposed consistently moderately important to very important in over 80 percent of the responses.

(8) Over 50 percent of respondents suggested that the appropriate place in the curriculum for the course should be the tenth grade. Over 30 percent of respondents selected eleventh grade for instructing the proposed computer literacy topics.

(9) As to the course length, over 65 percent of repondents selected the length of one semester. Second in frequency, which should not be neglected, was the length of two semester selected by 20 percent of respondents. It is worthwhile to note that all respondents who recommend the length of two semester also suggested teaching the basic concepts of two programming languages such as BASIC, FORTRAN, or COBOL.

(10) As to the type of computer system for the course, one-third of the respondents in each group suggested either microcomputers or a microcomputer network system. It indicates that two-third of respondents recommend the microcomputer system. It was surprising to learn that many respondents suggested the microcomputer network system for the computer literacy education.

(11) Over 67 percent of respondents in each group recommended that commercial high school students take the course of typing in English for computer operation.

(12) All computer educators except one reported that there is a need to teach computer programming for computer literacy. Approximately nine out of ten data processing managers also reported the necessity of teaching computer programming.

(13) A majority of respondents in each group indicated that commercial high school students should attain the ability to write simple program and understand program logic for computer literacy.

(14) As to the importance of Aukermans' four aspects of computer programming, three-fourths of respondents suggested that defining the problem and planning the program are the most important aspects in writing computer programs.

(15) As to the appropriate method to teach the proposed computer literacy curriculum, a majority of respondents in each group recommended that it should be offered as an additional new subject of general business education course required of all students.

(16) As to the appropriate method for developing computer literate teachers, respondents in each group suggested the in-service training and the taking of computer courses at the universities.

Conclusions and Recommendations

On the basis of the research findings and the review of related literature, the writer makes the following conclusions and recommendations:

(1) There is an urgent need for providing a computer literacy curriculum in vocational business education at the commercial high school level in Korea. Its purposes are not only to prepare effective office workers with computer literacy competencies, but also to improve the business system in burgeoning computer information society of Korea.

(2) A review of related literature reveals that there is some debate in the literature concerning whether the computer literacy curriculum should include the topics of computer programming.

(3) From the analysis of the questionnaire, a majority of computer educators and data processing managers recommended that computer literacy curriculum at the commercial high schools of Korea should include the topics of fundamental concepts of programming. A majority of respondents emphasized the importance of Aukermans' four aspects to communicate with the computers. These four aspects of computer programming should be included as a topic of the instructional unit of Fundamental Concepts of Programming.

(4) Based on the result of analysis of computer literacy curriculum questionnaire, a proposed computer literacy topic could be used for developing a competency based curriculum of computer literacy at the commercial high school level in

Korea. Computer literacy curriculum at the commercial high school level should include an instructional unit concerned with simple data base concepts.

(5) Review of related literature reveals that as the microcomputer software advances, the secondary vocational computer literacy education should be changed and updated in response to the manpower supply of computer literate clerical office workers and entry level data processing personnel.

(6) To implement the proposed computer literacy curriculum effectively at the commercial high school level in Korea, there is a need for developing a competency based curriculum for each topic proposed. This computer literacy course should be required of all students for the graduation.

(7) Considering current computer literacy education without computer equipment and current financial trends, the educational authorities should make use of existing computing facilities whether they belong to Government offices, private industries, or to universities.

(8) Since the preparation of computer literate teachers is a key element in the development of the computer literacy education, the business educators of Korea and educational authorities should develop a business teacher education curriculum for secondary business computer education.

(9) Based upon the results of the survey and review of related literature, the BASIC or COBOL programming language should be taught, but the programming details should not dominate the computer literacy course.

(10) In order to develop an effective computer literacy curriculum at the commercial high school level, it is recommended that the data processing managers and the computer educators have a roundtable discussion regarding these same research problem.

(11) Since most of the computer literacy topics proposed were rated generally as favorable, it is recommended that these topics be used for a computer literacy program in vocational business education at the commercial high school level in Korea.

A Proposed Course Content

Based on the research findings and results of the study, the following curriculum content for a computer literacy course at the commercial high school level in Korea is proposed;

Proposed Topics

Unit I: Microcomputer hardware

1. Generations of Computer
2. Data Representation and number system
3. Major component of a computer system
4. Input/Output device and media
5. The physical components of microcomputer

Unit II: Microcomputer software and data processing

1. Method of storing and retrieving information
2. System software and its function

3. Use of wordprocessing software

4. Distributed data processing networks

5. Utilization of packaged software

Unit III: Application of computers

1. The use of microcomputers in business and other organizations

2. The role of the microcomputer and its operation

3. Applications and uses of data bases

Unit IV: Social impact of computers

1. Careers in data processing

2. The impact of computers on organizations

3. The impact of computers on people

Unit V: Fundamental concepts of programming

1. Understanding programming concepts and computer languages

2. Flowcharting and algorithm

3. The four aspects of computer programming

   a. Define the problem

   b. Plan the program

   c. Code the program

   d. Debug the program

4. Programming in BASIC

   a. BASIC variables and arithmetic statements

   b. Input/Output statements

      Input, Read, and Print

   c. Branching with IF statement

   d. Looping with GO TO and IF statement

e. Looping with FOR/NEXT statement

BIBILIOGRAPHY

Anderson, R. E., The Minnesota Educational Computing Consortium Project On Computer Literacy Instructional Module. St. Paul,Minnesota: Minnesota Educational Computing Consortium, 1981.(Unpublished paper prepared for presentationat the National Educational Computing Conference).

Anderson, R. E. and Klassen, D. L. "A Conceptual Framework for Developing Computer Literacy Instruction." AEDS Journal, 1981, 14 (3), pp. 128-142.

Anderson, R. E., Klassen D. L., and Johnson, D. C. "In Defence of a View of Computer Literacy - a reply to Luehrmann." Mathematical Teacher, 1981. 74, pp. 687 -690.

Aulgur, Jeretta Horn. "Status and Trends of Information Systems Program in Accredited Collegiate School of Business." Diss. Oklahoma State University 1982.

Aukerman, Richard. "Business Student and Computer Programming." Business Education Forum, November, 1977, pp. 27-28.

Austing, R. H., Cottermn, W. W., and Engel, G. L. Computer Impact on Society and Computer Literacy Courses. In D.C. Rine (ED), Preceedings of the Computer Science and Engineering Curricula Workshop. Williamburg, Virginia: Institute of Electrical and Electronics Engineer, Inc., 1977, pp. 55-59.

Barger, R . Newton. "Computer Literacy: Toward A Clear Defintion." T.H.E. Journal October, 1983. pp. 108-112.

Bell, N. T. "A Computer Awareness Program for All Teachers and All Students." T.H.E. Journal, September, 1983, pp. 138-144.

Bitter, Gary G. "The Road to Computer Literacy: A Scope and Squence Model." Electronic Learning, September, 1982, pp. 60-63.

Bove, Tony "What is Computer Literacy?" Infoworld December, 1980 pp. 13.

Burgress, Water Jackson. "Business Data Processing Instruction at the Public Secondary School Level in Georgia." Diss. Georgia State University 1972.

Carney, Cashy C. "Teacher + Computer =More Learning." Computer Teacher, March, 1986, pp. 12-15.

Charp, Sylvia. "Effectiveness of Computers in Institution." Viewpoint in Teaching and Learning, 1981, 17(2), pp. 13-22.

Clemmensen, Darrell R. "In-service Workshops Help Develop Computer Literacy Among Business Education." Business Education Forum, March, 1985, pp. 27-29.

"Computers in Classroom." Mathematic Teachers, May, 1978, pp. 468.

"Computer Literacy of California High School Seniors." Computing Teacher, November, 1983, pp. 68-71.

Dence, Marie. "Toward Defining the Role of CAI: A Review." Educational Technology, November, 1980, pp. 50-54.

Directory of Business Firms. Seoul, Korea: Economic Planning Board, 1985

Ferman, John T. "Texas Instrument Software Engineering Education." Paper presented at annual ACM Computer Conference, St. Louis, February, 1981, New York.

Feuer, Dale. "Where the Dollars Go." Training, October, 1985, pp. 45-53.

Franklin, Patricia Ann "Intergration of Data Processing Concepts in Secondary and Post Secondary Vocational Programs in the State of Alabama." Diss. Ohio State University 1998

Fray, Barbara A. "Computer Literacy For Staff Development." AEDS Journal, Summer, 1984, pp. 1-8.

Hunter, Beverly. "Computer Literacy." Paper presented at the Patterns conference on Computer Literacy Rochester, New York, April 27, 1981.

Jacobs, Judith E. "Let's Prepare Computer Educator - Not Computer Science Educators." Computer Teachers, August/September, 1985, pp. 17-18.

Johnson, M. F. "Computer Literacy: What is it?" Business Education Forum, December, 1980, pp. 18-22.

Johnson, M. F. "The Contents of Computer Literacy Course"

Balance Sheet, Vol 64, September, 1982, pp. 27-30.

Jordan, J. A. Jr. "Computing Education for the Developing Asian Countries." Computer, June, 1986, pp. 11-12.

Kim, Yoon Tai and Yun, Chung Il. Manpower Projection and Strategies 1979-1991. Seoul, Korea: Korean Educational Development Institue, 1979.

Klassen, Daniel L. "Computer Literacy." In topics in Computer Education for Elementary and Secondary Schools, edited by David Moursund, pp. 66-70. New York: SIGESE-SIGCUE, Association up Computers Michinary, 1981.

Lee, Jeoung Keun, Hahn and Houng, Sa Myung. Current Status of Vocational Education and Training in the Republic of Korea. Seoul, Korea: Korean Educational Development Institue, 1979.

Lee, Jeoung Keun, Hong, Sa Myung, and Shin, Se Ho. Vocational Technical Education in the Republic of Korea. Seoul, Korea: Korean Educational Development Institute, 1979.

Mandell, Steven L. Computer and Data Processing with BASIC. New York: West Publishing Co., 1986.

Manning, Nick. The Computer Literacy Curriculum. In Nancy Waston (Ed.), Microcomputer in Education: Getting Started, Conference proceedings. Tempe, Arizona: Arizona State University, Janurary 16-17, 1981. (Erig Document Reproduction Service No. ED 205 216).

Massat, Francis E. "Computer Literacy in Higher Education "AAHE-FRAC/Higher Education Research Report No.6, 1981, pp. 10-35.

Mazlack, Lawrence J. "Identifying Potential to Acquire Programming Skill." Communication of the ACM, vol. 231 (Janurary, 1980), pp. 14-17.

Ministry of Education, Republic of Korea. Education in Korea, Seoul, 1984.

Ministry of Labour, Republic of Korea. Vocational Training in Korea, Seoul, 1984.

Molnar, A. R. "The Next Great Crisis in American Edcuation: Computer Literacy." Journal of Education System, 1978, vol. 7, issue 2, pp. 275-285.

Moreles, A. Milestones to Build a Course of Informatics for Secondary Schools.In J. A. Jordon, Jr. & K. Malaivongs (Eds.), Computer Application in Developing Countries.

Bankok: Asian Institue of Technology, 1974, pp. 1411-1418.

Mussleman, Donald and Smith, Glenn "Teaching Data Processing in Secondary Schools." Journal of Business Education. October, 1979, pp. 34-35.

National Business Education Association (NBEA) Task Force on Computer Literacy, " A Focus On Computer Literacy." A statement by NBEA, Business Education Forum, October,1984, pp. 5-6.

National Council of Teachers of Mathematics (NCTM). "Computer in the Classroom." Position statement. Resten, Virginia: NCTM, 1978.

Papert, Seymour. Mindstorms: Children, Computers, and Powerful Ideals. New York: BASIC Books, 1980.

Poirot, James L."Computer Literacy: What is It? Electronic Learning, January, 1986, pp. 33-37.

Policies Commission for Business and Economic Education (PCBEE). "Computer Literacy." Position statement. Reston, Virginia, 1984.

Pritchard, William H. "Instructional Computing in 2001: A Scenaric." Phi Delta Kappa, 1982, vol. 63, Issue 5, pp. 322-325.

Ralston, Anthony. "Computer Science Education in the Colleges and Universities of New Jersey." A Report to the Department of Higher Education of the State New Jersey. Treuton, N. S., 1981.

Region IV Education Service Center. " Microcomputers: Passing Fad or Educational Revolution? " Houston, Texas: Region IV Education Service Center, 1978.

Reports from a National Survey (1983) School use of microcomputers. Baltimore, Maryland: Johns Hopkins University.

Sanders, Donald H. Computers Today, New York: McGraw Hill Company, 1985.

Stevens,D. J. "Educators' Perceptions of Computers in Education: 1979 and 1981." AEDS Journal, 1982, vol. 16, pp. 1-15.

Szymizuk,Michael and Frericks, Dean. "Using Standardized Tests to predict Achievement in an Introductory High School Computer Course." AEDS Journal, Fall, 1985, pp. 20-27.

Wood, Maple. "Computer literacy." Balance Sheet, vol. 64, No. 4, (April, 1982), pp. 231-233.

Young, L. F. "A Ease in MIS Education: Attitude Changes Among MBA's." Information and Management, vol. 3 (June, 1980), pp. 73-80.

APPENDIX A

STUDY INSTRUMENT

Computer Literacy Curriculum Questionnaire

The purposes of this study are to propose the curriculum contents and implementing strategies appropriate for a computer literacy program in vocational business education at the commercial high school level. The term computer literacy is defined as whatever understanding skills and attitudes one needs to function effectively within a given social role that directly or indirectly involves computers.

Section I

DIRECTIONS: This section consist of 17 topics in the five major areas - Hardware, Software and Data Processing, Applications of Computers, Social Impact of Computers, and Fundamental Concepts of Programming.

Please place a check mark( ) in one of the five boxes to indicate your opinion as to the relative importance for each topic in a computer literacy program according to the following scale.

1	2	3	4	5
Not Important	Somewhat Important	Moderately Important	Important	Very Important

Computer Literacy Topics	Degree of Importance 1	2	3	4	5
I. Hardware					
1. Historical development of computers					
2. Major components of a computer system					
3. Data representation and number systems					
4. Input/Output devices and media					
II. Software and Data Processing					

1	2	3	4	5
Not Important	Somewhat Important	Moderately Important	Important	Very Important

Computer Literacy Topics	Degree of Importance 1	2	3	4	5
5. Methods of storing and retrieving information					
6. Distributed data processing networks					
7. Word processing and electronic mail system					
8. Systems software and its function					
9.Utilization of packaged software					
III. Application of Computers					
10. The use of computers in business and other organization					
11. The role of the microcomputer and its operation					
IV. Social Impact of Computers					
12. Careers in data processing					
13. The impact of computers on people					
14. The impact of computers on organizations					
V. Fundamental Concepts of Programming					
15. Understanding programming concepts and computer languages					
16. Flowcharting and algorithms					
17. Simple programming in Basic					

Section II

DIRECTIONS: This section includes questions relevant to the teaching of computer programming to enhance the basic understanding of computers.

1. Students should be required to take the course of typing in English (or keyboarding) for computer operation.

___Agree
___Disagree

2. In your opinion, is it necessary to teach computer programming in the computer literacy course?

___Yes
____No

If yes, please specify what language should be taught as part of the course.

____ (a) BASIC
____ (b) KOREAN BASIC
____ (c) FORTRAN
____ (d) PASCAL
____ (e) LOGO
____ (f) COBOL
____ (g) other (please specify)_____

3. For a general course of this type, students should be able to; (check all that apply)

____ (a) write simple programs
____ (b) correct errors
____ (c) understand computer logic
____ (d) use software
____ (e) modify computer programs
____ (f) other(please specify) _____

4. How would you rate each of the following four aspects of computer programming in terms of how to communicate with the computer. Please place a check mark ( ) in one of the five blanks.

	Not Important	Somewhat Important	Moderately Important	Important	Very Important
Define the problem	( )	( )	( )	( )	( )
Plan the program	( )	( )	( )	( )	( )
Code the program	( )	( )	( )	( )	( )
Debug the program	( )	( )	( )	( )	( )

Section III

DIRECTIONS: This section includes questions relevant to the implementing strategies of a computer literacy program.

1. How would you rate the value of computer literacy for commercial high school students.

____ (a) not important
____ (b) somewhat important
____ (c) moderate important
____ (d) important
____ (e) very important

2. What type of computer system is appropriate for a computer literacy course?

____ (a) microcomputer (personal computer)
____ (b) mini-computer
____ (c) mainframe
____ (d) central computer serving several schools with individual school terminal (network system)
____ (e) others (please specify)

_____

3. Please rank (1-5) the appropriate method to develop computer literate teachers according to the following scale.

(5: Best) (4:Very good) (3: Good) (2: Poor) (1: Very poor)

____ (a) in-service training (seminar,workshop, etc.)
____ (b) off-service training
____ (c) take computer course(s) at universities
____ (d) self-study
____ (e) other (please specify) _____

4. At what grade level should computer literacy be taught

____ (a) grade 10
____ (b) grade 11
____ (c) grade 12
____ (d) other(please specify)_____

5. What should be the length of the course.

____ (a) one semester
____ (b) mini-course
____ (c) other (please specify)_____

6. Please rank (1-4) the appropriate method to teach the computer literacy topics mentioned in Section I according to the following scale.

(4: Best) (3: Very good) (2: Good) (1: Poor)

____ (a) an additional subject of business education
____ (b) a part of all related course (example: accounting)
____ (c) a general business education course required to all students
____ (d) an elective course

If you have any comments or additional topics for computer literacy programs at the commercial high school level, please write your suggestions or comments in the following spaces.

_____

_____

_____

_____

Name: _____ Job Title: _____

Company/Institution Name:_____

Company/Institution Location: _____

Thank you very much

Please return to:

Dr. Yung Hee Rho
Professor
Graduate School of Environmental Studies
Seoul National University
Sinlim San 56-1 Kwan Ak Ku
Seoul, Korea

APPENDIX B

CORRESPONDENCE TO COMPUTER PROFESSIONALS

OSU

Oklahoma State University

COLLEGE OF BUSINESS ADMINISTRATION

STILLWATER, OKLAHOMA 74078
(405) 624-5064

Dear Sir/Madam:

We are presently conducting a research study to determine the appropriate curriculum topics and implementing strategies for a computer literacy curriculum at the commercial high school level in Korea. It is the purpose of this study to collect data which will provide information in determining the appropriate topics and strategies for the curriculum.

As a computer professional in the business field, your opinion is an important part of this process. Would you please take a few minutes to complete the enclosed questionnaire. The questionnaire will be identified and utilized by the researchers.

It possible the questionnaire should be returned on or before June 15. An adressed, postage-paid envelop is enclosed for your convenience in returning the questionnaire.

The result of this research study should contribute greatly to the development of a computer literacy curriculum for secondary vocational business education.

I would like to thank you for taking a few minutes from your busy schedule in responding to the requested information contained in the questionnaire.

Your personal attention to this request will be highly appreciated.

Sincerely yours,

In Hai Ro
Researcher

Richard Aukerman, Ph.D.
Advisor and Committee
Chairman

APPENDIX C

UNIT OBJECTIVES FOR PROPOSED TOPICS

Suggested Unit Objectives for Proposed Topics

The following are suggested unit objevtives for the proposed topics in a computer literacy course. These objectives were developed on the basis of the researcher's experiences, discussions with other computer professionals, and the review of related literature. The purpose of this appendix is to assist in the initial implementation of a computer literacy course. These objectives were not developped as a direct result of the findings of this study.

Course Content

Unit I: Microcomputer hardware

Proposed topics for the Unit I

1. Generation of Computers
2. Data Representation and Number System
3. Major Components of a Computer System
4. Input/Output Device and Media
5. The physical components of microcomputer

Unit objectives

Students are able to:

1. Describe the characteristic of each generation of computers and of each classification of computer hardware.
2. Identify the five major components of a computer system and describe the function of each component.
3. Describe flow of data through microcomputer data processing system.
4. Recognize the rapid growth of microcomputer hardware and software since 1980.
5. Identify the fact that we communicate with computers through a binary code.

Unit II: Microcomputer software and data processing

Proposed topics for the Unit II

1. Method of storing and retrieving information
2. System software and its function
3. Use of word processing software
4. Distributed data processing networks
5. Utilization of packaged software

Unit objectives

Students are able to:

1. Identify the fact that data processing involves the transformation of data by means of a set of

pre-defined rules.
2. Recognize that a microcomputer needs system siftware and application programs to operate.
3. Recognize that a computer is capable of storing a program written in programming language and data.
4. Understand how to use the five major word processing commands: CREATE, EDIT, INSERT, ERASE, and PRINT.
5. Identify how we communicate and access a computer at any distance via telephone lines.

Unit III: Application of Computers

Proposed topics for the Unit III

1. The use of microcomputers in business and other organizations
2. The role of the microcomputers and ite function
3. Application and uses of data bases

Unit objectives

Students are able to:
1. Recognize specific use of microcomputers in business, education, government, and transformation.
2. Recognize the activities are among the major types of computer applications: data processing, process control, information storage and retrieval, and simulation.
3. Understand how to use a data base software (dbase II)- creating simple data base file, entering input data, and reporting the output.
4. Identify the limitations and capabilities for using computers.

Unit IV: Social impact of computers

Proposed topics for the Unit IV

1. Careers in data processing
2. The impact of computers on organizations
3. The impact of computers on people

Unit objectives

Students are able to:
1. Distingush among the following careers: data entry operator, computer operator, computer programmer, and system analyst.
2. Recognize that identification codes and passwords are a primary means for restricting use of computers systems and of data base sysrems.
3. Describe how computer systems can affect security in organizarions.
4. Describe how people may be benifit from the use of

computers by organizations.

Unit V: Fundamental concepts of programming

Proposed topics for the Unit V

1. Understanding computer programming concepts and computer languages
2. Flowcharting and algorithm
3. The four aspects of computer programming
    a. Define the problem
    b. Plan the program
    c. code the program
    d. debug the program
4. Programming in BASIC
    a. BASIC variables and arithmetic statements
    b. Input/Output statements:
        INPUT, READ, and PRINT
    c. Branching with IF statement
    d. Looping with GO TO and IF statement
    e. Looping with FOR/NEXT statement

Unit objectives

Students are able to:

1. Describe advantages and disadvantages of the five computer programming languages: BASIC, COBOL, FORTRAN, PL/I, and PASCAL.
2. Explain what is meant by defining the problem, planning the program, coding the program, and debugging the program.
3. Identify the symbols used to develop flowchart and understand how to develop a flowchart for the program.
4. Write and run a simple BASIC program using READ and DATA statements.
5. Write and run a simple BASIC program using IF-THEN, GO TO, and FOR/NEXT statements.

VITA

In Hai Ro

Candidate for the Degree of

Doctor of Education

Thesis: PROPOSED TOPICS FOR A COMPUTER LITERACY PROGRAM IN VOCATIONAL BUSINESS EDUCATION IN KOREA

Major Field: Business Education

Biographical:

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