THE ECONOMIC FEASIBILITY OF UTILIZING COMPUTER-ASSISTED INSTRUCTION AS A PRIMARY TEACHING STRATEGY IN SCHOOLS OF VOCATIONAL NURSING IN TEXAS

DISSERTATION

Presented to the Graduate Council of the North Texas State University in Partial Fulfillment of the Requirements

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By

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Each vocational nursing program in Texas was surveyed to determine the faculty and media costs per student classroom instructional hour. Data were obtained from 131 schools, or 99 per cent of the population. These schools taught a total of 4,718 students. The average faculty cost was $1.72 per hour. Faculty cost ranged from $0.17 to $7.75. The average media cost was $0.12 per student hour with a range from no media expenditure to $7.55. The reliability of these costs was not demonstrated.

Each program director was asked to identify a principal textbook representing the content taught for each content area in their program. A total of 75 textbooks were identified by two or more programs. A cross tabulation analysis procedure yielded 1,582 combinations of 2 or more textbooks from 2 or more schools. Twenty-five per cent of the schools used the most frequently identified combination of two textbooks.

Computer hardware and operating expenses were subtracted from the combined faculty and media cost per
student classroom instructional hour. The amount remaining for software purchase was identified as $1.61 with a range of from $0.03 to $7.85 per hour for teaching the required 600 hours.

The twenty textbook combinations with the greatest remainder for software utilization were identified. The combination with the largest arithmetic mean remainder was used by 624 students. It was $1.61 per hour. This combination consisted of Ingalls and Salerno's *Maternal and Child Health*, used to teach maternal and child health, and Hood and Dincher's *Total Patient Care*, used to teach Medical-Surgical Nursing.
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CHAPTER I

INTRODUCTION

Drucker states that educators will face increased demands for performance and accountability during the next two decades (13). Gundlach feels that computer-assisted instruction will become a necessity as education administrators attempt to respond to these pressures (17, p. 13).

Research has been conducted on the use of computer-assisted instruction (CAI) since the mid-1950's (38, p. 60). In 1961 Carter predicted that by 1981 the typical student might be learning through the use of "individual materials presented by a teaching machine" (9, p. 4). Shostack predicted in 1981 that CAI will have the same impact on education that written textbooks had 500 years ago (42 p. 357).

Educational institutions are increasingly using computers in instruction. In 1981 95 per cent of Minnesota's elementary, secondary, and college students were enrolled in districts or institutions that used computers for instruction (34, p. 9). At the present time twenty-four colleges and universities require, supply, or strongly recommend that their students have microcomputers (45, p. 28).
Many experts feel the major reason CAI is not used more extensively in education is its high cost (11, p. 247; 23, p. 37; 25, p. 24; 28, p. 12; 31, p. 1301; 36 p. 221). Salisbury states, "... there is no need to purchase microcomputers for instruction if some other medium will work as well or better, and for much less cost" (41, p. 55). A related problem is the small number of prepared CAI programs which are available (1, p. 14; 11, p. 248; 12, p. 23; 20, p. 27; 22 p. 137; 23, p. 33; 26, p. xvi; 32, p. 367; 42, p. 8; 47, p. 169).

Kearsley states that while pools of experts have consistently shown cost to be the major obstacle to widespread acceptance of CAI, it is not the actual cost, but the educators' perceptions of the cost that is the real obstacle (23, p. 101). Mullen and Love state that CAI is almost always cost-effective (35 p. 35). The use of CAI is saving some institutions money. The U. S. Navy is now saving about $10,000,000 annually by using CAI (23, p. 108). Until economic feasibility studies are done to determine if CAI is either too expensive to implement or a cost-effective methodology, educational administrators and potential program authors will have no research information upon which to base a rational decision.

Bolwell and Thomas reported in 1986 on a survey on microcomputer use in nursing education in community hospitals and baccalaureate and higher degree nursing
programs. The hospitals listed the cost of hardware, the cost of software, and the lack of quality software as the top three factors inhibiting the growth of instructional computing. The schools listed "lack of educator's time," and "lack of educator skill" as the first two factors, followed lack of quality software, cost of software, and cost of hardware (5, p. 958). If CAI is seen as being too expensive to use in nursing education, then CAI programs will not be developed and distributed.

Statement of Problem

This study is concerned with the economic feasibility of utilizing computer-assisted instruction as the primary teaching strategy in schools of vocational nursing in Texas.

Statement of Purpose

The purposes of this study are:

1. to determine the cost of faculty for classroom instruction in vocational nursing programs in Texas;

2. to determine the media costs for classroom instruction in vocational nursing programs in Texas;

3. to determine the content similarities of various vocational nursing programs in Texas; and

4. to determine if the present costs of classroom instruction in vocational nursing programs in Texas are high enough to permit the replacement of the present teaching strategies with CAI.
Research Questions

To carry out the purposes of this study the following research questions are answered:

1. How much do vocational nursing programs in Texas spend on faculty costs for classroom instruction?
2. How much do vocational nursing programs in Texas spend on media for classroom instruction?
3. What are the textbook commonalities among the vocational nursing programs in Texas?
4. When computer equipment and operating expenses are subtracted from the present classroom instructional costs, what amount will remain for the development and distribution of CAI programs?
5. In programs using one or more common textbooks what amount will remain for software development and distribution when computer hardware and operating expenses are subtracted from the present instructional costs for the course which use those textbooks?

Definition of Terms

The following terms are defined for this study as:

1. Computer-Assisted Instruction (CAI).--

   The student is engaged in . . . communication with the computer through a terminal device. The computer directs the presentation of some instructional materials. The student responds, and on the basis of analysis of that response, the computer directs the presentation of new material (29, p. 62).
The Encyclopedia of Computer Science states,

Computer assistance with learning and teaching has been described by many different phrases. One could follow the word "computer" with two terms, one from each of the following lists:
- aided training
- assisted instruction
- augmented learning
- based teaching
- extended education
- managed
- mediated
- monitored
- related
used in
The most common label has been CAI . . . (40, p. 272).

2. Schools of Vocational Nursing.—Those schools and programs which are approved by the Texas Board of Vocational Nursing (3, p. 9).

3. Class Hours.—"Those hours allocated to each subject and included testing" (3, p. 20).

4. Course.—"A unit or subject of the curriculum" (3, p. 20).

5. Program Director.—The individual with the authority to direct the vocational nursing program in all its phases (3, p. 24).

6. Hardware.—"Physical equipment, as opposed to the computer program or method of use, e.g., mechanical, magnetic, electrical, or electronic devices. Contrast with "software" (14, p. 572).

7. Software.—"A set of programs, procedures, rules and possibly associated documentation concerned with the
operation of a data processing system. For example, compilers, library routines, manuals, circuit diagrams" (14, p. 586).

8. Educational Media.---"The means of communication that are available for educational purposes" (15, p. 205), excluding human resources. Educational media includes, pertinent materials and technological devices such as TV, teaching machines, programmed learning material, electronic learning laboratories; also includes many well established audiovisual media such as motion pictures, filmstrips, slides, and recorders (15, p. 205).

9. Teaching Strategy.---The way the content is presented for student learning. Gagne and Briggs state, "The instructional events of a lesson may take a variety of forms... In a basic sense, these events constitute a set of communications to the student"(16, p. 122).

Basic Assumptions

1. It was assumed for the purpose of this study that one hour of classroom instruction equals one hour of computer time. This assumption was based upon the following information. Glass' meta-analytic techniques were used to combine the results of fifty-nine independent studies of CAI. The authors found that students who used CAI typically learned the lesson content in two-thirds the time required to teach the same content by conventional methods (26, p. 537). Clark states that this time savings might be the result of better instructional design and development,
instead of a superiority of CAI over traditional instructional methods (10, p. 449).

The Texas Board of Vocational Nurse Examiners evaluates programs on the basis of the time spent in learning, not the amount of knowledge acquired by the students (3, p. 28). Prior to the development of the actual CAI materials, estimates of instructional time therefore can only be an assumption.

2. It was assumed for the purpose of this study that one Apple II Plus computer will serve a maximum of five students. The estimation of the economic feasibility of using CAI as the primary teaching strategy for classroom instruction needs an associated estimation of the computer hardware to be utilized. This assumption was based upon the fact that the Texas Board of Vocational Nurse Examiners requires 600 class hours to be taught over a fifty-week period (3, p. 30), or an average of twelve class hours per week. Five students individually using a computer twelve hours a week would result in each computer being used sixty hours per week. Turner states that there is an average of one computer for every five people in colleges and universities that stress computing (46, p. 16).

A computer consultant and computer science faculty member at Pan American University, and a computer consultant for Computer Man in San Antonio, agreed that this was a reasonable usage assumption. Time lost to equipment
malfunctions is insignificant with the Apple II Plus because it is so easy to repair (32, p. 55).

3. It was assumed for the purpose of this study that faculty in programs which identify the same primary textbook for a course expect students in those programs to learn the same content.

Limitations

This study was subject to all the limitations of mailed questionnaires involved in doctoral studies.

Significance

Smith states that every time we provide a student in Texas with an educational opportunity, we need to offer it at the lowest possible cost (43, p. 1). Lyons states, "The real question health educators have to address is 'Why is it going to cost X dollars to produce Y units of output in fiscal year Z?'" (19, p. 7). Hannah and Edwards state, "they (nursing educators) have virtually no means of rational evaluation/decision making with regard to educational computing or its comparison with alternate teaching/learning strategies" (18, p. 966).

Joseph and Joseph state that we should, "Begin with information gathering. Identify the instructional or educational problems and requirements" (21, p. 530). The cost of classroom instruction in vocational nursing programs
in Texas should be measured prior to attempts being made to lower the cost. The Texas Board of Vocational Nurse Examiners is the only agency which regulates all the schools of vocational nursing in Texas. The Board has not published any information on the costs of this instruction. Faculty and educational media costs need to be determined before alternative instructional methods can be compared.

The Texas Board of Vocational Nurse Examiners has also not examined the content taught in schools of vocational nursing. A panel of experts consisting of a staff member of the Texas Board of Vocational Nurse Examiners, a vocational nursing instructor, two directors of hospital based schools of vocational nursing, a director of a community college based school of vocational nursing, and a director of a university based multicampus school of vocational nursing agreed that textbook usage was the best way to compare class content between schools. It is important to determine what is being taught along with the cost of providing the instruction. Bolwell states, "A CAI program that can only be used once by a few learners is not cost-effective. The most cost-effective CAI program is one that can be used many times without repetition by many learners" (4, p. 9).

Armstrong and dewit state that the first step in designing instruction is to analyze the instructional needs (1, p. 14).
Braun states that it is important to resolve problems which prevent the students currently in the educational system from being educated in the most effective, most efficient manner (7, p. 144). Levien states that the principal national objectives concerning instruction with the computer should be:

To ensure that access to the computer and associated instructional materials is possible wherever its use would be cost-effective . . . and . . . it improve the cost-effectiveness of instruction with the computer where such improvement will lead to a consequent improvement in the cost-effectiveness of higher education (28, p. 434).

Hannah and Edwards state, "In the author's opinion cost/effectiveness analysis is the most appropriate method for comparing instructional computing with other instructional methods. . . ."(18, p. 968). Before cost effective CAI can be developed, the economic criteria for cost effectiveness need to be identified. Sweeney states that CAI can be cost effective if there is a sufficient number of students using the program (44, p. 150). If CAI can be developed within established the economic criteria, then students can be provided access to this teaching strategy.

Therefore this study is significant in that:

1. The cost of faculty for classroom instruction in vocational nursing programs in Texas had not been measured.

2. The media costs for classroom instruction in vocational nursing programs in Texas had not been measured.
3. The content similarities of various vocational nursing programs in Texas had not been identified.

4. Vocational nursing programs should be provided with the information necessary to choose between competing teaching strategies.

5. Existing programs, and those individuals and groups involved in software production should be able to identify the economic criteria necessary for computer-assisted instruction to become a cost effective primary teaching strategy in schools of vocational nursing in Texas.

The procedure developed for this study, then provides business firms with both the content to be taught with CAI, and the amount available for the development and distribution of CAI software. Computer science faculty members at North Texas State University, a representative from a small for profit software development firm, a representative from a large for profit software development firm, and a representative from a nonprofit software development firm were contacted. They all agreed that there was no reliable formula for calculating software development costs. The representative from the small for profit software development firm stated that the sales price for their CAI was based upon what the purchasers would pay, and not upon the development costs.

ODell states,  

Business firms are begging (because of competition) for educators to tell them what and how to use the technology now in hand -- yet educators wait for industry
to tell them what is available. The information explosion seems to be forcing educators into a new role -- that of participatory partnership (37, p. 159).

The study also provides business with the information necessary to decide about participation in vocational nursing education in Texas.

Bork states that the software developer must be able to market the material at a price that will attract the users (6, p. 97). Billings states, "it is valuable to develop CAI courseware for perceived or ascribed needs and later measure results of courseware against these needs" (2, p. 60).

Summary

According to Sweeney, because of the expense and time associated with implementing computer systems, it is important to conduct a complete needs assessment prior to initiating computer use (44, p. 202). The economic feasibility of computer-assisted instruction for schools of vocational nursing in Texas should be determined prior to the development and implementation of CAI. This study identifies the present faculty and media costs in schools of vocational nursing, and the content similarities between the programs. A procedure was developed to determine which content areas have the greatest potential for the development of cost-effective CAI.
CHAPTER BIBLIOGRAPHY


3. The Board of Vocational Nurse Examiners, Rules and Regulations (effective 9/1/81), Austin, Texas.


CHAPTER II

REVIEW OF THE LITERATURE

Vocational Nursing Education in Texas

To become a licensed vocational nurse in the state of Texas a student must 1) complete a vocational nursing course lasting at least twelve months, 2) have completed two years of high school or its equivalent, 3) be of good physical and mental health, and 4) pass a state written examination (6, p. 34).

The Texas Board of Vocational Nurse Examiners has established strict time requirements for the vocational nursing programs. The program must be a minimum of fifty-two weeks excluding eighteen days for vacation, illness, and/or holidays (6, p. 28). The class hours are broken down into the following minimum time allotments: 1) 10 hours for Personal and Vocational Adjustments; 2) 10 hours for Basic Microbiology; 3) 20 hours for Mental Health and Mental Illness; 4) 165 hours for Vocational Nursing Skills; 5) 50 hours for Pharmacology; 6) 20 hours for Nutrition; 7) 50 hours for Anatomy; 8) 20 hours for Geriatric Nursing; 9) 120 hours for Medical-Surgical Nursing; and 10) 80 hours for Maternal-Child Nursing (6, p. 28).
Mager states that it is illegal to teach efficiently in the educational system because the system is based upon the time students spend learning instead of the quantity or quality of what they learn (56, p. 1). Teaching methodologies which help students learn faster are discouraged because Texas statutes require vocational nursing programs to spend at least twelve months in teaching the student (Vernon's Ann. Civ. St. Art. 4528c Sec. 12. (b)). The Rules and Regulations of the Texas Board of Vocational Nurse Examiners specify the time to be spent in teaching, but do not specify the content to be learned by the students (6). Graduates of vocational nursing schools are evaluated in terms of the quantity and quality of knowledge through the state licensure examination, but traditional schools are evaluated by the Board of Vocational Nurse Examiners in terms of the time spent in teaching. A school is not rewarded for teaching faster than other schools, nor for the students learning more than they would have in another school.

Gerhold feels efforts spent on CAI are wasted unless they result in "more effective teaching, more efficient teaching, or teaching of worthwhile material which cannot be covered otherwise ..." (21, p. 15). More effective teaching would result in the students learning more of the lesson content. More efficient teaching would result in the lesson content being learned with less waste of human or other resources.
The regulations of the Texas Board of Nurse Examiners permit a school to develop challenge examinations for each course (6, p. 20 & 28). Schools can use this option to convert knowledge gained by more efficient educational methods to the classroom hours required by law.

An instructor in a school of vocational nursing must be either a Registered Nurse (R.N.) or Licensed Vocational Nurse (L.V.N.) (6, p. 24). An individual can become a Registered Nurse after completion of a two year nursing program (Vernon's Ann. Civ. St. Art. 4518 Sec. 1). The regulations do not require the director or any of the instructors to have any experience or knowledge of education.

Although instructors and directors have not been prepared to be accountable for their programs, they will be forced into increasing fiscal accountability. Harper states:

Regardless of their diversity and complexity, allied health professions education programs are faced with the same accountability and scarce resources allocation problems as other health education programs and higher education in general (25, p. 73).

Computer Assisted Instruction

According to Caldwell, "Computer-assisted instruction has the potential of upgrading the quality of nursing practice by conveniently providing high-level instructional materials and making materials available" (11, p. 13). CAI is theoretically more effective because it enables the best
teachers to reach a larger number of students (46, p. 2036). CAI should also be more efficient because the initial production effort results in materials that can be available at many locations and at almost any time (11, p. 14).

Mullen and Love state, "The growth of CAI has been chaotic, uncoordinated, and haphazard" (41, p. 35). CAI has been tested primarily in a single setting with a specific program and specific group of students (21, p. 21).

Glass' meta-analytic techniques were used to combine the results of fifty-nine independent studies of CAI. Students who used CAI typically learned the material in two-thirds of the time required to teach the same subject by conventional methods. The students using CAI also scored one-quarter of a standard deviation unit better on tests, and showed a slightly larger increase in interest in the subject than the students taught by conventional methods (32, p. 537-538).

Lower used CAI in an introductory chemistry course, and reported he had fewer students failing the course without a parallel increase in the student drop rate. He also stated the students showed improvement in the subsequent chemistry courses taught conventionally (39). He did not state the number of students involved, nor if he used a research design.

Moonen compared 121 students in a regular statistics course using three different CAI systems. The control group
for his comparison utilized discussion sessions to facilitate their learning. He concluded that the CAI-taught students: 1) were more "self-active"; 2) showed improved performance; 3) learned faster; 4) preferred the learner control provided by CAI; 5) stated the frequent feedback increased their self-confidence; and 6) showed more obvious learning if they had a weak mathematics background (40).

Stephens describes the use of CAI in teaching dental students the clinical diagnostic skills necessary for planning orthodontic treatment. The computer program was available for student use for one year, but its use by students was not required. There were fifty-six students in the class. Forty-three of those students returned a ten question anonymous survey on the program. Eighty per cent of those returning the questionnaires had used the program, and the users were unanimous in feeling that the program had helped their learning (50).

Levien and Mossman state that CAI assists the student to mastery learning and to perfecting skills (37, p. 63). Mastery learning occurs when the student learns all the subject material and not just the amount required to pass the test. Mastery learning would explain Lower's students who showed improved performance in subsequent courses. If CAI helps perfect skills, it would explain why the students with poorer math skills showed the most improvement in performance in Moonen's study.
Computer Assisted Instruction in Nursing

A survey was conducted of 150 R.N. students, who used a CAI program called "Bottle" to learn about chest tubes. The students "were unanimous in liking the immediate response to their answers, the opportunity to move quickly through understood material, being actively involved in their own learning" (14, p. 531). The students were asked to rank order the various learning methods and clearly preferred CAI over patient observation, lecture and discussion, and reading (14, p. 532).

The earliest report of using CAI in nursing was published in 1966 by Bitzer. She evenly divided a class of fourteen R.N. students into two groups for a two-hour section on care of the patient with angina pectoris and myocardial infarction (4, p. 145). There was no significant difference between the control group using conventional instruction and the experimental group using CAI on their pretest scores. There was, however, a significant difference on the posttest results, measured at the nine per cent level using a two-tailed t test with the CAI group scoring higher (4).

In 1966 Bitzer and Boudreaux reported using CAI in a maternity nursing course. Twenty students were divided into two groups, matched according to their ability. The control group learned through conventional classroom instruction and the experimental group used CAI except for sharing a common
two-hour clinical conference. A comparison of final examination grades showed no significant difference between the groups, but the experimental group learned in an average of one-third the time required by the conventional method. All the students who used CAI completed the lessons in less than fifty hours, while the control group spent eighty-four hours in the classroom (5).

Valish and Boyd in 1975 reported on the use of CAI in providing continuing education to registered nurses. They randomly chose 124 registered nurses from the staff of the hospital and then randomly divided the nurses into three groups with each group using CAI to study different subject material (54, p. 18). The nurses who did not use a specific set of CAI lessons were used as the control group for those particular lessons. No other form of instruction was provided. A posttest only research design was used. The posttests were not based upon the content of the CAI courses but instead drew "from the theoretical universe based upon the criteria of relevancy, appropriateness, and applicability" (54, p. 23). The posttest also showed that there was no significant difference between the subjects based upon their educational level, ages, years of clinical experience, or department of employment (54).

A different study compared thirty-four registered nurses, who were randomly divided into a control group of twelve and CAI-instructed group of twenty-two. The control
group received a "traditional inservice education program on cardiopulmonary resuscitation," designed for medical students and physicians. A pretest posttest design was utilized with the tests being written for physicians. The control group did significantly change their test scores, but the CAI users showed an improvement significant at the .05 level (27).

A study of ninety-nine undergraduate women was reported by Fisher et al., in 1977. These non-nursing students were assigned in nonrandom order to one of four groups. One group received computer instruction, one group spoken instruction, one group written instruction, and another group received no instruction on collecting a clean voided urine specimen. The students who performed the procedure most effectively would secure the lowest total bacteria count, and total bacteria counts were used to compare the groups. Each participant visited the laboratory three times and on the first two visits was taught in the assigned manner. On the third visit all participants received spoken instruction only. On each visit the women collected a clean voided urine specimen. A Mann-Whitney one-tailed test was used to compare the groups. Counts on the group which received no instruction were higher than any other group in the first and second visit ($P<0.0001$). The CAI group had lower bacterial counts than the written instruction group in each of the three visits ($P<0.03$) and lower than the spoken
instruction group on the third visit (P<0.04). The CAI group was more consistent in their performance of the urine collection procedure than the other instructed groups (P<0.002, F-test) (19).

Newman and O'Brien in a report published in 1978 compared student research proposals. A control group of nurses in a master's degree program was taught the research process using traditional classroom instruction. The experimental group used computer simulations of the research process and small group discussions to learn the material. There was no significant difference between the two groups on a pretest over research methodology. There was also no significant difference between the two groups on the grades the students received for their final research proposal, which was the criterion measure used by Newman and O'Brien (43).

Hannah in 1978 reported a study of thirty-five students studying the problems of immobility. A control group was taught using traditional didactic methods, and an experimental group used only CAI to learn the same material. The difference between the pretest and posttest scores showed the CAI group learned significantly more (t = .017) by a two-tailed test (24).

Kirchoff and Holzemer in 1979 reported a study using CAI to teach postoperative nursing care. No control group was used, but the pretest-posttest mean difference was
significant at the .01 level, demonstrating that the students learned about postoperative nursing care using CAI (31).

The same year Huckaby et al. compared CAI with lecture-discussion considering cognitive learning, transfer of learning, and affective behaviors. Seventeen graduate nursing students were in the control group, and fourteen were in the experimental group using CAI with lecture-discussion. Both groups learned significantly, but only the CAI group was able to transfer what they had learned to specific patient situations at a significant level (P<0.03) (28).

Timpke and Janney reported in 1981 that by using CAI to teach pharmacology mathematics, they had improved the students' performance on a final mastery examination. In the group of students using traditional methods eleven out of twenty-eight failed the posttest. In the second group taught with partial CAI, two students out of thirty-two failed. In the third group with fully implemented CAI there were no failures among the thirty-two students (53).

Day and Payne in 1983 used a quasi-experimental design to compare CAI with lecture presentation of Health Assessment course content. Eighty-two students were divided into two groups in a non-random manner. One group used CAI to learn assessment of the ears and eyes, while the other group used a three hour classroom lecture. The groups were
then reversed for the teaching of assessment of the lungs, thorax, breast, and axilla. A one-way analysis of variance was used to compare the multiple-choice midterm and final exams. No significant difference (p < 0.05) was demonstrated between the groups. A questionnaire on attitude toward CAI was given to the students. It revealed that the students felt negatively toward the CAI (16).

Yoder and Heilman in 1985 reported the results of a study using CAI to teach nursing diagnosis. The subjects consisted of thirty-nine undergraduate and seventeen graduate students. The students spent twenty to forty minutes completing a CAI module. A pretest and posttest design was used in the study. A paired t-test demonstrated a significant increase in knowledge at the 0.0005 level for both the undergraduate and the graduate students (57).

Reynolds and Pontious in 1983 and 1984 provided supplemental learning activities consisting of CAI, individual faculty conferences, practice in a simulation laboratory and peer tutoring following a lecture on medication dosages. The total student population of 143 nursing students were given a competency test over the content 2 weeks following the lecture. Those students who failed to pass the examination at a 90 per cent level were given a similar test 4 weeks after the initial lecture. Failure to pass the competency exam after both attempts resulted in 12 students being withdrawn from the course. A
chi-square analysis was used to compare the use of the CAI materials with all other activities and no other activities. The use of CAI was very positively \( (p \leq 0.000019) \) linked with passage of the test (47).

Thiele used a posttest only quasi-experimental design to compare the use of CAI with traditional teaching for teaching medication calculations. The forty-six junior level, beginning nursing students in 1983 were presented the calculation content by CAI with an optional hour long review session attended by half the students. The two previous classes (1981 and 1982) were presented a three hour class and a self-instructional workbook covering the same material. Only 64.5 per cent of the students, who were part of the control group, passed a criterion referenced test at the 90 per cent level. The same test given in similar circumstances was passed by 91 per cent of the group which used CAI (52).

Droste-Bielak compared the use of role-playing by students in a clinical laboratory with a computer simulation for teaching interviewing and data collection skills. Random assignment was used to place forty-five volunteers into either the control or the experimental group. Students in the control group practiced collecting information from each other and from other students. An instructor was present to provide feedback for the role-playing experience. Students in the experimental group used a computer program
to simulate an interview. All students received a fifty
minute lecture and discussion on interviewing techniques.
Tape recordings of the students with actual clients were
evaluated and scored by by four judges. A t test and a one
way analysis of variance was used to compare the scores of
the groups. No significant difference was found in the tape
recordings between the students which used the CAI and those
who learned by role playing (17).

Bratt and Vockell reported in 1986 the results of their
use of CAI to teach freshman R.N. students factual knowledge
of respiratory assessment. Eighty-five students taught the
preceding semester by traditional methods served as the
control group. Fifteen students, which were not randomly
selected, served as the experimental group. The
experimental group was taught a unit on basic assessment
using the same traditional teaching methods that were used
for the control group. There was no significant difference
in the students scores on an identical test covering this
material. The experimental group's mean was significantly
higher (<.001) on an identical test over the material which
they learned by using CAI in comparison with the control
group, who learned by traditional classroom instruction (8).

Kelley reviewed the available CAI programs, and
evaluated the feasibility of adapting existing CAI programs
for vocational nursing education. All the available
materials had been written for registered nursing students.
Kelley felt that the available programs were primarily designed to teach specific content rather than simulate a patient care situation. She felt that simulations might be developed for use in both vocational and registered nursing education. She found the programs to be unsuitable for use in vocational nursing education since they were based on registered nursing education (30).

Hamby developed one hour of CAI drill and practice on ratio and proportion for vocational nursing students. A total of sixty-four students were randomly placed into either a control group or an experimental group. Both groups were presented a lecture over the content. The control group had an additional hour of discussion and practice on worksheets. The experimental group had an additional hour of CAI. Performance on a ten item posttest was used to compare groups. An analysis of variance demonstrated no significant difference between the groups (23).

Murphy states that there are some problems with the limited quantity of research into the effectiveness of CAI for nursing, and "some problems or ambiguities with available studies" (42. p. 220). Clark indicates that it was not the CAI which resulted in the improvement of instruction in CAI studies, but the improved instructional design (12, p. 445). Clark and Salomon state that all media appear to teach with equal effectiveness, and selection of
teaching strategies should be based upon cost effectiveness and appeal to students (13, p. 474).

The research studies that have been done show that CAI could be an effective educational tool for vocational nursing education. The question, which is still to be answered, is whether or not it is possible to provide CAI at a reasonable cost (34, p. 444).

The Computer Assisted Instruction Market

The costs of conventional instruction have been increasing at a rate equal to the general inflation rate and are expected to continue increasing with the general inflation rate (2, p. 456). The cost of computer technology has been decreasing at a rate of twenty-five per cent per year in spite of inflation (49, p. 357). Kearsley states, "There is little doubt that the cost of CAI will continually decrease (while the cost of traditional instruction continues to increase)" (29, p. 110).

Schools in 1975 were spending $3,000 to $5,000 per year per terminal to use a computer in a time sharing system. By 1980 they could make a one time purchase of a powerful microcomputer for less than $2,000 (9, p. 139). The average cost in 1980 for all the equipment involved in a CAI system was estimated to be $2,500 (44, p. 30).

A school wanting to use CAI needs more than the computer equipment, referred to as hardware. The school also needs the software or instructional programs.
It has been estimated that it takes 100 to 150 hours of preparation for each hour of CAI program material (15, p. 521; 18, p. 106; 30, p. 24; 33, p. 12). The University of Delaware's Office of Computer-Based Instruction spent 700 hours of development time for each hour of lesson time, when they converted a chemistry class to computer-assisted instruction (20, p. 146). Mager states that it takes faculty members a long time to develop instructional programs, because they think it should take a long time, and because they do not know their subject matter (56, p. 10). CAI formerly took much time to develop, because it had to be written in complex languages. As computer languages are improved and developed for CAI, the preparation time is decreased (37, p. 1302). Tarp estimates that the use of a modern authoring system enables a CAI lesson to be written in five to ten hours instead of the 100 to 200 hours it had taken to manually produce a lesson (51, p. 2).

Educators might be tempted to postpone implementation of CAI because the advances in computer technology and authoring systems present a promise of an increasingly better future at an increasingly lower cost. This view ignores the educational needs of the present students (10, p. 446). Adams and Fuchs state, "Waiting for new models is a little like waiting for new cars before teaching driver's education. Sure they are different and have more power for
the energy expended, but there is only so long you can wait to teach a student ready to learn drive" (1, p. 126).

Gerhold states, "It is a time for dramatic growth in the use of CAI at all levels of education" (21, p. 17). Hales and Rothenberg state that a large market exists in nursing education programs for both computer hardware and computer software (22, p. 3).

Most institutions are using locally produced CAI (26, p. 37). Tarp feels that, "For the near future most CAI lesson development is going to have to occur at the local or regional level" because only a few commercial software development companies have shown an interest in nursing education (51, p. 3).

Silva states,

It is unlikely, as well as unrealistic in terms of time, equipment, expense, and duplication of effort, that each school of nursing will develop its own computerized learning packages. Instead, nurse educators will turn to educational computer firms to prepare these packages (48, p. 96).

Wasserman and Gutz state that to production of a large, high quality educational software package takes at least five person years of work over at least a two year period (55, p. 247). They also state that while the cost of the computer hardware will continue to decrease, the cost of software is over eighty per cent of the actual cost of CAI. This cost of developing software is continuing to increase (55, p. 241).
A few small, independent companies have been producing software. Major publishers are beginning to become involved (3, p. 78). McGraw-Hill, Addison Wesley, Random House, Rinehart and Winston, SRA, Milton Bradley, Borg Warner Educational Systems, and Milliken Publishing are now marketing CAI for microcomputers (45, p. 1). J. B. Lippincott was developing CAI for nursing education but has decided to postpone further development due to market uncertainty (38, p. 1).

Bejar states that CAI has done poorly in the market place because software developers were not sure of the market, and they did not strive to produce high quality products. Since few high quality products existed, market acceptance was poor (3, p. 78).

Prospective CAI authors face no incentive to write CAI program. The lack of distribution mechanisms limit CAI to the author's own campus which prevents the financial rewards and professional prestige provided by other forms of publishing (35, p. 547).

Levien and Mossman state that if hardware is standardized, "discipline-based organizations can play a large role in achieving widespread distribution" (35, p. 521). While hardware has not been standardized, modern authoring languages are being written to run on a wide variety of different equipment. COMMON PILOT for example will run on the SwTPC 6800 (multi-user), the Odell 85, any 8089 or Z/80
under North Star DOS, or CP/M, the TRS-80, the Apple II, the 
Alpha microsystems, the TERC, the Interdata 7/32, and with 
slight modification on the new 16 bit microcomputer (21, p. 
19).

Before commercial firms become involved in software 
production there will have to be a demonstration of the 
potential to make a profit (35, p. 520). Borg and Gall 
state that before a new product is introduced it is 
important to develop a research base, which identifies the 
deficiencies of the present products (7, p. 35).

Summary

A review of the literature indicates that CAI in 
vocational nursing could be at least as effective in 
teaching the material as traditional classroom instruction. 
The content of the classroom instruction in vocational 
nursing programs in Texas has not been identified in the 
literature, nor have the costs been identified. The 
development of software has been shown to be a costly 
process which should be undertaken based on cost 
effectiveness for both the developers, and the schools which 
use CAI.
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CHAPTER III

METHODS AND PROCEDURES

The Population

The population consisted of the vocational nursing schools in Texas. This population is regulated by the Texas Board of Vocational Nurse Examiners (3, p. 3). The entire population was surveyed. Chou states data from the population provides more accurate information than data from a sample. The entire population should be surveyed if the population is relatively small, and if it would not be excessively costly to gather the data (7, p. 23). A complete and up-to-date list of the schools was obtained from the staff of the Texas Board of Vocational Nurse Examiners in Austin, Texas seven days before the start of the survey (29, p. 129). This list contained the names and addresses of 154 vocational nursing schools in Texas.

The Instrument

The questionnaire (Appendix A) was developed based upon the literature. The questionnaire was designed to determine how much money is being spent for classroom instruction in vocational nursing programs in Texas. Present expenditures were used as the basis for estimating future purchases by
these programs. Chou states, "Past sales can be considered a reliable estimate of future purchases" (7, p. 447).

A panel of six experts was chosen to provide content validity (29, p. 136). The panel consisted of a staff member of the Texas Board of Vocational Nurse Examiners who is involved in the evaluation of vocational nursing programs; a vocational nursing instructor; two directors of hospital based vocational nursing programs; a director of a community college based vocational nursing program; and a director of a university based multicampus vocational nursing school. All six of the evaluators were women and registered nurses, and their experience ranged from one year to fourteen years in vocational nursing education.

The panel agreed that faculty costs plus educational media costs was a fairly accurate way of measuring classroom instructional cost. The Carnegie Commission on Higher Education has stated, "New institutions may be able to incorporate new technologies into their instructional programs on both economical and instructional grounds. But many existing institutions are able to invest in the new technologies only if they offer immediate cost-savings" (6, p. 49). Microcomputers can be placed in conventional classrooms avoiding additional construction costs for existing programs.

The panel felt that the choice of a principal textbook would reflect the general course content. One panel member
stated that an analysis of course objectives might be a more accurate measure, but she noted that all vocational nursing programs do not have course objectives. In one Texas study an attempt was made to compare the course objectives of eleven registered nursing schools. The study found over 12,000 objectives without a uniform approach being used in the construction of the objectives (22, p. 77). Even if all vocational nursing programs had course objectives, it seems then that identifying content similarities on the basis of objectives from over 150 programs would be an impossible task.

The panel felt that the directors of vocational nursing schools would be able to answer the questions on the questionnaire. They also felt the questions were understandable, but offered minor modifications to improve their clarity. Minor rephrasing was accomplished as a result of their input.

Procedures for Collection of Data

1. After the current list of vocational nursing programs was obtained from the Texas Board of Vocational Nurse Examiners, the names of each school were placed on an individual slip of paper. Confidentiality of the respondents was be maintained by issuing each school a code number. The names were drawn at random without replacement. As the names were drawn, they were assigned code numbers starting
with 101 and continuing in ascending order. To protect the respondents' confidentiality only the investigator had access to the list identifying schools by the code number (4, p. 77).

2. The director of each school was sent a questionnarie (Appendix A) with the school code printed in the upper right corner, the letter of transmittal (Appendix B), and a stamped envelope addressed to the investigator.

3. Two weeks after the initial survey, the follow-up letter number one (Appendix C) was sent to those programs which did not respond. This follow-up letter again requested the directors to complete and return the questionnaire.

4. Five weeks after the initial survey, the directors of the schools who did not respond were sent follow-up letter number two (Appendix D), another copy of the questionnaire, and another stamped envelope addressed to the investigator. Follow-up letter number two stressed the importance of obtaining a response from as many schools as possible, and again urged them to respond.

5. Six weeks after the initial survey, ten per cent of the schools responding to the initial survey request were chosen at random. These schools were sent the request for reliability letter (Appendix E), another coded questionnariae and stamped envelope addressed to the investigator. The request for reliability letter asked the directors to complete the questionnaire again to determine the
reliability of the responses. The replies to this request were used to determine test-retest reliability (4, p. 221).

6. Eight weeks after the initial survey, the non-respondents were contacted by telephone, and an attempt was made to complete the questionnaire by telephone.

Research Design

The research questions were answered by establishing the decision parameters of factors to be used in making the decision for or against CAI use (7, p. 13).

Levien and Barro identify the decision parameters which should be used by educators in judging between CAI and conventional instruction:

1. Lower cost, equal effectiveness - The superior alternative is less costly than the others, and is equally effective.
2. Equal cost, higher effectiveness - The superior alternative is no more costly than the others, and is more effective (19, p. 438).

CAI will not suddenly become economically feasible at a specific cost (19, p. 451). When CAI costs are compared with conventional costs based on the averages, the opportunity for cost-effective use of CAI are underestimated (19, p. 453). A cost per student figure provides a better basis for decision making than an overall institutional cost figure (11, p. 41).

Cost per user on a CAI program decreases as the number of students using the program increases (17, p. 23). This reduction is because the development cost is distributed
over a greater number of users. There is also a decrease in the cost of CAI as the number of hours the system is in use increases (19, p. 451), because the hardware costs are distributed over a greater number of hours.

The expenses involved in using CAI or conventional instruction must be compared on the basis of cost per student hour (19, p. 446). Cost per student hour was determined through the use of descriptive statistics. Descriptive statistics are used when the sample includes the whole population (7, p. 5). Potential CAI publishers need both the type of product needed (28, p. 9) and the potential for profit resulting from the product in order to decide whether or not to produce CAI (28, pp. 134-135).

Conventional instruction costs vary with differences in class size and instructional salaries (19, p. 447). A school by school determination of the conventional cost per student hour of instruction was based upon the amount of faculty time spent on preparing for teaching in the classroom. It also included costs for media used in the classroom.

The cost per student hour of CAI should include hardware costs, software costs, operations, courseware development, and telecommunication expenses (2, p. 359; 16, p. 102; 30, p. 539).

The Apple II Plus 48K was used to calculate the hardware costs. "In classrooms, there are more Apple II-series computers than any other type of computer" (8, p.60). A
survey of 305 baccalaureate and higher degree R.N. programs found almost twice as many Apple computers in those schools as IBM PCs (27, p. 175). A 1985 survey of R.N. programs in the area of the Southern Regional Education Board revealed again that there were many more Apple computers used in R.N. programs than any other brand (23, p. 3). The University of Texas at Austin had a three year federal grant to develop a microcomputer authoring system for nursing on the Apple II Plus (13, p. 2). There is a wide variety of hardware available. The Apple II Plus 48K was therefore chosen a priori for this study because of its wide usage in registered nursing programs (14, p. 3).

There is rapid advancement in the sophistication of computer systems. A lifetime of only five years is realistic for a system (5, p. 534; 10, p. 7; 16, p. 103). Hardware costs will be calculated using a five year replacement period.

The computer price was based upon Apple's Suggested Retail Price List Effective June 1, 1982. An Apple II Plus 48K computer with a disk drive and a nine inch monitor cost a total of $2,415.00 (24). This amount divided by five yields an annual cost per computer of $483.00. A service contract for the Apple II Plus and the attached peripherals cost $225.00 per year (21, p. 150), yielding a total annual cost of $708.00 per year per computer. During the time of this study Apple has introduced less expensive and more sophisticated computers (15. pp. 32-33).
Operating costs for the Apple II Plus with a single disc drive are minimal. The computer system's power consumption is 150 watts (1). The June, 1982 average residential electricity cost in Texas was $66.03 per 1000 kilowatt hours (26), yielding an average operating cost of one cent per hour. Maintaining a complete library of CAI courses is negligible (9, p. 103). The Apple II is a microcomputer, so no telecommunication expenses are required in its operation.

Hardware costs plus operating costs subtracted from conventional costs yield the amount remaining for software and software development. If the remainder is large enough the results will stimulate the production and distribution of software (19, p. 520).

The Carnegie Commission on Higher Education states that the use of hypothetical models is necessary to compare alternative instructional methodologies, when the actual cost figures based upon actual use are not available. They caution the users of the data from hypothetical models to remember that in actual practice costs may vary (6, p.82).

Procedures for the Analysis of Data

Faculty salaries were multiplied by the percentage of time the faculty is involved in classroom teaching or preparation for classroom teaching, thus determining the program's total faculty cost for classroom instruction. The
total faculty cost for classroom instruction was divided by the number of hours of classroom instruction in the program to yield the total faculty cost per hour of instruction. Total faculty cost per hour of instruction was divided by the number of students in the program to yield faculty cost per student classroom instructional hour.¹

The range for all the programs was calculated by identifying the program with the lowest faculty cost per student classroom instructional hour and the program with the highest faculty cost per student classroom instructional hour (7, p. 104). The arithmetic mean for all the programs was calculated by adding the individual program's faculty cost per student classroom instructional hour and dividing by the total number of programs in the study (7, p. 53).

Media cost per student classroom instructional hour was calculated for each program in the study. Each program's annual media cost was divided by the number of classroom instruction hours.

¹Faculty cost per student classroom instructional hour

\[
\begin{align*}
\text{FS} \times \text{(PT)} &= \text{TFC} \\
\text{TFC} / \text{NH} &= \text{FCIH} \\
\text{FCIH} / \text{NS} &= \text{FCSIH} \\
\text{FS} &= \text{Faculty salaries} \\
\text{PT} &= \text{Percentage of time faculty spends on classroom teaching} \\
\text{TFC} &= \text{Total faculty cost for classroom instruction} \\
\text{NH} &= \text{Number of classroom hours taught in the program} \\
\text{FCIH} &= \text{Total faculty cost per hour of classroom instruction} \\
\text{NS} &= \text{Number of students in the program} \\
\text{FCSIH} &= \text{Faculty cost per student classroom instructional hour}
\end{align*}
\]
instructional hours in the program to yield the total media cost per classroom instructional hour. The total media cost per classroom instructional hour was divided by the number of students in the program to provide the media cost per classroom instructional hour.\(^2\) The range and the arithmetic mean was calculated for the media cost of all the programs using the same procedures identified in the preceding paragraph.

The directors of the vocational nursing programs selected a principal textbook for each nursing course (Appendix A). These principal textbooks were used to compare similarities among the programs. Each principal textbook used by two or more vocational nursing schools was identified by a cross tabulation analysis procedure (18, pp. 70-71), along with the number of programs and the number of students using the textbook. Next, each combination of two principal textbooks used by two or more vocational nursing programs was identified along with the number of nursing schools and the number of students using both textbooks.

\(^2\)Media cost per student classroom instructional hour

\[
TMC/NH = MCIH \\
MCIH/NS = MCSIH \\
TMC = The individual program's annual media cost \\
NH = The number of classroom instructional hours in the program \\
MCIH = Total media cost per classroom instructional hour \\
NS = Number of students in the program \\
MCSIH = the media cost per student classroom instructional hour \]
This sorting procedure continued with combination of three, four, five, six, seven, eight, nine, ten, and eleven. Schools with eleven primary textbooks in common had all the primary textbooks in common.

The amount remaining for the development and distribution of software after computer hardware and software expenses was subtracted from present classroom instructional costs was calculated by the following method. The review of the literature and discussions with individuals involved in vocational nursing education in Texas indicate no Texas vocational nursing program is using CAI. A program director indicated on the questionnaire that one program uses CAI, and that program was excluded from all calculations of the amount of money remaining for software development and distribution. Schools using CAI have hardware, software, and operating expenses as part of the present budget. The present classroom instructional costs per student hour for each remaining program were calculated by adding the program's faculty cost per student classroom instructional hour and the program's media cost per student classroom instructional hour.

Each program's computer hardware cost per student was determined. The number of students in the program was divided by five. If five did not evenly divide into the number of students, the quotient was rounded up to the next whole number. Rounding the quotient up prevented the calculations
from being based upon a computer serving more than five students or a school buying a fraction of a microcomputer. This calculation provided the number of computers needed by the program.

The annual cost per computer was identified in the research design section of this proposal as $708.00. This amount was multiplied by the number of computers needed by the program to yield the program's annual computer hardware cost. The program's annual computer hardware cost was divided by the number of students in the program to yield the annual per student computer hardware cost. The annual per student computer hardware cost was divided by the number of classroom instruction hours taught in the program to yield the computer hardware cost per student classroom instructional hour.

The average hourly operating cost for an Apple II Plus microcomputer with a single disc drive has been identified in the research design section of this dissertation as being $0.01. This amount was added to the computer hardware cost per student classroom instructional hour to provide the computer hardware and operating cost per student classroom instructional hour.

The amount remaining for software was calculated using the following formula. Computer hardware and operating cost per student instructional hour was subtracted from the
present classroom instructional cost. The range and arithmetic mean for all the programs in the survey were calculated using the same procedures discussed earlier in this section.

Content areas offering the greatest potential for cost effectiveness use of CAI as the primary teaching strategy were identified through the use of the following method. The program currently using CAI was excluded from the calculations. The calculations to obtain each program's annual computer hardware cost per student and each program's present cost per student and each program's present cost per student classroom instructional hour have been described in

\[\text{Amount remaining for development and distribution of CAI software} \]
\[\text{FCSIH} + \text{MCSIH} = \text{PCSIH} \]
\[\text{NS/5 = NC} \]
\[(\text{NC})(\$483.00 + \$225.00) = \text{ACC} \]
\[\text{ACC/NS} = \text{ACCS} \]
\[\text{ACCS/NH} = \text{CCSIH} \]
\[\text{PCSIH} - \text{CCSIH} - \$0.01 = \text{ARC} \]
\[\text{PCSIH} = \text{Faculty cost per student classroom instructional hour} \]
\[\text{MCSIH} = \text{Media cost per student classroom instructional hour} \]
\[\text{PCSIH} = \text{Present cost per student classroom instructional hour} \]
\[\text{NS} = \text{Number of students in the program} \]
\[\text{NC} = \text{Number of computers needed (rounded up)} \]
\[\$708.00 = \text{Annual cost for 1 Apple II Plus with disc drive} \]
\[\text{ACC} = \text{Annual computer hardware cost} \]
\[\text{NH} = \text{Number of classroom instructional hours in the program} \]
\[\text{ACCS} = \text{Annual computer cost per student} \]
\[\text{CCSIH} = \text{Computer cost per student classroom instructional hour} \]
\[$0.01 = \text{Hourly operating cost} \]
\[\text{ARC = Amount remaining for software} \]
this section of the study. The hourly operating cost for an Apple II Plus microcomputer has also been identified.

As discussed earlier, research question three was answered by identifying two or more schools which use the same primary textbook for one or more courses. The course or courses with common textbooks will be referred to as a block to simplify the discussion of this method. The Texas State Board of Vocational Nurse Examiners requires each course to be taught for a specific number of hours (3, p. 28). The total number of hours required to teach the block was calculated by adding the hours required to teach each course in that block.

The amount remaining for development and distribution of computer software was calculated by the following methods. Each school using the same primary textbook(s) to teach the block had the amount remaining for software development and distribution calculated. The number of

\[ \text{Amount remaining for development and distribution of software for instructional blocks} = \frac{\text{NHB}}{\text{ACCS}} = \text{CCSIH} \]

\[ \text{PCSIIH} - \text{CCSIH} - $0.01 = \text{ARC} \]

\[ \text{NHB} = \text{Number of hours required by the Texas Board of Nurse Examiners to teach the block} \]

\[ \text{ACCS} = \text{The school's annual computer cost per student} \]

\[ \text{CCSIH} = \text{Computer hardware cost per student classroom instructional hour for the block} \]

\[ $0.01 = \text{Hourly operating cost for the Apple II Plus} \]

\[ \text{PCSIIH} = \text{Present cost per student classroom instructional hour} \]

\[ \text{ARC} = \text{Amount remaining for software} \]
hours required to teach that block was divided by each school's annual computer hardware cost per student to obtain the computer hardware cost per student instructional hour for the block. The hourly operating cost for the Apple II Plus microcomputer was added to the computer hardware cost per student instructional hour to obtain the hourly hardware and operating cost for the school. The school's hourly hardware and operating cost was subtracted from that school's present cost per classroom instructional hour to obtain the amount remaining for software development and distribution for each school.

Schools with a positive amount remaining for software development and distribution were identified. Schools without a positive amount remaining after subtracting the hourly hardware and operating cost could not cost effectively teach that specific block with CAI. The number of schools with positive remainders and the total number of students in those schools are reported along with the range of their amounts remaining for software development and distribution.

An arithmetic mean was calculated on a student basis rather than on a school basis. This calculation precluded a school with a large amount remaining but only a few students enrolled from raising the mean. For example, if School A had 100 students and $1.00 per hour remaining; School B had 50 students and $2.00 per hour remaining; and School C had 100
students and $10.00 remaining the arithmetic mean for the schools would be $4.44. The arithmetic mean would drop to $1.85 when the calculations are done on a student basis.

The hours all the respondents stated they were teaching each course was compared with the class hours required by the Texas Board of Vocational Nurse Examiners. This comparison provided an evaluation of concurrent validity (4, pp. 214-215; 29, p. 137).

The method for calculating the present cost per student classroom instructional hour has previously been described. The present cost per student classroom instructional hour was calculated for the programs responding to the retest questionnaire. The retest results were compared with the original present cost per student classroom instructional hour for those programs. The product moment correlation coefficient (11, pp. 106-107) was used to compare these amounts and provide a measure of instrument reliability (4, pp. 488-489).

Summary

The director of each vocational nursing program in Texas was sent a confidential questionnaire, which requested information on faculty costs, media costs, and principal textbooks. A panel of experts provided content validity for the questionnaire. Two follow up mailings, and a phone call were made to obtain a maximum response rate. Faculty and
media costs per student instructional hour were calculated. A cross tabulation procedure was used to identify textbook commonalties between the programs. Calculations were performed to determine the economic feasibility of replacing traditional classroom instruction with computer assisted instruction. A product moment correlation was performed to determine instrument reliability.
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22. Nursing Project Council, Toward Quality Health Care: The Improvement of Nursing and Nursing Education in Texas, Austin, Texas, Coordinating Board Texas College and University System, 1975.

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CHAPTER IV

PRESENTATION OF DATA

The Vocational Nursing Schools Studied

The Texas Board of Vocational Nurse Examiners provided a list of 154 approved schools of vocational nursing in Texas. One of the schools refused to participate in the study. Twenty-two schools were either inactive, or administratively under another vocational school, or taught vocational nursing using a curriculum which was not subdivided into the content areas used in this study. A total of 131 schools provided information used in this study. These schools taught a total of 4,718 students. The schools which provided information represent eighty-five per cent of the approved schools and ninety-nine per cent of the schools in Texas which could have provided the data.

Eighty-nine of the reporting schools stated they received funds from the Texas Education Agency (TEA). Forty-one of the schools stated they did not receive Texas Education Agency funds. One program director did not know if the school received TEA funds. Twenty-four schools stated they only received funds from student tuition and student fees. Sixty schools stated they received money from sources other than TEA, student tuition, and student fees.
Forty-three schools stated they received funds from TEA, student tuition, student fees, and other sources. One program director did not know if the school received funds from sources other than TEA, student tuition, and student fees.

The number of classroom instruction hours in the 131 programs ranged from 600 hours to 1450 hours. The program providing 1450 hours of classroom instruction was contacted by telephone. The director of that program confirmed those hours as being spent on classroom instruction. The arithmetic mean for classroom instructional hours was 650.6 hours.

Faculty cost per student classroom instructional hour, and media cost per student classroom instructional hour were based upon returns from 105 schools. The remaining schools did not provide sufficient data to calculate these items.

Faculty Cost

Research question one sought data to determine the amount of money nursing programs in Texas spend on faculty costs for classroom instruction. Table I compares faculty costs according to program size and TEA funding.

Faculty costs per student classroom instructional hour were calculated by taking each program's reported faculty cost times the percentage of time the faculty spend on classroom instruction, then dividing by the number of students in the program and dividing the quotient by the
TABLE I

COMPARISON OF FACULTY COSTS IN VOCATIONAL NURSING PROGRAMS IN TEXAS BY NUMBER OF STUDENTS AND BY TEXAS EDUCATION AGENCY (T.E.A.) FUNDING

<table>
<thead>
<tr>
<th>Program Size (Students)</th>
<th>Number of Programs</th>
<th>Average Number of Students</th>
<th>Average Faculty Cost</th>
<th>Average Per cent of Faculty Time For Classroom</th>
<th>Average Program Class Hrs.</th>
<th>Average Faculty Cost per Student Classroom Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.E.A. Funded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-29</td>
<td>40</td>
<td>16.45</td>
<td>$35,059.10</td>
<td>44.20</td>
<td>613.58</td>
<td>$1.67</td>
</tr>
<tr>
<td>30-247</td>
<td>34</td>
<td>65.50</td>
<td>147,881.00</td>
<td>43.03</td>
<td>627.65</td>
<td>1.42</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>38.99</td>
<td>86,896.00</td>
<td>43.66</td>
<td>620.04</td>
<td>1.55</td>
</tr>
<tr>
<td>Not T.E.A. Funded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-29</td>
<td>26</td>
<td>13.69</td>
<td>35,532.18</td>
<td>53.27</td>
<td>641.69</td>
<td>2.25</td>
</tr>
<tr>
<td>30-110</td>
<td>5</td>
<td>74.00</td>
<td>160,200.00</td>
<td>40.00</td>
<td>634.60</td>
<td>1.49</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>23.42</td>
<td>55,639.90</td>
<td>51.13</td>
<td>640.55</td>
<td>2.13</td>
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<td>All Programs in Study</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-15</td>
<td>41</td>
<td>10.98</td>
<td>25,014.33</td>
<td>51.68</td>
<td>612.37</td>
<td>2.15</td>
</tr>
<tr>
<td>16-30</td>
<td>31</td>
<td>24.00</td>
<td>51,788.81</td>
<td>43.16</td>
<td>638.42</td>
<td>1.49</td>
</tr>
<tr>
<td>31-247</td>
<td>33</td>
<td>73.24</td>
<td>167,397.57</td>
<td>41.18</td>
<td>631.58</td>
<td>1.41</td>
</tr>
<tr>
<td>All</td>
<td>105</td>
<td>34.39</td>
<td>77,668.18</td>
<td>45.87</td>
<td>626.10</td>
<td>1.72</td>
</tr>
</tbody>
</table>
number of hours in the program. The average faculty cost per student classroom instructional hour was $1.72. The range for faculty cost per student classroom instructional hour was from $0.17 to $7.55. The most costly program spent approximately forty-four times as much per student classroom instructional hour as the least costly. The averages in Table I are calculated by adding the amount for each program in the group and dividing by the number of programs in the group.

Programs with fewer students tended to cost more per student classroom instructional hour and the faculty tended to spend more time in classroom instructional activities. A correlation coefficient (r = -0.22) indicated that as the number of students increased the faculty costs per student classroom instructional hour decreased.

A program with fewer than sixteen students could be taught using only one faculty member. The average faculty cost of $25,014.33 for these programs indicates a single faculty member in most of these smaller programs. This single faculty member would have to teach all the hours in the program and would have to spend more time in classroom preparation and teaching. Programs with sixteen to thirty students could have two faculty members and the average faculty cost for these programs of $51,788.81 indicates they do have an average of two faculty. These faculty members in medium sized programs spent only 43.16 per cent of their
work time on classroom instruction compared with 51.61 percent spent by their peers in the smaller programs. The medium size programs also tended to have more hours of classroom instruction.

Media Cost

Research question two sought data to determine the amount of money nursing programs in Texas spend on media for classroom instruction. Media cost per student classroom instructional hour was calculated by dividing the program's media expenditures by the number of students in the program and then dividing the quotient by the number of classroom instructional hours in the program. The arithmetic mean educational media cost per student classroom instructional hour was $0.12. The range for media cost per student classroom instructional hour was from $0.00 to $2.52. The most expensive program in terms of media cost reported being in the process of acquiring a substantial amount of media hardware at the time of the study.

Table II compares media costs according to the size of the programs and TEA funding. The averages in Table II are calculated by adding the amount for each program in the group and dividing the resultant sum by the number of programs in the group.

Media costs per student classroom instructional hour decreased as the number of students in the programs
TABLE II

COMPARISON OF MEDIA COSTS IN VOCATIONAL NURSING PROGRAMS IN TEXAS BY
NUMBER OF STUDENTS AND BY TEXAS EDUCATION AGENCY (T.E.A.) FUNDING

<table>
<thead>
<tr>
<th>Program Size (Students)</th>
<th>Number of Programs</th>
<th>Number of Students</th>
<th>Average Media Cost</th>
<th>Average Program Cost per Student Class Hrs.</th>
<th>Average Media Cost per Classroom Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.E.A. Funded</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>6-29</td>
<td>40</td>
<td>16.45</td>
<td>$976.13</td>
<td>613.58</td>
<td>$0.14</td>
</tr>
<tr>
<td>30-247</td>
<td>34</td>
<td>65.50</td>
<td>2,862.76</td>
<td>627.65</td>
<td>0.08</td>
</tr>
<tr>
<td>All</td>
<td>74</td>
<td>38.99</td>
<td>1,842.96</td>
<td>620.04</td>
<td>0.11</td>
</tr>
<tr>
<td>Not T.E.A. Funded</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-29</td>
<td>26</td>
<td>13.69</td>
<td>1,392.50</td>
<td>641.69</td>
<td>0.17</td>
</tr>
<tr>
<td>30-110</td>
<td>5</td>
<td>74.00</td>
<td>680.00</td>
<td>634.60</td>
<td>0.02</td>
</tr>
<tr>
<td>All</td>
<td>31</td>
<td>23.42</td>
<td>1,277.58</td>
<td>640.55</td>
<td>0.14</td>
</tr>
<tr>
<td>All Programs in Study</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-15</td>
<td>41</td>
<td>10.98</td>
<td>1,304.24</td>
<td>612.37</td>
<td>0.21</td>
</tr>
<tr>
<td>16-30</td>
<td>31</td>
<td>24.00</td>
<td>1,025.42</td>
<td>638.42</td>
<td>0.07</td>
</tr>
<tr>
<td>31-247</td>
<td>33</td>
<td>73.24</td>
<td>2,749.15</td>
<td>631.58</td>
<td>0.07</td>
</tr>
<tr>
<td>All</td>
<td>105</td>
<td>34.39</td>
<td>1,676.04</td>
<td>626.10</td>
<td>0.12</td>
</tr>
</tbody>
</table>
increased. A correlation coefficient ( \( r = -0.14 \) ) indicated media costs decrease less than faculty costs as the number of students increase.

Programs with fewer than sixteen students spent an average ( $0.21 ) or three times as much per student classroom instructional hour as programs with sixteen to thirty students ( $0.07 ). Programs with more than thirty students had the same per student classroom instructional hour media costs ( $0.07 ) as programs with sixteen to thirty students. As the number of students in the program increases the media costs should decrease, if the media usage remains the same, because much of the hardware and software can be purchased just once and used by all the students in the program. For example a filmstrip and projector cost the same total amount for use with ten students as fifty but the per student amount is five times as much in the smaller program. The increase in total media expenses and the low negative correlation ( \( r = -0.14 \) ) indicate larger programs are spending more on media than smaller programs.

Textbook Commonalities

Research question three sought data to determine the textbook commonalities among the vocational nursing programs in Texas. Seventy-five principal textbooks were identified by two or more respondents as being used in their program.
Appendix F contains a list of the titles, authors, and International Standard Book Numbering System (ISBN) numbers of these textbooks. The ISBN number provides an individual identifying number for the books.

The cross tabulation procedure yielded 1,582 combinations of principal textbooks used by 2 or more programs of the 131 programs. The same principal textbooks were identified for use in all the courses in only two cases. Two schools teaching a combined total of forty-five students identified the same books for all the courses. Two different schools with a combined student population of sixty-four students identified the same textbooks for all the courses. The sixty-four students represent only one per cent of the total students in the reporting programs.

The combination of two different textbooks used by the most programs was Lewis' Fundamental Skills in Patient Care, and Ingalls and Salerno's Maternal and Child Health Nursing. This combination was used by twenty-five per cent of the programs with a combined student population of seventeen per cent of the total student population. Vocational and Personal Adjustments in Practical Nursing by Becker et al. and Fundamental Skills in Patient Care by Lewis were the combination used by the most students. This combination was used by twenty-one per cent of the student population and eighteen per cent of the programs.

Tables III to XIII present the textbooks used in individual courses. Not all of the responding programs
<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>13</td>
<td>Microbiology and Pathology</td>
<td>Smith</td>
<td>0-8016-4673-1</td>
</tr>
<tr>
<td>2</td>
<td>86</td>
<td>Structure and Function of the Human Body</td>
<td>Memmler &amp; Wood</td>
<td>0-397-54194-5</td>
</tr>
<tr>
<td>2</td>
<td>173</td>
<td>Nursing: A Human Needs Approach</td>
<td>Ellis &amp; Nowlis</td>
<td>0-395-29642-0</td>
</tr>
<tr>
<td>2</td>
<td>350</td>
<td>Fundamentals of Nursing: Concepts and</td>
<td>Kozier &amp; Erb</td>
<td>0-201-03904-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>184</td>
<td>Dimensions of Practical/Vocational Nursing</td>
<td>Juneau</td>
<td>0-02-361520-6</td>
</tr>
<tr>
<td>7</td>
<td>228</td>
<td>Total Patient Care</td>
<td>Hood &amp; Dincher</td>
<td>0-8016-2574-2</td>
</tr>
<tr>
<td>9</td>
<td>186</td>
<td>Microbiology for the Health Sciences</td>
<td>Burton</td>
<td>0-397-54309-3</td>
</tr>
<tr>
<td>11</td>
<td>380</td>
<td>Textbook of Basic Nursing</td>
<td>Rosdahl</td>
<td>0-397-54254-2</td>
</tr>
<tr>
<td>13</td>
<td>378</td>
<td>The Human Body in Health and Disease</td>
<td>Memmler and Wood</td>
<td>0-397-54193-7</td>
</tr>
<tr>
<td>32</td>
<td>766</td>
<td>Microbiology for Health Careers</td>
<td>Ferris &amp; Fong</td>
<td>0-8273-1901-0</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook
identified a principal textbook for each course. Principal textbooks identified by only one program were not listed in the tables. For these reasons, the individual tables do not list all the programs.

**Basic Microbiology Textbooks**

Ten principal textbooks were identified by two or more programs as being used in teaching microbiology. These textbooks are presented in Table III.

*Microbiology for Health Careers* was reported as the principal textbook by the largest number of schools. This textbook was used by thirty-two of the responding schools and, represents twenty-four per cent of the total schools responding and sixteen per cent of the total student population.

The second most popular textbook was Memmler and Wood's *The Human Body in Health and Disease.* This textbook was used by a total of 13 programs with a combined student population of 387 students. *The Human Body in Health and Disease* was used by ten per cent of the reporting schools for eight per cent of the total student population.

Sixty-five per cent of the reporting schools representing fifty-eight per cent of the total student population either failed to list a principal textbook for microbiology, or listed a textbook used by no other reporting school.
### TABLE IV

NUTRITION TEXTBOOK COMMONALITIES IN TEXAS SCHOOLS OF VOCATIONAL NURSING

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>37</td>
<td>Textbook of Basic Nursing</td>
<td>Rosdahl</td>
<td>0-397-54254-2</td>
</tr>
<tr>
<td>7</td>
<td>150</td>
<td>Essentials of Nutrition and Diet Therapy</td>
<td>Williams</td>
<td>0-8016-5575-7</td>
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<tr>
<td>7</td>
<td>266</td>
<td>Nutrition and Diet Modification</td>
<td>Townsend</td>
<td>0-442-26192-6</td>
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<tr>
<td>7</td>
<td>350</td>
<td>Practical Nursing Nutrition Education</td>
<td>Shackleton</td>
<td>0-7216-8112-3</td>
</tr>
<tr>
<td>12</td>
<td>330</td>
<td>Basic Nutrition in Health and Disease</td>
<td>Howe</td>
<td>0-7216-4796-0</td>
</tr>
<tr>
<td>16</td>
<td>717</td>
<td>Basic Nutrition and Diet Therapy</td>
<td>Robinson</td>
<td>0-02-402450-3</td>
</tr>
<tr>
<td>24</td>
<td>666</td>
<td>Nutrition and Diet Therapy for Practical Nurses</td>
<td>Kerschner</td>
<td>0-8036-5301-8</td>
</tr>
<tr>
<td>43</td>
<td>1667</td>
<td>Mowry's Basic Nutrition and Diet Therapy</td>
<td>Williams</td>
<td>0-8016-5556-0</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook
Nutrition Textbooks

Eight principal textbooks have been identified for use in teaching Nutrition. These textbooks are listed in Table IV. Thirty-three of the respondents identified Williams' Mowry's Basic Nutrition and Diet Therapy as being their principal textbook for teaching nutrition. This textbook was used for thirty-five per cent of the students in the study, and was the most popular nutrition text.

Kerschner's Nutrition and Diet Therapy for Practical Nurses was the next most frequently listed nutrition textbook. This book was used by 24 programs with 666 students. Programs using this book represent eighteen per cent of the total reporting programs, and fourteen per cent of the total student population.

Robinson's Basic Nutrition and Diet Therapy was used by fewer schools than Kerschner's nutrition textbook, but the schools using Robinson's book taught more students. Basic Nutrition and Diet Therapy was used by 16 schools with 717 students. This represents twelve per cent of the schools, and fifteen per cent of the total student population.

Ten per cent of the reporting schools failed to provide a principal nutrition textbook, or listed a textbook which was not used by any other school. These schools taught eleven per cent of the total reported student population.
TABLE V
PERSONAL AND VOCATIONAL ADJUSTMENTS TEXTBOOK COMMONALITIES IN TEXAS SCHOOLS OF
VOCATIONAL NURSING

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>350</td>
<td>Fundamentals of Nursing: Concepts and Procedures</td>
<td>Kozier &amp; Erb</td>
<td>0-201-03904-4</td>
</tr>
<tr>
<td>4</td>
<td>383</td>
<td>Nursing: A Human Needs Approach</td>
<td>Ellis &amp; Nowlis</td>
<td>0-395-29642-0</td>
</tr>
<tr>
<td>7</td>
<td>207</td>
<td>Fundamental Skills in Patient Care</td>
<td>Lewis</td>
<td>0-397-54283-6</td>
</tr>
<tr>
<td>7</td>
<td>228</td>
<td>Textbook of Basic Nursing</td>
<td>Rosdahl</td>
<td>0-397-54254-2</td>
</tr>
<tr>
<td>13</td>
<td>369</td>
<td>Dimensions of Practical/Vocational Nursing</td>
<td>Juneau</td>
<td>0-02-361520-6</td>
</tr>
<tr>
<td>43</td>
<td>1261</td>
<td>Personal and Vocational Relationships in Practical Nursing</td>
<td>Ross</td>
<td>0-397-54281-X</td>
</tr>
<tr>
<td>45</td>
<td>1516</td>
<td>Vocational and Personal Adjustments in Practical Nursing</td>
<td>Becker et al.</td>
<td>0-8016-0566-0</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook
Personal and Vocational Adjustments Textbooks

Seven textbooks were being used by two or more schools to teach Personal and Vocational Adjustments. These are identified in Table V. *Vocational and Personal Adjustments in Practical Nursing* by Becker et al. was the most popular principal textbook in this subject. It was used by thirty-two per cent of the students in thirty-four per cent of the programs.

*Ross' Personal and Vocational Relationships in Practical Nursing* was the second most popular textbook for teaching Personal and Vocational Adjustments. This book was identified as a principal textbook by forty-three programs. These programs represent thirty-three per cent of the reporting programs and twenty-seven per cent of the total student population.

Ten programs either did not identify a principal textbook for teaching Personal and Vocational Adjustments, or identified a textbook which was not used by any other program in Texas. These ten schools represent only eight per cent of the reporting schools, and nine per cent of the student population in those schools.

Vocational Nursing Skills Textbooks

Ten principal textbooks were identified by the respondents as being used for Vocational Nursing Skills. A listing of these textbooks is presented in Table VI along
### TABLE VI

**VOCATIONAL NURSING SKILLS TEXTBOOK COMMONALITIES IN TEXAS SCHOOLS OF VOCATIONAL NURSING**

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number *</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>56</td>
<td>Fundamentals of Nursing</td>
<td>Wolf et al.</td>
<td>0-397-54234-8</td>
</tr>
<tr>
<td>3</td>
<td>56</td>
<td>Basic Nursing Procedures</td>
<td>Hornemann</td>
<td>0-8273-1320-9</td>
</tr>
<tr>
<td>3</td>
<td>87</td>
<td>Illustrated Manual of Nursing Techniques</td>
<td>King</td>
<td>0-397-54284-4</td>
</tr>
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<td>4</td>
<td>49</td>
<td>Foundation Skills for Nursing and Allied Health Professionals</td>
<td>Smith &amp; Duell</td>
<td>0-8016-4720-7</td>
</tr>
<tr>
<td>5</td>
<td>121</td>
<td>Textbook of Basic Nursing</td>
<td>Rosdahl</td>
<td>0-397-54254-2</td>
</tr>
<tr>
<td>5</td>
<td>415</td>
<td>Fundamentals of Nursing: Concepts and Procedures</td>
<td>Kozier &amp; Erb</td>
<td>0-201-03904-4</td>
</tr>
<tr>
<td>9</td>
<td>562</td>
<td>Nursing: A human Needs Approach</td>
<td>Ellis &amp; Nowlis</td>
<td>0-395-29642-0</td>
</tr>
<tr>
<td>11</td>
<td>432</td>
<td>Techniques for Nurses a Comprehensive Approach</td>
<td>Kozier &amp; Erb</td>
<td>0-201-03911-7</td>
</tr>
<tr>
<td>21</td>
<td>701</td>
<td>Nursing Skills for Clinical Practice</td>
<td>Rambo &amp; Wood</td>
<td>0-7216-7458-5</td>
</tr>
<tr>
<td>61</td>
<td>2144</td>
<td>Fundamental Skills in Patient Care</td>
<td>Lewis</td>
<td>0-397-54283-6</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook
with the number of students and the number of programs which use them.

Lewis' *Fundamental Skills in Patient Care* was the most frequently identified principal textbook for Vocational Nursing Skills. It was also the second most frequently identified of the seventy-five principal textbooks in this study. It was identified by 61 programs for use with 2,144 students. This represents by forty-seven per cent of the total programs and forty-five per cent of the total student population.

*Nursing Skills for Clinical Practice* by Rambo and Wood was the second most popular principal textbook used in teaching Vocational Nursing Skills. It was identified by 21 respondents with 701 students. This represents sixteen per cent of the total respondents and fifteen per cent of the total student population.

Only five per cent of the responding programs did not report using one of the ten listed textbooks for Vocational Nursing Skills. These six programs have two per cent of the total student population.

**Anatomy Textbooks**

Eight textbooks were identified as reflecting the content in the Anatomy course. These textbooks are listed in Table VII. Memmler and Wood's *The Human Body in Health and Disease* was the principal textbook identified most often for
### TABLE VII

**ANATOMY TEXTBOOK COMMONALITIES IN TEXAS SCHOOLS OF VOCATIONAL NURSING**

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>112</td>
<td><em>Elements of Anatomy and Physiology</em></td>
<td>Jacob &amp; Francone</td>
<td>0-7216-5088-0</td>
</tr>
<tr>
<td>2</td>
<td>122</td>
<td><em>Human Anatomy and Physiology</em></td>
<td>Hole</td>
<td>0-697-04597-8</td>
</tr>
<tr>
<td>3</td>
<td>222</td>
<td><em>Textbook of Basic Nursing</em></td>
<td>Rosdahl</td>
<td>0-397-54254-2</td>
</tr>
<tr>
<td>4</td>
<td>127</td>
<td><em>Basic Human Anatomy and Physiology</em></td>
<td>Dienhart</td>
<td>0-7216-3082-0</td>
</tr>
<tr>
<td>7</td>
<td>350</td>
<td><em>Textbook of Anatomy and Physiology</em></td>
<td>Anthony &amp; Thibodeau</td>
<td>0-8016-0255-6</td>
</tr>
<tr>
<td>29</td>
<td>890</td>
<td><em>Structure and Function of the Human Body</em></td>
<td>Anthony &amp; Thibodeau</td>
<td>0-8016-0287-4</td>
</tr>
<tr>
<td>31</td>
<td>975</td>
<td><em>Structure and Function of the Human Body</em></td>
<td>Memmler &amp; Wood</td>
<td>0-397-54194-5</td>
</tr>
<tr>
<td>43</td>
<td>1463</td>
<td><em>The Human Body in Health and Disease</em></td>
<td>Memmler &amp; Wood</td>
<td>0-397-54193-7</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook
for use in Anatomy. This text was identified by thirty-three per cent of the respondents for use with thirty-one per cent of the students.

Structure and Function of the Human Body the second most popular principal textbook was also by Memmler and Wood. This textbook was used in 31 programs for 975 students. This represents twenty-four per cent of the total programs and twenty-one per cent of the total student population. When both textbooks are considered together they represent fifty-six per cent of the total reporting schools, and fifty-two per cent of the total number of students.

Another pair of authors wrote the third and fourth most popular anatomy textbooks. Anthony and Thibodeau's two textbooks were reported by twenty-seven per cent of the schools which taught twenty-six per cent of the total student population.

Ten programs either failed to report a principal textbook for the Anatomy content, or reported a textbook which was not used by other programs in the study. These programs represent eight per cent of the total responding schools, and ten per cent of the total student population.

Medical-Surgical Nursing Textbooks

Seven textbooks were identified as representing the Medical-Surgical content. These are listed in Table VIII. The most frequently identified Medical-Surgical Nursing
### TABLE VIII

MEDICAL-SURGICAL NURSING TEXTBOOK COMMONALITIES IN TEXAS SCHOOLS OF VOCATIONAL NURSING

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>127</td>
<td>Total Patient Care</td>
<td>Johnson &amp; Hood</td>
<td>0-8016-2573-4</td>
</tr>
<tr>
<td>4</td>
<td>224</td>
<td>Medical Surgical Nursing</td>
<td>Phipps et al.</td>
<td>0-8016-3932-8</td>
</tr>
<tr>
<td>7</td>
<td>493</td>
<td>Textbook of Medical-Surgical Nursing</td>
<td>Brunner &amp; Suddarth</td>
<td>0-397-54238-0</td>
</tr>
<tr>
<td>8</td>
<td>333</td>
<td>Essentials of Medical-Surgical Nursing</td>
<td>Keane</td>
<td>0-7216-5313-8</td>
</tr>
<tr>
<td>25</td>
<td>920</td>
<td>Basic Medical-Surgical Nursing</td>
<td>Mason</td>
<td>0-02-376950-5</td>
</tr>
<tr>
<td>36</td>
<td>953</td>
<td>Total Patient Care</td>
<td>Hood &amp; Dincher</td>
<td>0-8016-2574-2</td>
</tr>
<tr>
<td>42</td>
<td>1491</td>
<td>Introductory Medical-Surgical Nursing</td>
<td>Scherer</td>
<td>0-397-54200-3</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook.
textbook was Scherer's *Introductory Medical-Surgical Nursing*. This text was identified as the principal textbook used by 42 schools with 1,491 students. These schools represent thirty-two per cent of the reporting programs with a student population of thirty-two per cent of the total number of students.

The second most popular Medical-Surgical Nursing textbook was *Total Patient Care* by Hood and Dincher. This textbook was reported by 36 schools for use with 953 students. These programs represent twenty-seven per cent of the total responding programs and twenty per cent of the students.

Eight programs, or six per cent of the total number of responding programs, did not identify a Medical-Surgical Nursing textbook used by other vocational nursing programs in the state. These programs taught a total of 177 students, or four per cent of the student population.

**Geriatric Nursing Textbooks**

Ten principal textbooks were identified by the respondents as being representative of the content taught in their Geriatric Nursing courses. These textbooks are listed in Table IX. Hood and Dincher's *Total Patient Care* was the most frequently identified Geriatric Principal Textbook. It was named by 19 programs, or fifteen per cent of all the schools for use with 572 pupils, or twelve per cent of the students in this study. This textbook was also identified by twenty-seven per cent of the schools as their principal Medical-Surgical Nursing text.
<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>87</td>
<td>The Care of The Elderly Person</td>
<td>O'Brien</td>
<td>0-8016-3695-7</td>
</tr>
<tr>
<td>2</td>
<td>97</td>
<td>Care of the Elderly Person</td>
<td>Flaherty</td>
<td>0-8016-3706-6</td>
</tr>
<tr>
<td>2</td>
<td>115</td>
<td>Essentials of Medical-Surgical Nursing</td>
<td>Keane</td>
<td>0-7216-5313-8</td>
</tr>
<tr>
<td>2</td>
<td>210</td>
<td>Nursing: a Human Needs Approach</td>
<td>Ellis &amp; Nowlis</td>
<td>0-395-29642-0</td>
</tr>
<tr>
<td>8</td>
<td>299</td>
<td>Basic Medical-Surgical Nursing</td>
<td>Mason</td>
<td>0-02-376950-5</td>
</tr>
<tr>
<td>9</td>
<td>220</td>
<td>Textbook of Basic Nursing</td>
<td>Rosdahl</td>
<td>0-397-54254-2</td>
</tr>
<tr>
<td>10</td>
<td>336</td>
<td>Geriatrics a Study of Maturity</td>
<td>Caldwell &amp; Hegner</td>
<td>0-8273-1935-5</td>
</tr>
<tr>
<td>16</td>
<td>333</td>
<td>Geriatric Nursing for Practical Nurses</td>
<td>Stevens</td>
<td>0-7216-8594-3</td>
</tr>
<tr>
<td>17</td>
<td>418</td>
<td>Introductory Medical-Surgical Nursing</td>
<td>Scherer</td>
<td>0-397-54200-3</td>
</tr>
<tr>
<td>19</td>
<td>572</td>
<td>Total Patient Care</td>
<td>Root &amp; Dincher</td>
<td>0-8016-2574-2</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook.
The most frequently identified Medical-Surgical Nursing textbook, *Introductory Medical-Surgical Nursing* by Scherer, was the second most popular Geriatric textbook. This textbook was reported as the principal Geriatric textbook by 17 schools with 418 students. This represents thirteen per cent of the reporting programs, and nine per cent of the total student population.

The third and fourth most popular Medical-Surgical Nursing Textbooks, *Basic Medical-Surgical Nursing* by Mason and *Essentials of Medical-Surgical Nursing* by Keane, were also cited by programs as principal Geriatric textbooks. A total of 46 programs with 1404 students used the four most frequently named Medical-Surgical Nursing textbooks as Geriatric Nursing textbooks. This represents thirty-five per cent of the reporting schools, and thirty per cent of the total student population.

A total of 44 programs which taught 2031 students did not identify a Geriatric Nursing textbook which was used by another vocational nursing program in Texas. These programs represent thirty-four per cent of the reporting programs with forty-three per cent of the total student population.

**Mental Health/Mental Illness Textbooks**

Eight principal textbooks were identified by two or more of the respondents as being used in teaching Mental Health/Mental Illness. Table X presents these textbooks.
TABLE X
MENTAL HEALTH/MENTAL ILLNESS TEXTBOOK COMMONALITIES IN TEXAS SCHOOLS OF VOCATIONAL NURSING

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number *</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>68</td>
<td>Therapeutic Approaches to Care of the Mentally Ill</td>
<td>Bailey &amp; Dreyer</td>
<td>0-8036-0550-1</td>
</tr>
<tr>
<td>2</td>
<td>109</td>
<td>Mental Health Nursing</td>
<td>Pasquali et al.</td>
<td>0-8016-3758-9</td>
</tr>
<tr>
<td>3</td>
<td>55</td>
<td>Psychiatric Nursing: A Basic Manual</td>
<td>Crawford &amp; Kilander</td>
<td>0-8036-2112-4</td>
</tr>
<tr>
<td>3</td>
<td>174</td>
<td>Total Patient Care</td>
<td>Hood &amp; Dincher</td>
<td>0-8016-2574-2</td>
</tr>
<tr>
<td>5</td>
<td>64</td>
<td>Textbook of Basic Nursing</td>
<td>Rosdahl</td>
<td>0-397-54254-2</td>
</tr>
<tr>
<td>9</td>
<td>464</td>
<td>Basic Psychiatric Nursing</td>
<td>Irving</td>
<td>0-7216-5046-5</td>
</tr>
<tr>
<td>30</td>
<td>1009</td>
<td>Care of Patients with Emotional Problems</td>
<td>Saxton &amp; Haring</td>
<td>0-8016-4341-4</td>
</tr>
<tr>
<td>57</td>
<td>2070</td>
<td>Mental Health and Mental Illness</td>
<td>Morgan &amp; Johnston</td>
<td>0-397-54189-9</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook
along with the number of programs and number of students which used them.

The textbook most frequently identified as the principal Mental Health/Mental Illness textbook was Morgan and Johnston's *Mental Health and Mental Illness*. This textbook was identified by 57 programs which taught 2070 students. This represents forty-four per cent of the programs which taught forty-four per cent of the students.

Saxton and Haring's *Care of Patients with Emotional Problems* was the next most popular textbook in this area. This textbook was used by 30 programs with 1009 students. This represents twenty-three per cent of the responding programs with twenty-one per cent of the students.

A total of 20 programs with 705 students did not identify a principal Mental Health/Mental Illness textbook used by another vocational nursing program in the study. These programs represent fifteen per cent of the programs and fifteen per cent of the students.

**Pharmacology Textbooks**

Thirteen principal textbooks were identified by the respondents for use in teaching pharmacology. These textbooks along with the number of programs and students using them are presented in Table XI. Asperheim's *Pharmacology an Introductory Text* was used by 26 schools with 578 students. This represents twenty per cent of the
<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number *</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>97</td>
<td>Simplified Drugs and Solutions for Nurses</td>
<td>Dison</td>
<td>0-8016-1311-6</td>
</tr>
<tr>
<td>3</td>
<td>110</td>
<td>Pharmacology and Medications</td>
<td>Worley</td>
<td>0-8036-9593-4</td>
</tr>
<tr>
<td>3</td>
<td>150</td>
<td>Administering Medications</td>
<td>Bayt</td>
<td>0-672-61522-3</td>
</tr>
<tr>
<td>3</td>
<td>175</td>
<td>Drugs and Nursing Implications</td>
<td>Govoni &amp; Hayes</td>
<td>0-8385-1785-4</td>
</tr>
<tr>
<td>4</td>
<td>114</td>
<td>Essentials of Pharmacology</td>
<td>Cibulskis</td>
<td>0-397-54334-4</td>
</tr>
<tr>
<td>4</td>
<td>189</td>
<td>The Pharmacologic Basis of Patient Care</td>
<td>Asperheim &amp; Eisenhauer</td>
<td>0-7216-1438-8</td>
</tr>
<tr>
<td>4</td>
<td>201</td>
<td>The Nurse's Drug Handbook</td>
<td>Loebl et al.</td>
<td>0-471-06017-8</td>
</tr>
<tr>
<td>5</td>
<td>146</td>
<td>Basic Arithmetic Review and Drug Therapy for Practical Nurses</td>
<td>Fitch &amp; Larson</td>
<td>0-02-338010-1</td>
</tr>
<tr>
<td>10</td>
<td>263</td>
<td>Pharmacology for Practical Nurses</td>
<td>Asperheim</td>
<td>0-7216-1445-0</td>
</tr>
<tr>
<td>10</td>
<td>353</td>
<td>Medications and Mathematics for the Nurse</td>
<td>Skelley</td>
<td>0-8273-1923-8</td>
</tr>
<tr>
<td>17</td>
<td>522</td>
<td>Introductory Clinical Pharmacology</td>
<td>Scherer</td>
<td>0-397-54272-0</td>
</tr>
<tr>
<td>25</td>
<td>676</td>
<td>Basic Pharmacology for Nurses</td>
<td>Squire &amp; Clayton</td>
<td>0-8016-4743-6</td>
</tr>
<tr>
<td>26</td>
<td>578</td>
<td>Pharmacology an Introductory Text</td>
<td>Asperheim</td>
<td>0-7216-1446-9</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook
responding programs, and twelve per cent of the total students.

Squire and Clayton's *Basic Pharmacology for Nurses* was used for 676 students in 25 programs. This is nineteen per cent of the programs and fourteen per cent of the total student population.

Asperheim was also the author of *Pharmacology for Practical Nurses* used by 10 schools with 263 students, and a co-author of *The Pharmacological Basis of Patient Care* used by 4 programs with 189 students. The three textbooks with Asperheim as author or coauthor were identified by a total of 40 programs with 1,030 students as being principal textbooks.

**Maternal Child Health Textbooks**

The Texas Board of Vocational Nurse Examiners considers Maternal Child Health to be one area. For the purposes of this study it was subdivided into Obstetric or Maternal Health Nursing, and Pediatric or Child Health Nursing. Nine textbooks were identified for Child Health Nursing, and nine were identified for Maternal Health Nursing.

One textbook selected by two of the program directors is a general nursing text by Rosdahl. Two of the remaining textbooks are used by programs for both Maternal and Child health. Juneau's *Maternal and Child Nursing* was identified by five programs as being representative of their Child
### TABLE XII

**CHILD HEALTH NURSING TEXTBOOK COMMONALITIES IN TEXAS SCHOOLS OF VOCATIONAL NURSING**

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>29</td>
<td>Textbook of Basic Nursing</td>
<td>Rosdahl</td>
<td>0-397-54254-2</td>
</tr>
<tr>
<td>2</td>
<td>63</td>
<td>Pediatrics for the Practical Nurse</td>
<td>Brigley</td>
<td>0-8273-0332-7</td>
</tr>
<tr>
<td>2</td>
<td>154</td>
<td>Textbook of Pediatric Nursing</td>
<td>Marlow</td>
<td>0-7216-6099-1</td>
</tr>
<tr>
<td>3</td>
<td>205</td>
<td>Contemporary Pediatric Nursing: A Conceptual Approach</td>
<td>McFarlane et al.</td>
<td>0-471-03908-X</td>
</tr>
<tr>
<td>5</td>
<td>139</td>
<td>Maternal and Child Nursing</td>
<td>Juneau</td>
<td>0-02-361530-3</td>
</tr>
<tr>
<td>6</td>
<td>336</td>
<td>Child Health Nursing</td>
<td>Pillitteri</td>
<td>0-316-70793-7</td>
</tr>
<tr>
<td>14</td>
<td>565</td>
<td>Basic Pediatric Nursing</td>
<td>Hamilton</td>
<td>0-8016-2040-6</td>
</tr>
<tr>
<td>20</td>
<td>909</td>
<td>Pediatric Nursing</td>
<td>Thompson</td>
<td>0-7216-8843-8</td>
</tr>
<tr>
<td>73</td>
<td>2179</td>
<td>Maternal and Child Health Nursing</td>
<td>Ingalls &amp; Salerno</td>
<td>0-8016-2326-X</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook
Health content, but by only three programs as being a principal textbook for Maternal Health. Ingalls and Salerno's *Maternal and Child Health Nursing* was selected by one less program director for use in Child Health than it was for use in Maternal Health.

The nine principal textbooks, which were selected by two or more of the program directors as representing the content taught in Child Health Nursing, are listed in Table XII. These textbooks were used by a total of 127 programs with 4,579 students.

Ingalls and Salerno's *Maternal and Child Health Nursing* was the most popular textbook in the study. For Child Health it was used by fifty-six per cent of the programs and forty-six per cent of the total student population.

Table XIII presents the nine principal textbooks identified for Maternal Health or Obstetric Nursing. In this area also Ingalls and Salerno's textbook is clearly the most popular. It was used by 74 programs with 2,194 students. This represents fifty-six per cent of the responding programs and forty-seven per cent of the total student population.

A Maternal Health textbook used by other Texas vocational nursing programs was not identified by five programs with a total of 194 students. This represents four per cent of the total student population.
<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Textbook</th>
<th>Author(s)</th>
<th>ISBN Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>29</td>
<td>Textbook of Basic Nursing</td>
<td>Rosdahl</td>
<td>0-397-54254-2</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>Maternal and Child Nursing</td>
<td>Juneau</td>
<td>0-02-361530-3</td>
</tr>
<tr>
<td>3</td>
<td>209</td>
<td>Maternal and Infant Care</td>
<td>Dickason &amp; Schult</td>
<td>0-07-016796-6</td>
</tr>
<tr>
<td>3</td>
<td>224</td>
<td>Family Centered Maternity/New Born Care</td>
<td>Phillips</td>
<td>0-8016-3920-4</td>
</tr>
<tr>
<td>4</td>
<td>167</td>
<td>Bedside Maternity Nursing</td>
<td>Bleier</td>
<td>0-7216-1743-3</td>
</tr>
<tr>
<td>7</td>
<td>334</td>
<td>Maternal-Newborn Nursing</td>
<td>Pillitteri</td>
<td>0-316-70792-9</td>
</tr>
<tr>
<td>13</td>
<td>480</td>
<td>Basic Maternity Nursing</td>
<td>Hamilton</td>
<td>0-8016-2031-7</td>
</tr>
<tr>
<td>17</td>
<td>812</td>
<td>Introductory Maternity Nursing</td>
<td>Bethea</td>
<td>0-397-54144-9</td>
</tr>
<tr>
<td>74</td>
<td>2194</td>
<td>Maternal and Child Health Nursing</td>
<td>Ingalls &amp; Salerno</td>
<td>0-8016-2326-X</td>
</tr>
</tbody>
</table>

* The International Standard Book Numbering System number for the textbook
Amount Remaining for Computer Software

Research question four asked, "When computer equipment and operating expenses are subtracted from the present classroom instructional costs, what amount will remain for the development and distribution of Computer Assisted Instruction (CAI) programs?" The range for software was based upon 102 programs with a total of 3,419 students. The program which currently uses CAI and two integrated programs were excluded from the 105 programs used to calculate faculty and media costs. The arithmetic mean remainder for software development and distribution per student classroom instructional hour was $1.61. This calculation is based upon all the classroom instructional hours being converted and taught using only CAI.

Table XIV presents a breakdown of the remainder for software by program size and T.E.A. funding. Small programs not receiving T.E.A. funding had the largest amount per student hour for software, and programs with thirty or more students had the least amount remaining. This difference was due to the decreased faculty costs per student instructional hour in the larger programs.

Based upon the figures provided by the program directors, the purchase of computer hardware is not the limiting factor in implementing CAI in vocational nursing education. This supports the literature stating that the availability of software and not the price of hardware is the factor which limits CAI usage.
### TABLE XIV

Comparison of Remainder for Software after Subtracting Computer Costs from Faculty Costs and Media Costs in Vocational Nursing Programs in Texas by Number of Students and by Texas Education Agency (T.E.A.) Funding

<table>
<thead>
<tr>
<th>Program Size (Students)</th>
<th>Number of Programs</th>
<th>Average Number of Students</th>
<th>Average Faculty Cost per Student Hour</th>
<th>Average Media Cost per Student Hour</th>
<th>Average Software Remainder per Student Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T.E.A. Funded</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-29</td>
<td>39</td>
<td>16.28</td>
<td>$1.71</td>
<td>$0.14</td>
<td>$1.58</td>
</tr>
<tr>
<td>30-247</td>
<td>32</td>
<td>61.31</td>
<td>1.44</td>
<td>0.09</td>
<td>1.29</td>
</tr>
<tr>
<td>All</td>
<td>71</td>
<td>36.58</td>
<td>1.59</td>
<td>0.12</td>
<td>1.45</td>
</tr>
<tr>
<td><strong>Not T.E.A. Funded</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-29</td>
<td>26</td>
<td>13.69</td>
<td>2.25</td>
<td>0.17</td>
<td>2.15</td>
</tr>
<tr>
<td>30-110</td>
<td>5</td>
<td>74.00</td>
<td>1.49</td>
<td>0.02</td>
<td>1.29</td>
</tr>
<tr>
<td>All</td>
<td>31</td>
<td>23.42</td>
<td>2.13</td>
<td>0.14</td>
<td>2.01</td>
</tr>
<tr>
<td><strong>All Programs in Study</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-15</td>
<td>41</td>
<td>10.98</td>
<td>2.15</td>
<td>0.21</td>
<td>2.07</td>
</tr>
<tr>
<td>16-30</td>
<td>30</td>
<td>24.03</td>
<td>1.54</td>
<td>0.07</td>
<td>1.35</td>
</tr>
<tr>
<td>31-247</td>
<td>31</td>
<td>69.42</td>
<td>1.44</td>
<td>0.07</td>
<td>1.27</td>
</tr>
<tr>
<td>All</td>
<td>102</td>
<td>32.58</td>
<td>1.75</td>
<td>0.12</td>
<td>1.61</td>
</tr>
</tbody>
</table>
An Apple II Plus 48K micro-computer with a single disc drive was chosen a priori at a cost of $2,415.00 per computer. In the research design section the annual computer hardware and operating cost have been identified as $708.00. While this study was being conducted Apple announced the Apple IIe with a larger internal memory and comparable equipment for a retail price of $1,995.00 (4, p. 10). This computer can now be purchased by programs for $850.00 (3, p. 1). The literature states that the hardware will continue to decrease in price leaving increasing amounts for software development and distribution. Even if the computer hardware was provided at no cost to the school the average remainder for software would only increase slightly. Average faculty and media cost per student instructional hour for the 102 programs totaled $1.87. This is only twenty-six cents more than the average software remainder per student instructional hour.

The average remainder of $1.61 per student classroom instructional hour would not be sufficient to develop and distribute software even if the classroom content in all the vocational nursing programs was identical. Frank estimates that ten per cent of software publication costs are spent on software authoring costs (6, p. 200). Tarp identified CAI courseware authoring as taking an average time of 10.6 hours to develop an hour of nursing instruction using the authoring system IMAS, and 81.8 hours to develop similar materials
using the BASIC computer language (8). Using these figures, if a CAI authoring system was used it would take 663 students using the material before $10.00 per hour authoring cost would be realized. Unfortunately, the use of an authoring system has an associated cost for the development of the system. The IMAS authoring system cost $100,000 to develop (2). This is much more than the amount available for software. It would take 5,112.5 student users at $0.16 per hour to provide $10.00 per hour authoring costs if the basic language was used. There were only 4,718 students in the total population studied.

Results for Software with Common Textbooks

Research question five sought to determine the amount of money remaining for software development and distribution when computer hardware and operating expenses are subtracted from the present instructional costs in programs using one or more common textbooks for the courses which use those textbooks. This study found 1,582 combinations of principal textbooks used by two or more programs. A hypothetical example was used to compare principal textbook usage with the available funds for software for the courses using those textbooks. Nursing programs which use the same principal textbooks for a course were identified as being likely to teach the same content in that course.

This method added faculty cost per student classroom instructional hour and media cost per student classroom
instructional hour to determine present costs per student classroom instructional hour. Per student computer hardware and maintenance costs were divided by the number of hours the courses were required to be taught to provide a computer hardware cost per classroom instructional hour. The computer hardware cost per classroom instructional hour and the hourly operating cost were subtracted from the present costs per student classroom instructional hour to determine the schools remainder for software.

Table XV illustrates this process in a comparison of costs for programs using Ingalls and Salerno's *Maternal and Child Health* to teach Maternal/Child Health nursing and Hood and Dincher’s *Total Patient Care* to teach Medical-Surgical nursing. A total of 20 programs with a combined population of 443 students identified these two common principal text-books for use in the same courses, and had a positive remainder for software. Hardware and operating costs per student instructional hour were based upon the computer costs per student divided by the 200 hours the schools were required by the Texas Board of Vocational Nurse Examiners to spend teaching the content.

A total of $552.72 per student instructional hour remained for software development and distribution to these schools. The arithmetic mean amount for software per student was $1.25. The remainder for software per school
TABLE XV

COMPARISON OF FACULTY COSTS, MEDIA COSTS, HARDWARE AND OPERATING COSTS, REMAINDER FOR SOFTWARE PER STUDENT HOUR, AND REMAINDER FOR SOFTWARE PER PROGRAM HOUR FOR PROGRAMS USING MATERNAL AND CHILD HEALTH BY INGALLS AND SALERNO FOR MATERNAL/CHILD HEALTH AND TOTAL PATIENT CARE BY HOOD AND DINCHER FOR MEDICAL-SURGICAL NURSING

<table>
<thead>
<tr>
<th>Program Number</th>
<th>Number of Students</th>
<th>Faculty Costs per student Hour</th>
<th>Media Costs per student Hour</th>
<th>Hardware &amp; Operating Costs per Student Hour</th>
<th>Remainder for Software per Student Hour</th>
<th>Remainder for Software per Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>111</td>
<td>39</td>
<td>$ 2.79</td>
<td>$ 0.08</td>
<td>$ 0.74</td>
<td>$2.13</td>
<td>$ 83.07</td>
</tr>
<tr>
<td>227</td>
<td>8</td>
<td>1.85</td>
<td>0.00</td>
<td>0.89</td>
<td>0.96</td>
<td>7.68</td>
</tr>
<tr>
<td>118</td>
<td>8</td>
<td>2.47</td>
<td>0.06</td>
<td>0.77</td>
<td>1.76</td>
<td>49.28</td>
</tr>
<tr>
<td>195</td>
<td>16</td>
<td>2.79</td>
<td>0.11</td>
<td>0.80</td>
<td>1.01</td>
<td>16.16</td>
</tr>
<tr>
<td>199</td>
<td>7</td>
<td>3.43</td>
<td>0.23</td>
<td>1.02</td>
<td>2.64</td>
<td>18.48</td>
</tr>
<tr>
<td>215</td>
<td>63</td>
<td>0.95</td>
<td>0.05</td>
<td>0.74</td>
<td>0.26</td>
<td>16.38</td>
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<tr>
<td>237</td>
<td>9</td>
<td>2.80</td>
<td>0.93</td>
<td>0.80</td>
<td>2.93</td>
<td>26.37</td>
</tr>
<tr>
<td>102</td>
<td>25</td>
<td>1.06</td>
<td>0.07</td>
<td>0.72</td>
<td>0.41</td>
<td>10.25</td>
</tr>
<tr>
<td>174</td>
<td>5</td>
<td>2.24</td>
<td>0.03</td>
<td>0.72</td>
<td>1.55</td>
<td>7.75</td>
</tr>
<tr>
<td>165</td>
<td>26</td>
<td>2.30</td>
<td>0.03</td>
<td>0.83</td>
<td>1.50</td>
<td>39.00</td>
</tr>
<tr>
<td>188</td>
<td>15</td>
<td>2.55</td>
<td>0.20</td>
<td>0.72</td>
<td>2.03</td>
<td>30.45</td>
</tr>
<tr>
<td>239</td>
<td>22</td>
<td>2.48</td>
<td>0.15</td>
<td>0.81</td>
<td>1.82</td>
<td>40.04</td>
</tr>
<tr>
<td>228</td>
<td>15</td>
<td>0.73</td>
<td>0.04</td>
<td>0.72</td>
<td>0.05</td>
<td>0.75</td>
</tr>
<tr>
<td>198</td>
<td>13</td>
<td>4.22</td>
<td>0.13</td>
<td>0.83</td>
<td>3.52</td>
<td>45.76</td>
</tr>
<tr>
<td>112</td>
<td>30</td>
<td>3.79</td>
<td>0.05</td>
<td>0.72</td>
<td>3.12</td>
<td>93.60</td>
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<tr>
<td>245</td>
<td>14</td>
<td>1.47</td>
<td>0.06</td>
<td>0.77</td>
<td>0.76</td>
<td>10.64</td>
</tr>
<tr>
<td>164</td>
<td>30</td>
<td>0.90</td>
<td>0.08</td>
<td>0.72</td>
<td>0.26</td>
<td>7.80</td>
</tr>
<tr>
<td>226</td>
<td>15</td>
<td>0.98</td>
<td>0.05</td>
<td>0.72</td>
<td>0.31</td>
<td>4.65</td>
</tr>
<tr>
<td>229</td>
<td>39</td>
<td>1.48</td>
<td>0.01</td>
<td>0.74</td>
<td>0.75</td>
<td>29.25</td>
</tr>
<tr>
<td>168</td>
<td>24</td>
<td>1.39</td>
<td>0.00</td>
<td>0.75</td>
<td>0.64</td>
<td>15.36</td>
</tr>
<tr>
<td>totals</td>
<td>443</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>552.72</td>
</tr>
<tr>
<td>averages</td>
<td>22.15</td>
<td>2.08</td>
<td>0.12</td>
<td>0.78</td>
<td>1.42</td>
<td>27.64</td>
</tr>
</tbody>
</table>

Software Mean per student = 1.25

* Total Program Software remainder divided by total number of Students
ranged from a low of $0.05 for program number 228 to a high of $3.52 for program number 198.

Table XVI presents the twenty combinations of programs and textbooks with the largest total arithmetic mean remainder for software. The total arithmetic mean remainder for software development and distribution can be calculated from the table by taking the number of students times the mean of software per student. The amount remaining if all the programs converted the hours to CAI at or below their present cost can be calculated by taking the least amount remaining from the 'range of software per student' and multiplying by the number of students.

TABLE XVI

AMOUNT REMAINING FOR CAI SOFTWARE PER STUDENT HOUR
BASED UPON THE HYPOTHETICAL EXAMPLE
IN DECENDING ORDER OF REMAINDER

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Number of Courses</th>
<th>Textbooks</th>
<th>Range for Software per Student</th>
<th>Mean of Software per Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>624</td>
<td>9</td>
<td>0-397-54200-3</td>
<td>$ 0.40 - 3.68</td>
<td>$ 1.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>0-8016-2326-X</td>
<td>0.26 - 2.10</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>0-8016-2326-X</td>
<td>0.05 - 3.52</td>
<td>1.25</td>
</tr>
<tr>
<td>16</td>
<td>744</td>
<td>1</td>
<td>0-8016-0566-0</td>
<td>0.48 - 3.88</td>
<td>1.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>0-397-54283-6</td>
<td>0.06 - 3.33</td>
<td>1.48</td>
</tr>
<tr>
<td>20</td>
<td>443</td>
<td>9</td>
<td>0-8016-2326-X</td>
<td>0.05 - 3.52</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>0-8016-2326-X</td>
<td>0.26 - 2.10</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>0-8016-2326-X</td>
<td>0.05 - 3.52</td>
<td>1.25</td>
</tr>
<tr>
<td>12</td>
<td>487</td>
<td>7</td>
<td>0-397-54193-7</td>
<td>0.06 - 3.33</td>
<td>1.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>0-397-54200-3</td>
<td>0.26 - 2.10</td>
<td>0.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>0-8016-2326-X</td>
<td>0.05 - 3.52</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>0-8016-2326-X</td>
<td>0.06 - 3.33</td>
<td>1.48</td>
</tr>
<tr>
<td>12</td>
<td>337</td>
<td>4</td>
<td>0-397-54283-6</td>
<td>0.05 - 3.52</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9</td>
<td>0-8016-2574-2</td>
<td>0.26 - 2.10</td>
<td>0.78</td>
</tr>
</tbody>
</table>
### TABLE XVI Continued

<table>
<thead>
<tr>
<th>Number of Schools</th>
<th>Number of Students</th>
<th>Number of Courses</th>
<th>Textbooks***</th>
<th>Range for Software** Mean of Software per Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>600</td>
<td>3</td>
<td>0-8016-4341-4</td>
<td>0.01 - 2.56</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>0-397-54283-6</td>
<td>0.22 - 3.51</td>
</tr>
<tr>
<td>15</td>
<td>565</td>
<td>7</td>
<td>0-397-54193-7</td>
<td>0.11 - 2.41</td>
</tr>
<tr>
<td>16</td>
<td>470</td>
<td>9</td>
<td>0-397-54200-3</td>
<td>0.28 - 3.06</td>
</tr>
<tr>
<td>14</td>
<td>568</td>
<td>4</td>
<td>0-397-54283-6</td>
<td>0.01 - 2.51</td>
</tr>
<tr>
<td>19</td>
<td>691</td>
<td>10</td>
<td>0-8016-2326-X</td>
<td>0.16 - 2.49</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>0-8016-2326-X</td>
<td>0.10 - 4.85</td>
</tr>
<tr>
<td>13</td>
<td>369</td>
<td>5</td>
<td>0-397-54200-3</td>
<td>0.08 - 3.27</td>
</tr>
<tr>
<td>21</td>
<td>387</td>
<td>10</td>
<td>0-8016-2326-X</td>
<td>0.03 - 2.72</td>
</tr>
<tr>
<td>15</td>
<td>306</td>
<td>11</td>
<td>0-8016-2326-X</td>
<td>0.07 - 2.41</td>
</tr>
<tr>
<td>18</td>
<td>437</td>
<td>11</td>
<td>0-8016-2326-X</td>
<td>0.10 - 1.07</td>
</tr>
<tr>
<td>12</td>
<td>230</td>
<td>10</td>
<td>0-8016-2326-X</td>
<td>0.35 - 2.74</td>
</tr>
<tr>
<td>9</td>
<td>169</td>
<td>6</td>
<td>0-8016-5556-0</td>
<td>0.07 - 2.41</td>
</tr>
<tr>
<td>8</td>
<td>158</td>
<td>6</td>
<td>0-8016-2326-X</td>
<td>0.03 - 2.72</td>
</tr>
<tr>
<td>7</td>
<td>144</td>
<td>6</td>
<td>0-397-54194-5</td>
<td>0.10 - 1.07</td>
</tr>
<tr>
<td>10</td>
<td>215</td>
<td>9</td>
<td>0-397-54200-3</td>
<td>0.07 - 2.41</td>
</tr>
</tbody>
</table>

* 1= Personal and Vocational Adjustments; 2= Basic Microbiology; 3= Mental Health and Mental Illness; 4= Vocational Nursing Skills; 5= Pharmacology; 6= Nutrition; 7= Anatomy; 8= Geriatric Nursing; 9= Medical-Surgical Nursing; 10= Pediatrics; 11= Maternal Nursing.

** The International Standard Book Numbering System number for the textbook.

The textbook combination with the largest total arithmetic remainder for software development and distribution was Scherer's *Introductory Medical-Surgical Nursing* used in Medical-Surgical Nursing and Ingalls and Salerno's *Maternal and Child Health Nursing* used in Maternal Child Health Nursing. This combination had a $624.00 per hour remainder if all the programs purchased it at the mean remainder of $1.00, and a $249.60 per hour remainder if all the programs purchased it at the lowest remainder of $0.40.

The twenty schools using these common textbooks for Medical-Surgical Nursing and Maternal-Child Health have the greatest potential for being converted to cost effective CAI. Even if each of these programs were willing to convert these courses to the same CAI material at their present instructional costs, the remainder of $624.00 per student instructional hour would probably not be enough to pay for the development and distribution of the CAI materials.

Kulik, Kulik, and Cohen state CAI has the potential to teach more content in a shorter period of time (7, p. 537-538). Frank states that most educational software on the market does not live up to this potential (5, p.177). It is unlikely CAI can be developed and distributed to Texas vocational nursing programs as inexpensively as the present classroom instructional strategies.
Reliability and Validity Measures

Three of the six programs asked to provide reliability data completed the questionnaire a second time. A product moment correlation coefficient of $r = -0.48$ and $r^2 = 0.23$ was calculated from their responses. This calculation does not demonstrate instrument reliability. Comments written on questionnaires and expressed in telephone conversations support the finding that cost figures are only a rough approximation.

The responses from all the programs were checked against the requirements of the Texas Board of Vocational Nurse Examiners as a measure of concurrent validity. In all areas except Geriatric Nursing, the respondents were teaching at least the required number of hours. Twenty-three programs were teaching ten to twenty hours of Geriatric Nursing. The Board increased the requirement from ten hours to a requirement of twenty hours in October 1981. The programs listing less than the present requirement of twenty hours may be counting some of their Medical-Surgical hours as Geriatric hours to meet the Board's requirements. This account would be legitimate because geriatric patients do have medical and surgical problems, and the content is not specified by the Board.
Summary

The state of Texas listed 154 approved schools of vocational nursing. One hundred thirty-one of these schools provided data for use in the study. Responses were obtained from ninety-nine per cent of the schools which could have participated in the study. These programs were teaching 4,718 students. Their class hours ranged from 600 to 1,450 each year.

Faculty and media costs were calculated for 105 programs. The average faculty cost per student instructional hour was $1.72. Faculty costs ranged from $0.17 to $7.55 per student instructional hour. Media costs ranged from $2.52 per instructional hour to no expense for media. The cost for both faculty and media tended to be lower in larger programs.

Seventy-five principal textbooks were identified by the program directors in two or more schools. The cross tabulation procedure yielded 1,582 combinations of these texts.

The potential for using CAI as the primary teaching strategy was calculated for all the programs. An average of $1.61 remained per student instructional hour for software development and distribution. This did not appear to be sufficient to develop the necessary software. The largest amount remaining when common textbooks were compared was $624.00. This was again insufficient to promote CAI.
A product moment correlation coefficient ($r = 0.48$) did not demonstrate instrument reliability. Concurrent validity was demonstrated.
CHAPTER BIBLIOGRAPHY


CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This investigation was concerned with the economic feasibility of utilizing computer-assisted instruction (CAI) as a primary teaching strategy in schools of vocational nursing in Texas. Vocational nursing programs in Texas must last twelve months, and are regulated by the Texas Board of Vocational Nurse Examiners. The purposes of this study were (1) to determine the cost of faculty for classroom instruction in vocational nursing programs in Texas, (2) to determine the media costs for classroom instruction in vocational nursing programs in Texas, (3) to determine the content similarities of various vocational nursing programs in Texas, (4) to determine if the present costs of classroom instruction in vocational nursing programs in Texas are high enough to permit replacement of the present teaching strategies with CAI.

Data for this study were collected through a questionnaire developed for this study. The questionnaire was checked for content validity by six registered nurses involved in vocational nursing education in Texas. The questionnaire was mailed to the 154 program directors listed.
by the Texas Board of Vocational Nurse Examiners. Non-
respondents were sent two additional letters and contacted
by telephone in an attempt to have as complete a response as
possible.

Twenty-two of the programs contacted were inactive, or
taught the curriculum content in a manner different than
that used in the study, or were administratively under
another vocational nursing school. One school chose not to
participate in the study. A total of 131 schools provided
information used in the study. These schools are eighty-
five per cent of those listed by the Texas Board of
Vocational Nurse Examiners. Faculty and media cost figures
were based upon the 105 programs which supplied the
requested cost information.

The responses were analyzed and reported in a manner
most appropriate for the type of data collected.
Descriptive statistics were used to report study data
because the study population consisted of the entire
population of vocational nursing programs in Texas.

Findings

1. The average faculty cost per student classroom
instructional hour was $1.72. The range for faculty costs
was from $0.17 to $7.55 per student classroom instructional
hour. A correlation coefficient (r = -.22) indicated that
as the number of students in a program increased the faculty
cost per student instructional hour decreased.
2. The average educational media cost per student classroom instructional hour was $0.12. The range for these costs was from $0.00 to $2.52. A correlation coefficient \( r = -0.14 \) indicated that media costs per student instructional hour also decrease as the number of students in the program increase.

3. An unexpected finding was the large number of principal textbooks identified by the program directors, and the lack of a pattern of textbook usage between programs. Seventy-five principal textbooks were identified by two or more respondents as being used in their programs. Ingalls and Salerno's *Maternal and Child Health Nursing* was the most frequently identified principal textbook. It was used by fifty-six per cent of the responding programs for forty-seven per cent of the total student population. A total of 1,582 combinations of two or more principal textbooks used by two or more programs were identified. The combination used by the largest number of schools was identified by twenty-five per cent of the schools. This combination consisted of two textbooks used in teaching Maternal Child Health and Vocational Nursing Skills.

4. When computer equipment and operating expenses were subtracted from the present classroom instructional costs the arithmetic mean remainder was $1.61 per student classroom instructional hour. The remainders ranged from $0.03
to $7.85. A repeat questionnaire to a portion of the study population was used to test the reliability of the classroom costs per student instructional hour. A product moment correlation coefficient ( $r = -0.48$ and $r^2 = 0.23$ ) did not demonstrate the reliability of the costs per student instructional hour.

5. The twenty textbook combinations with the greatest remainder for software development and distribution were identified. The combination with the largest total arithmetic mean remainder had a remainder of $1.00$ per instructional hour for a total of 624 students. This combination consisted of Ingalls and Salerno's *Maternal and Child Health*, used to teach Maternal/Child Health, and Hood and Dincher's *Total Patient Care*, used to teach Medical-Surgical Nursing.

**Conclusions**

1. Vocational nursing students in Texas appear to be taught at an extremely low cost per instructional hour.

2. CAI cannot be used as a supplemental teaching strategy without greatly increasing the media costs of vocational nursing programs.

3. The large number of principal textbooks being used in vocational nursing programs in Texas, and the very large number of textbook combinations indicate a lack of content uniformity between programs.
4. Computer-assisted instruction may not profitably be utilized at a cost equal to or less than the present classroom instructional costs in vocational nursing programs in Texas.

5. The complaint of a lack of quality computer software frequently identified in the literature will probably continue due to the lack of content uniformity, and the low potential for profit.

Recommendations

1. Vocational nursing program administrators in Texas should consider CAI as a supplement to traditional teaching rather than a cost effective replacement for traditional classroom instruction.

2. Vocational nursing program administrators in Texas should consider supplementation of their media with CAI, when there is a demonstrated instructional benefit which is worth the increased cost.

3. State regulatory agencies and state and national nursing organizations need to identify the minimal required knowledge and skill levels necessary to practice vocational nursing.

4. Program directors should calculate their individual program's cost per student classroom instructional hour and compare that cost with alternative instructional strategies, before purchasing CAI materials.
5. Individuals and companies interested in selling CAI for vocational nursing programs in Texas need to be able to sell it at a very low cost per student hour, or demonstrate its clear superiority to the present classroom instructional strategies.

Recommendations for Further Study

1. The wide variation in faculty cost per student classroom instructional hour needs further study. The faculty cost in relation to faculty preparation, faculty workload, class size, faculty salaries, and number of hours taught in the program should be studied in relation to the program's graduates performance on the state board licensing examination, and the graduates performance as vocational nurses.

2. The wide range of media costs per student classroom instructional hour needs further study. A longitudinal study would be needed to determine if individual programs vary from year to year, and if the differences between programs continues over time.

3. There is a major need for further clarification of and research into the course content of vocational nursing programs. Part of this task might be accomplished through a content analysis of the principal textbooks identified in this study.
APPENDIX A

Questionnaire on Vocational Nursing Education
QUESTIONNAIRE ON VOCATIONAL NURSING EDUCATION

Individual program information will be kept confidential by the investigator. Only composite totals will be released for publication and specific programs will not be identified.

INSTRUCTIONS: Please answer the following questions about the present practices in your program. If you can not provide an exact answer, estimate as closely as possible.

1. What is the current total enrollment in your program? 

2. Does your program receive funds from the Texas Education Agency? 

3. Does your program receive funds from sources other than the Texas Education Agency, student tuition, and Student fees? 

4. What is the total (salary and fringe benefits) 12 month cost for instructors (faculty)? 

5. What percentage of the instructor's time is spent on preparation for and provision of classroom instruction? 

6. How much will you spend this fiscal year on instructional aids (charts, models, overhead transparencies, movies, filmstrips, videotapes, projectors, etc.) for classroom instruction? 

The following courses are required by the Texas Board of Vocational Nurse Examiners. Please provide the textbook which most reflects the content taught as the Principal Textbook, and the number of hours the subject is taught. If you combine some courses (ex. Geriatric Nursing is taught along with Medical-Surgical Nursing) please estimate the time spent for each component.

7. Personal and Vocational Adjustments
   A. Principal Textbook (author) (title)
   B. Number of class hours 

8. Basic Microbiology
   A. Principal Textbook (author) (title)
   B. Number of class hours
9. Mental Health and Mental Illness
   A. Principal Textbook (author) (title)
   B. Number of class hours

10. Vocational Nursing Skills
    A. Principal Textbook (author) (title)
    B. Number of class hours

11. Pharmacology
    A. Principal Textbook (author) (title)
    B. Number of class hours

12. Nutrition
    A. Principal Textbook (author) (title)
    B. Number of class hours

13. Anatomy
    A. Principal Textbook (author) (title)
    B. Number of class hours

14. Geriatric Nursing
    A. Principal Textbook (author) (title)
    B. Number of class hours

15. Medical-Surgical Nursing
    A. Principal Textbook (author) (title)
    B. Number of class hours

16. Child Nursing (Pediatrics)
    A. Principal Textbook (author) (title)
    B. Number of class hours

17. Maternal Nursing (Obstetrics)
    A. Principal Textbook (author) (title)
    B. Number of class hours

18. Are you currently using Computer-Assisted Instruction (Students learning from interactions with a computer) in your program? (Yes or No)

IF YOU WOULD LIKE AN ABSTRACT OF THIS STUDY CHECK THIS BOX ☐

Thank You
APPENDIX B

Letter of Transmittal
Dear Vocational Nursing Program Director:

The enclosed questionnaire has been developed to help determine the economic feasibility of using computer-assisted instruction in Vocational Nursing Education. This study is being conducted as part of my doctoral work at North Texas State University, Denton, Texas. The results of this study will be used for the improvement of Vocational Nursing Education.

Texas has a tradition of quality vocational nursing programs. If we are to continue this tradition, the future must be built on the strength of today's programs. All vocational nursing programs in Texas are being surveyed and information from your program is an important part of building the future.

It will be appreciated if you complete the enclosed survey and return it prior to November 10, 1982 in the enclosed stamped, addressed envelope. The individual program results will be held confidential by the investigator and only composite information from several programs will be released. After the study is completed, abstracts of the study will be sent to all the participating programs that check the appropriate box in the questionnaire.

Thank you for your cooperation.

Sincerely yours,

Bruce K. Wilson L.V.N., M.S.N.
APPENDIX C

First Follow-up Letter
Dear Vocational Nursing Program Director:

Two weeks ago you were sent a questionnaire on Vocational Nursing Education. It is important that all the programs in Texas respond. If you have recently returned the questionnaire, thank you for your assistance. If you have not returned the questionnaire, please do so as soon as possible so that the research can be completed.

Sincerely,

Bruce K. Wilson R.N.
APPENDIX D

Second Follow-up Letter
Dear (Name of Program Director):

Several weeks ago you were sent a copy of a questionnaire on Vocational Nursing Education. Yours is one of the few schools I have not yet received a reply from.

I have enclosed another copy of the questionnaire. Please complete it and return it in the enclosed envelope as soon as possible.

The results will be kept strictly confidential.

Thank you,

Bruce K. Wilson, R.N.
APPENDIX E

Request for Reliability Letter
Dear (Name of Program Director):

Thank you for your prompt response to my questionnaire on Vocational Nursing Education.

To complete the study a sample of the respondents must fill out the questionnaire again. Your school has been randomly selected to be a part of this sample.

The study is almost complete. Please fill out the enclosed questionnaire to help establish the reliability of the study.

Thank you,

Bruce K. Wilson,
APPENDIX F

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