DOCUMENT RESUME

ED 247 903 IR 011 253

AUTHOR Schimizzi, Ned V.; Dudley, Donald
TITLE Microcomputers on Campus.
INSTITUTION State Univ. of New York, Buffalo. Coll. at Buffalo.
SPONS AGENCY State Univ. of New York, Albany. Research Foundation.
PUB DATE 83
NOTE 50p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Colleges; Computer Assisted Instruction; *Computer Oriented Programs; *Educational Planning; Higher Education; Inservice Education; *Microcomputers; *Program Development; *Program Implementation; Purchasing; *Teacher Education Curriculum; Universities
IDENTIFIERS Computer Uses in Education

ABSTRACT

The study reports on a nationwide survey that investigated the specific planning steps and procedures used by colleges and universities in implementing microcomputer instruction into their teacher education curriculum. The findings presented are based on 101 usable responses to a 55-item questionnaire mailed to five major college and university campuses in each of the 50 states (40% return on 250 questionnaires). Following an introduction, statement of the problem, and description of the research methods, a literature review addresses computer and microcomputer use in instruction and lists 140 references. Findings are reported separately for each of the survey questions, which concern such issues as enrollment, curriculum, access to microcomputers, programming languages taught, and inservice training. Conclusions and recommendations for the campuses and for further study are included. A composite program plan is given which summarizes specific key steps and procedures used to implement programs and includes steps in initial planning and in planning for providing inservice training for the education faculty, teacher education curriculum changes, and equipment purchases and placement. The lack of systematic and comprehensive long-term planning before microcomputer acquisition is identified as a major teacher education weakness. (LMM)

MICROCOMPUTERS ON CAMPUS:

A Study Funded by the Research Foundation of

the State University of New York

in 1983

Principal Investigator:

Ned V. Schimizzi
Associate Professor
of Education
Department of Curriculum
and Supervision

Assisted by Donald Dudley
Student, SUCB

TABLE OF CONTENTS

Microcomputers on Campus

Introduction. For millions of young learners, education continues to be the lamp of hope for a better life. During recent decades educators have been criticized and at times blamed for our nation's failures in space, its social inequities, and the declining test scores of its young learners. Today's teachers, the products of our colleges and universities, conduct classes in modern buildings which may be equipped with central air conditioning as well as central heating. The classroom walls are painted in pleasant pastel colors. The chalkboards may no longer be black, the bulletin boards may no longer be brown and the floors may no longer be wooden. The lighting is brighter and more efficient and the learners may hang their coats in colorful metal lockers instead of closets and cloakrooms. The teachers may be younger and have more formal education. These teachers may be more democratic and less authoritarian in their classroom manner. The textbooks contain colored photographs. The workbooks and drill sheets have remained about the same through several recent decades. Many young learners continue to express their creativity and originality in clever methods of playing "hooky." Some of the same students who learn how to perform incredible athletic feats never learn how to read. Too many students among those who perform satisfactorily in their academic subjects, for some reason, do not grasp the challenge to excel in them. The kinds of attitudes and emotional support provided by the home, family and parents may continue to play a decisive role in determining to what degree children succeed in school or elsewhere. This success is measured annually with standardized tests for which national statistical norms have been developed. What can educators say has actually changed in the process of educating over the many decades of the twentieth century? Indeed, an 80-year-old senior citizen touring today's major modern institutions including shopping areas, offices, banks, farms and factories may suffer the least amount of future shock when visiting a modern classroom on any educational level.

The reasons for changes or lack of changes in the schools have filled many term papers and dissertations. The many educational questions and topics of today may include one of the recent developments which may make a difference in the classroom if it is implemented with planning and care and if it is applied in appropriate and challenging ways. This development can serve the teacher both as a tool for more effective teaching and as an object of instruction. Indeed, the most important single modern development for learning may be a piece of technological hardware which is so tiny that it can lose itself underneath a human fingernail. This piece of new technological hardware is called a microchip. It can do more than a multi-million dollar mainframe computer could do a decade or so ago. When tucked into a small cabinet the size of a typewriter or smaller and connected to a keyboard and a TV monitor it becomes what may be the teacher's first valid tool to come along in many decades. This marvelous tool, when used by those who are properly prepared, enables the teacher to provide the young learner with true individualized instruction and to do so with a variety of teaching methods, teaching styles, and curriculum content. Microcomputers can make learning in the academic subjects as much fun and challenging for the learner as completing a successful 30 yard pass in a football game or a jump shot in a basketball game when the score is tied. The teacher can determine and control the desired teaching mode or method with which to engage the learner and the microcomputer. The teacher may use the computer as a tutor to drill the child and give him practice in a specific skill and content area. The teacher's plans may require a simulated environment where the learner may apply what he has learned. As a reward and reinforcement technique, the teacher may next engage the learner(s) in educational gaming. After mastering specific skills and concepts in a given content area, the learner can be taught by the teacher to teach those same skills and concepts to the computer or to develop a computer program to teach them to other children. Indeed, the microcomputer itself can teach computer programming to the learner and do so in almost every computer language.

Whatever the microcomputer does, it can do so in an interactive mode and in color, graphics, pictures, sounds voices and animation while it respects Dewey, Piaget or Skinner. Its increasing capabilities are surpassed only by its decreasing costs.

Since the middle 1970s, microcomputer topics have increasingly dominated national and regional conferences of education and teacher associations of all kinds. The same phenomena is occurring at those conferences and association meetings for those who prepare teachers. Many schools, school systems and teacher preparation institutions have acquired microcomputers or are planning to do so.

The results of this study should reveal those major microcomputer decisions made by those teacher education departments which have already begun to develop their microcomputer programs. The results of this study should reveal those specific planning procedures developed by teacher education departments for implementing microcomputers into their curriculums. The trends and patterns of microcomputers in teacher preparation departments too should be revealed.

The results of this study should be applicable and valuable to those teacher education departments in colleges and universities which are in the planning or developmental stages of microcomputer implementation (including SUCB, Department of Curriculum and Supervision).

The vital role to be played by teacher education departments in the implementation of microcomputers on all instructional levels cannot be overstated. Without the strong preparation of teachers, the microcomputer may share the fate of the expensive and impressive language laboratories of the 1950s and the 1960s. Computers may, with reasonable certainty, remain important throughout the young learner's lifetime.

Statement of the Problem

General statement of the problem.

This study is an investigative analysis which was conducted for the purpose of determining how plans were formulated and which kinds of decisions were made by colleges and universities with teacher preparation departments concerned with the instructional applications of the microcomputer, i.e., which decisions have been made concerning the implementation of microcomputer instruction by colleges and universities with teacher education programs? Which specific planning procedures were used?

Explanation of the problem.

This study involved a nationwide survey of five randomly selected colleges and universities with teacher education departments in each of the fifty states. The total number of the campuses surveyed was 250. The project was designed to report the kinds of components and procedures which were used in the planning for implementing microcomputers in teacher education. The project design also included provisions for reporting the specific kinds of decisions that were made by the campuses in integrating microcomputer instructional applications into the program.

Major questions. The investigation sought the answers to the following 55 questions:

1. Do you offer a degree or a major in computer assisted instruction or instructional computing?

2. The enrollment in your teacher education program is (?)

3. Does your campus have a microcomputer center(s) available to students for instructional purposes?

4. Do specific departments or divisions on your campus have a microcomputer center available to students for instructional purposes? If so, please identify them.

5. Does your teacher education program require "hands on" experiences in microcomputer assisted instruction in methods and curriculum courses?

6. Does your teacher education program have "hands-on" methods and curriculum experiences in microcomputer assisted instruction available on a voluntary or elective basis to those students desiring it?

7. These "hands-on" methods and curriculum experiences in microcomputer assisted instruction for education students include such experiences in: (?)

8. Does your campus use the microcomputer for testing student performance?

9. The microcomputers on your campus center(s) are used for?

10. The students having access to microcomputers include (?)

Microcomputers on Campus

11. Which microcomputer skills are offered to graduate students or inservice teachers in your teacher preparation program for elementary teaching?

12. Which microcomputer skills are offered to undergraduate students preparing to become elementary school teachers?

13. Which microcomputer skills are offered to undergraduate students preparing to become secondary school teachers?

14. The programming language offered to graduate students and inservice teachers in elementary education is?

15. The programming language offered to graduate students and inservice teacher education is?

16. The programming language offered to undergraduate students preparing to become elementary school teachers is?

17. The programming language offered to undergraduate students preparing to become secondary school teachers is?

18. The microcomputer skills required of graduate students and inservice teachers in elementary education include?

19. The microcomputer skills required of undergraduate students preparing to become elementary school teachers include?

20. The microcomputer skills required of undergraduate students preparing to become secondary school teachers include?

21. Which brand name of microcomputer is used by your school or department of teacher education?

22. The considerations for the brand name selection of your particular hardware included?

23. The decision to purchase a particular make and model was made by?

24. The decisions concerning the purchase of courseware/software are made by?

25. Most of your microcomputer software/courseware was? (purchased or school generated

26. Is your microcomputer equipment designed for programs and courseware recorded on? (tape or disk)

27. What were (or are) the major obstacles in establishing the means to provide teachers and prospective teachers with experiences in microcomputer assisted instruction?

28. Before you acquired microcomputers, did you use time-sharing computer terminals for instruction?

Microcomputers on Campus

29. Would you now be able to offer experiences in computer assisted instruction if microcomputers were not available?

30. How were your microcomputers financed?

31. Would you recommend a microcomputer installation for departments or schools for teacher preparation elsewhere?

32. If yes, why?

33. If no, why not?

34. At what future date do you foresee the availability of microcomputers in the building housing your teacher preparation faculty?

35. How do you secure the equipment when the facilities are closed?

36. Do you offer programming instruction to teachers for the purpose of?

37. How many microcomputers do you have for each student?

38. If you have more than one brand name of machine, for which do you make software for?

39. Did you have a systematic plan for implementing microcomputer instruction before you acquired microcomputers?

40. Who participated in formulating this plan?

41. Do you now have a systematic plan for implementing microcomputer instruction? Is it a five-year plan?

42. What were the circumstances under which you acquired your first microcomputer?

43. Do you provide inservice training for teacher education faculty interested in microcomputer instruction?

44. Does this inservice training include? (which topics)

45. Skills-training with which peripheral devices is provided through inservice training?

46. If you advocate the teaching of programming to children, why do you do so?

47. What agency do you think should sponsor a microcomputer consortium?

48. For which special applications of the microcomputer do you instruct?

49. How many micrcomputers do you now have available for each teacher education faculty now in need of or interested in microcomputer training?

Microcomputers on Campus

50. The microcomputers on our campus which serve teacher education departments are used in which environments?

51. The teacher education instructors using microcomputers are supported by a: (?) (types of supportive services)

52. The prospective or inservice teachers using microcomputers are supported by a : (?) (types of supportive services)

53. Which obstacles do you perceive as hindering the growth and development of your microcomputer program in teacher education?

54. How do you secure the equipment when the facilities are in use?

Definition of Terms:

microcomputer: a small, relatively inexpensive clas -oom computer made possible by microelectronics.

microcomputer center or laboratory: an indoor facility on campus set aside for the purpose of housing microcomputer equipment for faculty and student use.

hands-on experiences: learning experiences gained by actually operating the microcomputer in its various capabilities.

programming language: One of several coding systems for preparing and assembling instructions for a computer.

software: completed computer programs which are ready to use and their accompanying printed materials.

courseware: software containing interactive instructional programs.

computer-assisted instruction: making use of a computer's several instructional modes with learners in an interactive dialogue.

inservice training: "on the job ·raining" for faculty.

peripheral devices: devices which are connected to the microcomputer. These devices perform special functions, e.g., a printer or a light pen.

Basic Assumptions

These basic assumptions are related to this study:

1. Microcomputers are viable, accepted, and effective learning tools on all educational levels.

2. Educators are just beginning to become aware of the full potential of the microcomputer in the interactive learning situations.

3. Microcomputers are being used with young learners in many schools.

4. Teachers need to be trained in microcomputer instructional applications.

5. Colleges and universities with teacher education programs shall be expected to provide microcomputer skills for teachers and prospective teachers.

6. Many colleges and universities have yet to prepare themselves to provide these skills to teachers and prospective teachers. and

7. Many colleges and universities have prepared themselves or are in the process of preparing themselves for doing so. These institutions have already made decisions and have developed procedures concerning the implementation of microcomputers. These decisions and procedures, if known, can be valuable to those colleges and universities with teacher education programs which are now planning their own microcomputer programs. A major purpose of this study is to gather information about these decisions and procedures which have already been made and to share them with those institutions who are in their microcomputer planning stages.

The Method of Investigation

General Design. This study is an investigation. Its major purposes are to determine: (1) the type and range of decisions made by campuses with teacher education programs concerning their implementation of microcomputer instruction into the curriculum; (2) the procedural steps used by the campuses for implementing microcomputers into their programs.

Each campus of a selected sample received a survey instrument designed to elicit the kinds of decisions being made concerning the major issues in microcomputer instruction for teachers. The actual procedural steps developed by each campus to implement microcomputer instruction into the teacher education curriculum were also elicited. The results from these survey instruments were tabulated and computerized with the use of the Social Studies Statistical Package in order to determine the kinds and frequencies of the decisions being made by the campuses. The actual procedural steps which were being used by the campuses to implement microcomputer instruction into teacher education curriculum were hand-processed.

Microcomputers on Campus

Population and sample limitations.

The sample consisted of colleges and universities with teacher education departments in these five categories:

a. less than 250 students

b. 250 to 500 students

c. 500 to 750 students

d. 750 to 1000 students

e. more than 1000 students

The survey instrument was mailed to 250 campuses, 5 of them in each of the 50 states. Efforts were made to include the state supported campuses as well as those campuses which were located in major cities.

Data and Instrumentation.

The data for this study were collected by means of a detailed 55 item survey instrument. Fifty-four of the items were multiple-choice. Each multiple choice item was designed with an open-end. The 55th item was in essay form. Its purpose was to elicit the actual step-by-step procedures used by the campuses for implementing the microcomputers into their teacher education programs. The content of the survey instrument was finalized only after the investigator spent nearly a year visiting and interviewing key microcomputer educators on campuses and school systems around the Great Lakes. It was anticipated that the collected data would include specific information concerning the implementation of microcomputer instruction in teacher education programs, Appendix 1.

Reporting the findings.

The major objectives of this study were to determine: (1) the type and range of the decisions made by those campuses with teacher education programs concerning their plans for implementing microcomputer related curriculum into their program; (2) the specific procedural steps used by the campuses for implementing microcomputers into instructional programs; and (3) possible trends concerning the issues involved with implementing microcomputer instruction as may be revealed in the findings.

Percentages were used as the most direct method of reporting the findings. The data from the returned questionnaires were tabulated and reported in terms of the precentage of responses for each of the items listed under each question. Multiple responses were allowed for most of the questions asked.

Microcomputers on Campus

The procedures.

1. Two-hundred-fifty (250) campus with teacher education institutions were selected from Patterson's Directory to American Colleges and Universities according to the predetermined enrollment categories. Selection preference was given to state supported institutions. State supported institutions were assumed to be the most likely institutions to have sizeable teacher education programs. Five campuses were selected from each of the 50 states.

2. A 55-item survey instrument was designed to elicit specific information concerning the decisions made by the campuses when implementing microcomputers in their teacher education programs as well as the specific procedures used in their planning for microcomputers. The questionnaire was evaluated by two colleagues including my department chairperson, Dr. Norman G. Walker. The questionnaire and cover letter are included in the appendix.

3. The survey instrument was mailed to each of the five selected campuses in each of the fifty states for a total of 250 campuses.

4. One-hundred-one (101) usuable survey instruments were returned.

5. The data elicited by the survey instruments were recorded and computer tabulated by using the Social Studies Statistical Package. The results were reported directly by using simple percentages.

6. The findings were written and reported question-by-question.

7. Conclusions and recommendations were formed from the findings.

Need for the study (significance to education).

The advent of the small, convenient, and relatively inexpensive microcomputer has made it possible for schools in every community to offer computer assisted instruction to students. Teacher education departments in colleges and universities need to address themselves to meeting the needs of teachers and prospective teachers by implementing microcomputer skills and instructional concepts into their programs. While many colleges and university teacher education departments are still in their planning stages for implementing microcomputer instructional skills and concepts, others have already made major decisions and have developed specific procedural steps for doing so.

It is the responsibility of the Department of Curriculum and Supervision, the State University College at Buffalo, and of SUNY to continually explore and investigate innovations which may hold promise for more effective preparation of teachers and thus, indirectly, of young learners.

Microcomputers on Campus

There is a continual need for those of us in teacher education to familiarize ourselves and our students with trends and issues concerned with improving instruction by using more effective methods. Microcomputers as instructional tools and as objects of instruction may be among the most impactual instructional innovations of this century's closing decades. The Department of Curriculum and Supervision and the institution in which it is housed should be responsible for making available the necessary leadership for exploring sound practices and procedures for implementing microcomputers into our instructional program.

There are no known studies as recent, comprehensive, and specific as this one. The results of this study shall be of use to the college and its teacher preparation program when gauging those curricular needs related to microcomputers. The results of this study shall enable other colleges and universities, especially those in the SUNY system, to more effectively implement microcomputers into their teacher education programs.

WHAT DOES RESEARCH SAY ABOUT THE USE OF COMPUTERS AND MICROCOMPUTERS FOR INSTRUCTIONAL PURPOSES? A SURVEY OF THE LITERATURE

Part I. Microcomputers: Their Benefits for Learners

Introduction.

Computer assisted instruction has been used and tested in a variety of human learning situations which include penal institutions and military posts as well as traditional school settings. The students using this instruction varied widely in ability levels and ethnic background as well as in personal goals. The excerpts and summaries of reports presented in this project were merely a sampling of the abundance of available research concerning computer assisted instruction. An attempt was made to summarize the results of each study in one or two paragraphs as follows:

(1) Three Minnesota correctional institutions sought to improve the reading and mathematics abilities among a group of males aged 17-21, a group of males and females aged 12-18 and another group of males aged 13-18. The program's evaluation focused on the learning of the basic skills, students' attitudes toward the learning of reading and mathematics and the staff's attitudes toward computer assisted instruction. Although the results did not clearly support the effects of computer assisted instruction on achievement, the students did show progress. The students' attitudes in general showed improvement. Their attitudes toward computer assisted instruction were generally positive as were the attitudes of the staff.

(2) When a group of pupils in grades 4 to 6 in Illinois were taught mathematics through the use of microcomputers, the results were positive in terms of both achievement and attitude. The program was described as being a clear success when presented in an "add on" mode and as particularly successful when it was integrated with the teacher's mathematics program. There were large achievement gains reported in grades four through six. The gains in grades four and five were more moderate when the children were presented with material

Related Literature

that was less familiar or when the reading level of the material was too advanced. A highly structured fractions strand was particularly effective in conveying understanding and skills to the pupils. An important finding was that the computer could go beyond the manipulation of symbols. It could present concepts and operations as well as measure the pupils' abilities to master them. This system demonstrated that it was capable of teaching as well as providing supportive drill and practice for those concepts already introduced by the classroom teacher.

(3) In Saskatchewan, Canada, thirty-six third grade students were identified as the poorest spellers in their grade. These students were the participants of a computer assisted spelling program. The students, who were frustrated from failure in traditional classroom settings, showed a 5.6 month gain in their spelling abilities at the end of a five week period. This was a substantial gain not expected with traditional means over the same brief period of time. Although these children were discouraged with their own academic performance, they responded positively and productively to the alternative game-like qualities of the computer program. The opportunity to try again immediately after an incorrect response provided a sense of challenge and reinforcement rather than feelings of discouragement.

(4) Adult non-readers, when presented with a computerized basic skills program, averaged a 1.12 grade level gain in reading achievement after an average instructional time of 13 hours. The data revealed that a 1.0 grade level gain could be achieved in 18.34 hours with the computerized reading program. This system seems highly motivational and successful with students who have experienced difficulty in text-oriented passive classroom environments. The novelty effect of the system was found to be extremely motivating.

(5) Sixty-four soldiers at Fort Belvoir, Virginia were divided into two groups for the purpose of learning language arts and mathematics. None of them were high school graduates. The average soldier was twenty years of age, had a tenth grade education, and had a seventh grade achievement level as measured by the California Achievement Test. One group was taught by traditional methods. The other group was taught with traditional and computer assisted instruction. After all measures were completed, the scores for soldiers in the traditional group with computerassisted instruction were higher than for soldiers in the traditional group only. This Army study indicated that computer assisted instruction can provide individualization, standardization, and efficient instruction to adult learners who require remediation in the basic skills.

(6) In Seattle, Washington, the Highline Public Schools established a computer assisted instruction program under Title I. Mathematics, language arts and reading instruction were presented through this program to those students who were found to be severely deficient in any one of the basic skills. These students were in grades K-12. After three years, the achievement gains indicated by pre- to post-test SAT data exceeded expectations. This system was found to be a viable method for teaching the basic skills to severely deficient children. At $100 per student for three years, the system was found to be cost efficient. Students, teachers, and parents were positive about the system.

Related Literature

(7) The results of another three year study in West Germany indicated that engineering students were able to learn pre-instructional skills in mathematics, physics, and technical thermodynamics with computers at the same level of achievement, if not better, than traditional methods.

(8) Students in grades three and four in thirteen Montgomery County, Maryland Public Schools scored a 3.6 to 4.2 month achievement gain in arithmetic after a six month computer assisted instruction program. These students had below average scores on the pretest. Students in grades 3 to 6 using microcomputers showed significantly greater gains than students in the traditional setting.

(9) Seven thousand, three hundred students who were two or more years below grade level in mathematics in 50 New York City high schools took part in the Remedial Mathematics Skills Program funded under Title I of the Elementary and Secondary Education Act. The program's objective was to improve computational skills with the use of computers, calculators and other materials. This corrective mathematics program was supplementary and individualized. The results of the Metropolitan Achievement Test (Advanced Level) indicated that statistically significant gains were achieved by the students in their mathematics skills.

(10) One hundred eleven deaf students ages 8 to 15 in Washington, D.C. made significant achievement gains in mathematics as a result of their participating in a computer assisted instruction program. The computers released teachers from tedious chores and made them available for individualized instruction.

(11) In Pittsburg, Pa., elementary school students were given a set of rules for managing their own progress through a mathematics unit. Interactive computer programs which could be controlled by the student were used. These fourth and fifth graders not only were able to manage their own learning of mathematics but learned faster and enjoyed better retention than students in traditional situations.

(12) A federally sponsored program was designed to combine the teaching of mathematics content and problem solving skills. Eighty-eight percent of the students taught this way achieved the course objectives.

(13) When a microcomputer was used to test for the mathematics weaknesses of high school students many benefits were enjoyed. Among these were the saving of teachers' time, elimination of paperwork, and a form of testing that was found enjoyable by the students. The test results were immediately available to students and teachers alike and in a variety of forms.

(14) Many functionally illiterate adults who were unable to experience success in learning the basic skills in the classroom have succeeded in doing so at the computer carrels at the Baltimore Learning Center. These CETA (Comprehensive Employment and Training Act) students have acquired the self-confidence as well as the skills necessary to succeed in productive employment.

Related Literature

(15) When computer assisted instruction was used with 875 handicapped children in Canada the results were extremely pos ve. These children were physically disabled, learning disabled or deaf. The achievement gains in mathematics and language arts for those children in the CAI group were several months more than the achievement gains of those handicapped children in the central group.

(16) Classroom computers have been found to provide teachers with accurate diagnosis of each child's strengths and weaknesses in reading. These computer programs followed each diagnosis with accurate prescriptive recommendations for the remediation needed by each child.

(17) A study at Stanford University was designed to identify those properties of computer assisted instruction that arouse and maintain students' interest over rather lengthy periods of time. Among these properties were novelty, incongruity, surprise, change, some degree of conceptual conflict, and those properties of the machine itself which generate curiosity, i.e., the self pacing and accompanying sounds and motions.

(18) There were 101 students at the Texas School for the Deaf who used the mathema ics Strands Program of the Institute of Mathematical Studies in the Social Sciences at Stanford University. It was found that the number of computer assisted instruction sessions provided for these students correlated positively with their Metropolitan Achievement Test gains. The MET gains for these hearing impaired students were substantial.

(19) Researchers at MIT who frequently observed children learning in LOGO computer environments reported that children experienced certain positive phenomena not experienced in BASIC computer environments. Children working in LOGO computer environments experienced immediate success. Their attention spans were lengthened considerably. They began liking numbers. They learned line integrals without noticing it while doing turtle drawings. Like Euclid, they could make complex hierarchical constructions which may give them a taste for mathematics. Finally, the observers found the children thinking for themselves as they provided their own directions for the turtle.

(20) The results of a study concluded at Wittenburg University indicated that second graders could learn basic addition facts by using a drill and practice game called Fish. The teacher reported that the students enjoyed the experience and had few problems using the computer.

(21) After a computer storytelling mathematics program for Pueblo Indian students, teachers observed an improvement in the classroom atmosphere. Student discipline improved most noticeably along with increased interest and productivity. The teacher became less of an authoritarian and more of an instructional partner. The students' behavior became more active, participatory and stimulated. Many kinds of learning took place about mathematics and the use of computers.

Related Literature

(22) A 1975 study at Stanford University indicated a high correlation between the on-line rate of progress and student achievement during a computer assisted instruction program in initial reading.

(23) When a computer assisted training program was used to supplement conventional methods of teaching a sight vocabulary to mildly mentally retarded school children, their sight vocabularies increased by an average of 128 percent. This increase remained constant over a 23 week period. The control group had a 34 percent increase.

(24) Frederick H. Bell (1974) reported that computer related learning environments provided an opportunity for learners to be creative in getting their programs to run, to teach their peers what they've learned, and to gain recognition in their efforts. These may be some of the reasons why some students do outstanding work in a computer learning environment.

(25) Errol M. Magidson (1978) reported that college students using computer assisted instruction responded favorable to it in the following ways: (1) they enjoyed using PLATO computer assisted instruction; (2) they did not feel that it was dehumanizing; (3) they found it to be a helpful learning aid; (4) they sometimes used it during their free time. Magidson found that college students viewed their computer assisted instruction experiences very positively in every instructional area and regardless of the length of time it was used. Any possible novelty effects did not seem to wear off during prolonged usage. There was some annoyance and frustration reported with terminal and computer breakdowns. Note: these kinds of interruptions and breakdowns are commonplace when mainframe computers and multiple terminals are used. These kinds of breakdowns are greatly reduced or eliminated when microcomputers are used.

(26) Gerald W. Bracey reported on the work of James Kulik at the University of Michigan. Kulik analyzed 51 separate research studies with well designed methodologies. The 51 studies showed that students who received computer assisted instruction scored better on objective tests than students who received traditional instruction only. Computer assisted instruction was found to improve retention when students were tested at later dates. Kulik and his colleagues found that CAI can also improve the speed at which students can master a given set of materials.

(27) San-Yun W. Tsai and Norval F. Pohl (1980-81) seemed to find general agreement that students using computer assisted instruction were able to master a given set of materials in less time than required by students taught only by traditional methods.

(28) Gerald W. Bracey wrote about the affective motivational outcomes of computer assisted instruction as reported in a 1980 study by James Gershman and Evannah Sakamoto at the Ontario Institute for Studies in Education. Students were able to progress at their own pace and were able to make their mistakes in private without embarrassment. Their comments included: "You can learn at your own rate" and "There's no teacher to yell at you."

Related Literature

(29) Lewellen and Allen (1971-1972) reported that CAI students took less time to learn a given set of material than students being taught only by traditional methods. Time savings of 40% were reported.

Summary

In summary, Part I of the literature seemed to indicate that learners who used microcomputers benefited in several ways. Learners achieved more at a faster rate and had better retention when they participated in microcomputer assisted instruction regardless of which subject of the curriculum was involved. Disadvantaged learners and physically and mentally disabled learners had the same benefits. Learners maintained positive views of the concepts and skills which they were learning. They were more successful in learning problem solving and in being creative. Adult learners and young students were more successful in learning the basic skills with microcomputers than with the traditional methods only. Learners were highly motivated and often excited when using microcomputers.

Teachers found that they were more effectively achieving their goals in less time. They found it easier to engage in diagnostic and prescriptive teaching and remediation. Teachers found that student motivation seemed to be built into computer assisted instruction.

Related Literature

PART II. Trends in the U of Microcomputers for Instruction:
A Survey of the iterature

Introduction

The use of microcomputers for instruction has widened considerably in the schools and in the college and university departments which prepare teachers. The implementation of microcomputers has not been without problems. This section of the survey of the literature includes some of the trends and problems revealed in a number of studies.

(30) Only 15.5 percent of 134 Southeastern teacher education colleges and universities offered course for acquainting pre-service teachers with microcomputers according to a recent survey study. However, almost half (47.3%) offered inservice microcomputer training for the teacher education faculty. Some institutions (15.5%) were offering an introductory microcomputer course to their preservice teachers. Twenty-six percent of the institutions already had such a course for their inservice teachers. Seventeen percent of the responses indicated that their education department had a microcomputer laboratory. Thirty-six percent of the responses indicated the inclusion of one or more microcomputer in their educational media laboratory. Seventy-one percent of the respondents indicated that there was "some" or "a great" demand to have microcomputers available. Nearly half (47.3%) have offered inservice microcomputer training for the college faculty. Only four institutions reported having a formal, written policy concerning microcomputer education for either graduate or undergraduate students. The two institutions offering computer certification programs for teachers were both located in Florida. One-fifth of the respondents indicated that they had plans for offering this kind of certification. Seventy-one percent agreed that there is a need for a state or a regional clearinghouse for instructional courseware.

(31) According to . C. Elliott, computer competencies should be accessible as a necessary esource for teachers. Colleges and universities with teacher education de artments are preparing teachers who are entering classrooms where computer illiteracy is rapidly becoming as intolerable as other forms of illiteracy Computer literacy may become the fourth "R." Learning how to learn thr ugh the act of computer programming may become one of the most valuable means f a young learner to keep pace with a lifetime of rapid technological chang . Indeed, how soon will programming skills be required of high school a d college freshmen?

(32) Michael T. Ba tista reported a lack of microcomputer instruction for preservice elementary teachers. Many among those preservice teachers who had programming instructi n seemed to lack a knowledge of the important computer literacy topics. Battist noted that there was little chance of systematic instruction for elementar school students if their future teachers were not being adequately prepared.

Related Literature

(33) Laurel Dickerson and William H. Pritchard, Jr., in pointing out the important need for microcomputer literacy among educators and the planning for microcomputer instructional programs, has indicated that microcomputers can project an exponentially greater impact to the learner than television because of its storage and interactive capabilities. Thus an exponentially greater loss to the learner may occur if educators are not prepared.

(34) The results of a 1981 Alberta study concerning the use of microcomputers in instruction revealed that: 12% of the schools had one or more microcomputers; the three brand names of machines most frequently selected were Commodore Pet (45%), Apple II (31%), and Radio Shack TRS-80 (19%); the machines seemed to be evenly spread across grade levels; the most frequently reported uses were for computer literacy and computer assisted instruction. Most users expressed the need for additional equipment, software and training; the majority of those schools that did not have a microcomputer were anticipating the delivery of equipment in the near future. Sadly, a large number of this group did not know enough about microcomputers to even anticipate what their needs might be. The remaining responses reported a strong need for information about hardware, programs, and additional training. Only a small number reported that they had no interest in introducing microcomputers into their schools.

(35) Thirty-one school districts in three New York State Counties were surveyed in 1981 to determine the extent of microcomputer utilization as well as the attitudes toward the concept. The responses indicated that microcomputers were used mostly in the teaching of mathematics from grades 3 to 12. Programming was taught in the 11th and 12th grades. The software was purchased except for that which was generated by students and faculty in the chemistry and programming courses. The study indicated that the machines should be made more accessible to a greater number of students. The attitudes of administrators toward microcomputers was usually favorable; teachers' attitudes varied from modest to impressed.

(36) A 1980 survey of 46 Arizona school districts revealed that computer assisted instruction was used most frequently in language courses. Arizona school districts were interested in the educational applications of microcomputers but were being held back by lack of trained personnel and effective software. Several districts recommended the following: courses in microcomputer teaching methods for education majors, inservice workshops for computer literacy and software development, a program to help districts implement microcomputers into the instructional process, and inservice microcomputer literacy courses for administrators.

(37) A 1981 survey of each California School district concerning the instructional use of computers indicated these findings: computers were used in instruction by one-third of the districts; at least 2/3 of those districts used microcomputers; hands-on experiences in 82% of the computer-using districts were limited to fewer than 25% of the students; the most frequent curricular applications in order of frequency were mathematics, computer science/literacy, business education and career education; the BASIC language was used in over 60% of the instructional applications; over 60% of the teachers in those districts using microcomputers were found to be either unprepared or inadequately prepared to function in a computer supported environment; one third of the districts not using computers were planning to initiate programs within a year or so.

Related Literature

(38) A large national survey of 974 school districts concerning microcomputers in education resulted in the finding that 74% of the districts were using computers for instruction with projections to 87% by 1985. Computer assisted learning was reported by 54% of the districts surveyed with projections to 74% by 1985. The major usage in high schools was for drill and practice in mathematics, natural sciences, business, and language arts. Projections for the 1980s included increased usage in the social sciences. Increased use is projected for the elementary grades in all subject areas with shifts to tutorial and simulation delivery systems. The major obstacles to microcomputer programs were reported as financial, lack of knowledge and training on this topic, faculty attitudes, and the need for improved software.

(39) According to the results of a 1980 study completed by Lisa Loop and Paul Christianson microcomputers were already a significant tool for learning in the schools. The price barrier had been broken which was making microcomputers available both in school and in the home. Educators, encouraged by the media and their own professional organizations, were placing a high priority on learning about microcomputers. Teachers were crowding microcomputer methods courses and there was a need for materials of all kinds for supporting learning and teaching about microcomputers.

The results of interviews with teachers indicated that less time was spent on curriculum content and more time spent on computer literacy, thinking, problem solving skills, and computer applications. The teachers expressed a need for more equipment, software, and microcomputer training.

(40) The most powerful argument for the widespread introduction of microcomputers into the schools may be Luehrmann's argument which include the statement that the ability to use computers is as basic and necessary to a person's formal education as reading, writing and arithmetic.

Summary

In summary, Part II of the survey of the related literature, microcomputer training for teachers was available both inservice and on many college campuses. Much has yet to be done in the preparation of teachers. Most colleges and universities which prepare teachers still lack a written policy concerning microcomputer education for preservice teachers and for graduate students. Most school systems seem to be using microcomputers. Yet, too few students are receiving hands-on experiences.

School systems are projecting increased use of microcomputers for the 1980s with implications for the colleges and universities which prepare teachers. Microcomputers have become a significant instructional tool. Unprepared tëachers will cause a great loss to learners.

Related Literature

1. Sandman, Richard S. and Wayne W. Welch, ED 189125. Evaluation of Title I CAI Programs at Minnesota State Correctional Institutions, sponsored by the Minnesota Educational Computing Consortium, St. Paul. Published in July of 1978.

2. Davis, Robert B. ED 184-885, Alternative Uses of Computers in Schools: Cognitive vs. Natural Languages Statements. Illinois University. Computer Based Education Lab. Sponsored by National Science Foundation, Washington, D.C. Published, April 1980.

3. Robertson, Gladeno. ED 184 128. A Comparison of Meaningful and Non-Meaningful Content in Computer-Assisted Spelling Programs. Saskatchewan Schools Trustees Association Research Center. Published April, 1978. Canada.

4. Caldwell, Robert M. and Peter J. Rizza, Jr., ED 184 554, A Computer Based System of Reading Instruction for Adult Non-Readers.

5. Simutis, Zita M. CAI As An Adjunct to Teach Basic Skills. Supported by the Defense Activity for Non-Traditional Educational Support. Pensacola, FL. 1979 ED 171326.

6. Maser, Arthur L. and others. ED 167114. Highline Public Schools Computer Assisted Instruction Project: A Program to Meet Disadvantaged Students' Individual Needs for Basic Skill Development: Final Report, 1977.

7. Kurz, Gunther and others. ED 162620. Comparing Traditional and Modern Ways of Teaching Engineering Students Mathematics and Physics. Fachhochschulen, Essligen, W. Germany. This paper was presented at the Annual Meeting of the Association for the Development of Computer Based Instructional Systems in March, 1978.

8. Morgan, Catherine E. and others. Evaluation of Computer Assisted Instruction. Rockille, Maryland, 1977. ED 139655.

9. Posamentier, Alfred S. Remedial Mathematics Skills Program; School Year 1974-1975. New York City Board of Education, Brooklyn, N.Y. Office of Educational Evaluation, 1975. ED 137478.

10. Nomeland, Ronald E. and Rachel Harris. Computer Assisted Instruction at Kendall Demonstration Elementary School. Washington, D.C. August, 1976. ED 129273.

11. Jacobson, Eric and Murray Thompson. ED 104362. Self-Managed Learning Using CAI. Pittsburg University. Learning Research and Development Center. April, 1975.

Related Literature

12. Roman, Richard Allan. ED 101690. Teaching Problem Solving and Mathematics by Computer. Pittsburg University, Learning Research and Development Center, 1974.

13. Schneider, Mark S. "Computer Assisted Skills Assessment in the Secondary Mathematics Curriculum." Technological Horizons in Education, V7, N3, p. 34-35, March, 1980.

14. Raloff, Janet. "You're Never Too Old."--Science News, V. 114, No. 23, p. 394-396. December, 1978.

15. Sandels, Lauren H. ED 173 983. Computer Assisted Applications for Learning with Special Needs Children. April, 1979.

16. Fey, Thomas Federick. ED 119 117. Ed.D. Dissertation, The University of Florida, 1975. A Comparison of Computer and Teacher Prepared Individual Reading Prescriptions.

and

Venezky, Richard and others. ED 106765. On Line Diagnosis of Reading Difficulties. University of Wisconsin, Madison, 1975.

17. Miller, Ruth and Robert D. Hess. The Effect Upon Students' Motivation of Fit Between Student Ability and the Level of Difficulty of CAI Programs. Stanford University, 1972.

18. Friend, Jamesine E. Computer Assisted Instruction for the Deaf at Stanford University, Institute for Mathematical Studies in Social Science, 1972.

19. Assessment and Documentation of a Children's Computer Laboratory. Massachusetts Institute of Technology, Cambridge, 1977.

20. Kraus, William H. "Using a Computer Game to Reinforce Skills in Addition Base Facts in Second Grade." Journal for Research in Mathematics Education. March, 1981.

21. Hakes, Judith A. ED 215 888, SE037082, "Computer Storytelling Mathematics for Pueblo Indian Upper Elementary Level Students." All Indian Pueblo Council. Albuquerque, N.M. Sept., 1981. Sponsored by the National Institute of Education and the National Science Foundation, Washington, D.C.

22. Campbell, J.O. and others. ED 101 324. "Predicting Reading Achievement from Measures Available During Computer Assisted Instruction," Stanford University, California. Institute for Mathematical Studies in Social Science. National Science Foundation, 1975.

23. Lally, M. "Computer-Assisted Teaching of Sight-Word Recognition for Mentally Retarded School Children." American Journal of Mental Deficiency, January, 1981, Vol. 85, No. 4, pp. 383-388.

24. Bell, Frederick H. "Why Is Computer-Related Learning So Successful?" Educational Technology. December, 1974.

Related Literature

25. Magidson, Errol M. "Student Assessment of PLATO: What Students Like and Dislike about CAI." Educational Technology. August, 1978.

26. Bracey, Gerald W. "Computers In Education: What the Research Shows." Electronic Learning. Nov./Dec., 1982.

27. Tsai, San-Yun W. and Norval F. Pohl. "Computer Assisted Instruction Augmented with Planned Teacher/Student Contacts." Journal of Experimental Education. Winter, 1980/81.

28. Bracey, Gerald W. "Computers in Education: What the Research Shows." Electronic Learning. Nov./Dec., 1982

29. Allen, J. R. "Current Trends in Computer Assisted Instruction." Computers in the Humanities, 1972, 7, 47-55. Reported by Marie Dence. "Toward Defining the Role of CAI; A Review." Educational Technology, November, 1980.

and

Lewellen, L. "Computers in the Classroom." Journal of Educational Data Processing. 1971, 8, 33-38. Reported by Marie Dence. "Toward Defining the Role of CAI: A Review." Educational Technology. November, 1982.

30. "No Micro-Training Available to Education Majors." Electronic Education. Sept., 1982, p. 19.

31. Elliott, Portia C. "Programming - An Integral Part of An Elementary Mathematics Course." Journal of Mathematics Education for Science and Technology. Vol. 7, no. 4., pp. 447-454.

32. Battista, Michael T. "Computer Literacy of Fifth Grade Students and Preservice Elementary Teachers Involved in Computer Programming Instruction." The Computing Teacher. Vol. 9, no. 3, 1981.

33. Dickerson, Laura and William H. Pritchard, Jr. "Microcomputers and Education: Planning for the Coming Revolution in the Classroom." Educational Technology, January, 1981. pp. 7-12.

34. Petruk, Milton W. "Microcomputers in Alberta Schools, Final Report." ED 205214 IR009519. Dialogue File: ERIC, Alberta Dept. of Education, Edmonton, Planning and Research Branch. Feb., 1981, 43 p.

35. Terzian, Peter J. "Microcomputers in Public Schools: Albany, Schenectady and Saratoga Counties of New York State." ED 212291. IR010000. Dec., 1981, p. 5.

36. Bitter, Gary G. "Survey of Arizona Public School Practices and Needs for Computer Assisted Instruction." ED 218704, EA014627 Dialogue File: ERIC. This study was initiated by the Working Group on Microcomputers in Education, College of Education, Arizona State University, Tempe, Arizona. Date: May, 1980. pp. 18.

Related Literature

37. Stutzman, Carl R. "Computer Supported Instruction in California Elementary and Secondary Schools," ED 206304, IR009606, March, 1981. 39p. Paper presented at the Annual Fresno Research Symposium, April 24, 1981.

38. Chambers, Jack A. and Alfred Bork. "Computer Assisted Learning in U.S. Secondary/Elementary Schools." ED 202461. IR00[illegible]33. DIALOG File: ERIC. Association of Computing Machinery, N.Y. N.Y. July, 1980. 50 pp.

39. Loop, Lisa and Paul Christianson . "Exploring the Microcomputer Learning Environment." Far West Lab. for Educational Research and Development. San Francisco, California. Nov., 1980. 90 pp. DIALOG File: ERIC ED 201307 IR009192.

40. Forman, Denyse. "Instructional Use of Microcomputers: A Report on B.C.'s Pilot Project." Discussion Paper 03/81. British Columbia Dept. of Education, Victoria, Sept. 1981. ED 211039 IR009777. DIALOG File: ERIC.

Microcomputers on Campus

The Findings

Please note:

(1) there were 101 total respondents to this study

(2) each respondent was allowed to circle as many responses to each item as were appropriate. Thus, there may be more total responses for each item than there were total respondents.

(3) the percentage figures were rounded off. Thus, in some items, the total percentages may add up to 99% or to 101%.

Total responses for this item 104

1. Do you offer a degree or a major in computer assisted instruction or instructional computing?

Four percent of the responses indicated that they offered an M.S. or M.A. in education with a major in these areas. Two percent offered the major with a specialist degree. Three percent offered these majors with a doctorate in education. Four percent of the responses offered teacher certification in instructional computing or computer assisted instruction. Two percent indicated that they offered an M.Ed. with a concentration in computer science. The remaining responses varied widely. Eighty-three percent simply wrote in a "no" for this item.

2. The enrollment in your teacher education program is: (?)

Total responses for this item 98

Twenty-five percent of the respondents indicated that they had an enrollment of 250 to 500. Twenty percent had an enrollment of less than 250 students. An enrollment of between 500 and 750 was reported by 9% of the respondents. Ten percent reported an enrollment of 750 to 1000. An enrollment of over 1000 was reported by 36% of the respondents.

98R

3. Does your campus have a <u>microcomputer</u> center(s) available to students for instructional purposes?

Seventy-five percent of the respondents indicated that they had a <u>microcomputer</u> center(s) available to students for instructional purposes Twenty-five percent of the respondents marked "no" for this item.

176R

4. Do specific departments or divisions on your campus have a microcomputer center available to students for instructional purposes? If so, please identify them.

The largest group of responses (30%) to indicate that their specific departments or campus divisions had a microcomputer center available to students for instructional purposes were in education. The next largest group (20%) indicated that their mathematics department had such a center. The business and economics department had such a center for 19% of the responses. Twelve percent of the responses indicated that their natural and physical sciences had a microcomputer center available to them. The remaining responses were divided among several disciplines and non-academic areas, i.e., no (3%), unknown (1%); instructional technology (1%); one center only (1%); computer science (5%).

5. Does your teacher education program require "hands-on" experiences in microcomputer assisted instruction in methods and curriculum courses?

The largest group of responses (54%) indicated that they did not require "hands-on" experiences in microcomputer assisted instruction in methods and curriculum courses at this time. Seventeen percent of the responses indicated that these kinds of experiences were required of their undergraduate students only. Sixteen percent of the responses indicated that these experiences were required of both graduate and undergraduate students. The remaining 13% of the responses indicated that these experiences were required in some programs or they were encouraging or planning these kinds of requirements. Thus, 45% of the respondents either had these requirements at this time or were encouraging and planning them for the near future.

6. Does your teacher education program have "hands-on" methods and curriculum experiences in microcomputer assisted instruction available on a voluntary or elective basis for those students interested in them?

The largest group of responses (54%) indicated that their teacher education programs had "hands-on" methods and curriculum experiences in microcomputer assisted instruction available on a voluntary or elective basis for those interested students on both undergraduate and graduate levels. Eight percent of the responses indicated that these voluntary or elective microcomputer experiences were available to graduate students and inservice teachers only. Four percent of the responses indicated that these experiences were available for undergraduate students only. Fourteen percent of the responses indicated that although these voluntary and elective experiences were not available at this time, they were planning to make them available.

7. These "hands-on" methods and curriculum experiences in microcomputer assisted instruction for education students include such experiences in: (?)

The largest group of responses (25%) indicated that these "hands-on" methods and curriculum experiences in microcomputer assisted instruction for education students included mathematics education. The remaining responses were for science (18%); reading (17%); social studies (15%); art and music (10%); industrial arts (1%); computer science (1%); computer literacy (3%); general methods course (2%); educational psychology (1%); business education (1%); other (4%). Thus, most of the responses indicated that education students were acquiring some microcomputer experiences in one or more of their methods courses, i.e., in the curriculum subject areas in which they may be teaching after graduation.

8. Does your campus use the microcomputer for testing student performance?

101R

Overwhelmingly the largest group of responses (80%) indicated that microcomputers were not used for testing student performance on campus. However, eleven percent of the responses indicated that student performance was tested with the microcomputer in regular required coursework and with professor-made tests. Four percent of the responses used microcomputers for entrance exams and comprehensive exams required of students in certain areas. Three percent of the responses indicated that they used only that microcomputer testing which is designed into the courseware. Two percent of the responses indicated that they are already using the microcomputer for most kinds of testing.

9. The microcomputers in your campus center(s) are used for: (?)

192R

The largest group of responses (22%) indicated that their microcomputers in campus microcomputer centers were used for drill, practice and the mastery learning of a foundation of basic concepts and facts in a particular discipline or course of study. Another large group of responses (21%) used their campus microcomputer centers for independent study. The use of the campus microcomputer center for problem solving through the simulation of situations was reported by 18% of the responses. Sixteen percent of the responses indicated that they used microcomputers as a means to foster creativity through interaction with problematic situations. Eleven percent of the responses indicated that they used microcomputers for programming experiences and computer literacy. The campus microcomputer center was used for remediation in mathematics and English for 8% of the responses. The microcomputers were used for research by 2% of the responses and for "other" study skills by another 2% of the responses.

10. The students having access to microcomputers include: (?)

110R The largest group of responses (54%) indicated that <u>all</u> of their students had access to the campus microcomputers. The remaining responses indicated that their students had access to microcomputers as follows: regular students (16%); students only in certain curriculum areas (16%); gifted students (6%); handicapped students (5%). The remaining responses varied widely.

11. Which microcomputer skills are <u>offered</u> to graduate students or inservice teachers in your teacher preparation program for elementary teaching?

93R The clear majority of the responses (65%) indicated that they offered graduate students and inservice teachers the basic operational literacy necessary to operate the equipment plus some programming skills and a knowledge of software/courseware. The remaining responses indicated their offerings to graduate students and inservice elementary teachers were: the basic literacy required to operate the equipment (10%); basic operational literacy plus some programming skills (5%). Three percent of the responses indicated a combination of the previously mentioned offerings or that their plans were not yet solidified. Sixteen percent of the responses indicated that they were offering none of the previously mentioned skills (those offering programming only may have been included in this group). The remaining responses varied widely.

Microcomputers on Campus

12. Which microcomputer skills are offered to undergraduate students preparing to become elementary school teachers?

93R The largest group of responses (44%) indicated that the microcomputer skills which they offered to those undergraduate students preparing to become elementary school teachers included the basic literacy required to operate the equipment, some programming skills, and a knowledge of software/courseware. The remaining responses indicated that the skills they offered to those undergraduate students preparing to become elementary teachers included: the basic literacy required to operate the equipment (23%); the basis operational literacy plus some programming skills 8%. Seventeen percent of the responses indicated that they offered none of the listed microcomputer skills (included in this group may be those offering programming only). Five percent of the responses indicated that they were still planning. One percent of the responses indicated that they offered programming primarily while 2% offered the basic operational literacy and software study.

13. Which microcomputer skills are offered to undergraduate students preparing to become secondary school teachers?

0R The largest group of the responses (43%) indicated that they taught the basic literacy required to operate the equipment plus some programming skills as well as a knowledge of software and courseware. Twenty-two percent of the responses indicated that they taught the basic literacy required to operate the equipment. Six percent of the responses indicated that they taught the basis operational literacy plus some programming skills. Twenty-three percent of the responses indicated that they taught none of the previously mentioned skills as combined above (some of these responses may have indicated, if given a choice, that they taught programming skills only). The remaining responses varied widely.

14. The programming language offered to graduate students and inservice teacher in elementary education is: (?)

17R Sixty-two percent of the responses indicated that the programming language which they offered to graduate students and inservice teachers in elementary education was BASIC. LOGO was offered by 18% of the responses. PILOT was offered by 10% of the responses while 8% offered PASCAL. Only 1% offered FORTRAN. The reamining responses were varied. There were no responses for TUTOR.

15. The programming language offered to graduate students and inservice teachers in secondary education is: (?)

11R The largest group of responses (62%) indicated that the programming language which they offered to graduate stu-ents and to inservice teachers in secondary education was BASIC. The remaining responses indicated that the programming languages which they taught to inservice teachers and graduate students in secondary education were TUTOR none; LOGO 17%, PILOT 11%, PASCAL 8%, FORTRAN 1%, varied 1%.

Microcomputers on Campus

16. The programming language offered to undergraduate students preparing
99R to become elementary school teachers is: (?)

The largest group of responses (67%) indicated that BASIC was the programming language offered to undergraduate students preparing to become elementary school teachers. The remaining responses indicated that the programming languages which they offered to this group were: LOGO (17%); PILOT (7%); PASCAL (7%), varied (1%), TUTOR (0%).

17. The programming language offered to undergraduate students preparing to be-
95R come secondary school teachers is: (?)

Sixty-eight percent of the responses indicated that the programming language which they offered to undergraduate students preparing to become secondary school teachers was BASIC. The remaining responses indicated that the programming languages which they offered to this group were: LOGO (14%); PILOT (7%); PASCAL (7%); TUTOR (1%), FORTH, LISP (1%); varied (1%).

18. The microcomputer skills <u>required</u> of graduate students and inservice teachers
74R in elementary education include:

The largest group of responses (60%) indicated that they did not require microcomputer skills of graduate students and inservice teachers at this time but that these requirements were included in their future curriculum plans. Sixteen percent of the responses indicated that they required the basic literacy needed to operate the equipment, some programming skills and a knowledge of software/courseware. Seven percent of the responses indicated that they required only the basic literacy necessary for operating the equipment. One percent of the responses indicated that they required the basic operational literacy and some programming skills. Fifteen percent of the responses indicated that they did not require microcomputer skills of their graduate students and inservice teachers in elementary education at this time and they did not indicate plans to do so. One percent indicated future plans for basic literacy.

19. The microcomputer skills <u>required</u> of undergraduate students preparing
84R to become elementary school teachers include: (?)

The largest group of responses for this item (54%) indicated that they were not requiring undergradaute students preparing to become elementary school teachers to acquire the basic literacy necessary for operating the equipment, programming skills or a knowledge of software and courseware at this time but that they were including these skills and knowledges in their future curriculum plans. The remaining responses indicated that they required these skills: the basic literacy required to operate the equipment (17%); the basic operational literacy plus some programming skills (3%); the basic literacy plus some programming skills as well as a knowledge of software and courseware (12%), no microcomputer requirements (11%); the basic literacy in future plans (3%).

Microcomputers on Campus

2R 20. The microcomputer skills required of undergraduate students preparing to become secondary school teachers include: (?)

Fifty-four percent of the responses indicated that they did not now require any microcomputer skills of their undergraduates preparing to become secondary school teachers but that they were including the following requirements in their future curriculum plans: the basic literacy required to operate the equipment, programming skills, and a knowledge of software/courseware. The remaining responses indicated that they now required these skills: the basic literacy required to operate the equipment (17%); basic operational literacy and some programming skills (2%); basic operational skills, some programming skills and a knowledge of software/courseware (12%); one percent of the responses required some of their students in this category to acquire the previously mentioned microcomputer skills; four percent had a basic literacy requirement in their future plans; ten percent of the responses had no microcomputer skills requirements and did not indicated any future plans for them.

59R 21. Which brand name of microcomputer is used by your school or department of teacher education?

The largest group of responses (55%) indicated that they had selected the Apple brand name of microcomputer. The second largest group of responses indicated that they had selected the Radio Shack TRS-80 (22%). The remaining responses indicated that they had selected the following brands of microcomputers: Commodore Pet (7%); Hewlett-Packard (2%); IBM (4%); Xerox (1%); Northstar (2%); Texas Instruments (2%); Atari (2%), other (3%+).

35R 22. The considerations for the brand name selection of your particular hardware included:

The responses indicated their considerations for selecting the brand name of their particular hardware as follows: quality 24%; price 17%; flexibility (provisions for expanding capacity) 20%; service availability and rapid delivery 15%; simplicity of operation 12%; software availability (6%); compatibility with that equipment already acquired or with nearby school districts 3%; other 3%.

23. The decision to purchase a particular make and model was made by: (?)

R The largest group of responses (43%) indicated that the decision to purchase a particular make and model of microcomputer was made by the faculty. The second largest group of responses (32%) indicated that their decision was made by both the faculty and the administration; the remaining responses indicated that their decision was made by administration (13%); faculty, administration and students (7%); campus-wide computer committee (1%); computer lab personnel (3%); other (1%). The faculty was involved in seventy-five percent of the decisions. It may also be said that 75% of the decisions involved the faculty or the faculty and administration.

Microcomputeis on Campus

24. The decisions concerning the purchase of courseware/software were made by: (?)

92R

Fifty-five percent of the responses indicated that the faculty made the decisions concerning the purchase of courseware/software. Twenty-six percent of the responses indicated that these decisions were made by both the faculty and the administration. Eleven percent of the responses indicated that these decisions were made by the faculty, administration and students. Thus, 92% of the decisions concerning software/courseware purchases included the faculty. The remaining responses indicated that these decisions were made by: the administration (3%) and the computer laboratory personnel and director (4%).

25. Most of your microcomputer software/courseware was: (how attained?)

The largest group of responses (58%) indicated that they purchased most of their microcomputer software from the commercial market. Twenty-nine
93R percent of the responses indicated that their courseware was evenly mixed
between that which they purchased and that which they programmed themselves. Three percent of the responses indicated that their software was programmed by their own teachers and staff while 6% indicated that it was programmed by their students. The remaining responses varied widely.

26. Your microcomputer equipment is designed for programs and courseware recorded on: (re: storage medium?)

89R Most of the responses (53%) indicated that their microcomputer equipment configuration was designed for programs and courseware recorded on both the tape cassette and the disk. The next largest group of responses (43%) indicated that their programs were recorded on disks only. Thus 96% of the respondents indicated hardware provisions for soft disks only or both soft disks and tape cassettes. Only 2% of the responses indicated that they had hardware provisions for tape cassettes only. One percent of the responses indicated using tape cassettes and soft disks on separate machines. Only 1% indicated usage of a hard disk.

27. What were (or are) the major obstacles in establishing the means to provide
177R teachers and prospective teachers with experiences in microcomputer instruction?

The two largest groups of responses indicated that financial problems (41%) and unprepared faculty (30%) were the major obstacles in establishing the means to provide teachers and prospective teachers with experiences in microcomputer instruction. The remaining responses indicated that their major obstacles were: negative attitudes or disinterested faculty (10%) lack of student support (3%); lack of perceived need (12%). The remaining responses varied widely.

28. Before you acquired microcomputers, did you use time-sharing computer terminals for instruction?

95R

Fifty-one percent of the responses indicated that they used time-sharing computer terminals for instruction before they had acquired microcomputers; 47% indicated that they had not. The remaining responses continue to use time-sharing computer terminals either as their primary system or on a limited basis.

Microcomputers on Campus

29. Would you now be able to offer experiences in computer assisted instruction if microcomputers were not available?

Fifty-six percent of the responses indicated that they would now be able to offer experiences in computer assisted instruction if microcomputers were not available; 43% indicated that they would <u>not</u> be able to do so. One percent indicated that they would be able to do so on a minimal basis only.

30. How were your microcomputers financed?

According to the responses, microcomputers on campus were financed by department funds (33%); division funds (18%); all campus funds (22%); special college fund (1%); federal grant(s) (10%); equipment was loaned or denoted by the manufacturer (8%); state funds (2%); personal equipment was used(1%); private foundation (2%); other (2%). In summary 74% of the responses indicated that their microcomputers were financed by one of several sources on the campuses themselves.

31. Would you recommend a microcomputer installation for departments or schools or teacher preparation elsewhere?

Ninety-nine percent of the responses indicated that they would recommend a microcomputer installation for departments or schools for teacher preparation elsewhere. Only 1% of the responses indicated that they would not recommend so.

32. If so, <u>why</u> would you recommend a microcomputer installation for departments or schools for teacher preparation elsewhere?

The responsed indicated that they would recommend a microcomputer installation for departments or schools for teacher preparation elsewhere because of: a desire to meet the needs of teachers and prospective teachers (30%); the trend (s) toward the use of microcomputer assisted instruction (27%); to provide teachers with a vital form of literacy (27%); pressure from society in terms of its needs from the teaching profession (15%). The other responses were widely varied.

33. If no, why would you <u>not</u> recommend a microcomputer installation for departments or schools for teacher preparation elsewhere?

There were only <u>6</u> responses to this item. In order of declining importance, the reasons given for not recommending a microcomputer installation for departments or schools for teacher preparation elsewhere were: cost (67%); lack of evidence indicating microcomputer effectiveness (17%); lack of appropriate and varied software (7%). Again, there were only <u>6</u> responses to this item.

34. At which future date do you foresee the availability of microcomputers in the building housing your teacher education faculty?

Seventy percent of the responses indicated that microcomputers were available at this time in the building housing their teacher education faculty. Fifteen percent of the responses indicated that microcomputers would be available in their education buildings between 1982-1984; 7% indicated 1985-1987. Eight percent of the responses indicated that they were not now planning for such facilities because they were using a campus-wide microcomputer center shared with other departments or divisions on their campus. Two percent indicated that the equipment was available in their education buildings for planning purposes.

35. How do you secure the equipment when the facilities are closed?

87R Eighty-three percent of the responses indicated that their microcomputer equipment was secured in an ordinary and locked room. The remaining responsed indicated that their microcomputers were secured by the following methods: chained to the floor, walls, or tables in a locked room (14%); in a vaulted room (1%); in a media center (1%); computer laboratory with an electronic alarm system (new school building) (1%).

36. Do you offer programming instruction to teachers for the purpose of: i.e., for which specific purpose do you offer programming instruction for teachers?

219R

The responses indicated that they offered programming instruction to teachers for the purpose of. enhancing computer literacy (30%); increasing the ability to actually use the computer (operational literacy) (30%); developing problem solving courseware for students (15%); developing drill and practice courseware for students (13%), developing tutorial courseware for students (12%). The remaining responses were varied and included the desire to offer courses.

37. How many microcomputers do you have for each student?

82R According to the responses, their ratios of microcomputers to students were: one computer for each student (10%); one computer for two students (16%); one computer for three students (10%); one computer for four students (1%); one computer for five students (15%); one computer for more than five students (30%); only one to three microcomputers in the entire department (11%); 1:10 ratio 5%; varied and other (3%).

38. If you have more than one brand name of machine, for which do you make software for?

Forty-two percent of the responses indicated that they made software for every brand name among their microcomputers. Software was made for one
60R brand only as indicated by thirty-seven precent of the responses. Seventeen percent of the responses indicated that they used vendor software only. Other responses included "we don't" (2%); "plan to do so for more than one" (2%); "we do for several" (2%).

39. Did you have a systematic plan for implementing microcomputer instruction <u>before</u> you acquired microcomputers?

The responses indicated that they had a limited plan for implementing
147R microcomputer instruction before they acquired microcomputers, i.e. for instruction (22%); for curriculum (14%); for staff (16%); for space (15%); for hardware and software (16%); for research (1%); "working on it now" (2%); "no plan" (15%).

Microcomputers on Campus

40. Who participated in formulating this plan?

According to the responses, the participants who formulated this plan were: the faculty (43%); administrators (34%); computer experts (12%); outside consultants (6%); vendors (4%).

41. Part 1. Do you now have a systematic plan for implementing microcomputer instruction?

Forty-eight percent of the responses indicated that they did not now have a systematic plan for implementing microcomputer instruction while 47% indicated that they did have a plan. Five percent indicated that they were developing a plan.

Please note: The number of responses for item 41 is 55 fewer than the number of responses for item 39.

41. Part 2. If you have a plan, is it a long range plan?

Seventy percent of the responses indicated that their plan was not a long rangeplan; thirty percent indicated that they did have one.

42. What were the circumstances under which you acquired your first microcomputer?

According to the responses the circumstances under which they acquired their first microcomputer included: interested faculty; math education (23%); interested department chairperson (23%); interested dean (22%); interested faculty, reading education (4%); interested faculty, science education (9%); faculty, educational psychology (2%); faculty, social studies (1%); Media Center: faculty director (4%); faculty, research (2%); faculty, no specific department (9%).

43. Do you provide inservice training for teacher education faculty interested in microcomputer instruction?

Seventy-eight percent of the responses for this item indicated that in-service training was provided for teacher education faculty interested in microcomputer instruction. One percent indicated that they had plans to do so. A negative response was indicated by 21% of the responses.

44. What does the inservice training include for the teacher education faculty?

The responses indicated that their inservice training for the teacher education faculty included programming (30%); classroom strategies (22%); one-on-one drill (10%); tutorial (15%); training with peripheral devices, i.e., printers 17%; basic computer literacy 2%; other 3%.

45. Skills-training with which peripheral devices is provided through inservice training?

The peripheral devices for which inservice training was provided, according to the responses, included: the printer (63%); the light pen (6%); the card reader (3%); speech synthesizer (4%); hard or floppy disks (4%); game paddles (3%); telephone modem (3%); graphics tablet (4%); none (6%); learning through independent study (3%).

46. If you advocate the teaching of programming to children, why do you
297R do so?

The responses indicated that they advocated the teaching of programming to children for these reasons: as a skill which may have occupational value (13%); as a form of computer literacy (25%); as an instructional method for helping children to internalize concepts (19%); as an instructional method to help children develop those mental processes necessary for problem-solving (23%); as a method of instruction and as a skill designed to enhance the child's creativity (21%); other (0%).

47. Which agency do you think should sponsor a microcomputer consortium?

146R The responses indicated that the agency which should sponsor a microcomputer consortium should be: a college or university (41%); a large school system (20%); a teacher center (17%); a commercial organization (7%); it should be a separate entity (8%). The remaining responses varied widely.

48. For which special applications of the microcomputer do you instruct the
70R students?

The largest group of responses indicated that they instructed their students for these special applications of the microcomputer: the gifted (41%); slow learners (30%); mentally retarded (14%); the deaf (7%); the blind (braille) (4%). The few remaining responses varied.

49. How many microcomputers do you now have available for each teacher education faculty member now in need of or interested in microcomputer
73R training?

According to the responses, the number of microcomputers available to education faculty members now in need of or interested in microcomputer training varied as follows: one computer for more than five faculty members (22%); one computer for every five interested faculty members (22%); one computer for each interested faculty member (11%); only 1 to 3 micros in the entire department (11%); one machine for every ten faculty members (8%); one computer for every three interested faculty members (7%); one computer for every four interested faculty members (7%); education department not interested (1%); other (1%).

50. The microcomputers on our campus which serve teacher education departments are used in which environments?

109R

The responses indicated that the environments where the microcomputers which served their teacher education departments were located included the microcomputer laboratory <u>and</u> in the classrooms (47%); used only in the laboratory (31%); checked out by the instructor as AV equipment (13%); used only in the classroom (4%); checked out by the students overnight and weekends (3%); division chairpersons office (1%); inhouse use by interested faculty (1%); through modern/terminal only (1%).

51. How are the teacher education faculty members using microcomputers supported
76R in their efforts?

According to the responses, the teacher education instructors using microcomputers were supported by: the building computer leader (24%); a campus-wide computer committee (20%); the building computer committee (17%); a campus-wide computer coordinator (16%); a newsletter (5%); learning resource center (3%); interest group (3%); computer center and lab (3%); key staff members in the department (4%); no support (7%).

52. The prospective and inservice teachers using microcomputers are
86R supported by a: (?)

The responses indicated that <u>prospective</u> <u>or</u> <u>inservice</u> (graduate students) using microcomputers were supported by: resource persons (42%); center for information (19%); journals and periodicals (16%); computer club (8%); newsletter (6%); no support (7%); other (2%).

53. How do you secure the equipment when the facilities are in use?

The responses indicated that when the microcomputer facilities were in
use, the equipment was secured by: the presence of a staff member (40%);
177R the presence of a student attendant (31%); the equipment was chained to
the floors, walls or table (17%); the honor system (7%); locked room,
key access with I.D. (3%); specially designed study carrels (1%).

54. Please use words or phrases in the remaining space to outline the major steps of the procedure used by your teacher education department(s) for establishing microcomputers in the classrooms or in a center.

The results for item #54 are presented on page 44 and are titled: Planning for Microcomputers in College and University Teacher Education Departments.

Conclusions and Possible Trends

Some of the respondents indicated that they offered a B.S. or B.A. degree with a major in computer assisted instruction or in instructional computing.

Most of the responses (75%); indicated that they had a microcomputer center(s) available to students for instructional purposes.

The specific departments or divisions which had their own microcomputer center available to students for instructional purposes were: in education (30%); mathematics (20%); business and economics (19%); natural and physical sciences (12%).

Most of the responses (54%), indicated that they did not require "hands-on" experiences in microcomputer assisted instruction in methods and curriculum courses at this time. However, 17% of the responses required these experiences of undergraduate students only, while 16% of the responses required them of both undergraduate and graduate students. Thirteen percent were encouraging or planning these kinds of requirements. Thus, the responses may be indicating a growing trend for these kinds of requirements, i.e., CAI.

The largest group of responses (54%), indicated that their teacher education programs had "hands-on" methods and curriculum experiences in microcomputer assisted instruction available on a voluntary or elective basis for those interested students on both undergraduate and graduate levels. Fourteen percent of the reqponses indicated that they were planning for these kinds of experinces. Thus, the responses for this item seem to indicate a trend toward these kinds of experiences on a voluntary or elective basis.

The "hands-on" methods and curriculum experiences in microcomputer assisted instruction for education students included such experiences in mathematics education (25%); science education (18%); reading (17%); social studies (15%); art and music (10%).

Most of the responses (80%) indicated that their microcomputers were not used for testing student performance on campus. The remaining responses, however, may indicate a growing trend toward the use of microcomputers for testing student performance.

The microcomputers in the campus centers were used for: the drill, practice, and the mastery learning of a foundation of basic concepts and facts in a particular discipline or course of study (22%); for independent study (21%); simulated problem solving situations (18%); creativity through interaction with problematic situations (16%); programming experiences and computer literacy (11%); remediation in mathematics and English (8%); research (2%); other study skills (2%).

Conclusions

Most of the responses (54%) indicated that all of their students had access to the campus microcomputers. The remaining responses indicated that these students had access to the machines: regular students (16%); students only in certain curriculum areas (16%); gifted students (6%); handicapped students (5%).

The clear majority of the responses (65%) indicated that they offered to graduate students and inservice teachers the basic operational literacy to operate the equipment plus some programming skills and a knowledge of software and courseware. The remaining responses indicated that they offered varied combinations of these skills to inservice teachers.

The microcomputer skills offered to those undergraduate students preparing to become elementary school teachers included: the basic literacy required to operate the equipment, some programming skills and a knowledge of software/courseware (44%); the basic literacy required to operate the equipment (23%); the basic operational literacy plus some programming skills (8%). Other responses indicated a possible trend toward these kinds of offerings. Only 17% of the responses offered none of the microcomputer skills to this group of students.

The largest group of responses (43%) indicated that the microcomputer skills offered to undergraduate students preparing to become secondary school teachers included the basic literacy necessary for operating the equipment plus some programming skills as well as a knowledge of software and courseware. Other responses indicated that they offered: the basic literacy required to operate the equipment (22%) operational literacy plus some programming skills (6%). Twenty-three percent of the responses indicated that they taught none of the previously mentioned skills. Some of these "none" responses may have indicated that they taught programming skills only if they were given such a choice to mark on the survey instument.

Most of the responses (62%) indicated that the programming language which they offered to graduate students and inservice teachers in elementary education was BASIC. LOGO was offered by 18% of the responses, PILOT (18%) and PASCAL (8%).

Most of the responses (62%) indicated that the programming language which they offered to graduate students and inservice in secondary education was BASIC. The remaining responses indicated that the programming languages which they taught were TUTOR (none); LOGO (17%); PILOT (11%); PASCAL (8%).

Most of the responses (67%) indicated that BASIC was the programming language offered to undergraduate studnets preparing to become elementary school teachers. The other responses indicated the offering of these languages: LOGO (17%); PILOT (7%); PASCAL (7%); varied (1%); TUTOR (0%).

The programming language offered most often to undergraduate students preparing to become secondary school teachers was BASIC (68%). Other languages included: LOGO (14%); PILOT (7%); PASCAL (7%); TUTOR (1%); FORTH, LISP (1%); varied (1%).

Conclusions

The largest group of responses (60%) indicated that they did not require microcomputer skills of graduate students and inservice teachers at this time but that these requirements were included in their future curriculum plans. Most of the remaining responses indicated that they now required varied microcomputer skills of this group.

Most of the responses (54%) indicated that they did not require microcomputer skills of undergraduate students preparing to become elementary school teachers. Most of the remaining responses indicated that these skills were required.

Fifty-four percent of the responses indicated that they did not now require any microcomputer skills of their undergraduates preparing to become secondary school teachers but that they were including such requirements in their future curriculum plans. Most of the remaining responses indicated that they now required various microcomputer skills of this group.

Most of the responses (55%) indicated that they had selected the Apple brand name of microcomputer. The second largest group (22%) selected the Radio Shack TRS-80.

The considerations indicated for the selection of a particular brand name of hardware included: quality (24%); price (17%); flexibility and possible expansion (20%); service (15%); simplicity (12%); software (6%); compatibility with nearby school districts (3%); other (3%).

The decision making process to purchase a particular make and model of microcomputer included the faculty according to 82% of the responses, faculty only (43%); both the faculty and the administration (32%); faculty, administration and students (7%).

The decision making process for software purchases included the faculty according to 92% of the responses.

Most of the software was purchased (58%); 29% indicated that their software was evenly mixed between that software that was purchased and that which was generated by teachers, staff and students.

An overwhelming majority of the responses (96%) indicated that they had hardware provisions for soft disks only or for both soft disks and for tape cassettes. Only 2% had hardware provisions for tape cassettes only.

Fifty-two percent of the responses indicated that their major obstacles in establishing the means to provide teachers and prospective teachers with experiences in microcomputer instruction included unprepared faculty, negative attitudes or disinterested faculty and a lack of perceived need. Forty one percent cited financial problems as the major obstacles.

Conclusions

Fifty-one percent of the responses indicated that they used time-sharing computer terminals for instruction before they had acquired micro-computers.

Fifty-six percent of the responses indicated that they would now be able to offer experiences in computer assisted instruction if microcomputers were not available; 43% indicated that they would not be able to do so if microcomputers were not available.

Most of the responses (74%) indicated that their microcomputers were financed by one of several sources on the campuses themselves, i.e., department funds (33%); division funds (18%); all campus funds (22%); special college fund (1%).

Ninety-nine percent of the responses indicated that they would recommend a microcomputer installation for departments or schools for teacher preparation elsewhere. Most of the responses indicated that they would recommend so for meeting the needs of college faculty, teachers, prospective teachers, societal needs and education trends in general.

Seventy percent of the responses indicated that microcomputers were available in the buildings housing their teacher preparation faculty. Fifteen percent of the responses indicated that microcomputers would be available in their education buildings between 1982 and 1984.

Eighty-three percent of the responses indicated that their microcomputer equipment was secured in an ordinary and locked room.

Programming instruction was offered to teachers for the purpose of enhancing computer literacy and to increase the ability to actually use the computer according to 60% of the responses.

The number of computers indicated as being available for each student varied widely from one computer for each student to one computer for every ten or more students.

The largest group of responses among those with more than one brand of machine indicated that they made software for every brand name of machine (in their possession).

Most of the responses indicated that they had only limited plans for implementing microcomputer instruction before actually acquiring the machines These plans were not comprehensive nor were they long range plans. These plans were usually formulated by the faculty and the administration.

The circumstances under which most of the responses acquired their first microcomputer included either an interested faculty member or an interested administrator.

Most of the responses (78%) indicated that inservice training was provided for teacher education faculty interested in microcomputer instruction. This training included classroom strategies, instructional applications, and peripheral devices. The peripheral device most often included for training was the printer.

Conclusions

Most of the responses advocated the teaching of programming to children for several sound reasons: the occupational value for the skill (13%) as a form of computer literacy (25%); as an instructional method ot help children internalize concepts (19%); as an instructional method to help children develop those mental processes necessary for problem solving (2?%); as a method of instruction and as a skill designed to enhance the child's creativity (21%).

The largest group of responses (41%) indicated that the agency which should sponsor a microcomputer consortium should be a college or university.

The responses indicated that they instructed their students for these special applications of the microcomputer: the gifted (41%); slow learners (30%); mentally retarded (14%); the deaf (7%); the blind (braille 4%).

Although the number of microcomputers available to education faculty members now in need of or interested in microcomputer training varied widely, only 1% of the responses indicated a complete absence of microcomputer equipment for this purpose.

Forty-seven percent of the responses indicated that those microcomputers on campus which serve the teacher education departments are used both in a laboratory concept and in the classrooms (47%); used only in the laboratory (31).

The teacher education instructors using microcomputers receive supportive services from both building and campus-wide sources.

The prospective and inservice teachers using microcomputers are supported mostly by resource persons (47%) as well as a center for information (19%) and journals and periodicals (16%).

The obstacles perceived as hindering the growth and development of microcomputer programs in teacher education included: too few computer literate and interested instructors (45%); and a lack of funds for new hardware and software (43%).

While being used, the equipment and other facilities were secured most frequently by the presence of a staff member or a student attendant (71%).

Summary of the Conclusions

(1) Colleges and universities with teacher education departments were making an effort to implement microcomputer training programs. This training included a variety of instructional applications of the microcomputer. This training was not required but was expected to become so.

Summary of the Conclusions

(2) BASIC was the language most often taught to teachers. It was the language most often taught to learners.

(3) Teachers were included in the decision making process for hardware and software purchases.

(4) Unprepared and ~~uninterested faculty and a lack of funds were the~~ major obstacles to the establishment of microcomputer programs.

(5) Most of the microcomputers were financed by sources within the campuses.

(6) Most teacher education faculties had microcomputers or microcomputer centers available in their buildings. Ordinary security was used for the equipment when it was not in use. Faculty or students were present when the equipment was being used.

(7) Programming was taught to teachers and recommended to learners for a variety of reasons.

(8) Inservice training was available for most teacher education faculty.

(9) Instruction included the special applications of microcomputers and a variety of peripherals.

(10) Plans for implementing microcomputer instruction into the teacher education curriculum before the actual purchase of equipment (and after) were either non-existent or short ranged.

Recommendations for the Campuses

Considerations may be given for developing college majors and concentrations in the microcomputer instruction for teachers and prospective teachers.

Colleges and universities which prepare teachers may consider requiring both undergraduate and graduate students to have "hands-on" microcomputer experiences or to increase the availability of these experiences on a voluntary basis.

Efforts should be made to increase microcomputer instructional applications for every methods and curriculum area in teacher education, i.e., reading and social studies as well as in mathematics.

Much more can be done to harness the microcomputer's capacity for testing student performance on campus.

Advanced studies, horizontal enrichment, and remediation may be components to any college course with the appropriate software and supportive programming services for faculty.

Continued efforts are needed to increase the teaching of such educationally appropriate languages as LOGO, PILOT and PASCAL.

Faculty and administrators should be included in the decision making process for hardware and software purchases. Additional efforts are needed to involve the students in these discussions.

Campuses which are "newcomers" to microcomputers should consider hardware provisions for disks.

Teachers should be taught with microcomputers, not time-sharing terminals. The schools in which they will be teaching will require them to use microcomputers, not time-sharing terminals.

Teacher education faculty should be helped to become prepared to teach microcomputer methods and curriculum courses or to add such components to their existing courses. The unpreparedness of many faculty members is often accompanied by negative attitudes and a lack of interest.

Innovative sources for financing microcomputer equipment and software may be very useful with tightened college budgets.

The ratio of microcomputers and the number of students needing to use them should be improved on most campuses.

More systematic, comprehensive, and long-range planning is needed before microcomputers are purchased.

Microcomputers may be best secured when being used in the presence of a staff member or a student attendant.

Recommendations for Further Study

Can the testing of student performance be more efficient, effective, and meaningful when done in a campus microcomputer center? Which supportive services would be needed by the faculty who would use these facilities for testing?

How may the components of advanced study, horizontal enrichment, and remediation be added to a college course by using microcomputer technology? Which supportive services would be required by the faculty who would use microcomputers for this purpose?

What kinds of software would increase the use of microcomputers in the social studies, reading, language arts, science, health, art and music?

How may the teaching of those programming languages which may be more appropriate for teachers and students than BASIC be encouraged?

Innovative means for financing microcomputer equipment and software should be studied.

How may the many members of teacher education faculties be helped to overcome negative attitudes, lack of interest, and their states of unpreparedness for microcomputers?

Why are campuses failing to engage in systematic, comprehensive, and long-range planning <u>before</u> microcomputers are purchased?

PLANNING FOR MICROCOMPUTERS IN COLLEGE AND UNIVERSITY TEACHER EDUCATION DEPARTMENTS: THE RESULTS OF A NATIONAL STUDY

The specific planning steps and procedures which were actually applied by colleges and universities with teacher education programs for implementing microcomputer programs were elicited by a study titled: "Microcomputers on Campus." "Microcomputers on Campus" was a nationwide study which included 250 major colleges and universities with teacher education departments. A survey instrument was mailed to five campuses in each of the 50 states (250 campuses). The specific key steps and procedures applied by the colleges and universities to implement microcomputer programs into their teacher education curriculums were identified and edited into a composite plan. This composite plan was designed to provide possible assistance to those institutions which were in the process of planning and implementing their own microcomputer programs.

Please note that many of the planning steps from each stage were taking place simultaneously and not necessarily sequenced as this edited composite arrangement might imply.

<u>STAGE I. Steps in the Initial Planning</u>

1. The faculty became aware of the educational possibilities of microcomputers.

2. Interest in microcomputer instructional applications was expressed at all levels throughout the college of education.

3. Support was sought from the office of the vice president for academic affairs.

4. Support was sought from the director of academic computing.

5. A campus computer committee was formed.

6. A new educational technology committee which represented all divisions on campus including the business manager and the computer literate faculty members was established.

7. The microcomputer objectives and applications for each division were determined.

8. A person with expertise in microcomputer education was identified and asked to help prepare plans and identify needs and problems.

9a. A committee of interested faculty and administrators was organized to work with the person identified in item #10.

9b. "We have a committee which has systematically worked on the issue of microcomputers in education. This committee is made up of representatives from each of several departments. A proposal will be made to our program (curriculum) committee soon."

STAGE I Continued:

11. Representatives from each department were interviewed as to their plans and goals and their needs for achieving these goals.

12. Recommendations for program development were made.

STAGE II. Steps in the Planning for Providing In-Service Training for the Education Faculty

1. In-service training for the faculty was planned.

2. The computer science department offered in-service workshops and courses to interested faculty.

3. In-service training arrangements were made for each department. These sessions were conducted by someone in the department who was computer literate.

4. Faculty workshops for computer literacy which included such programming languages as BASIC and LOGO were developed.

STAGE III. Steps in Planning the Curriculum Changes in the Teacher Education Curriculum

1. The chairperson's council of the school of education made a commitment to develop a microcomputer literacy program for students.

2. The needs of elementary and secondary teachers were surveyed.

3. The availability of microcomputers in the schools was surveyed.

4. It was determined that teachers needed computer literacy.

5. Special interest groups were formed.

6a. Courses were developed or reorganized to include microcomputer competencies.

6b. We developed course modules.

7. A microcomputer topics course was offered on graduate and undergraduate levels to teachers and prospective teachers.

8. An elective introductory course and a course in PILOT were offered.

9. A microcomputer unit was included in an undergraduate A-V course.

10. A proposal waa developed for an M.S. degree in education with an emphasis on microcomputer education.

STAGE III Continued:

11. All students entering (our) teacher education program are required to take basic and advanced computer science.

12. Curriculum changes designed to include microcomputer education were implemented.

13. A central location for computer programs was developed.

STAGE IV. Steps in the Planning for Equipment Purchases and Placement

1. Hardware purchases were discussed with the chairman of the department of computer science.

2. Hardware and software purchase recommendations were made by the committee of faculty and administrators (Item 9a, Stage I). Some software was purchased with unrestricted gift money to the campus.

3. Individual departments within the college were given the option to purchase microcomputer equipment.

4a. A proposal for funding a microcomputer laboratory was prepared.

4b. The establishment of a microcomputer center was initiated by the dean (this was indicated in only one of the submitted outlines).

5. Funding was sought for equipment and software purchases and to establish a center or laboratory for microcomputing.

6. A plan was established for securing space as well as instructor and student assistance.

7. Funding from the university was applied for. The request for funding was submitted to the dean.

8. Our first microcomputers were purchased.

9. Some microcomputers were housed in department and faculty offices and were moved to the classrooms when they were needed.

10. A location for the microcomputer laboratory was determined which was convenient for all departments.

SUMMARY

The major weakness found in teacher education concerning the implementation of microcomputer programs was the lack of systematic and comprehensive long-term planning before the acquisition of microcomputers. Fifteen percent of the respondents indicated a complete lack of planning before the acquisition of microcomputers. The remaining respondents had planned only for separate specific elements in their programs such as space or staff (not necessarily both). Less than one-half of the respondents (47%) had a systematic comprehensive plan after hardware acquisition. Seventy percent of these plans were short-term in their design.

Planning may be the most important single factor in the success or failure of a microcomputer program. The optimum utilization of microcomputers in education requires an understanding of their complexities and their many separate capabilities for the facilitation of learning. Without systematic, comprehensive, long-term planning many microcomputers may become prestigious dust-collectors and may be stored beside the expensive language laboratories of the 1950's and 1960's. The real losers in such situations will be the teachers, prospective teachers, and the young learners. Unlike the language laboratories, computers shall be common and essential ingredients throughout the lives of the learners.

The planning for implementing microcomputers in teacher education programs should contain provisions for: increasing computer literacy, encouraging teachers to write programs, familiarizing teachers with the several computer assisted instruction capabilities of microcomputers, and encouraging the use of microcomputers in all curriculum areas and with all children, including those with special needs. Provisions should be included for the in-service training of the teacher education faculty.

The most important long-term planning goals may be to help educators conceptualize the microcomputer as a marvelous tool for implementing the existing or regular curriculum, as an instrument which helps learners conceptualize formal abstract operations, and as a means to structure procedures for solving specific problems. To repeat the words of fellow educators, "No other single piece of equipment can do as much for education." Perhaps, we should consider adding the words, "when managed by the faculty who have been prepared for this tool's maximum utilization."