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ABSTRACT

This practicum was designed to address the problem of computer anxiety and minimal computer usage among preservice teachers. An integrated curriculum was designed based on guidelines from the International Society for Technology in Education, in an attempt to require computer use by students for course assignments and instruction. Workshops outside of class time offered hands-on instruction with IBM (MS-DOS) and Macintosh platforms. Computer logs were kept by the students to determine the frequency and type of work completed on the computer. Each education course was evaluated at its conclusion to determine the effectiveness of the assignments in diminishing the students' computer anxiety and increasing the integration of the technology into the instruction. The data collected showed an increase in the computer usage by the students in all of the courses. Of the 88 computer logs submitted, 69 students indicated using the computer more than once a week. Out of the total 277 students who submitted course evaluations, 27 expressed frustration, and 26 stated their preference for a word processor over a computer. Of the same total, 178 indicated that their computer skills increased during the course in question. Appendices include a computer usage log sheet, a workshop schedule, a technology manual, an evaluation rubric, and a sample course evaluation. (Contains 40 references.) (Author/SWC)

Increasing the Computer Literacy of Preservice Teachers Through an Applied Integrated Curriculum

by

E. Penny Clawson

Cluster 57

A Practicum II Report Presented to the Ed. D. Program in Child and Youth Studies in Partial Fulfillment of the Requirements for the Degree of Doctor of Education

NOVA SOUTHEASTERN UNIVERSITY

1996

PRACTICUM APPROVAL SHEET

This practicum took place as described.

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June 5, 1996

Date

This practicum report was submitted by E. Penny Clawson under the direction of the adviser listed below. It was submitted to the Ed. D. Program in Child and Youth Studies and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

Approved:

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Date of Final Approval of Report

Mary Ellen Sapp

Mary Ellen Sapp, Ph.D., Adviser

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Finally, my deepest gratitude is offered to my mother who has always believed in me. Whether learning to ride a bike, translate a Latin passage, or write this practicum, she has always been there. Thank you, Mom.

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This practicum was designed to address the problem of computer anxiety and minimal computer usage among preservice teachers. An integrated curriculum was designed based on guidelines from the International Society for Technology in Education, in attempt to require the students to use the computer for course assignments and instruction. Workshops offered hands-on instruction, outside of class time, for IBM (MS-DOS) and Macintosh platforms.

The writer, as the department chair, led the development of the integrated curriculum. Computer logs were kept by the students to determine the frequency and type of work completed on the computer. Each education course was evaluated at its conclusion to determine the effectiveness of the assignments in diminishing the students' computer anxiety and increasing the integration of the technology into the instruction.

The data collected showed an increase in the computer usage by the students in all the courses. Of the 88 computer logs submitted, 69 students indicated using the computer more than once a week. Out of the total 277 students who submitted course evaluations, 27 expressed frustration, and 26 stated their preference for a word processor over a computer. Of the same total, 178 indicated that their computer skills increased during the course in question.

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As a student in the Ed. D. Program in Child and Youth Studies, I do (X) do not ( ) give permission to Nova Southeastern University to distribute copies of this practicum report on request from interested individuals. It is my understanding that Nova Southeastern University will not charge for this dissemination except to cover the costs of microfiching, handling, and mailing of materials.

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E. Penny Clawson
Signature

CHAPTER I

INTRODUCTION

Description of Community

The community for this practicum is a private religious institution of higher learning located in the northeastern part of the country. The college is an independent institution without denominational affiliation and is fully accredited by the regional accrediting association. The financial backing for the college comes from many sources: churches, individuals, foundations, and other groups. The student tuition supplies only a portion of the overall budget income.

The academic program of the college is divided into three components. Every student at the college, regardless of the professional course of study, completes a component of 48 credits in Religious Studies. In conjunction, every student also completes two other components that include credits in Professional Studies and credits in Arts and Sciences. The total credits in these components varies according to the professional program.

The Division of Professional Studies is divided into eight departments. Each department offers programs for specific professions and is led by a chair person. The Teacher Education Department is one of those departments.

The Teacher Education Department at the college seeks to prepare professional educators for elementary and secondary classrooms by offering six certified education programs. All six programs offer certification by the Association of Christian Schools International while the Elementary Education program also offers certification by the state department of education.

The education programs include credits from the three components of the curriculum. Every education student, regardless of the choice of program, completes a component of 48 credits in Religious Studies.

The Elementary Education program totals 158 credits, scheduled to be completed in ten semesters. The students in Elementary Education must complete 48 professional credits in education as the second component, and 62 credits in the Arts and Sciences as the third component of the curriculum. The credits are predetermined and required for certification with the only electives available within the framework of the required field of study, e.g.. Literature.

The Early Childhood Education program totals 123 credits. The education student must complete 30 professional credits as the second component and 45 credits in the Arts and Sciences as the third component of the curriculum for Early Childhood Education.

Similarly, the Bible Education program totals 123 credits. The education student in Bible Education must complete the additional two components with 30 professional credits in education and 45 credits in the Arts and Sciences.

The Music Education program totals 155 credits. The education student in Music Education must complete 59 professional credits in music and education with the third component of the curriculum including 45 credits in the Arts and Sciences.

The Physical Education program totals 149 credits. The student in Physical Education must complete 39 professional credits in education and 39 credits in the Arts and Sciences.

The Guidance Counseling program totals 138 credits. The education student in Guidance Counseling Education must complete 36 professional credits in educational guidance and 45 credits in the Arts and Sciences.

Writer's Work Setting

The Teacher Education Department offers to its students programs approved to certify teachers. It is the desire of the college and the Teacher Education Department that each teacher candidate demonstrate those competencies deemed necessary for the certified educator. These competencies are in the academic, professional, and affective domains.

In order to be an effective professional educator, the preservice teacher must demonstrate academic competencies. The student must demonstrate acceptable written and oral communication skills, an ability to understand and perform basic mathematical functions and a working knowledge in general subject areas. The student who specializes in a particular field must demonstrate a working knowledge in the specific subject area related to the specific certificates.

Professional competencies are also in order for the preservice teacher who hopes to be an effective professional educator. The student must demonstrate an ability to utilize learning theory in the instruction of students in the classroom and to plan and prepare instruction in accord with the lesson's behavioral objectives. The ability to effectively use time to facilitate student learning, including the establishment of transitions and an appropriate sequence of instruction is vital for the effective teacher. The student, as a preservice teacher, must demonstrate the ability to pose questions which require students to analyze, synthesize, and think critically. These preservice teachers must demonstrate the ability to establish rapport with students and thereby motivate and enlist student participation and cooperation. They must demonstrate the ability to select and develop assessment techniques and instruments for determining pupil achievement of learning objectives. Throughout the preparation program these preservice teachers must demonstrate the ability to utilize a variety of teaching strategies and methods to meet the needs of all students. It is also important to demonstrate the ability to utilize technology in the classroom as a teaching method, for classroom management, and as a means to meet the unique needs of students.

The effectiveness of the professional educator also requires the preservice teacher to demonstrate affective competencies. The students, as preservice teachers, must demonstrate the ability to analyze and evaluate their own teaching abilities and appropriately adjust. They must demonstrate the ability to analyze and evaluate their own planning, implementing, personal teaching, strengths and weaknesses. The use of

personal interaction skills is important to work as a part of an instructional team. These preservice teachers must also demonstrate the ability to adjust to current stressful situations.

The teacher education programs provide instructional and practical experiences as integral parts of the students' professional training. The preservice teachers' instructional experiences primarily occur in the collegiate classroom. These instructional experiences include courses designed for professional educational development. The collegiate classroom provides opportunities for specific experiences in instructional design and methodology. Course requirements are designed to sequence the acquisition of the necessary skills and information for a classroom teacher. Each of the activities or assignments is designed to meet multiple instructional objectives as constructed by the faculty.

The preservice teachers also have supervised practical experiences in classrooms in the field. These practical experiences for the preservice teachers include early field experiences as weekly volunteer service in local classrooms for three or four semesters. Classroom cooperating teachers evaluate the preservice teachers. The preservice teacher also has a one semester practicum in a local classroom supervised by the cooperating teacher and a college supervisor. The practical experiences conclude with fourteen credits of professional field education as student teachers in two local classrooms in two different schools. These supervised placements are in the public and private sectors.

The experiences of the students within the Teacher Education programs are designed to provide instruction, supervision, evaluation,

and reflective self-evaluation for each student. Instruction in the education courses is directed by the faculty for each field of study. Specific methods courses are instructed by faculty with expertise in each particular field. Course requirements are consistent within multiple sections of the same course, but the evaluation is personally and individually completed by the course instructor for each student in the course. Students are guided through reflective self-evaluation of demonstrated teaching skills by the use of specific questions and departmental rubrics designed for specific types of assignments.

Supervision of field experiences is conducted by faculty and cooperating teachers. College supervisors regularly observe students practicing in the field. During the Practicum, observations by the college supervisor occur three times during the semester, while during student teaching, observations occur weekly. Observations include a review of the instructional activity, the planning for instruction, the assessment of student learning, and general classroom management. Cooperating teachers serve as mentors and supervisors for the preservice teachers. These trained cooperating teachers guide students practicing in the field. Their model and direction for the student teachers play a significant role. In addition, the Department Chair observes all student teachers at least once in each placement.

The evaluation of teacher competence should consider both the quantity and the quality of the learning experiences . The quantity of classroom instruction and field experiences for the preservice teachers gives ample opportunity for thorough evaluation. A self-evaluation is

completed by the preservice teacher at the conclusion of each of the semesters of field experience. The classroom cooperating teacher also completes an evaluation instrument at the conclusion of each of the semesters of the student's field experience. Each of the different field experiences are usually at different grade levels in different schools providing a diverse set of experiences and evaluations. Similarly, the student teaching experiences provide opportunity to evaluate the preservice teachers' work in the culminating semester.

Opportunity for evaluation of the quality of the work is available during every field placement. The self-evaluation of the preservice teacher reviews the quality of the preservice teachers' instruction and their students' work; simultaneously the classroom cooperating teacher evaluates the instruction of the preservice teacher as well as the work of the students. The college supervisor has opportunity to compare the observations and evaluations of the supervisors with those of the students' self-evaluations.

The Writer's Role

The writer of this proposal, as the Chair of the Teacher Education department, provides the leadership for the education programs. It is the role of the Chair to guide the policies and procedures for all the field experiences in the teacher education programs. In order to maintain a consistency in the instruction and supervision of field experiences, policies and procedures for the classroom cooperating teacher and college supervisors are necessary. These policies and procedures have been

incorporated into a departmental handbook. Evaluation instruments for the students have been designed to be used by cooperating teachers, faculty, college supervisors, and the students themselves. College supervisors for the field experiences must use the established procedures for observation and evaluation of these students.

Development of the courses within the Teacher Education department is under the leadership of the Chair. The faculty within the department meet to outline and plan the academic program for students. In order to maintain this consistency, course requirements are uniform within multiple sections of the same course. Evaluation rubrics are available for the assessment of student work.

The Chair of the department is the instructor for specific methods courses. The introductory course in the Teacher Education department is required of all education students regardless of the program and is taught by the Chair, providing leadership and visibility to all education students. The additional teaching load for the Chair includes two courses required in three programs, and two courses only required in two specific programs.

The Chair actively participates in the field supervision of student teachers. During the fall semester she participates in regular weekly supervision of student teachers. In contrast, during the spring semester the Chair supervises students in their practicum experiences. Throughout the year, it is also necessary for her to visit every student teacher in the field at least once in each placement. This enables her to have an active role while she directs all college supervisors observing students during any field experience.

The Chair directs the budget for the Teacher Education department. As the Chair, she is responsible for moneys for educational material and supplies. The approval of departmental library requests for books, periodicals, and media is the responsibility of the Chair. She also manages the funds for the implementation of course instruction and field supervision. This includes teaching material, honoraria for cooperating teachers, and reimbursement for mileage accrued by college supervisors.

The Chair advises students throughout the length of the education program. She serves as the advisor for all students who are beyond the total of 60 accumulated credits. The Chair reviews the transcripts of incoming transfer students, and maintains the role of advisor for all enrolled transfer students.

CHAPTER II

STUDY OF THE PROBLEM

Problem Description

The students in the Teacher Education department do not demonstrate the level of computer literacy needed for classroom teachers. The students have not incorporated the use of computers as a means to expedite and enhance teaching, instructional, and management skills.

Student teachers, who have successfully completed the academic program of teacher preparation, and are eligible to enroll in student teaching, have poor computer knowledge and skills. In the field experiences, these student teachers demonstrate weak skills and minimal abilities to use the computer effectively as a teacher. They do not use available software to create instructional material for the classroom, nor do they direct the use of the computer among their students in their field experiences. The student teachers do not use the computer to research information for lesson preparation. They do not use the computer and its various software programs to prepare media for classroom instruction. The student teachers do not use the computer for the management of information about their classes, the students, or the school.

The preservice teachers in the Teacher Education department of the college have not acquired computer skills through the current curricular

programs. A specific course in computer literacy is not required of education students. Although computer usage is required in specific components of educational methods courses, the students only compete the minimum acceptable work. Students in the department have resisted these minimal requirements for computer usage. They have not transferred acquired computer skills to other assignments beyond those required. Although there has been an increase in the instruction offered to students, they have not increased their use of the computer. Instructional materials that can be created with available software on the computer are created by hand by the students. Those students within the department who use the computer, use it primarily for word processing. The students have described their feelings or attitudes about computers as those of inadequacy, anxiety, and frustration.

Problem Documentation

Information gathered from students, graduates, cooperating teachers, and faculty documents the existence of the problem. On a survey of the 117 students within the Teacher Education department at the conclusion of the spring semester in April 1995, 99 replied to document the students' attitudes and abilities for computer usage. Although only 8 out of the 99 have never had any computer instruction, 62 out 99 students indicated on the survey that they avoid using the computer. The regularity of student usage was indicated by 50 out of 99 students who use the computer 0 to 2 times week, 24 out of the 99 who use it 0 to 2 times a semester, and 4 students who indicated that they pay some one to do their computer work.

On this survey, 45 out of 99 students indicated that they always used the computer for major word processing assignments. Among the 39 upperclassmen (over 60 accumulated credits), 21 indicated they use the computer for major papers. Among the 45 students who indicated that they used the computer for major assignments, 31 were in the group of 64 students who live on campus in dormitory housing.

Out of the 99 students who responded, 52 indicated that they use the computer for those assignments not required to be completed on the computer, but only 6 out of the 99 students indicated that they always used the computer for creating lesson plans. Among the surveys returned, 7 out of the 99 indicated that they feel proficient using the computer for producing instructional material, 5 out of the 99 for preparing learning activities, and 5 out of the 99 for preparing media.

There were 17 out of the 99 students who used their own computers. When reviewing if residence influenced the use of the campus computer lab, the survey indicated that 9 out of the 64 dorm students and 5 out of the 35 commuting students always or often used the campus computer lab facilities.

Besides using the computer for production work, there were other tasks that show a deficiency in computer usage. Among the 99 students who responded, 21 never used the computer in the library for searches. In reviewing the student use of the computer in field placement classrooms, only 32 out of the 99 indicated they used it in some way.

Feelings of inadequacy seemed to have an impact on usage. Of the 15 males who responded, 1 male never felt inadequate, and of the 84 females who responded, 4 females never felt inadequate using the computer.

A further indication of students' lack of understanding was that of the 30 students who indicated that they load their own software, 14 did not even use their own computers.

A survey of the faculty within the department documented computer usage by students and faculty. Of the four faculty who responded to the survey, four used their own computers for word processing, two for preparing instructional material, two for preparing media, and two for preparing instructional materials. Although none of the faculty responded that they avoid using the computer, all four indicated some feeling of inadequacy on the computer. Interestingly, all four faculty members have had some instruction for computer use. The faculty in the department use the computer a minimum of three times a week. Only one faculty member indicated using the computer for library searches. The faculty indicated that they required students to use word processing for submitted written work.

The cooperating teachers in the local classrooms had indicated that students need additional computer skills. During this academic year, 5 out of the 16 cooperating teachers indicated that the student teachers had insufficient computer skills. Those cooperating teachers whose schools had a computer network or computer classroom indicated that student teachers had not been able to direct instruction on the computers, regardless of the system platform, nor had they used the computers in the

classrooms for student production of work, or their own management of information.

Graduates in each of the educational programs had indicated a need for additional computer instruction. During the exit interviews conducted by College administrators for the preceding two years, graduating seniors indicated a desire for additional computer instruction. Alumni, responding to institutional surveys gathered during those two years, also indicated a need for additional computer instruction.

Causative Analysis

There have been curricular, practical, and personnel factors that have contributed to the poor computer usage and skills demonstrated by the preservice and student teachers. The curricular programs are extensive and cannot be altered to add another course. The triple component design of the education programs decreases the flexibility of the education programs. Programs beyond the total of 128 credits require additional semesters of study beyond the usual eight. The requirements for certification as stipulated by certifying agencies eliminate the elective options available to other students.

Computer hardware and software available to students is minimal. The computer laboratory is available for student use only when it is not being used as a classroom for computer courses. The computer laboratory has had 26 PC computers on a network, 1 Macintosh computer, and 2 Apple computers. The PC network uses a Windows application to serve the network. The software available for educational uses is limited to the

Mac computer hard drive or floppy discs for the PC's and Apple computers. Educational software can be used by only a few students at a time. Faculty offices are not equipped with computers by the College. Those computers found in faculty offices are personal property and differ in the preferred system platform.

The personnel teaching the education courses and supervising the students in the field have modeled minimal computer usage beyond word processing. The faculty within the Teacher Education department have varying levels of computer literacy. Among the four full time faculty within the department, three have used the computer for word processing, two used it for instructional materials, and two used it to manage data for the department. Among the six part time faculty within the department one has used the computer for word processing, presentation, instructional materials, and data management. Among the six part time faculty within the department, three used the computer for word processing. One part time faculty used the computer for class presentations.

The educational curriculum had limited computer usage integrated into the established courses. Students have been required to use word processing for all major writing assignments. The methods course in mathematics contained a required review of elementary mathematical software. The remaining education courses included instruction about the computer, but did not demonstrate or require the use of the computer as an instructional tool.

Relationship of the Problem to the Literature

The literature indicates that competencies for new teachers in the area of computer education and literacy are becoming an issue addressed in the discussion of national standards (Beichner, 1993). As technology increases its presence in classrooms, there is an ever increasing need for teachers to demonstrate certain levels or standards of competency with technology.

Students in education programs have shown a sense of anxiety about computers and inadequate skills in computer usage for the classroom. Current teacher education program have been found to be lacking in the preparation of preservice teachers for computer use in the classroom (Ingram, 1992; Oke, 1992). Most preservice teachers feel that their training has been inadequate and insufficient (Beichner, 1993). The trainers of teachers must change their attitudes about the use of technology in education for the attitudes of the students to change (Barker, 1993; Bosche & Cardinale, 1993; Burgan, 1994; Todd, 1993a).

Surveys of preservice teacher education students have indicated that computer anxiety inhibits the development of computer literacy (Cardinale, 1992; Chen & Brown, 1994; Okinaka, 1992; Parker, Lumpkins & Steinmiller, 1993; Savenye, 1993). The teacher who feels inadequate in the use of the computer will not seek to find new and additional uses for it. This pattern of avoidance decreases the experiences and thereby increases the anxiety. Frequently, students in education programs describe themselves as feeling inadequate with regard to the use of computers, and particularly as instructional tools in a school setting (Okinaka, 1992). Instead, they see the computer as a supplement to the teacher's central role

in instruction. Byrum & Cashman (1993) found in their survey of preservice teachers a preference for drill and practice software rather than that which encouraged or required higher order thinking skills. Another form of anxiety that inhibits computer use among preservice teachers is the additional pressure to conform to the instructional patterns of the cooperating teachers in the field (Byrum & Cashman, 1993).

Studies have shown that training programs designed to increase computer skills, decrease computer anxiety or technophobia (Brennan, 1991; Cates & McNaull, 1993; Gilman, Emhuff, Bender, Gower & Miller, 1991; Jordan & Follman, 1993; Kolehmainen, 1992; Mc Inerney, 1990; Overbaugh, 1993; Pina & Harris, 1993; Savenye, Davidson & Orr, 1992; Woodrow, 1992). Pina & Harris (1994) noted in particular that a "teachers' preservice training can play a crucial role in developing positive teacher attitudes toward technology" (p. 6).

Preservice teachers must demonstrate an increase in their abilities to use computers to create instructional material and media, to access and manage information in a database, to use spreadsheets for the maintenance of records, and to conduct research. Recognizing the need for standards in teacher education programs, the International Society for Technology in Education developed 13 guidelines for the inclusion of computer education in these programs (Thomas, Taylor, & Knezek, 1993; Todd, 1993a). The intention of the Society is to provide direction for planning educational applications of computer technology in teacher preparation curricula through the integration of the following competencies for preservice teachers:

The candidate for teacher certification will

1. Demonstrate knowledge and ability in the everyday operation of a computer system in order to successfully utilize software.
2. Evaluate and use computers and related technology to support the instructional process.
3. Apply current instructional principles, research, and appropriate instructional assessment practices to the use of computers and related technologies.
4. Explore, evaluate, and use computer/technology- based materials, including experience in using applications, educational software and associated documentation.
5. Demonstrate knowledge of uses of computers for problem solving, data collection, information, management, communications, presentations, and decision making.
6. Design and develop student learning activities that integrate computing and technology for a variety of student grouping strategies and for diverse student populations.
7. Evaluate, select and integrate computer/technology-based instruction in the curriculum in one's subject area(s) and/or grade levels.
8. Demonstrate knowledge of uses of multimedia, hypermedia, and telecommunications to support instruction.
9. Demonstrate skill in using productivity tools for professional and personal use, including word processing, database, spreadsheet, and print/graph utilities.

10. Demonstrate knowledge of equity, ethical, legal and human issues of computing and technology use as they relate to society and model appropriate behaviors.
11. Identify resources for staying current in applications of computing and related technologies in education.
12. Use technology to access information to enhance personal and professional productivity.
13. Apply computers and related technologies to facilitate emerging roles of the learner and the educator.

(Todd, 1993a, p. 10)

These guidelines have been adopted by the National Council for Accreditation of Teacher Education (NCATE) as the standards for the level of preparation needed for all teachers to function effectively in the technology enriched schools of the future (Beichner, 1993). Todd (1993a) proposed using these guidelines as the framework for an educational curriculum model that includes four components: a course content objective, computer practice, an ISTE guideline, and an evaluation item. This integrated model, developed for the eleven basic required education courses in an education program, provided the appropriate context for the students' computing experiences.

As preservice teachers design instructional plans they should learn to incorporate technology in ways such as using the computer as a part of a problem-solving unit (Brown, 1992). Specific lesson plans must indicate the integration of computers as a means of learning, not just the means to produce the evidence of learning.

Individual teacher education programs at colleges and universities have developed specific strategies to increase the computer skills of the preservice teachers (Barker, 1993; Hirumi, 1994; Oliver, 1994; "Teacher Education," 1991). The computer competencies, indicating skills and levels of ability, set the direction for the development of the programs' strategies. Beichner (1993) found word processing and curricular integration to be the priorities for teacher training programs. He also noted the importance that these skills can be demonstrated for evaluation of the students' competency levels.

Various models have been designed and implemented to increase the computer literacy of preservice teachers. Teacher educators have found an integrated model where the use of computers is incorporated into all the education courses, with the teaching faculty in the education department demonstrating the process, to be effective in the preparation of the preservice teacher (Ehley, 1992; Gilman et al., 1991; Ingram, 1992; Maddux, Johnson, & Harlow 1993; Todd, 1993a; Walters, 1992). Yet teacher educators are reminded to keep a balance in the training programs to include the practical uses of computers with information that presents exciting and promising applications for the future (Maddux, Johnson, & Harlow 1993). Todd (1993a) also noted that the "coursework in these programs needs to be redesigned to integrate technology in both methods and foundations courses so that computers are used in relevant contexts" (p. 5).

In order to design an integrated model, the instructional goals and objectives must be established as the framework for the curriculum (Hirumi, 1994; Todd, 1993a; Walters, 1992). This framework can ensure

that preservice teachers have a variety of computer experiences. The faculty of the education department should have a part in the design of the curriculum and the delivery system for the instruction (Hirumi, 1994). As the faculty model the advanced technology, students will become skilled in using the technologies as instructional tools (Barker, 1993; Byrum & Cashman, 1993; Burgan, 1994; Ehley, 1992; Oke, 1992; Todd, 1993b). The education faculty must update their own skills and then incorporate technology into their coursework with purpose and design. Among the course requirements, the curriculum can include multiple drafts of papers, data analyses using spreadsheets, and the use of high quality graphics in student papers and presentations (Beichner, 1993). Walters (1992) suggests that the faculty use a four stage process for including technology in the integrated curriculum: awareness, adaptation, analysis, and application.

Hands-on experiences have been found to increase skills and decrease anxiety (Motter, 1995; Pina & Harris, 1994). Savenye (1993) found that a systematic hands-on course made a difference in making attitudes towards computers more positive. Initial full day meetings followed by shorter meetings have increased participation in the use of computers in education (Motter, 1995). Self-directed exploration in a workshop setting can decrease computer anxiety (Jones, 1991; Mc Inerney, 1990). Software is increasingly user-friendly and encourages this means of learning. Brennan (1991) concluded that the training should be interactive rather than passive, through practice, simulation, and application. Overbaugh (1993) found that instruction was more effective when it included more

application than instruction about the computer itself. The integration of student computer use incorporated with the teaching has been found to be an effective teaching tool at the collegiate level (Ehley, 1992; Pina & Harris, 1994).

Cooperative exercises increase skills and decrease anxiety (Pina & Harris, 1994). Assigning students to work in pairs with a single assignment packet encourages peer tutoring and interdependence. Motter (1995) found that cooperative efforts to maximize computer use actually increased problem solving successes. Cooperative efforts emphasize reflection on the problem to be solved between the working pair (Brown, J. M., 1992).

Experiences within the course structure should provide students with non-threatening opportunities for application of technology skills. Computer simulation activities can be an easy to use and effective tool in an education program (Brown, M. E., 1994). Pina & Harris (1994) emphasize the need for preservice teachers to experience success, fun, and friendly computers. In their program, they attempt to humanize the computer so it is less threatening and design the instruction to be personalized, product driven, and self-regulating.

Findings indicate that on-line services for teachers can provide a valuable resource for instructional material and media (Russett, 1994; "Telecommunications & Teachers", 1993). Whether using e-mail with fellow educators, or accessing professional resources, on-line services provide an ever increasing source of information for the preservice teacher.

Equipment for the training of preservice teachers should be varied and broad in its possibilities. Studies have found that preservice teachers need to build their skills on the Macintosh and IBM (MS-DOS) platform systems (Byrum & Cashman, 1993; Smith, 1993). Sequenced experiences with relevant software to many specific subject areas increases abilities and usage (Huppert & Lazarowitz, 1991). As preservice teachers learn to effectively use different types of software, their skills and applications increase beyond the drill and practice routines.

Regardless of the actual model chosen, the training program must be systematic in its design (Savenye et al., 1992). The sequence of activities must follow the goals and objectives set forth, and include those measures that can assess the competencies gained by the preservice teachers.

CHAPTER III

ANTICIPATED OUTCOMES

Goals and Expectations

It was expected that the preservice teachers in the Teacher Education department would demonstrate positive attitudes toward the use of computers for instruction and increase their usage of the computers for instruction and classroom management.

Expected Outcomes

The integrated curriculum of computer instruction within the education programs will yield a higher rate of usage and increased skill level on the computer for the 120 enrolled preservice teachers. The expected outcomes for this practicum include the following:

1. Seventy-five of 120 students will increase their frequency of use of the computer to an average of one time a week, or 15 times during a semester.

2. It is expected that 75 of 120 students will submit to faculty, material created on a computer for classroom instruction.

3. Eighty-five of 120 students will submit evidence of using a computer to research information.

4. Sixty-five of 120 students will submit lesson plans including a component of computer use within the lesson.

5. Forty-five of 120 students will submit sample work using software for desktop publishing in the classroom.

6. Thirty of 120 students will create a database or a spreadsheet to manage information in the classroom.

7. The number of preservice teachers who express anxiety and avoid using the computer will decrease to 25 out of 120.

The preservice teachers will increase their knowledge of computers and skills in using computers for lesson preparation, instruction, and classroom management. They will have successful experiences using the computer, expanding their skills beyond word processing.

The faculty teaching courses within the education programs will require the students to submit instructional material and lesson plans that demonstrate the integration of the use of the computer. Submitted instructional material will be created with software specifically designed to create the instructional material. Specific lesson plans will include the use of the computer in a problem solving component and/or a publishing component. Students will submit evidence that the computer has been used for research and development of a topic to be taught. Students will also submit a copy of a created database showing the organization of selected information for classroom management. The submitted work completed with a computer by the students will be evaluated with a rubric to provide consistency within the department.

8. At the conclusion of the practicum 55 out of 120 preservice teachers will use a computer for instruction and information in their field experience classrooms.

9. The variety of computer platforms present in the various schools where students are placed will require that 75 out of 120 preservice teachers will demonstrate a working knowledge of the IBM (MS-DOS) and Macintosh system platforms.

Whether the computer is located in a computer classroom (lab) or included in a grade level classroom, it is expected that the preservice teachers will incorporate the use of the computer in three presented lessons during each semester, and thereby demonstrate to the cooperating teachers a level of competency with the computer for a preservice teacher and model enthusiasm before their students. The lesson plans for these presentations will be submitted to the cooperating teachers and college supervisors.

10. Five of six faculty in the education department will model a positive attitude for the use of the computer in the courses for education students.

11. The syllabi, written by faculty, for the 16 education courses will include the revised course requirements integrating the use of the computer.

The faculty will increase the variety of uses of computers in their courses to include more than word processing. The students will identify within the faculty an expressed enthusiasm for these activities.

Measurement of Outcomes

Each of the outcomes will be measured as follows:

1. In order to measure the students' use of the computer, the preservice teachers will record in a log their use of the computer. This log will be kept by every student in the department and submitted at the conclusion of each semester. Each entry will include the type of work completed, the software used for the task, the type of computer used, and the location of the computer where the work was done. (See Appendix #A)

2. Each faculty member will require, collect, and evaluate student created material for instruction. The faculty will use an established rubric to evaluate submitted student work completed on the computer. A synopsis of the students' rubrics and completed work will be reported to the Chair for each assignment. Any concerns or questions about the students' performances will also be reported to the Chair.

3. The faculty will require those students enrolled in the courses that include research of topics or issues to submit evidence of the completed research. The faculty will then report to the Chair the extent of the research completed by the students and the evidences of the conclusions drawn by those students from the research.

4. The faculty teaching education methods courses will require, collect, and evaluate student lesson plans using the established rubrics for lesson plans and computer usage to determine the means for the inclusion of the computer within the lesson plans. A synopsis of the

students' rubrics and completed work will be reported to the Chair for each assignment.

5. The faculty teaching education methods courses will require, collect, and evaluate student work using the established rubrics for instructional material and computer usage to determine the quality of the students' desktop publishing. A synopsis of the students' rubrics and completed work will be reported to the Chair for each assignment.

6. The faculty teaching education courses will require, collect, and evaluate student created databases and spreadsheets using the established rubrics for computer usage to determine the accuracy and usefulness of the information. A synopsis of the students' rubrics and completed work will be reported to the Chair for each assignment.

7. In order to measure the perceived students' anxiety about the computer, the Chair will review the students' logs recording computer usage. The frequency of usage and the transfer of the learned skills beyond the required work for education courses will indicate the decrease in anxiety and avoidance for the computer. (See Appendix #A)

8. The preservice teachers working in field placements will submit to their advisors or supervisors, samples of their lessons and instructional materials for those presentations that include the use of the computer. The cooperating teachers will also review these lessons and presentations and evaluate the students' competency level demonstrated in the classroom.

9. Each entry in the computer usage log will include the type of work completed, the software used for the task, the type of computer system

used, and the location of the computer where the work was done. (See Appendix #A) This information will show the cross-platform work completed by the students.

10. At the conclusion of each education course the students will evaluate the instruction offered, the assignments required, and the faculty member who taught the course. The evaluation instrument will ask the students to review the course content, the methods used, the computer usage modeled in the course, and the means for evaluation of the students' work. These evaluations will be reviewed by the Chair and the results reported to the faculty member.

11. The faculty will submit to the Chair the proposed syllabi revisions, including the computer usage, for approval and authorization prior to the beginning of the semester.

CHAPTER IV

SOLUTION STRATEGY

Discussion and Evaluation of Solution

The students in the Teacher Education department did not demonstrate the level of computer literacy needed for classroom teachers. The students had not incorporated the use of computers as a means to expedite and enhance their teaching, instructional, and management skills.

In order to increase the computer skills and decrease the computer anxiety of these preservice teachers a specific training program would be designed (Brennan, 1991; Cates & McNaull, 1993; Gilman et al., 1991; Jordan & Follman, 1993; Kolehmainen, 1992; Mc Inerney, 1990; Overbaugh, 1993; Savenye, 1992; Woodrow, 1992). An integrated model where the use of computers is incorporated into all the education courses, with the teaching faculty in the education department demonstrating the process, would be developed as an effective means for training (Beichner, 1993; Thomas, Taylor, & Knezek, 1993; Todd, 1993a). A series of hands-on experiences in workshop settings for the students would increase their skills and decrease anxiety (Motter, 1995; Pina & Harris, 1994).

The workshop training experiences would be interactive rather than passive, with practice, simulation, and application (Brennan, 1991). The

instruction would include more application than instruction about the computer itself (Overbaugh, 1993) . Specific workshops covering topical uses would be an efficient means to equip the preservice teachers (Beichner, 1993).

The faculty in the education department would exhibit enthusiasm and skill in the use of computer (Burgan, 1994; Todd, 1993a). This would enable the faculty to model the use of computers for students in instructional settings (Burgan, 1994; Ehley, 1992; Oke, 1992; Todd, 1993a). The departmental faculty would work together with the Chair to design the curriculum and the delivery system for the instruction (Hirumi, 1994). Course instruction would demonstrate the integration of the computer as an effective instructional tool.

The 13 guidelines developed by the International Society for Technology in Education (ISTE) for the inclusion of computer education in teacher education programs would provide the framework for the integrated curriculum (Thomas et al., 1993; Todd, 1993a). In order to design this integrated model, the faculty must establish the instructional goals and objectives as the framework for the curriculum (Hirumi et al., 1994; Todd, 1993a, Walters, 1992).

Cooperative learning exercises for the students would increase skills and decrease anxiety, and provide additional opportunities for student use of the computers (Pina & Harris, 1994). As students work in pairs with a single assignment packet, it would encourage peer tutoring, high order thinking, and interdependence. Cooperative efforts to maximize computer use would actually increase problem solving successes (Motter,

1995). Cooperative efforts would emphasize reflection on the problem to be solved between the working pair (Brown, J. M., 1992).

Description of Selected Solution

New solutions for the education department at the college could increase and broaden student use of the computer. Assignments that called for the preservice teachers to use the computer, both as a word processor and as an instructional tool in a classroom, were to be integrated within the coursework of the curriculum. Whether the student was creating a series of transparencies on the computer, using the computer as a simulator in a lesson, constructing a database of reviewed children's literature, or formulating a spreadsheet to manage grades, there were assigned activities that required the students to use the computer in various ways throughout each semester.

A series of hands-on workshops were offered to faculty in the education department prior to the beginning of the academic year to increase their skills and enthusiasm for the computer as an instructional tool. An additional series of hands-on workshops were offered to students and faculty in the education department during the academic year to increase their skills and enthusiasm for the computer as an instructional tool. These workshops were on various platforms of computers, using multiple software programs, and at significant points in the semester schedule. The topics covered in these workshops demonstrated application of the computer in instruction and provided opportunity to

create instructional material for course assignments. A copy of the workshop schedule is found in Appendix B.

A technology manual was prepared for the students and faculty that described the guidelines and procedures for the inclusion of computer education. It included the goals and objectives for the computer component of the curriculum, the directions for the log to record computer use, and the schedule of the topics offered in workshops. Policies for computer usage and the descriptions for the different hardware and software available were included. It provided a copy of the instrument to be used by faculty to evaluate the submitted student work. A copy of the *Technology Manual* is found in Appendix C.

In the process of attempting to solve this problem, the Department Chair led the faculty and students through the process. The writer led the faculty through the process of curriculum review to include the altered course requirements and instructional designs. Revisions were designed and suggested in corporate discussions among departmental faculty members. The faculty were provided with the ISTE guidelines as the framework for the revision. Syllabi were then written and distributed to students. The instruction of the hands-on workshop sessions for the faculty and students, arranged by the Chair, was conducted by her and other consultants in the field of computers in education. Field observations, course reviews, and faculty evaluations were also completed by the Chair throughout the year. The technology manual was drafted by the Chair for review by the faculty in the department. Final approval and publication of the manual was the responsibility of the Chair.

Report of the Action Taken

The Department Chair was able to implement the course of action as described. In order to accomplish this, goal specific steps were taken.

The faculty in the department met prior to the beginning of each semester to design the integrated curriculum of coursework based on the instructional goals and objectives to include instruction about the use of computers, assignments requiring the use of computers, and student demonstration of the required knowledge and skills. Individual courses were reviewed to determine where the requirements for computer usage would best complement the course structure, content, and methodology. These computer tasks were designed to ensure the full inclusion of the guidelines for technology. The distribution of these guidelines in each course is described in Table 1. Course syllabi were revised to reflect these additional elements.

A proposed rubric was designed to provide consistent assessment of student knowledge and skills. Revisions followed with the completed rubric available to be completed in the *Technology Manual*. A copy of the rubric for computer usage is found in Appendix D.

The *Technology Manual* was created, revised, reviewed, and then distributed to all the students in the department describing the available hands-on workshop sessions, the procedures for logging computer activity, and the rubric used for the assessment of those course assignments requiring the use of the computer. The procedures for the report of computer use included time spent using the computer, the type of work done, and the location of the computer used.

The faculty participated in a two-day hands-on workshop prior to the beginning of the academic year to increase their skills and enthusiasm for the use of the computer in class instruction. Monthly departmental faculty meetings were held providing an opportunity to review these activities, express new ideas, concerns, and determine the participation of the students and faculty in the process.

Hands-on workshop sessions were offered to students at designated times throughout the academic year. The schedule for the sessions and their topics, the computer log, and a reminder to keep the log were distributed at the beginning of the fall semester and again at the beginning of the spring semester. Students and faculty attended at these workshops. attendance varied according the time and day of its presentation, and the topic being presented. A nucleus of students and faculty were present at most workshops.

The faculty approached this curriculum revision with enthusiasm and creative ideas. The enthusiasm was very evident in the planning and design components. During the departmental faculty meetings discussion was animated and open. The rubric for evaluation was the result of a cooperative effort of all the faculty.

An increased enrollment in the college and the department decreased the availability of the computers for the students and the faculty. Although the number of computers also increased, the ratio was not satisfactory.

Some students were willing to respond to the computer usage log and return it at the conclusion of each semester. The upperclassmen noted the

increase in computer requirements and some expressed gratitude, some expressed frustration, while others expressed enthusiasm.

Each course was evaluated at the conclusion of the semester to determine the types and amount of computer usage incorporated in the particular course. A copy of the course evaluation is located in Appendix E. The student responses on these course evaluations expressed their opinions and offered additional recommendations for future development in this area.

CHAPTER V

RESULTS, DISCUSSION, AND RECOMMENDATIONS

Results

An integrated curriculum, or course of study, has provided the students with the direct applications for increased computer use and skill, as well as frequent instruction, evaluation, and review.

The expected outcomes and results of the practicum were as follows:

1. Although students were previously required to use the computer, the additional revised requirements were intended to increase the frequency of student usage. Students who submitted computer usage logs listed their work completed on the computer. Of the 46 logs submitted at the conclusion of the fall semester, 30 students indicated using the computer more than fifteen times during the semester. Of the 42 logs submitted at the conclusion of the spring semester, 39 students indicated using the computer more than fifteen times during the semester. The submitted logs reported a small segment of the total student population in the department.

The evaluation forms completed by students at the conclusion of each education course provided additional information. Out of the 101 students completing the evaluations at the conclusion of the fall semester, 47 students indicated that they had used the computer for the education

courses more than six times during the semester, and 71 indicated that they had used it more than four times for these courses during the semester. The spring semester evaluations were similar in their indications. Out of the 176 students completing the evaluations, 93 students indicated that they had used the computer for the education courses more than six times during the semester, and 142 indicated that they had used it more than four times for these courses during the semester.

Although the reporting of the usage was not as clear as anticipated,the frequency of student use of computers was increased, and the outcome was met.

2. The revised course requirements included those assignments that expected students to submit to faculty material created on the computer for classroom instruction. The course evaluations indicated that 56 of the 101 students enrolled in education courses in the fall submitted these assignments, as well as 105 of the 176 students enrolled in the spring education courses. This outcome was achieved better than was anticipated.

3. The students indicated on the course evaluations their use of the computer to complete research during both semesters. The research was completed both on the CD-ROM in the college library, as well as directly on-line with First Search through OCLC. During the fall semester, 76 of the 101 students enrolled in education courses indicated competing research in this manner. During the spring semester, it was 73 of the 176. The variance in numbers between the semesters may be attributed to the students' classification and the course levels for each semester. During the

spring semester, the majority of students enrolled in education courses are at the underclassmen level (100 and 200 level courses with freshmen and sophomores enrolled). This outcome was achieved as anticipated.

4. The course requirements were revised to include a component of computer use in the students' created lesson plans. This assignment was introduced into five methods courses. The students' and faculty's interpretation of this activity differed. While a group understood this to mean that elementary children would use the computer in the lesson, others understood it to mean that the instructor would use the computer to create learning activities. Because of this discrepancy, the actual lessons created, differed in their inclusion of computers for instruction. Of the 98 students enrolled in these five education methods courses, 22 students incorporated the use of computers for instruction in their created lesson plans. This outcome was not met as anticipated.

5. The revisions in four of the education courses required 53 students out of the 148 students in the department to submit work produced using software for desktop publishing. The students used children's publishing software such as *Writing Center*, and professional publication software such as *Pagemaker*. Their publications included brochures, books of poetry, stories, calendars, and newsletters. These requirements appeared in fall and spring semester courses. This outcome was met as anticipated.

6. The revisions in two of the education courses required students to create and submit a database for information and a third course required the creation of a spreadsheet. These three courses enabled 65 out of the 148

students in the department to demonstrate their ability to manage information using a computer.

The course requirements differed somewhat in each course. In one course the students created and submitted a database in field format, while the other required a table format. Both courses required the submission of the paper copy and the diskette. In order to create the database, the students used *Access* as the preferred software, although others were acceptable with permission of the instructor. The spreadsheet was developed within a programming component of a math course. This outcome was met as anticipated.

7. The preservice teachers increased their knowledge of computers and skills in using computers for lesson preparation, instruction, and classroom management. They have had successful experiences using the computer, expanding their skills beyond word processing.

The course evaluations completed at the conclusion of both semesters indicated that there was minimal anxiety or frustration. Out of the total 277 students completing these evaluations, 27 expressed frustration with the assignments. Anxiety and avoidance were suggested by 26 students who stated their preference for the word processor and/or avoidance of the computer for any work. This outcome was met as bettter than anticipated.

8. Preservice teachers regularly participate in field experiences, both at the early levels for weekly visits, and at the concluding level of full time student teaching. These field experiences are intended to give the student an opportunity to practice the instructional strategies learned in the

methods courses, and to determine the effectiveness of the instructional plans created. Each preservice teacher works closely with a cooperating teacher in the classroom who directs the students' teaching and instructional planning. The inclusion of computer usage in the instruction is dependent upon the cooperating teacher's preferences, the accessibility of the computers, and the preservice teachers' scheduled teaching time. These factors either encourage or limit the computer usage in instruction.

The course evaluations completed at the conclusion of each semester inquired if the students had used a computer in a school. Thirty-five students indicated they had done so, but there were some students who were enrolled in more than one course and thus it cannot be assumed that there are thirty-five different students who have done so in the early field experiences. One student, in an early field experience, indicated on the course evaluation that there had been an opportunity to assist the cooperating teacher with a computer task.

Among the nine student teachers the amount of computer instruction differed. Two student teachers were required to provide the weekly computer instruction for their first and second grade students. Another student teacher participated in weekly instruction from the specialist by offering personal assistance to the second graders in her class in the same manner as the cooperating teacher. Two other student teachers used the computer in their classrooms for instruction and practice. All nine used the computer for management of information, the creation of instructional materials, and the production of instructional media.

The student teachers met the anticipated outcome, but the students in the early field experiences did not.

9. The variety of computer platforms present in the various schools where the students participate in field experiences require the students to be able to use the IBM (MS-DOS) and Macintosh platform systems. Out of the 88 students who submitted computer usage logs, 33 indicated using both platforms.

Within the computer lab on the college campus, there are 26 IBM compatible machines, two Macintosh machines, and one Apple IIe. Students' personal computers represent all three types of computers. The schools in the field experiences use all three, with the Macintosh being the most prevalent.

A variety of software is available on the machines, with the educational software limited to the Macintosh computers and Apple IIe. This is due to the college's high student enrollment that must use the limited number of machines in the lab.

Students who included computer usage in their created lesson plans, usually used the educational software available on the Macintosh computers. One student submitted a plan with software seen in the school of the field experience.

This outcome was achieved, although the numbers were lower than anticipated.

10. The course evaluations competed by students at the conclusion of each semester indicated that five out of the six faculty in the department modeled a positive attitude for the use of the computer in education.

Those faculty who demonstrated this enthusiasm were noted as such in each of the courses taught, and the one faculty member who did not, was identified in both semesters, and in all of the courses for which she was responsible. Students commented on the enthusiastic intensity of some faculty for computer usage. One faculty member, other than the Chair, attended every workshop offered and built a learning partnership with her students. This outcome was met as anticipated.

11. The education course syllabi, written by faculty, were revised to include course requirements integrating the use of the computer. The faculty met prior to the beginning of the academic year to review the curriculum, and found that the 21 courses to be offered during the year would benefit from this review. Syllabi from the 21 courses were revised in accordance with the ISTE Guidelines for Technology in Education. The 13 guidelines provided the standards to be used to measure the thoroughness of the technology included in these education courses. Each guideline was discussed to determine the most effective approach for implementation within a course design. The ever-present goal was to see a distribution of the guidelines met throughout the curriculum.

This outcome was met beyond what was anticipated.

Discussion

Curriculum Revision

The ISTE guidelines for technology in teacher education programs (Todd, 1993a) served as the standard for the curriculum revision. Each course was reviewed to determine how these guidelines might be

included. Guidelines such as numbers 1 and 9 were easily integrated. Activities and classtime were designated for computer instruction with little revision to the original courses. The inclusion of the expanded activities in guideline 9, beyond the usual word processing, were created with little difficulty. Guideline 8 was the most difficult to integrate. It required resources beyond those readily available at the college, and the faculty had minimal knowledge about these areas of computer usage. Table 1 indicates the number of courses that included each of the guidelines.

An attempt was made to include a component of programming for the spreadsheet development. This topic was included in the mathematics concepts course. At the conclusion, both the professor and students agreed that it was not a profitable element in the course. The course content is extensive, and programs are commercially available to accomplish the same goal. The exercise was mentally stimulating for the students, some found it challenging, but most saw it as frustrating.

Using the computer for research as described in guideline 12 required the use of hardware and software designed for this purpose. At the outset of the practicum, students had access to the professional information at ERIC through *First Search* at OCLC (On-line Computer Library Center). The students paid for 10 searches, and conducted these with the assistance of the library staff. It was in this manner that the first ERIC searches were completed. During the first 3 months of the year an *InfoTrac* system was set up in the library on a demonstration basis. This system contained abstracts and entire articles in a wide variety of fields. It provided the

Table 1

The Number of Courses Including the Guidelines for the Inclusion of Computer Education

Guideline	# of Courses
1. Software utilization	21
2. Instructional support	16
3. Instructional principles and practices	5
4. Educational software applications	10
5. Information utilization	12
6. Student group activities	9
7. Subject and grade selection	10
8. Multimedia for instruction	2
9. Productivity tools	20
10. Societal issues	5
11. Current resources	9
12. Information accession	9
13. Emerging role facilitation	10

Note. The complete and specific guidelines are found on pages 18 and 19 of this document.

students with the freedom to conduct their own searches at no additional cost. In the 4th month, the ERIC database on CD-ROM was purchased with the Silver Platter software to conduct searches. These were installed in the

college library computers. This addition enabled students to conduct more thorough research with multiple searches at no additional cost.

Computer requirements varied with the subject area of the education course and the level of the course. The 100 level course primarily reviewed how computers are an integral part of the education process at all levels, and the ethical and human issues of their usage in education. Submitted written work was required to be completed on a computer. The 200 level courses increased the components to include the creation of presentation materials, the evaluation of the place of computers in the learning activities for children, and an introduction to the use of computers for the management of the diverse learners in a classroom. In the 300 level courses the students were required to discuss the above topics and to produce instructional material and media on a computer, incorporate student use of the computer in a lesson plan, and evaluate educational software for appropriateness and effectiveness in instruction. At the highest level of the 400 level courses, the students were required to create databases and spreadsheets in addition to those skills already demonstrated. At each level the student work submitted to faculty was professional in appearance and was recognized by students as better than material produced by hand or with a word processor. One student commented on the course evaluation, "The use of computers within the course requirements is great. We need to know how to incorporate computers into instruction." Another said, "I thoroughly enjoyed learning and discovering the incredible variety of ways that I can use the computer to make teaching games and materials."

In order to bring consistency to the evaluation of the students' submitted work, specific rubrics have been used by the faculty. As part of the curriculum revision, an additional rubric was created for the evaluation of computer technology in instruction. A copy of this rubric is located in Appendix D. The rubric was designed to be used for the computer requirements in each class. During the fall semester the faculty found this instrument to be cumbersome and tedious. They requested that it not be used during the spring semester, and that the computer components be integrated into the established rubrics already in use. It was decided that the rubric would be used throughout this academic year, and that the revisions of all the rubrics would take place before the next academic year.

Workshop Presentations

In order to provide computer instruction for the students, 16 workshops were scheduled to be offered at various times during the academic year. The topics were selected based on the progression of skills and the course requirements during each semester. Students and faculty were not required to attend these, but were encouraged to participate according to their needs. Attendance at the workshops varied according to the topic being presented and the designated time of the workshop. The workshop schedule is located in Appendix B. Two workshops were canceled due to conflicts with college events added to the campus calendar, one was canceled due the illness of the instructor, and two were canceled due to the lack of need at that point in the semester.

A nucleus of students attended most of the workshops. This group of students, who had been seeking for a way to learn the computer, were eager to increase their skills and knowledge and ready to take advantage of this opportunity. They became excited and searched for new ways to use their skills. Others chose to attend those workshops that would assist them to complete course requirements. A few students selected those sessions that "looked like fun." One faculty member attended 10 of the workshops. Table 2 describes the attendance at the 11 workshops held.

Table 2

Workshop Attendance

Topic	Attendance
Word processing	4
Desk-top publishing for children	8
The production of learning activities	4
Computer integration in instructional plans	7
Data base construction	13
Presentation graphics	11
Adv. word processing	4
Creating learning activities and computer integration	8
Creating tests	1
Creating charts and graphs	8
Adv. word processing with graphics	11

Student comments on the course evaluations about the workshops included gratitude for the sessions, requests for more sessions on the weekends rather than Thursdays, and appreciation for the opportunity to

learn free of charge. There were other students, who had spent energy and time in previous years complaining about their lack of computer knowledge, who did not attend the workshops offered. Their comments focused on the times that did not fit their schedules. Others who could not attend, met with those that did for personal instruction and assistance.

Eight of the workshops were conducted by the writer. The three advanced workshops were taught by other college personnel who had demonstrated that area of expertise.

The workshops were conducted on the IBM (MS-DOS) and Macintosh platforms. Depending on the topic of the workshop, either one or both platforms were used in the particular session. The participants rotated among the computers to ensure their exposure to both platforms.

Faculty Participation

During the two initial workshop sessions prior to the beginning of the academic year, the faculty expressed willingness, enthusiasm, and a recognition of the need for the curriculum revisions. As the faculty reviewed their respective courses, ideas were shared and suggestions made to one another for the integration of the computer in their courses. Those faculty with greater computer knowledge were able to help those with less. Additional time spent working on the computers was beneficial. It showed the levels of computer ability the faculty actually could demonstrate and the ease with which they could assist another who was struggling. One faculty member had computer skills beyond the basic word processing, and one had keyboard skills, but little computer knowledge.

In an attempt to model computer skills in course instruction, the faculty found different means to offer this information. One faculty member sought assistance from the writer and other college personnel to make the presentations in class. Two faculty brought their classes to the computer lab at scheduled times to demonstrate and explain the use of computers. Two faculty brought the computers or the materials produced by them to the classroom for presentation. According to the course evaluations, one faculty member did little to demonstrate or describe how the computer could be used, even though the topics were listed in the syllabi for the courses taught. She seems to have settled for alternative means of producing the assignments or reneged due to time constraints.

In order to offer multiple computers on both platforms, an additional Macintosh had to be purchased. An auction of goods and services from college personnel was organized to raise the needed funds of $700. Faculty were creative and varied in the goods and services offered. Students and personnel bid for the items by silent bid for one week. The auction provided a total of $921.35 plus $600 from two gifts from faculty. This enabled the department to purchase the computer and the software. The additional funds were used to contribute to the purchase of the ERIC CD-ROM and Silver Platter program. This resource has been installed on the library computer. These additions to the computer systems on campus have made a major contribution to the accessibility and practicality for computer usage.

Student Participation

At the conclusion of both semesters, course evaluations were distributed to students in the education courses where computers had intentionally been integrated into the instruction and requirements. The evaluations were designated by course number/level, rather than by student classification (i.e.. senior, freshman, etc.). The evaluation asked the student to indicate, through self-evaluation, any increase in computer usage. This self-evaluation of the students' use of the computer is presented in Table 3.

Table 3

Student Use of the Computer

Semester	Course Level	n	Increased	Decreased	Remained the same
Fall					
	200	44	19	5	20
	300	26	22	0	4
	400	31	29	0	2
Spring					
	100	44	22	3	19
	200	41	29	0	12
	300	60	34	2	24
	400	33	23	1	9
Total		279	178	11	90

Word processing was the most common use of computers. Those students who continued to use the word processor, rather than the computer, claimed the availability of the computers, the ease of the word

processor, and their familiarity with the platform, as the deciding issues. At the conclusion of the fall semester, there were 9 out of the 101 students who conceded to not using the computer for word processing. During the spring semester, it was 30 out of the 178.

The construction and design of lesson plans on the computer has seen the greatest increase over the previous year. Some students in all level courses, as well as those student teaching, created lesson plans on computers in the computer lab, at home, and in the schools. This activity showed the students' increase in knowledge about software and efficiency of computer usage. Among the comments on the course evaluations were requests for a template of the lesson plan model to be available on the network.

Other comments indicated the new enthusiasm of students for the computer. A student in a 300 level course said, " This course stretched me beyond what I thought I could do on the computer. "Another said, " I have learned to love the computer. Throw out the typewriter!"

Students also commented on the components being required in the curriculum. "If it was not a requirement, I would not have experimented with the computer," said a student in a 200 level course. The ultimate goal was expressed when a student said, "Having to use the computer has made me more comfortable with doing work on it. I even use it for things that aren't assignments."

The computer log and *Technology Manual* were distributed to all the students in the Teacher Education Department at the beginning of both semesters. It provided the request and directions to record each time the

student used the computer for any class or activity. There was only one departmental meeting to remind students to record their computer usage. Those in education classes during the semesters were periodically reminded by some faculty to complete the log. A notice was distributed to the students via campus mail to submit the logs the last week of each semester. At the conclusion of the fall semester, 46 of the 141 logs distributed were returned, and 42 were submitted at the conclusion of the spring semester. The course evaluations inquired as to the regularity of the students' entries on the computer logs. At the conclusion of the fall semester, 32 students indicated they always recorded their computer work in their logs, 29 indicated they recorded it sometimes, and 40 indicated their entries were not regular. At the conclusion of the spring semester, 59 students indicated they always recorded their computer work in their logs, 35 indicated they recorded it sometimes, and 82 indicated their entries were not regular. It must be remembered that some students were enrolled in more than one education course, and thus completed more than one evaluation.

A few students looked for ways to purchase their own computers during the semester. The workshops and class discussions were an incentive and provided some instruction and assistance in setting up their machines. A set of sisters purchased an Apple IIc as their first computer at a minimal price. They requested assistance to set up the machine in their dorm. The software was included, and it was possible to use the system for their work. Their limited finances did not interfere with their new enthusiasm for computers.

An expressed concern among the students was the general increase in the college's enrollment. The total number of students increased this year, with out increasing the number of computers available at the same ratio. Thus, students found it difficult to have access to a computer in the computer lab if they did not have a personal machine.

Recommendations

In order to strengthen the progress made, and improve the current revisions to the curriculum, there must be additional considerations and modifications. These adjustments would include the curriculum, the instruction offered, the faculty leadership, and the resources available.

The inclusion of the computer requirements in the methods courses was seen as beneficial by students and faculty. It will need careful monitoring by the Chair of the department to ensure its full incorporation in the education courses. The thoroughness of the application and the clarity of instruction will need to be reviewed. Likewise, it must be clarified for faculty and students the point at which the computer is the exclusive technology for student assignments, and the word processor is not acceptable for submitted work.

The faculty has requested the revision of the rubrics currently used for the evaluation of student productions to include a component for the use of computer technology. An integrated rubric, rather than the separate one for computers, will better demonstrate the inclusion of the technology.

Students and faculty agreed that the programming component in the math concepts course was not beneficial, and have recommended that it be

eliminated. Instruction in the use of a software program for spreadsheets, such as *Excel*, or for grading, such as *MicroGrade*, would be more beneficial. This instruction could be offered in a workshop.

In order to increase the availability and attendance at the workshops, the schedule should be reviewed and adjusted. Thursday evenings were not as well attended, and created conflicts for the use of the computer lab. Friday evenings and Saturday mornings were the preferred times for the participants, the instructors, and the general student body who needed to use the computers.

In addition to the distributed list of workshop topics and times, there should be supplementary announcements in the education classes and in the weekly campus newsletter. Students did not always check the published list, but responded when reminded by faculty.

The topics for the workshops should continue to include the variety offered. Incoming students will continue to need the basic workshops, while the advanced topics will be necessary for the upper level course requirements. It will also be necessary to continue to monitor the level of computer skills and anxiety demonstrated by the incoming students, both as freshmen and upper level transfer students.

As the students' level of computer usage increases, their ability to include computer instruction in their field experiences will also increase. It will be important to monitor this to determine if it can be added as a requirement during the later field experiences or student teaching. Among the deciding factors will be the accessibility of the computers in the

classrooms, the specific software available for the preservice teacher to use, and the willingness of the cooperating teacher to provide this opportunity.

In order to foster the enthusiasm of the entire departmental faculty, continued discussion will be necessary. Departmental faculty meetings will need to include regular reports of computer usage, presentations of student products completed on the computer, and the recognition of excellence in instruction. It would also help to have the faculty participate in the instruction of the workshops. This would require the faculty to increase their skills, practice what they are requiring of students, and participate in the cooperative efforts of learning with the students.

The limited resources in technology can be a limiting factor, but it should not be. In order to increase the students' skills and knowledge of computers, expanded resources are necessary. Current educational software is increasingly only available on CD-ROM. The auction of personnel's goods and services was so well received, another should be held in the upcoming year, with the money raised for the purchase of the CD-ROM and its educational programs. This equipment would be part of the Macintosh systems, with the individual CD-ROM programs to be checked out through the reserve desk in the library.

With another anticipated increase in the student body, the computers in the computer lab will be less available unless its hours of operation are also increased. There should also be the consideration of a second computer lab. This additional lab facility would be used solely for instruction, thus permitting the existing lab to always be available for student use. The lab attendants are important for the personal assistance of

students. Any increase in open hours of operation, will necessitate an increase in the employment of these attendants.

In order to assist the faculty in presenting the use of computer for instruction, there should be a means to project the computer image to a full class. A recent purchase of a video projector was an attempt to provide this, but it can only be used in the existing computer lab. It is not available for the education classes. It is recommended that a projection device for the Macintosh system would provide the portability of the computer and the education software to the education classes. A proposal for this expenditure should be presented to the administration.

As the department seeks to make these adjustments, the continued growth will be evident.

Dissemination

The writer submitted a paper on the integration of the computer in the elementary classroom to be presented at the five day International Institute for Christian Teachers and Administrators in Columbia, SC. It has been accepted. The presentation will include a discussion of the use of the computer as teacher's tool for record keeping, gathering information, instruction, producing materials, and networking with other teachers.

The writer submitted a proposal to the Pennsylvania Association of Colleges and Teacher Educators for a presentation at the annual conference. One of the strands in the convention program is Technology, with an emphasis on preparing teachers for the use of technology. The

curriculum revisions implemented at the writer's site would offer a model to other institutions in the organization.

During the implementation of this practicum, the writer presented at conventions in Denver, Colorado; Strurbridge, Massachusetts; Lancaster, Pennsylvania and Philadelphia, Pennsylvania. These presentations offered opportunities to ascertain the computer usage of inservice teachers attending the conventions. Most teachers responded that they use the computer primarily for word processing and as a tutor for certain students. With this information, and the information gleaned during the practicum, the writer is making presentations in the coming year in Dallas, Texas and Lancaster, Pennsylvania to offer teachers assistance in ways to increase the effectiveness of their computer usage.

The college administration is currently exploring the feasibility of establishing a site on the world wide web. The writer has been contacted to offer information and opinions. Other faculty have also sought assistance for various uses of computer for instruction in their courses.

It is the desire of this writer, that the information and skills learned during this practicum will be a seed for many other educators seeking to grow in the use of technology.

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APPENDIX A

COMPUTER USAGE LOG

Teacher Education Department
Computer Use Log

Date	Type of Work or Actvity	Software Used	Type of Computer	Location of Computer

APPENDIX B

COMPUTER WORKSHOP SCHEDULE

Teacher Education Department

Computer Workshop Schedule

1995 - 1996

Date	Day	Time *	Location	Topic
September 14	Thursday	6:30 P.M.	AB 102	Word processing
September 22	Friday	7:30 P.M.	AB 102	Desk-top publishing for children
September 28	Thursday	6:30 P.M.	AB 104	The production of learning activities for classroom use
October 12	Thursday	6:30 P.M.	AB 104	Computer integration in instructional plans
October 20	Friday	7:30 P.M.	AB 102	Data base construction and its use for the management of information
November 11	Saturday	8:30 A.M.	AB 102	Presentation graphics for instruction
December 8	Friday	7:30 P.M.	AB 102	Word processing and general questions and answers
January 16	Tuesday	8:30 A.M.– 3:30 P.M.		TBA Word processing and desktop publishing
January 17	Wednesday	8:30 A.M.– 3:30 P.M.		TBA Media presentation and the creation of a database
February 2	Friday	7:30 P.M.	AB 102	Creating learning activities for classroom use
February 10	Saturday	8:30 A.M.	AB 102	Computer integration in instructional plans
February 15	Thursday	6:30 P.M.	AB 102	Creating tests using word processing
February 24	Saturday	8:30 A.M.	AB 102	Creating a spreadsheet
March 7	Thursday	6:30 P.M.	AB 102	Creating charts and graphs
March 30	Saturday	8:30 A.M.	AB 102	Question & answer session
April 12	Friday	7:30 P.M.	AB 102	TBA

* Unless otherwise noted, all sessions are 2 hours in length.

Fall Semester Dates

December 11 & 12 - Course evaluations will be completed by students in each of the education courses offered during this semester

December 14 - 18 - *Computer usage logs due* from all students in the education department

Spring Semester Dates

April 29 & 30 - Course evaluations will be completed by students in each of the education courses offered during this semester.

May 3 - *Computer usage logs are due* from all students in the education department

APPENDIX C

COMPUTER TECHNOLOGY MANUAL

Teacher Education Department
Technology Manual

Goals for Technology

The integration of technology and computer use is important for the professional development of all Teacher Education students. There must be a thorough understanding of the required knowledge and skills on the computer for the preservice teacher to be effective in the classroom. The faculty in the Teacher Education Department believe that an integrated curriculum of coursework based on instructional goals and objectives should include instruction about the use of computers, assignments requiring the use of computers, and student demonstration of the required knowledge and skills. This integrated curriculum has the 13 guidelines from the International Society for Technology in Education (ISTE) as the framework for the design.

The Technology Manual has been created, reviewed, and distributed to all the students in the department. It describes the available hands-on workshop sessions, the procedures for logging computer activity, and the rubric used for the assessment of those course assignments requiring the use of the computer. It is available to help and guide teacher education students in their development as users of technology.

Policies for Computer Use

In order to decrease student anxiety about computers and increase their usage of computers, the following policies have been implemented:

1. If you have an assignment to complete on a computer in the college computer lab, and every computer is in use, you may "bump" a game player. Remember courtesy is important for the user and for the requester.
2. When you are required to submit a disk with the printed assignment, be sure to verify with the instructor the disk size, the stipulated software for the assignment, and the system platform. These may vary for each assignment, course, or professor. Most will use the 3 1/2 inch disk, but it will vary from the Macintosh to the PC system.
3. All submitted material must follow MLA standards. The computers in the lab have a template of the MLA standards to ensure that any work completed there in a word processing program will be accurate. If you choose not to use this, be sure that

you follow all MLA standards. Check the current edition of the MLA manual carefully.

4. The College has set the following standards for college papers:
   - 10 or 12 point font size
   - left justification only
   - 1/2" indentation for paragraphs
   - font types
     For IBM/PC – Times Roman, Arial, Courier, or similar fonts
     For Mac – Helvetica, New Century Schoolbook, or similar fonts
   - Professors are encouraged to think in terms of number of words required not number of pages.
5. Be sure to keep aware of the hours that the computer lab is open. Note when classes are meeting in AB 102, and don't get caught with an assignment due and insufficient time to complete it.

Workshop Opportunities

In order to provide opportunities for students to gain computer skills and knowledge, hands-on workshops will be offered free of charge to Teacher Education students at Lancaster Bible College. These workshops are designed to provide instruction on specific means of integrating computers into the personal and professional life of a teacher.

The schedule of workshops has been announced for the '95-'96 school year. The topics are planned to give the student the sequential instruction needed to gain the skills for course assignments and application for field placements. These workshops will use both PC and Macintosh platforms to access numerous software applications.

It is understood that every student will not be able to attend all sessions. It is also understood that there are insufficient computers for the entire department to attend any one session. Therefore, the students are encouraged to learn from one another as each attends different workshops. This will build computer skills and cooperation among the students.

The workshop topics and dates scheduled for this semester are attached.

Computer Usage Log

In order to determine the effectiveness of this program for future planning, (and for Miss Clawson's dissertation project) every Teacher Education student is to keep a Computer

Usage Log. There are two blank pages attached. Additional pages are available in the Teacher Education Department. Please record each date you use a computer for anything, including assignments completed for courses outside the education department! Then record the type of work or activity you were doing, the software application you used for the work or activity, the type of computer (PC or Mac), and where that computer was located (work, dorm, lab, classroom, library, etc.). The faculty in the Department are completing these too! The Log will be submitted to the Department Chair at the conclusion of each semester. This will be reviewed to determine how and when the assignments were completed, and if students used the computer for more than their assignments. Don't worry, the faculty will remind you to record your efforts.

Computer Assignments

Throughout the Teacher Education curriculum there are assignments that have been adjusted to give the students opportunity to increase their computer skills. These assignments may include the review of software, or the use of word processing to produce a paper, or the creation of a database for information, or a media project for classroom instruction. This is only a sample. There are many more ways to use computers in education. Look ahead on your syllabi and at the workshop schedule to determine where your computer skills are weak and you need additional instruction. Then plan your schedule to attend the workshop that will provide that instruction. If there is a schedule conflict, arrange with a fellow student to share the attendance at the workshops and then share the knowledge. You will gain much through cooperative efforts.

The computer assignments will be evaluated by the attached rubric. You will notice that it is similar to the other rubrics used by the Departmental faculty. This will help you to know what is expected, and help us to be consistent. It may be used in conjunction with another rubric, such as the one for a lesson plan, if the assignment calls for it.

Software and Hardware

The computer lab has two types of computers for your use: the PC (IBM compatible) and the Macintosh. The variety of software is different for each platform. The PC's are on a network and offer a variety of programs for word processing, creating a database, and spreadsheets, among others. The Macintosh has a word processing program, many educational software programs for children, and databases of information.

How to Begin

The Macintosh is turned on by pushing the "Power Key" located on the top left of the keyboard, and turned off by using the pull down menu marked "Special". Select "Shut off" and the computer will be turned off. In order to save your work on a floppy use the Command Open to locate your disk, your file, and your document. Always save on your disk.

The PC is turned on by inserting the Network Booting disc and pushing the "On" button. The menu appears with the options available. Select the options you require and remember to save your information on your own disk.

Remember to always use your own floppy disk to save any work you're doing. It must not be saved to any hard disk. On the Macintosh, insert your disk, use Command Open to open, and the dialog boxes will be available to open your disk for work. Any work saved onto the hard drive will be deleted. The Macintosh desktop will not appear. It uses At Ease to access the software applications.

There is a large red three ring notebook located in the cupboards above the Macintosh that contains the information on all of the educational software on the Mac. The Table of Contents lists the programs in the order in which they are found in the notebook.

APPENDIX D

RUBRIC FOR EVALUATION OF COMPUTER USAGE

Teacher Education Department

Name_____ Assignment_____
Course TE_____ Software _____
Date _____

Computer Technology in Instruction
1=low, 5=high, NA= Not Applicable

I.	Computers for Research					
	A. Selection of Database	1	2	3	4	5
	B. Selection from Database	1	2	3	4	5
II.	Computers for Word Processing					
	A. Format of paper according to MLA standards	1	2	3	4	5
	B. Use of spell check/grammar check	1	2	3	4	5
	C. Page layout and breaks	1	2	3	4	5
III.	Computers for Creating Teaching Materials					
	A. Visual appeal and readability	1	2	3	4	5
	B. Format and layout of piece	1	2	3	4	5
	C. Consistent lines and spaces	1	2	3	4	5
	D. Print quality and size	1	2	3	4	5
	E. Accuracy in design	1	2	3	4	5
	F. Appropriate choice of graphics	1	2	3	4	5
IV.	Computers for Instruction					
	A. Meets stated objectives for lesson	1	2	3	4	5
	B. Designated as a lesson plan component	1	2	3	4	5
	C. Appropriate for the level of the selected learners	1	2	3	4	5
	D. Accessible to learners	1	2	3	4	5
V.	Computers for Data Collection					
	A. Sufficient fields for data	1	2	3	4	5
	B. Organization of data	1	2	3	4	5
	C. Accessibility of data	1	2	3	4	5

APPENDIX E

COURSE EVALUATION FOR COMPUTER USAGE

Teacher Education Department
Evaluation of Computer Usage in TE Courses

Directions: Please answer the following questions by selecting the appropriate responses provided. This information is for research purposes and needs your honest response. For these questions a computer is considered as a individual computer, not a word processor.

The following questions should be answered for this course **TE**_____

1. How many total times during this semester have you used a computer for this course? ☐ 6 or more ☐ 4-5 times ☐ 3-2 times ☐ 1 time ☐ 0 times

   a. How many of those times were for word processing?
   ☐ 6 or more ☐ 4-5 times ☐ 3-2 times ☐ 1 time ☐ 0 times

   b. How many of those times were doing library research?
   ☐ 6 or more ☐ 4-5 times ☐ 3-2 times ☐ 1 time ☐ 0 times

   c. How many of those times were creating a data base?
   ☐ 6 or more ☐ 4-5 times ☐ 3-2 times ☐ 1 time ☐ 0 times

   d. How many of those times were creating instructional materials?
   ☐ 6 or more ☐ 4-5 times ☐ 3-2 times ☐ 1 time ☐ 0 times

   e. How many of those times were preparing instructional media?
   ☐ 6 or more ☐ 4-5 times ☐ 3-2 times ☐ 1 time ☐ 0 times

   f. How many of those times were reviewing software?
   ☐ 6 or more ☐ 4-5 times ☐ 3-2 times ☐ 1 time ☐ 0 times

2. How many times were you required in this course to submit a disk with the assignment? ☐ 6 or more ☐ 4-5 times ☐ 3-2 times ☐ 1 time ☐ 0 times

3. Where did you work on the computer? Indicate all that apply.
   ☐ computer lab ☐ at home ☐ in the dorm ☐ at a school ☐ other _____

4. Have you entered your computer use in the computer log as requested?
   ☐ Yes ☐ No ☐ Sometimes

5. Have you received instruction on the computer during this semester? Indicate all that apply. ☐ None ☐ at a computer workshop ☐ from a friend ☐ from a professor ☐ from _____(other).

6. How often has the professor of this course demonstrated or described how a computer could be used?
   ☐ 15 or more ☐ 14-10 times ☐ 9-5 times ☐ 4-1 time ☐ 0 times

7. Has the amount of your use of the computer during this semester ☐ increased ☐ decreased ☐ remained about the same?

8. How many floppy disks are you personally using currently?
   ☐ 6 or more disks ☐ 4-5 disks ☐ 3-2 disks ☐ 1 disk ☐ 0 disks
9. To what degree did this course encourage and stretch your computer skills?
   ☐ out of sight ☐ steady growth ☐ frustrated me ☐ zero change
10. Please comment on any other aspect of your computer usage in regards to this course. Indicate any other thoughts that might clarify an answer or contribute additional information.

Thank you for your encouragement and help with this project. It is my sincere hope that you will gain significant skills for the classroom and that the teacher education programs at LBC will benefit from this research.

Miss E. Penny Clawson
Chair, Teacher Education Department

Tech

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