A Comparative Analysis Of Selected Educational Technology Competencies Regarded As Important For The Integration Of Technology In The Public Schools Of Pennsylvania.

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A comparative analysis of selected educational technology competencies regarded as important for the integration of technology in the public schools of Pennsylvania

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A COMPARATIVE ANALYSIS OF SELECTED EDUCATIONAL TECHNOLOGY COMPETENCIES REGARDED AS IMPORTANT FOR THE INTEGRATION OF TECHNOLOGY IN THE PUBLIC SCHOOLS OF PENNSYLVANIA

by

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Abstract

The purpose of this study was to identify the perceived relative importance of a set of professional competencies required for the successful coordination and/or integration of educational technologies in the public school districts of Pennsylvania.

Supervisors and experts were asked to complete a survey validated by way of a pilot study. The instrument contained eighty two competency items categorized into ten competency areas. A Likert scale was used ranging from one (not important) to five (critically important).

The following research questions were explored:

1. What is the importance of competencies, as perceived by supervisors?

2. Is there a significant difference in the relative importance, perceived by supervisors, with respect to district population?

3. What is the relative importance of competencies perceived by experts?

4. Is there a significant difference in the relative importance of competencies perceived by supervisors and experts?

Competency areas of greatest importance for supervisors ($\underline{M}$ = 4.000 - 5.000) were Resource Management

and/or Administration, and Selection and Utilization/Integration. Next most important (M = 3.000 - 4.000) Systems Approach to Instructional Design, Research, Historical/Social Impact, and Library/Information Science. Mass Communications, Interactive/Multimedia, Evaluation of Media and Computers for Instruction, and Technical competencies were perceived "somewhat important" (M < 3.000).

The MANOVA procedure utilized for question two showed no overall significance among the ten competency areas with respect to district population.

Research question three revealed experts perceived 51% of the competency attributes to be "very important" to "critically important" (M = 4.000 - 5.000). The greater number of areas included Selection and Utilization/Integration, Systems Approach to Instructional Design, Resource Management and/or Administration, Historical/Social Impact, and Evaluation of Media and Computers for Instruction. Thirty four percent of the eighty two competency attributes were perceived as "important" to "very important" (M = 3.000 - 4.000). Only four attributes fell in the "somewhat important" to "important" (M = 2.000 - 3.000) range. One

technical competency was considered "not important" to "somewhat important."

A comparison between the perceptions of supervisors and experts on the importance of competency areas found no significant difference among perceptions as tested.

Chapter I

DESCRIPTION OF THE PROBLEM

Introduction

Many public educators are inadequately prepared to meet the educational technology challenges of the 1990's (Gooler, 1989). They lack experience from their college courses or internships in applying technological methods to the curriculum (Bitter & Yohe, 1989). Typically, responsibilities for coordinating and/or directing the integration of educational technologies in public schools are assigned to mathematics teachers, science teachers, library/media specialists, or other educators many of whom possess little or no formal background in educational technology but nonetheless are required to perform a dual role (Bratton & Silber, 1984; Fulton 1989; Kerr 1989). The shifting of responsibilities of some educators from an 'as certificated' to an 'as assigned' status in the schools gives rise to conditions of incompetence, ineffectiveness, and frustration when dealing with the new technologies for teaching and learning, not to mention increased levels of stress generated by the additional work load (McGinty, 1987).

The continued introduction of new electronic technologies to education is expected to remain unabated

for the foreseeable future, and will change the nature of instructional design and delivery as we know it (OTA, 1988). The lack of preservice education in technology usage combined with the relentless flow of new technologies has resulted in educators who, for the most part, do not possess the specialized skills needed in using modern electronic educational systems to function in the classroom (Kerr, 1989).

In recent years, technological applications in education have been largely influenced by the proliferation of microcomputers and a variety of sophisticated audiovisual media as the new method for delivery of instruction (Belland, 1982; Cimochowski 1984). Additional challenges in the design and implementation of instruction can be found with recent surges in the audiovisual and information technologies largely symbolized by the use of cable television, satellite communications systems, and digital data conversion processes (Johnson, 1981). Many of the so called convergent technologies made possible by computerized digital processing have created the need for a new breed of educational technology supervisor with expertise in various areas (Allen, Dodge, & Saba, 1989). Accordingly, an educational technology supervisor might

be described as an educator who uses modern methods of instructional systems design along with electronic instructional delivery systems to enhance teaching and learning. The implication is that educational technology supervisors require many of the following special skills: (1) curriculum construction; (2) educational administration; (3) design, production, and evaluation of instructional materials and/or programs; (4) media utilization for education (i.e., telecommunications, computers); (5) library and information science; (6) areas of psychology (including cognitive psychology) and sociology (with diffusion and adoption of innovations); and (7) instructional systems design (Berbeckar, 1986; Bratton 1988; Dana, Warner, & Dames, 1987; Hutchenson & Rankin, 1989; Waggoner & Goldberg, 1986).

Ernest (1982) indicated that the need for educators to become competent in the use of educational technologies has been prompted by three factors:

1. The educational profession has been subjected to critical scrutiny by members of its own ranks as well as the public sector as emphasis on accountability and cost effectiveness has increased.

2. A rapid proliferation of technology has created an ever increasing array of tools and techniques of communication, entertainment, and instruction. Ill-prepared teachers must cope with students who are already "media literates" often by the time they reach school age.
3. There have been myriad research studies conducted on the effectiveness of educational technology in the teaching/learning process (p. 2).

The International Society for Technology in Education (ISTE, 1993) has established some basic guidelines for teacher educators in order to "promote quality preparation in the use of technologies in education" (p. 2). The society, in cooperation with the National Council for Accreditation of Teacher Education (NCATE), has produced a guide for teacher preparation institutions which are developing programs in educational computing and technology. Of particular interest is the master's degree program in Educational Computing and Technology Leadership which is designed to "prepare leaders in computer/technology education who will assist teachers in designing instruction that utilizes computers

and other related technologies to meet the learning needs of students" (p. 12). Leaders will also be able to provide appropriate staff development, teacher inservice in the use of technologies, school district long range planning, and curriculum guidance.

Educators cannot reasonably be expected to keep up with the rapidly changing trends of adapting modern information and educational technologies to their teaching methods, as well as changes in their content areas (Belland, 1982; McGinty, 1987). Furthermore, the trend toward greater use of non-print media in the classroom will ultimately result in increased emphasis on the need for preparation in these areas as well (Galey & Grady, 1987). Teacher preparation programs in colleges and universities have, by and large, ignored the technological approaches to classroom practice in favor of the more traditional didactic procedures (Diem, 1982; Gooler, 1989). This leaves most of the teachers certified by such programs virtually unprepared to meet the challenges of technology use in their classrooms (Futrell, 1989; Gooler, 1989). Additionally, educators assigned to coordinate and/or direct the use of educational technologies in the schools are, in many cases, doing so without certification or training other

than that which represents their major area of study as undergraduates (Dana, Warner, & Dames, 1987; McGinty, 1987).

Further frustration exists for Pennsylvania's educational technology supervisors. According to section 1202 of the Pennsylvania School Code, the Commonwealth of Pennsylvania requires that all persons must be certified whenever they are assigned to duties and responsibilities involving direct interaction with pupils. Such activities as curriculum development, pupil personnel services, selection of learning materials, planning or conduct of learning experiences, or direction of professional-level, certificated staff involved in the above requires certification. Furthermore, certification policies state that whenever "...a school entity, in scheduling classes and making assignments, finds it necessary to assign an employee on a 'split time' basis to two or more areas requiring specific and different certifications, the person must be properly certified for each area" (Pennsylvania Certification Manual, 1988, Certification and Staffing and Policy Guidelines (CSPG) No. 80, p. 1). Moreover, The Pennsylvania Professional Standards and Practices Commission has implemented a Code of Professional Practice and Conduct for Educators which

was adopted July 1, 1991. This document recommended, among other items, that in their practices, "...professional educators are prepared, and legally certified, in their areas of assignment. Educators should not be assigned or willingly accept assignments they are not certified to fulfill" (p. 2). With regard to certification, professional educators "...shall not accept employment, when not properly certificated, in a position for which certification is required; assist entry into or continuance in the educational profession of an unqualified person [or] employ a person who is not properly certificated" (p. 2).

The following facts provide summary for the statement of the problem:

1. There is no certificate title in the Commonwealth of Pennsylvania under the heading of Educational Technologist, but there is a non-teaching (specialist) certificate under the heading of Instructional Technology Specialist (Pennsylvania Standards for Program Approval and Teacher Certification, 1985).
2. There is a growing need at both inservice and preservice levels to overcome the shortage of personnel with specialized skills needed to

integrate modern electronic educational technologies in the classroom.

3. Many educators assigned to coordinate and/or direct the use of educational technologies in the schools are doing so without the benefit of formal instruction or certification in this area of expertise.
4. Pennsylvania law requires all who teach to be certified in their specific area of expertise.
5. The ISTE has developed a limited body of knowledge that provides some necessary guidelines regarding the minimum competency requirement for those seeking leadership positions or certification as supervisors in educational technology.

In order to certify educational technology supervisors as professionals, the need for criteria consistent with established certification and staffing procedures must be addressed (Galey & Grady, 1987).

Need for the Study

The continued growth and development of electronic technologies, and their expanded use in the classroom, is creating serious concerns for educators as well as agencies responsible for the certification process.

Stahl (1986), described teacher certification as "...the validation by a state board of education that a person has the required educational course work, experience, and professional characteristics deemed necessary to instruct in a given area" (p. 16). Diem (1982) pointed out that "...without adequate training and understanding there is little likelihood of most teachers augmenting instruction with technology no matter how attractive its usage may seem" (p. 3). Since the practical application of modern electronic technologies to teaching and learning will have a great deal of influence on the future competency requirements for educators, it should be included in any discussion of certification of educational technologists (Galey, 1980; Galey & Grady, 1987).

A major concern, especially important to educators responsible for coordinating and/or directing the use of educational technologies, was identified in 1986 by the Association of Educational Communications and Technology (AECT). The AECT presentation outlined leadership imperatives for the educational technology profession and described what they consider "a distinct lack of proper descriptive terminology" for supervisors in the field:

> ...there are too many names used to refer to our profession: educational media,

> instructional media, instructional technology, educational communications, instructional communications, learning resources, etc. These names are definitely confusing to people outside our profession. We must provide leadership by recommending a single terminology to designate who we are (AECT, 1986).

The association further recommended that the profession develop a body of knowledge to include "...clear standards for certification of its members" (p. 15).

According to the Pennsylvania Certification Manual, Certification and Staffing Policies and Guidelines (1988), the Commonwealth of Pennsylvania has one non-instructional certification category, Instructional Technology Specialist, under which the duties and responsibilities of an educational technologist are sanctioned. The certificate description given in the manual under the heading of Instructional Technology Specialist Certification and Assignment Scope (K-12) is as follows:

1. A person holding a College Certificate endorsed Coordinator of Audio-Visual Education, Audio-Visual Specialists and Instructional Media Specialist is

considered qualified to perform as an Instructional Technology Specialist. These endorsements should not be confused with "Coordinator of Audio/Visual Materials."

2. A person holding an Educational Specialist Certificate endorsed for Instructional Technology Specialist is concerned with the improvement of the learning processes and instruction through the use of appropriate instructional media. This endorsement does not qualify the holder to serve as a School Librarian (CPSG No. 56, p. 1)

Statement of the Problem

Determining minimum competencies for supervisors requires identification of the educational technology-related duties and responsibilities. Competencies which are found to be important for supervisors but are not addressed under the guidelines of existing state teaching certificates should be identified and then recommended for inclusion under a new certificate title or modified existing certificate categories. The desired information

can be obtained by surveying supervisors who are presently responsible for directing/coordinating the integration of educational technologies at the school district level, as well as experts from the field of educational technology working in the education departments of teacher preparation institutions.

A consensus on the minimum competency criteria for supervisors of technology integration in education is difficult to identify in the popular literature. Indications are that educators responsible for the district-wide coordination and/or integration of educational technologies in public schools have no common set of standards on which to base their professional duties and responsibilities. According to Kerr (1989), school district personnel performing the function of educational technologist must be legitimized under the guidelines of a specialist's certificate or similar professional designation. The AECT (1986) described the lack of uniformity with regard to the title assignments for supervisors in this area of expertise.

The purpose of this study was to identify the perceived relative importance of a set of professional competencies required for the successful coordination

and/or integration of educational technologies in the public school districts of Pennsylvania.

Research Questions

Data collected for this study were used to address the following research questions:

1. What is the relative importance, perceived by supervisors, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?
2. Is there a significant mean difference in the relative importance, perceived by supervisors, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies with respect to district student population in the public school districts of Pennsylvania?
3. What is the relative importance, perceived by experts, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?
4. Is there a significant mean difference in the relative importance perceived by supervisors

and experts as to the competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?

Null Hypotheses

General research questions two and four were restated in the form of null hypotheses which were statistically analyzed for significance at the .05 level.

1. There is no significant mean difference in the perceived relative importance by supervisors, with respect to district student population, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania.
2. There is no significant mean difference in the perceived relative importance by supervisors and experts as to the competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania.

Definition of Terms

Audiovisual Media

Audiovisual media are a series of electronic devices which are interconnected to display collections of educational materials using the auditory and visual senses (Berbeckar, 1986).

Certification

Certification is the validation by a state board of education that a person has the "required educational course work, experience, and professional characteristics deemed necessary to instruct in a given area" (Stahl, 1986, p. 16).

Computer Assisted Instruction (CAI)

Computer Assisted Instruction (CAI) is defined as learning experiences generated and/or controlled by the aid of a computer. Some examples of CAI are: drill and practice exercises, tutorials, inquiry/dialog, games/simulations, or where the computer is used as a teaching machine. CAI is "generally programmed instruction where the student responds at his/her own rate to a computer stimulus" (Cimochowski, 1984, p. 8).

Computer Managed Instruction (CMI)

Computer Managed Instruction (CMI) is a computerized system used for, (among other things) keeping track of

student progress during instructional sessions. It generally is used as a record keeper, diagnostic tester, test scorer, and/or prescriber of what to study next (Cimochowski, 1984).

Content Attributes

Content attributes are important elements of a specific competency recommended by expert sources to ensure that the competency is effectively described (Sonier, 1989).

Convergent Technologies

The term convergent technologies describes the merging of media device modalities by way of electronic digital encoding in the storage, manipulation, and communication of information (Allen, Dodge, & Saba, 1989).

Educational Technologist

An educational technologist is a person who is skilled in the appropriate use of instructional systems design methods and electronic instructional delivery systems to enhance teaching and learning (AECT, 1986).

Educational Technology

Educational technology is an interdisciplinary, holistic, and problem solving approach to learning which makes the best use of combinations of human resources,

instructional media, and techniques and processes in order to promote effective learning at the lowest possible cost (Berbeckar, 1986).

Expert or Educational Technology Expert

In the field of education, experts are considered to come from several sources including researchers, public officials, administrators and supervisors, and classroom teachers. This definition includes teachers of supervisors as well as the supervisors (Haynes, Pilato, & Malouf, 1991).

Instructional Delivery Systems

Instructional delivery systems are methods for conveying instruction to the learner and/or for receiving and responding to input from the learner (Reigeluth, 1983).

Instructional Systems Design

Instructional systems design is a series of steps involving preparation, implementation, evaluation, and revision for the purposes of producing effective instruction (Dick & Carey, 1985).

Instructional Technologist

An instructional technologist is a person involved with the improvement of instruction and learning through

the use of appropriate instructional media (Pennsylvania Certification Manual, PDE, 1987 (CSPG No. 56, p. 1)).

Professional Certification

Professional certification is documentation recognizing the fulfillment of requirements set forth by agencies of the state government for the purposes of standardizing teacher preparation. Professional certification rests on the assumption that only members of the same profession are qualified to judge whether its members possess the knowledge and skills to practice the profession in a responsible way (Bratton & Hildebrand, 1980).

Supervisor or Educational Technology Supervisor (District Level)

Supervisors are district-level personnel currently employed as educational technology coordinators and/or directors who may be assigned duties and responsibilities under a variety of position titles currently held.

Limitations of the Study

The review of literature in related specific areas such as computer specialist, library/media specialist, and teacher preparation in general was necessary because of the lack of studies regarding professional

competencies required by persons who function as educational technology supervisors. Such related areas provided some basis for this study.

Because of the various names applied to the positions described herein, this study may have overlooked some educators responsible for the supervision of educational technologies in public schools.

Competency items for the survey instrument were gathered from several studies mentioned in the literature review. Since some of the competencies pertained to technologies which were considered obsolete, efforts made to ensure that additional competencies representing newer technologies may have been short sighted in scope and therefore overlooked important areas of concern.

Chapter II

REVIEW OF THE LITERATURE

Introduction

The review of the literature identified pertinent information with respect to the competencies necessary for the performance of the duties and responsibilities or certification of educational technologists. Findings important to answering the research questions of this study emanated from expert professional opinion, historical review, and recent studies and surveys conducted at the local, state, and national and international levels. Topic areas covered in this review include the following:

1. Teacher certification
2. Educational technology competencies
3. Computer technology competencies
4. Audio-Visual media competencies

Teacher Certification

Issues of teacher certification are handled differently by each state, but hold a common premise: that certification represents societal approval and respect for the accomplishments of individuals who meet the qualifications for the certificate in question.

While examining functional competence is the primary reason for certification requirements, there are two other vehicles for assurance of competence: accreditation and licensure. Accreditation, licensure, and certification are described by Bratton and Hildebrand (1980) as follows:

> Accreditation is the process whereby an agency or association grants public recognition to a school, college, university, or specialized study program that meets certain predetermined qualifications or standards. With this kind of voluntary, self regulation, an institution will conduct a self study and then be visited by a team of professionals from the same area of expertise to conduct a type of 'audit' of the institution to determine whether or not it meets the goals of its charter as stated. Accreditation is only for institutions or their programs, not individuals. Licensure is a mandatory legal requirement for certain professions in order to protect the public from incompetent supervisors. Individuals only are licensed, not the institution or employer. Certification is the process by which a

professional organization or an independent external agency recognizes the competence of individual practitioners. (p. 22)

Bratton and Hildebrand pointed out that teacher certification is more of a licensing process since it is issued by a legal agency, the state government, and requires that all representatives possessing this credential shall have completed certain requirements prior to its issuance. Indeed, Commonwealth of Pennsylvania certification requirements call for the certificate applicant to have completed "...in addition to all legal requirements, a program of teacher education approved by the Department and shall have the recommendation of the preparing institution" (Pennsylvania Department of Education Standards, Policies and Procedures for State Approval of Certification Programs and for the Certification of Professional Educators for the Public Schools of Pennsylvania, 1988, p. 5). Endorsements are added as necessary when the licensee desires to teach, or is assigned duties and responsibilities, in specialized areas such as a computer specialist, or media specialist.

Furthermore, indications are that the emphasis placed on the educational technologist's time, other than

teaching, can be classified into three main competency categories with respect to educational applications: (1) general educational technology applications (includes instructional design), (2) computer technology applications, and (3) audio-visual media applications. This literature review presents studies from all three areas in an effort to describe the minimum competencies required by personnel working with these technologies.

Educational Technology Competencies

Ernest (1982) conducted a study to determine what educational technology competencies are most necessary for the preparation of new teachers at the preservice level. Ernst's study also looked at a sample of teacher preparation programs to determine if there were curricular provisions set aside to include such competencies. The following questions were posed:

1. What educational technology competencies for teachers are identified as most important by experts in the fields of media and teaching?
2. What educational technology competencies for teachers are identified as most

important by personnel in a selected sample of teacher education programs?

3. What is the relationship between the competencies identified by the experts and the competencies identified by the personnel in the teacher education programs?
4. To what extent are the identified competencies taught in the selected sample of teacher education programs?
5. What is the relationship between the competencies identified by the experts and the extent to which the competencies are taught in the selected sample of teacher education programs?(p. 7)

The population selected for the study consisted of fifty experts in the media and/or teaching fields. Twenty media specialists were sampled from throughout the United States, and the other thirty from the state of Alabama, ten each from the areas of teacher education, supervision/administration, and classroom teaching. Participants were selected according to their publication records, research or other application areas in

educational technology. The final sample was selected from an initial group of 100 by a random sampling.

Ernest constructed an instrument which was divided into four parts and investigated the following: (1) background of the respondents, (2) items to measure the respondent's perceptions of the importance of media competencies in the teacher preservice program, (3) a chance to list additional competencies, and (4) other comments. A review of the literature provided the basis for the initial question set which were answered using a four-point Likert scale as follows: little or no importance = 1.0, somewhat important = 2.0, moderately important = 3.0, very important = 4.0.

The instrument was field tested by a group of doctoral students and verified for content by two media specialists. The pilot instrument provided the experts with: (1) feedback on the consensus of items on round one, (2) the chance to re-rate items, and (3) the chance to justify the rating if it deviated from the mean. It also indicated frequency of response rating and the mean for each item.

The final instrument consisted of fifty four competency items which were arranged into seven categories. The categories were randomly ordered on the

instrument with the intent of rank ordering based on response means. The seven categories and the number of competency items in each are as follows:

1. Visual/Aural/Computer Literacies - 3 items
2. Production Techniques - 13 items
3. Equipment Operation - 10 items
4. Selection and Utilization Principles - 17 items
5. Communication Principles/Mass Media - 4 items
6. Systems Approach/Instructional Design - 4 items
7. Evaluation of Media, Instruction - 3 items

Data analysis included rank ordering of both the "identified competencies and the seven categories [by] utilizing the item means and the item means within categories" (p. 14). "Frequencies, percentages, and means were computed for each item and each of the seven categories" (p. 15)

The study findings resulted in two basic conclusions: (1) media specialists, teacher educators, administrators, and teachers perceive educational technology competencies for teachers as highly important; and (2) graduates of the preservice preparation programs

in Alabama have not utilized educational technology at the levels of importance established by the experts' and institutional representatives' perceptions (p. 19).

On a scale of 1.00 to 4.00, 64 of the 69 competencies had a mean of 3.00 or higher. This placed the items in the moderately important to very important range. Interestingly, the five items below the 3.00 mark dealt with microcomputers, telecommunication/computer developments, and photographic processes. Three quarters of the competencies were perceived as very important for preservice by Alabama teacher education program heads. Two of the microcomputer competencies listed scored lower than "moderately important" by the same group (p. 19)

Ernest discovered that preservice preparation was found to be at a lower level of importance than perceived. "No category was taught in more than 44.6% of the institutions, and no single competency was taught in more than 57.1% of the institutions" (p. 19).

Kerr (1989) presented a paper at the Association for Educational Communications and Technology entitled Technology, Teachers, and the Search for School Reform. This paper outlines some of the basic elements of reform necessary for teachers and educational technologists to realize maximum return on their efforts to include

technology in the curriculum. Kerr reviewed the fields of teaching and educational technology from the points of view of the teachers and the technologists. Four fundamental areas were presented: (1) "preparation of models for teaching-with-technology"; (2) "design of intelligent software"; (3) "creation of technologically based tools to support teachers' professional work and development"; and (4) "improvement of research about technology in education" (p. 5).

Kerr suggests that the educational technologist's vision of educational technology has seen the gradual trend away from emphasis on devices to a focus on systematic instructional design models and procedures along with a steady growth of interest in the cognitive and behavioral principles of learning, including artificial intelligence. He points out that as a result of this approach by educational technologists, their activities have become increasingly distanced from the work of ordinary public school teachers. He suggested that there is general agreement among educational technologists that if teachers would incorporate instructional design practices, classroom experiences would be vastly improved. Kerr elaborates on some possibilities:

> ...students would become motivated, instruction would become clear and logical, student achievement would increase, teachers would be freed from the drudgery of routine tasks, and classroom activities would become more varied. (p. 7)

Kerr cautions, however, that teachers have been slow to respond, either to those who have encouraged them to use technology-as-hardware or those who advocate the use of instructional design as a possible solution to problems in education. "The expectations and hopes of technologists have changed; reality, in the main, has not" (p. 7).

Kerr found that the teacher's vision of educational technology still, for the most part, implies hardware with its associated software, but not a process approach such as instructional design offers. Many teachers use simple technologies such as showing films or video tapes to get relief from the daily rigors of the classroom setting. Often, the use of films or tapes may bring on new ideas or alternative points of view just from seeing how the rest of the world operates. Sometimes, students, working with the tools of technology, can provide themselves with some empowerment stimulus necessary for

creative expression in subject areas. Kerr believes that a video camera and video cassette recorder can do wonders when trying to get students to accept a social point of view different from their own.

According to Kerr, if teachers did want to pursue the educational technologies from the standpoint of development, other than the application of hardware and software, they would have little or no time to spend because of the constraints placed on them by administrative maintenance. Furthermore, "teachers are not provided with or taught how to use more helpful alternative models during teacher training" (p. 9).

Kerr found the technologist's view of teaching gives the impression that a teacher's role in education "is something to be refined and shaped by principles of instructional design: inconsistencies are to be smoothed out, digressions eliminated, predictability developed" (p. 10). Instruction, from the technologist's point of view, should be designed in a manner that minimizes the contribution of the teacher and, in some cases, eliminates the instructor altogether.

According to Kerr, the teacher's view of teaching changes rapidly during early exposure to the task. Teachers, once they make it through their first year or

two, begin to formulate their ideas about what it is they should be doing (and how) including the construction of their classroom "world" which ultimately reflects their concept of what teaching entails. Kerr points out that teachers find comfort and solace in their classrooms in helping to overcome feelings of isolation from their peers. They often resent outside interference in their classroom affairs, and consider most administrative requests to be an unnecessary burden on their already demanding schedules. Their time constraints cause them to reject suggestions of instructional design development to improve or provide alternative instruction practices, in favor of the more comfortable and "practical" classroom featuring the basics in materials, approaches, or hardware. Teachers' descriptions of their occupation tends to direct attention to conventional "wisdom of practice" and the need to develop and maintain individual interactions with their students. Kerr states that teachers "see the barriers to improvement of schools as lying largely in administrative realms and express their frustration with not being allowed to have more control over their own destinies" (p. 8).

Educational reform, according to Kerr, presents new challenges to both teachers and educational technologists

to stem the tide of decline in academic standards and lack of confidence in public education. Joseph McDonald (1988) described the current second wave of reform as the search for "the teacher's voice" (p. 474). The major goals were:

1. Democratize school administration to allow teachers to take certain leadership responsibilities in an effort to direct their own school's destiny.
2. Enhance teacher professionalism and allow teachers the ability to select curricula, instructional materials, and teaching methods; make decisions on research, peer evaluation, merit promotions, and professional development.
3. Shift teacher and student roles to allow the teacher to become a guide or coach instead of the source of knowledge, diversify classroom activities to reduce frontal orientation of instruction, and introduce a variety of instructional models and practices.
4. Conduct new kinds of research on teaching and teacher preparation. Attempt to have colleges work more closely with teachers in defining

what teacher preparation courses should cover in their curriculum.

Educational technology can do its part in educational reform by developing "teaching-with-technology models, designing supporting software, supporting the education and future professional growth of teachers, and improving research on teaching-with-technology" (Kerr, 1988, p. 13).

A study entitled Preparing Schools for the Year 2000 and sponsored by the Society For Visual Education Incorporated (1988), surveyed the attitudes and opinions of specialists on the use of educational technologies in their curricula for the foreseeable future. The group was asked to prognosticate the use of technologies in the K-9 classrooms of the future. In addition, respondents were asked to forecast how curricula might change as well as instructional materials designs in the coming years.

This study started with an open ended set of questions in order to elicit a wide response. Three basic questions were asked of the respondents:

1. In reviewing the K-9 curriculum, what are the top five skills and/or subjects that are likely to be emphasized in the next ten years? (List no more than 5).

2. What types of instructional materials will be essential in the classroom and in the school media center in the mid-90's? (List no more than 5).
3. In what ways will classroom teachers use new technology as a teaching tool in the mid 90's? (List no more than 5). (p. 1)

A second question set was developed from the first by asking respondents to evaluate the statements generated by the initial open-ended questions. In addition to an agree/disagree rating, participants were asked if they thought the statement was true now, will be true in the future, or will never be true. The results were summarized and respondents were asked to answer several clarifying questions to achieve consensus on any unresolved items.

Seventy-eight participants were involved in the survey. They consisted of classroom teachers, school and college level library/media faculty or specialists, school administrators, state education representatives, educational consultants, and national education organization personnel. Twenty-seven states from all regions of the United States were involved.

The results found professionals in general agreement that today's students must be educated to face a world that is becoming increasingly complex, highly technical, and information-oriented. In order to cope, individuals must absorb an explosion of information as well as new theories and discoveries. "The rapid advance of computer technology has fueled this process, making vast amounts of information available to those who have learned to use a computer" (p. 3).

Further comments pointed out the increasing dependence on technology to carry out even simple life skills and how students "must be prepared to manage and control it" (p. 3). The world was described as "fast moving, constantly shrinking [and] influenced by a variety of cultures that we don't know very well" (p. 3). Important on the list of skills to be developed by students are things such as comprehension, communications, and cooperation. Furthermore, coping skills to deal with the myriad of social problems in today's society were given high priority by respondents along with a need to become literate, critical thinkers.

The International Society for Technology in Education (ISTE) published the results of its efforts to develop guidelines for accreditation of educational

computing and technology programs for teacher preparation colleges and universities. Contained in the 1993 publication are guidelines for master's degree programs intended to prepare those who will take on the role of the district-level computer/technology supervisor, school computer specialist, or director of computer-related training for businesses. Persons completing these programs will be able to:

> ...assist teachers in designing instruction that utilizes computers and other related technologies to meet the learning needs of students, provide appropriate staff development and inservice training to assist teachers in becoming effective users of educational technology, and assist school districts in preparing long range implementation plans for appropriately integrating educational computing in all curriculum areas and at all grade levels. (p. 12)

The following are competency areas being addressed by the master's degree guidelines:

1. research and learning theories
2. computer programming environments
3. computer authoring systems

4. computing systems
5. software selection, installation and maintenance
6. information access and delivery systems

Additional competencies recommended to gain "experiences with leadership and supervisory concepts and skills as they relate to technology-based systems in K-12 schools" (p. 12) are as follows:

1. facilities and resource management
2. instructional program development
3. teaching with and about technology
4. staff development

Computer Technology Competencies

Cimochowski (1984) conducted a study to examine levels of preservice and inservice teacher preparation in computer education at member institutions of the American Association of Colleges for Teacher Education (AACTE). The study investigated: (1) what is being taught in introductory courses; (2) which of the departments/schools are teaching computer education courses; (3) how many courses are being offered for preservice and inservice teachers; (4) qualifications of the professors teaching the courses; (5) number of

students enrolled in the courses; (6) time preservice and inservice teachers spend using computers and; (7) relationship between computer education courses offered and size of the teacher education program, public or private school affiliation, and regional location of the AACTE member institutions.

Findings indicated that there are a number of questions which remain to be answered:

1. What can be done to implement computer education course work at institutions where no such programs exist, to broaden the scope of those programs which do exist, and to make both preservice and inservice teachers aware of what teacher training institutions offer in computer education?
2. What can be done to increase the number of teacher training programs that require computer education course work for graduation? (p. 3)

Solutions to the problems outlined above are multifaceted and complex, but they are forthcoming by way of research studies. Suggestions below by Cimochowski are indicative of such inquiry:

1. Identify those institutions that have exemplary teacher education programs in computer education [then] once exemplary teacher training programs in computer education have been identified, a listing can be circulated through national organizations with widespread distribution networks on a regular, basis. The dissemination of this information at the national and state levels...would be of great value to teacher training institutions as well as prospective teachers and inservice teachers.
2. The requirement for computer education course work in teacher training programs may revolve around a state education agency (SEA) policy issue since most state departments of education set teaching certification standards. In reports by the Education Commission of the United States (1983) only a small number of states have set a computer literacy requirement for high school graduation and even fewer (the District of Columbia,

> North Dakota, and Virginia) are requiring teachers to have course work in computer education. However, another thirty states are studying the teacher certification requirements and/or recommending computer education training for teachers. (p. 61)

Cimochowski (1984) further recommends that this type of investigation be conducted on a regular basis as a follow-up using similar questions with revisions as necessary. Cimochowski adds that it would be valuable to ask about such things as upper level course offerings, and to include a description of each to determine course coverage and content, and number of credits. Additional information could be items such as required courses and course time spent on computer related activities both in and out of class.

Chen (1984) conducted a study on computer related competencies required by secondary teachers in Taiwan. The study identified a list of competencies which would be needed by teachers through the year 2000, and determined differences in the assigned importance of these competencies by the respondents involved. The study was developed by Chen because there was so little data available related to the minimum computer related

competencies which would be required by the secondary school teachers of Taiwan.

Using the instrument he developed, Chen surveyed secondary school principals and teachers, teacher educators, and experts from government and industry from various geographical locations across Taiwan.

The computer-related competencies were rank ordered using means computed from responses to a five point Likert scale. The response criteria used were as follows: strongly disagree (-2), disagree (-1), undecided (0), agree (1), and strongly agree (2). Nine competencies showed up in the upper 25 percent. They were:

1. Possess ability to solve simple computer related problems.
2. Have a thorough understanding of the application of the computer to motivate student learning.
3. Possess ability to effectively utilize the computer as an instructional aid.
4. Understand the influence of the computer, its impact on modern society, and its future trends.

5. Possess ability to operate at least one commercial microcomputer or personal computer in school or at home.
6. Possess skills in using instructional packages.
7. Have knowledge of computer assisted instruction (CAI), its meaning and function.
8. Possess ability regarding the application of the computer to input/edit/output/test from a test inventory.
9. Have ability to motivate students' interest in studying computer science and to apply computer concepts creatively to a variety of applications. (p. 99)

Conclusions reached as a result of this study were as follows:

1. The competency statements identified in the study show that the panel members are very optimistic, future oriented, and aware of the problems teacher education programs will have in incorporating computer technologies in their curricula.

2. The competency statements range from the basics, such as the ability to use the computer, to newer issues of automation and artificial intelligence.
3. It was the general consensus that the competencies as presented represented the majority of expert opinion.
4. Secondary principals and teachers placed the most items in the agree or strongly agree category, indicating their desire to see these items become part of professional education courses.
5. Government and industry experts as well as teacher educators perceived more competencies in the 'disagree' or 'strongly disagree' levels than principals or teachers. It is believed that this is a result of their concept of need with regard to the competencies identified in the study being different than the other respondents (p. 119).

Among Chen's final recommendations was one suggesting that "many competencies are beyond the basic levels needed by all secondary school teachers, but

should be possessed by at least one teacher on every campus" (p. 120). A further suggestion includes the need to set up an office of computer education for each school to facilitate the use of computer technologies by teachers. The duties of such an office would include:

1. supervise computer laboratories
2. assist in developing scope and sequence of computer education at the school
3. set up equipment for use by faculty and staff
4. train faculty and staff in selection and use of software
5. troubleshoot hardware and software problems
6. coordinate repair of equipment

Chen also pointed out some barriers to computer literacy training of teachers:

1. the traditional focus of teacher education programs
2. lack of instructional computer facilities
3. lack of competent teaching staff

Other respondents pointed out..."the lack of knowledge and support from administrative staff were the largest obstacles preventing the use of computers in schools" (p. 121). Chen's study suggested that computer literacy efforts be extended to administrators and

teachers through appropriate continuing education, inservice workshops, and graduate credit courses. One other suggestion was made to extend the efforts with computers to include instructional delivery systems using other technologies.

Lacina (1984) conducted a study to determine the competencies necessary for teachers to use computers in their classrooms. A survey instrument was sent to computer coordinators throughout the state of Texas and college of education teacher preparation program directors across the United States. The first part of the instrument collected demographic data such as years of instructional computer use in the school district or college, respondent's position or title, and computer language proficiency. The second part of the instrument provided a set of twenty competencies in three competency areas regarding computer knowledge and skills. The three areas from the Lacina computer skills questionnaire were:

1. Instructional Applications - 11 items
2. Administrative Applications - 10 items
3. Research Applications - 3 items

The items were rated by the respondents as to their perceived importance by way of a Likert scale from one (not important) to five (very important). The instrument

listed three categories of computer knowledge and skill areas. Instructional applications dealt with such items as history of computers,computer assisted instruction, software and hardware evaluation and programming. Administrative applications involved student records, legal and ethical matters, and word processing. Research applications covered items such as data processing and programming for research.

The results of the study found thirteen items between 3.5 and 4.5 classified as important. Six items were between 2.5 and 3.5 and were only moderately important.

Lacina conducted a comparison to determine whether differences in the perceptions of district computer coordinators and college program directors existed. She found that when the mean scores of each of the twenty items for both groups were compared, there were seventeen items on which they agreed. Only one item, evaluation of software (to evaluate and choose quality software), was considered "very important" by both groups. Twelve items were considered "important" while four were considered only "moderately important".

Audio-Visual Media Competencies

Savenye (1989) conducted a study to determine what teachers need to know in order to use technology effectively in the classroom. The study was done in an attempt to improve the content of a one credit media competency course required of teachers in order to receive their credentials in the state of California. The course provides teachers with the opportunity to apply the principles of instructional systems design according to "Gagne's (1977) nine events of instruction; media equipment operation; production of dittos; overhead transparencies and laminated visuals; media selection; basic instructional video production; and an introduction to educational computer software evaluation" (p. 3).

Survey questions were asked to determine both present and future needs of teachers for technology use in the curriculum. Areas of coverage were as follows:

1. Entry level technology skills of teacher credential candidates: What instructional materials have they produced? What devices can they operate?
2. Final evaluations of the skills they learned in the media course by students finishing the course: What do credential

students perceive as the most, and least valuable skills they learned?

3. Perceived needs of new teachers in the field: What technology related skills, learned during their credential programs, do they feel help them teach most effectively?
4. Perceptions of teacher education leaders: What do teacher educators believe teachers should learn in order to teach effectively using technology? (p. 3)

The results showed that teachers, both preservice and inservice, believe that learning about commonly available materials and equipment is important. Such items as overhead transparencies, dittos, chalkboards, and using projectors of all kinds were included in their opinions. It seems, however, that knowledge of most of these items was already possessed before the media course began, and that valuable class time could have been spent learning about newer, more distant technologies such as video production and media selection. Teachers felt that things already known could be applied to lesson preparation techniques in methods courses. Further recommendations were to increase emphasis on items such

as video production, computer related activities including computer assisted instruction (CAI), interactive video (IV),computer managed instruction (CMI), compact disc read-only memory (CD-ROM), and telecommunications.

In summation, Savenye concluded that:

> ...with the great need for teachers who are adept at performing the multiple roles required of them when they use the power of technology in their classrooms, can provide an opportunity for teachers to become 'empowered' themselves. This study indicates that preservice and inservice teachers recognize the dual need to be skilled at basic media use, while preparing themselves to skillfully use the new technologies to enhance their students' learning. (p. 8)

McCutcheon (1984) conducted a study to determine the factors influencing the content of introductory media courses offered in undergraduate teacher education courses in the United States. The two major areas of investigation were the topic coverage in the courses and the perceptions of the course instructors as to how such topics are determined. It was discovered that, for the

most part, the course instructors themselves were largely responsible for course content with contributing factors such as: college or department policy, student expression of needs, state certification requirements, items reported in the literature, and textbooks playing a lesser role.

McCutcheon pointed out the importance of introductory educational media courses to the professional community. Such courses provide an overview of the instructional technology field and "...serve the function of recruitment both into additional courses and possibly into careers" (p. 10). The introductory course serves as the largest employer of teachers in instructional technology. The teachers add their expertise to further course development and in turn add to their course outlines the study of new technologies as they become viable for curriculum integration.

Media related course content items are among the items listed as important in a number of other studies cited in the literature. Many studies date back to the 1930's and contain some competencies that are truly futuristic, such as radio and television education. Current studies have added more modern devices to the study of educational technology such as computers, video

discs, CD-ROM, interactive video, and satellite telecommunications systems.

Chapter III

METHODOLOGY

Introduction

The purpose of this study was to identify the perceived relative importance of a set of professional competencies required for the successful coordination and/or integration of educational technologies in the public school districts of Pennsylvania.

Data were gathered from: (1) district-level personnel currently employed as educational technology coordinators and/or directors who may be assigned duties and responsibilities under a variety of position titles currently held, and who, for the purposes of this study, were referred to as "supervisors" and (2) professors of education chosen from among colleges and universities with teacher preparation programs having educational technology departments or related programs or courses who for the purposes of this study were referred to as "experts."

Data collected for this study were used to address the following research questions:

1. What is the relative importance, perceived by supervisors, of competencies required by school personnel to coordinate and/or direct the

integration of educational technologies in the public school districts of Pennsylvania?

2. Is there a significant mean difference in the relative importance perceived by supervisors with respect to district student population, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?
3. What is the relative importance, perceived by experts, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?
4. Is there a significant mean difference in the relative importance perceived by supervisors and experts as to the competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?

Population

The population for this study consisted of supervisors from among the 501 Pennsylvania school

districts and experts from the education departments of selected colleges and universities in the Commonwealth of Pennsylvania.

The supervisor population was selected from personnel who coordinate and/or direct the integration of educational technologies in the 501 Commonwealth of Pennsylvania public school districts.

The expert population was made up of forty three people from the field of educational technology working in teacher preparation institutions throughout the Commonwealth of Pennsylvania, whose names were listed in the membership directories of the Association of Educational Communications and Technology (AECT) and the Pennsylvania Association of Educational Communications and Technology (PAECT). The institutions with which the experts are affiliated offer some form of educational technology related programs or courses as part of their teacher preparation curriculum requirements.

Sample

The supervisor sample was derived using a random sampling technique from among the 501 school districts in the Commonwealth of Pennsylvania. Student population statistics for 500 of the 501 districts were supplied by

the Pennsylvania Department of Education (1992). The missing district, Bryn-Athyn, is really a private, church-owned school. The state lists it as a school district because it is operated like a public school The sample was stratified, into four population ranges of 125 districts. Each group of 125 was assigned 32 random numbers for data collection (Appendix A.001) giving a total sample of 128. The population breakdown of these groups is described in Table 1.

Table 1

District Population Categories

District Population Category	Number of Districts in Category	Highest Population District	Lowest Population District
1	32	13,577	3,470
2	32	3,465	2,328
3	32	2,327	1,486
4	32	1,469	540
Total----->	128		

Letters were prepared (Appendix A) for each of the groups to explain the purpose of the study and to enlist their participation. The superintendents of the districts were asked to forward the survey instruments to supervisors responsible for coordinating and/or directing

the integration of educational technologies in their districts. Each supervisor received a demographic survey instrument and a competency survey instrument (Appendix B) to complete. There were 128 school districts, randomly selected (32 from each of four population groups), ranging in size from 13,577 students to 540 students.

The experts were selected from among 43 Pennsylvania colleges and universities. Participants' names were obtained from membership directories of the Association for Educational Communications and Technology and the Pennsylvania Association for Educational Communications and Technology. It was felt that persons from the ranks of these organizations would be most likely to have sufficient educational technology background to warrant classification as experts in the field. The entire expert population was used as the sample.

Data Collection

The survey instruments were sent to the superintendents in the school districts and institutions described above. Demographic information was requested in the first part of the instrument for purposes of describing the subjects of the study, their occupations,

and levels of experience in education. The respondents were asked to complete the second part of the instrument which indicates their perceptions of the importance of competency content attributes and areas that are (or should be) part of the duties and responsibilities of educational technology supervisors.

The Instrument

The survey instrument was developed on the basis of findings derived from the literature as well as information gathered from the Pennsylvania Department of Education. Pennsylvania has certification for Instructional Technology Specialist, an educational technology related, non-teaching, professional position. The competency survey instrument was designed using instrument items and categories developed for use in studies conducted by Chen, 1984; Ernest, 1982; International Society for Technology in Education, 1993; Lacina, 1984; and McCutcheon, 1984.

A factor analysis of response data was performed in an attempt to analytically define competency areas similar to those found in the literature. The results of the analysis (Table 2) showed a very heavy loading (81.7%) in only one factor. The items loaded into factor

one were not related to one another in any recognizable way, and made any attempt to categorize them impractical. Items loaded into the other factors were similar in nature to those in factor one, thus providing no differential from the heavy factor 1 loading.

Table 2

Factor Analysis of Competency Areas

Factor Number	Number of Items in Factor	Percent of Total
1	67	81.7
2	5	6.0
3	6	7.3
4	3	3.6
5	1	1.2
6	0	0
7	0	0
8	1	1.2
9	0	0
10	0	0
11	0	0
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	0	0

Because of the inability of the factor analysis to render a statistical decision as to competency item

categorization and area assignment, the best course of action with regard to categorization of competency items for this study was to rely on judgement based upon the review of the literature. Categories (areas) of competency items (attributes) for this study were formulated by intuitive comparisons from among similar items used by several studies in the literature review.

Sixty competency items were used by Chen in his study of computer competencies. Chen did not categorize the items into areas as did other researchers. As a result, his items were placed into computer competency areas synthesized for this study from the work of others.

Sixty nine competency items were organized into seven competency areas in Ernest's educational technology skills questionnaire. The seven areas are as follows (p. 15):

1. Visual/Aural/Computer Literacies - 3 items
2. Production Techniques - 13 items
3. Equipment Operation - 10 items
4. Selection and Utilization Principles - 17 items
5. Communication Principles/Mass Media - 4 items

6. Systems Approach/Instructional Design - 4 items
7. Evaluation of Media, Instruction - 3 items

Twenty items organized into three competency areas were included in Lacina's computer skills questionnaire. Within these three areas, subcategories of Social and Ethical Concerns, and History and Evolution of Technology were included. The three areas are as follows (p. 77):

1. Instructional Applications - 11 items
2. Administrative Applications - 6 items
3. Research Applications - 3 items

Sixty seven items organized into four competency areas were developed by McCutcheon for his educational media questionnaire. The four areas are as follows (p. 67):

1. How to Operate Equipment - 14 items
2. How to Apply to Instruction - 23 items
3. How to Produce Materials - 13 items
4. Principles of Communication, Selection, Evaluation, and Research - 17 items

For this study, a total of eighty two competency items were identified, synthesized, and categorized into ten competency areas using material from the above

studies. The ten competency areas and number of content attribute items for each area were formulated as follows:

1. Technical Competency Area - 8 items
2. Historical/Social Impact Competency Area - 8 items
3. Interactive/Multimedia Competency Area - 5 items
4. Library/Information Science Competency Area - 4 items
5. Research Competency Area - 10 items
6. Selection and Utilization/Integration Competency Area - 11 items
7. Mass Communications Competency Area - 6 items
8. Systems Approach to Instructional Design Competency Area - 8 items
9. Evaluation of Media and Computers for Instruction Competency Area - 12 items
10. Resource Management and/or Administration Competency Area - 10 items

A Likert scale format using a one to five range (one being not important, five being critically important) was used to facilitate timely completion by the respondents.

The final instrument presented eighty two educational technology competency attributes in ten areas required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts as determined by the literature review. The respondents indicated the relative importance of competency attributes based on perceptions of their present occupational duties and responsibilities or expert opinion.

A pilot instrument (Appendix B.04) was distributed to four participants who served as pilot supervisors (Appendix B.05). The participants were employed by two Northampton County school districts, the Colonial-Northampton Intermediate Unit 20, and the Carbon-Lehigh Intermediate Unit 21, all in Pennsylvania. A pilot instrument was also distributed to two participants who served as pilot experts (Appendix B.06). They were employed by the College of Education at Allentown College of Saint Francis de Sales and Lehigh University also in Pennsylvania. The pilot participants' responses determined the content of the final set of survey items for the purposes of content validity. Modifications to the instrument were made by reviewing the responses from the pilot study data and the descriptions provided by the

literature, along with recommended additions or deletions indicated by the pilot participants. If there were attributes which the respondents felt were important to an area but were omitted in the pilot instrument, a blank space was provided to write in additional competency areas as needed. Attributes and the areas to which they were added are shown in Table 3.

Table 3

Competency Areas and Additions/Deletions Recommended by Pilot Participants

Competency Area Number	Number of Area Attributes in Pilot Instrument (Appendix B.04)	Number of Area Attributes in Final Instrument (Appendix A.05)
1	6	8
2	8	8
3	4	5
4	4	4
5	6	10
6	10	11
7	3	6
8	5	8
9	11	12
10	8	10
Total ------->	65	82

Pilot participants further recommended some re-wording of attribute items to form complete sentences and

describe the competencies in behavioral terms where possible. For example: "ability to perform simple maintenance operations such as replacing bulbs" was changed to read: "Supervisors should be able to perform simple maintenance operations such as replacing bulbs."

The final instrument was distributed to the school districts (supervisors) and the colleges and universities (experts). The instrument was enclosed with a cover letter (Appendix A.01 and A.03) explaining its purpose and importance as well as the need for prompt completion and return. Included with the documents was a self-addressed, stamped return envelope as a courtesy and convenience to the respondent.

Each instrument was assigned a code number to determine from where responses were received. A three-week period of time was allowed to elapse before a reminder letter (Appendix A.07) was sent to those from whom no response had been received.

General Treatment of Data

Demographic data were organized in table form (Appendix C.01 through C15 and Appendix D.01 through D.13) and presented by number and percentage of respondents.

Questions assessing the importance of competency areas required for the respondent's occupational duties and responsibilities were provided in a Likert scale format and a numerical value was assigned to each item. For example, a value of 5 was assigned to indicate that the competency area was "critically important," 4 to "very important," 3 to "important," 2 to "somewhat important," and 1 to "not important." The mean scores were reported for each competency and identified collectively as the "importance value index."

A rank order listing of the perceived importance of competency attributes by the respondents were delineated in table form (Tables 5 and 9). Competency areas by rank order according to responses to the "overall" question (the last question in each area) were reported in table form (Tables 6 and 10).

In addition to the factor analysis of the instrument previously described, other statistical procedures involved multivariate analysis of variance (MANOVA) comparisons between the four population groups 1, 2, 3, and 4, and the ten clusters of content attributes. Next, a comparison between the perceptions of supervisors and experts with respect to the ten clusters of content attributes was conducted. All attributes under technical

competencies were examined in one analysis, historical/social impact attributes in another analysis, and so forth. This compared the supervisors' perceptions of importance against the experts' perceptions on the sets of items under each major competency cluster and gave a yes/no decision. The groups were either of the same opinion regarding importance on the items or they were different in some way. If they were different, then there was a post-hoc analysis conducted to try to determine where the differences were. The post-hoc strategy involved performing additional MANOVA procedures on any competency area which showed significant in the first test. This second test would examine differences among the two groups with respect to individual content attributes in a particular area. Similar investigations were conducted to determine if any differences existed between the perceptions of supervisors with respect to district population group.

Chapter IV

ANALYSIS OF THE DATA

Introduction

The purpose of this study was to identify the perceived relative importance of a set of professional competencies required for the successful coordination and/or integration of educational technologies in the public school districts of Pennsylvania. The research questions addressed in this study are as follows:

1. What is the relative importance, perceived by supervisors, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?
2. Is there a significant mean difference in the relative importance, perceived by supervisors, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies with respect to district student population in the public school districts of Pennsylvania?
3. What is the relative importance, perceived by experts, of competencies required by school personnel to coordinate and/or direct the

integration of educational technologies in the public school districts of Pennsylvania?

4. Is there a significant mean difference in the relative importance perceived by supervisors and experts as to the competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?

Supervisor Response Data

There were 65 supervisor responses with seven "no-data" surveys returned, for a total supervisor response (58 out of 128) of 50.78%. Forty (69%) of supervisors who responded were male while eighteen (31%) were female. McGinty (1987) reported that 68% of computer coordinators surveyed were male and 32% were female. The supervisor responses with respect to district population and response percentages are shown in Table 4.

Table 4

Number and Percentage of Respondents With Respect to District Population Group

District Population Group	Student Population Range	Number of Respondents	Percent of Respondents
1	3,470-13,577	18 out of 32	56.3%
2	2,328-3,465	15 out of 32	65.2%
3	1,486-2,327	14 out of 32	43.8%
4	540-1,469	11 out of 32	34.4%
Total-->	28,662	58 out of 128	50.78%

Most of the supervisors (87.9%) possessed instructional teaching certificates in one or more content areas. In 1987 McGinty found 73% had degrees in education. Appendix C.02 lists the various certificate types represented by the respondents.

Mathematics was the most frequently listed content area (20.7%) among supervisors. Elementary education (19.0%) was next followed by science (17.2%). If a respondent listed more than one certification area, for the purposes of simplification, the area with the greatest number of teaching years was used for this study (Appendix C.03).

Seventeen (25.9%) of the respondents had been teaching for five years or less. Fifty percent had been

teaching thirteen years or less while almost eighty percent taught twenty years or less. Two (3.4%) of the respondents taught 32 years, the highest number of years. Total years of teaching experience, number and percentage of all respondents are listed in Appendix C.04 .

Fifty percent of the respondents had over twenty three years of service as a professional educator. This indicates that the many of the respondents were involved in other areas of education besides teaching, such as administration. Appendix C.05 shows the years of professional education experience. McGinty found that the average district-level person had "been an educator or administrator for 17 years, the last four and a half as a computer coordinator" (p. 20). The majority of respondents in this study (80%) spent the last six years as technology supervisors. Appendix C.06 lists the number of years and the percentages as technology supervisors.

Thirty-four (58.6%) of the supervisors spent no time on teaching tasks, indicating that most or all of their time was used for technology related or administrative assignments. Appendix C.07 lists the percentage of time spent by supervisors performing teaching responsibilities.

Twenty-six supervisors (44.8%) spent no time on faculty/staff development. Eleven (19.0%) spent 10% of their time in development, five (8.6%) spent 20%. Overall, the majority of supervisors, 42 out of 58 (87.9%), spent less than 20% of their time in development. McGinty found full-time computer coordinators in 1987 spending eight hours out of a thirty five hour average work week, for a total of 22.8% of time, in faculty/staff development. The complete breakdown of time spent on faculty-staff development for this study is shown in Appendix C.08.

Appendix C.09 shows the number and percentage of time spent performing administrative tasks. Ten of the 58 (17.2%) spent 100% of their time performing administrative tasks, while eighteen (31%) spent no time. McGinty found administrative activities topped the list of duties and responsibilities for full-time computer coordinators at the district level.

Very little total time was spent performing audio-visual media and library/media specialist duties and responsibilities. Most of these items are handled at the building level and not by the district-level personnel. Appendix C.10 and C.11 list the percentage breakdown for this study.

Appendix C.12 shows the number and percentage of respondents with respect to percent of time spent performing the duties of technology supervisor. This study showed that 5.8% of respondents spent 100% or their time as supervisor.

Appendix C.13 indicates percentage of time spent for supervisors performing other duties and responsibilities. "Other" refers to write-in items such as: attending seminars, workshops, conventions, to upgrade skills or gain new skills and knowledge; time spent reading technical publications, educational journals; curriculum coordination/integration; transportation duties (driving school bus); and federal/state grant and/or proposal writing. Most of the respondents (86%) reported that they spent no time on such activities.

Most of the supervisors (70.7%) earned masters degrees, while another 20.7% earned a doctorate. This level is up from the McGinty survey where 51% possessed master's degrees and only 4% possessed the doctorate. Appendix C.14 lists the respondent's highest academic degree.

Appendix C.15 lists the number of graduate credits in Educational Technology earned by supervisors. Eighty-four and one-half percent of respondents accumulated less

than 24 graduate credits in educational technology. Four (6.9%) earned 24 credits, while thirteen (22.5%) accumulated more than 24. Nineteen supervisors (32.8%) had earned no graduate level credits in educational technology.

Professional Competencies and Their Importance as Perceived by Supervisors

General research question one "What is the relative importance, perceived by supervisors, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?" was answered by using the combined means of the four district population groups on each of the surveyed competency area content attributes. A table of content attributes and perceived importance values in rank order by mean was generated (Table 5) with attributes listed from most important to least important. The column with the asterisk indicates the competency area to which the attribute belongs. The competency areas are as follows:

T --Technical Competencies

H --Historical/Social Impact Competencies

M --Interactive/Multimedia Competencies

L --Library/Information Science Competencies

R --Research Competencies

S --Selection and Utilization/Integration Competencies

Ma -Mass Communications Competencies

I --Systems Approach to Instructional Design Competencies

E --Evaluation of Media and Computers for Instruction Competencies

A --Resource Management and/or Administration Competencies

There were no competency attributes perceived as "critically important" (M = 5.000). Fourteen competency attributes (17%) ranked in the range from "very important" to "critically important" (M = 4.000 to 5.000). Of these, five (36%) were Resource Management and/or Administration competency attributes, four (29%) were Selection and Utilization/Integration competency attributes, two (14%) were Systems Approach to Instructional Design competency attributes, one (7%) was a Research competency attribute, one (7%) was a Historical/Social Impact competency attribute, and one (7%) was a Technical competency attribute. Sixty-one

competency attributes (74%) were ranked in the range from "important" to "very important" (M = 3.000 to 4.000). Of these, five (8%) were Resource Management and/or Administration competency attributes, seven (11%) were Selection and Utilization/Integration competency attributes, six (10%) were Systems Approach to Instructional Design competency attributes, eight (13%) were Research competency attributes, seven (11%) were Historical/Social Impact competency attributes, six (10%) were Technical competency attributes, four (7%) were Library/Information Science competency attributes, five (8%) were Interactive/Multimedia competency attributes, five (8%) were Mass Communications competency attributes, and eight (13%) were Evaluation of Media and Computers for Instruction competency attributes.

Six competency attributes (7%) were ranked in the range from "somewhat important" to "important" (M = 2.000 to 3.000). Of these, one was a Research competency attribute, one was a Technical competency attribute, one was a Mass Communications competency attribute, and three were Evaluation of Media and Computers for Instruction competency attributes.

There were no competency attributes with a mean of less than 2.000, so none were considered to be in the "not important" to "somewhat important" range.

Table 5

Relative Importance by Rank, Classification, and Mean for Competency Area Attributes based on Supervisor Responses

Rank	*	Competency Area Attributes	Mean
1	A	effectively budget the use of internal and external funding to purchase technology hardware and software	4.293
2	S	effectively utilize the computer as an instructional aid, and to develop basic skills such as keyboarding	4.172
3	S	recommend applications of the computer to motivate student learning	4.172
4	I	formulate objectives and strategies for utilizing educational technologies in teaching/learning situations	4.172
5	A	employ management systems and methods that use spread sheets, data bases, and word processors on the computer	4.155
6	I	formulate educational goals and learning objectives which specify student outcomes, achievements, and evaluations	4.155
7	A	describe the role of an educational technology supervisor in providing services for classroom teachers	4.138
8	S	verify the appropriateness of educational materials for a specified teaching/learning situation by analyzing sophistication, cost, availability and technical quality	4.138
9	S	identify sources of educational materials including computer software and videodiscs	4.121
10	A	maintain organization, management, security, and inventory of supplies and equipment	4.103
11	R	evaluate the effectiveness of an instructional computer program	4.103
12	A	design and implement staff development programs for effective orientation, training, and skills upgrade in the use of technologies	4.086

Table 5 (continued)

Rank	*	Competency Area Attributes	Mean
13	H	recognize the capabilities and limitations of a computer and the misleading myths and misconceptions associated with it	4.086
14	T	demonstrate functional knowledge of technical terminology associated with educational computing and technology	4.000
15	S	integrate computerized teaching materials into a course to enrich instructional programs	3.983
16	H	assess the complexity of introducing educational change into the system through technology	3.966
17	L	have knowledge of data bases and the importance of standardization of documentation	3.948
18	A	effectively interpret and/or write policy for technology integration and modernization	3.931
19	L	possess skills in data storage/retrieval which would make information immediately available for instructional purposes and productivity enhancement	3.931
20	L	be able to explain rights, limitations, and responsibilities of users of copyrighted material as outlined in the Copyright Law	3.931
21	M	be able to describe the basic operation of an interactive multimedia workstation and how it can affect conditions of teaching and learning	3.914
22	A	apply the computer to administrative tasks such as attendance, grades, and student records)	3.897
23	S	identify software resources for teaching students how to select applications to solve academic and daily living problems	3.897
24	S	develop students' abstract reasoning ability and general problem-solving skills through computer studies	3.897

Table 5 (continued)

Rank	*	Competency Area Attributes	Mean
25	H	understand the influence of the computer, its impact on modern society, and its future trends	3.897
26	T	solve simple computer related problems such as printers not on line, booting up, etc	3.897
27	I	construct the elements of a lesson on the basis of a model which represents a systematic approach to teaching and learning	3.879
28	I	develop and design a variety of alternate teaching strategies using the computer and other electronic technologies	3.879
29	A	describe procedures of basic utilization plans (select, preview, use, follow-up, and evaluate) for educational media	3.862
30	I	utilize the three domains of learning (cognitive, affective, psychomotor) when developing technology-based instruction	3.862
31	H	discuss the uses of computers and other technologies in business, industry, and society	3.828
32	T	be able to set up, operate, and maintain all types of computer hardware and make recommendations concerning system configurations including networking	3.828
33	R	use sources of information about technology for professional development (i.e. journals, associations, seminars, conferences and on-line services)	3.793
34	M	be able to integrate the computer with other A/V instructional media, such as videodiscs, video tapes, animation, still images, 3D models etc., for more efficient, meaningful instruction	3.793
35	E	describe the major characteristics and appropriate teaching/learning situations for computer assisted instruction	3.793

Table 5 (continued)

Rank	*	Competency Area Attributes	Mean
36	L	have a detailed understanding of the principles of information processing, its contribution to teaching in general and specific subject areas	3.776
37	M	incorporate computer applications with networking to promote instructional interaction	3.741
38	T	be able to operate, most common types of A/V equipment such as projectors, tape recorders, disc players and cameras	3.724
39	R	assess media utilization procedures in terms of student growth and achievement according to specified instructional objectives	3.707
40	I	design teaching/learning strategies for incorporating the use of technologies with a specified group of learners (i.e. handicapped)	3.690
41	Ma	demonstrate an understanding of current and expected developments in the satellite, telecommunications and computer technologies	3.690
42	H	provide career guidance and information through the use of computers	3.672
43	A	write grant proposals to effectively compete for available public and private resources	3.638
44	H	discuss privacy, security, and moral issues resulting from the widespread use of computers	3.638
45	A	address problems of equal access and scheduling for technology use	3.621
46	E	design, implement, and evaluate instructional materials which use the computer	3.621
47	E	direct and assist teachers and students in preparation of their own media	3.621
48	H	determine the impact of media on learners from a psychological perspective	3.603

Table 5 (continued)

Rank	*	Competency Area Attributes	Mean
49	S	have knowledge and skills in computer assisted/managed instruction (CAI/CMI)	3.603
50	I	apply the basics of computer assisted instruction (CAI), and apply its meaning and function to educational practice	3.603
51	S	use instructional games and simulations appropriately and effectively in teaching	3.586
52	S	develop strategies for utilizing visual literacy skills for a specified group of learners	3.569
53	R	interpret the adequacy of research findings in education	3.534
54	Ma	display functional knowledge of utilization of telecommunications for information sharing, remote information access and retrieval, broadcast resources, and distance learning	3.534
55	M	be able to render advice regarding the use of computer assisted/managed technologies for special needs instruction (ie.handicapped, gifted)	3.517
56	T	possess some experience with systems analysis to provide for the most effective, trouble-free operation	3.500
57	R	develop, and use behavioral models to improve the integration of technologies for instruction	3.500
58	R	develop programs in the school district which benefit research for development of new approaches to instruction using technology	3.500
59	Ma	display functional knowledge of telecommunications tools and resources	3.500
60	E	produce instructional media such as graphics, video recordings slides and transparencies etc for a specified learning objective, with evidence of technical quality	3.466
61	H	associate automation and artificial intelligence issues with teaching	3.431

Table 5 (continued)

Rank	*	Competency Area Attributes	Mean
62	Ma	identify, analyze, and utilize nonverbal forms of communication	3.431
63	R	develop survey instruments to determine effectiveness of instruction using technology	3.414
64	Ma	analyze the impact of mass media (TV, radio, newspapers, etc.) on society, schools, and students	3.397
65	R	effectively utilize the computer to perform statistical analysis of data collected from regular classes and to interpret the results	3.379
66	E	identify and demonstrate the elements of composition in the preparation of visuals	3.379
67	T	be able to perform simple maintenance operations such as replacing bulbs	3.345
68	Ma	define components of the communication process and identify factors which enhance accurate transmission of messages	3.345
69	R	devise and employ validation procedures for teacher-made and commercially prepared materials	3.328
70	E	apply computer graphics techniques as needed to teach specific subjects	3.259
71	E	make necessary modifications in existing computer programs to meet instructional needs	3.259
72	S	have a basic understanding of computer aided design/manufacturing (CAD/CAM)	3.224
73	E	effectively use the computer for diagnosis and remediation of learning problems	3.224
74	I	design, construct, and validate a self-instructional module	3.190
75	T	possess some knowledge of main frame computers, local area networks, and their operations	3.103
76	E	display functional knowledge of program verification and debugging techniques	3.000

Table 5 (continued)

Rank	*	Competency Area Attributes	Mean
77	E	display functional knowledge of at least one programming language and the ability to compare languages commonly used in education (i.e. structured BASIC, Logo, and/or Pascal)	2.983
78	E	devise media presentations to accompany commercial programs or textbooks	2.931
79	M	be knowledgeable regarding the use of computers with authoring languages (such as QUEST, PILOT, MediaScript, etc.) to facilitate lesson design for individualized instruction	2.845
80	E	display functional knowledge of structured programming concepts and design of algorithms	2.810
81	R	administer tests through the use of the computer to insure a bias-free test environment for students	2.690
82	T	possess some background in electronics and logic circuitry	2.224

The last question in each of the ten competency areas of the survey contained a question which asked the supervisor's opinion of the overall importance of the area. This mean value was used as a tie breaker in the event that the mean values of two or more content attributes from different competency areas were the same. If there were tie mean values within the same area, they were considered to be equally important and listed alphabetically. Table 6 lists the rank order of the

competency areas as determined by the mean of the "overall" question.

Table 6

Supervisor's Rank Order of Competency Area Importance by the Mean of the Overall Question Response

Rank	*	Competency Area	Mean
1	A	Resource Management and/or Administration Competencies	4.069
2	S	Selection and Utilization/Integration Competencies	3.966
3	H	Historical/Social Impact Competencies	3.897
4	T	Technical Competencies	3.879
5	I	Systems Approach to Instructional Design Competencies	3.845
6	L	Library/Information Science Competencies	3.707
7	R	Research Competencies	3.690
8	M	Interactive/Multimedia Competencies	3.655
9	Ma	Mass Communications Competencies	3.483
10	E	Evaluation of Media and Computers for Instruction Competencies	3.293

Differences in Perception of Importance by District Population

General research question two "Is there a significant mean difference in the relative importance, perceived by supervisors, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies with respect to district student population in the public school

districts of Pennsylvania?" was answered by using multiple analysis of variance (MANOVA) to determine if there was any significant difference in the perceived competencies. The means of the ten competency areas were compared with the district population categories one through four. Table 7 shows the population numbers and categories used for the comparison.

Table 7

District Population Categories

District Population Category	Highest Population District	Lowest Population District
1	13,577	3,470
2	3,465	2,328
3	2,327	1,486
4	1,469	540

Working at the .05 level of significance, the null hypothesis "There is no significant mean difference in the perceived relative importance by supervisors, with respect to district student population, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania" was addressed.

Using the Statistical Package for the Social Sciences (SPSS) statistical computer software package, the (MANOVA) procedure tested the hypothesis of no overall difference in the ten competency area perception means among the four district population groups. The tests showed no significant difference at the .05 level and therefore resulted in acceptance of the hypothesis.

Upon review of the univariate F-tests for each of the ten competency areas, significance was found in one area: Systems Approach to Instructional Design. This meant that there were competency attributes in that area on which the respondent's perceptions of importance differed. A further post hoc analysis was conducted using a separate MANOVA procedure to test the eight Systems Approach to Instructional Design competency area attribute perception means among the four district population groups. This examination showed no overall significance at the .05 level. However, a closer look at the univariate F-tests for the individual competency attributes indicated four of the eight Systems Approach to Instructional Design competency attribute perceptions were found to be significantly different.

The four attributes in question are depicted in Table 8 and are numbered as they appeared on the competency survey instrument.

Table 8

Attributes of Significance for Systems Approach to Instructional Design Competency Area With Respect to District Population Category

Attribute 1

Formulate objectives and strategies for utilizing educational technologies in teaching/learning situations

District Population Category	Number of Respondents	Mean of Importance Value
1	18	4.389
2	15	3.600
3	14	4.429
4	11	4.182
Total----->	58	4.155

Table 8 (continued)

Attribute 2

Formulate educational goals and learning objectives which specify student outcomes, achievements, and evaluations

District Population Category	Number of Respondents	Mean of Importance Value
1	18	4.389
2	15	3.600
3	14	4.429
4	11	4.273
Total----->	58	4.172

Attribute 3

Develop and design a variety of alternate teaching strategies using the computer and other electronic technologies

District Population Category	Number of Respondents	Mean of Importance Value
1	18	3.889
2	15	3.200
3	14	4.214
4	11	4.273
Total----->	58	3.862

Table 8 (continued)

Attribute 7

Utilize the three domains of learning (cognitive, affective, psychomotor) when developing technology-based instruction

District Population Category	Number of Respondents	Mean of Importance Value
1	18	4.000
2	15	3.333
3	14	4.214
4	11	4.000
Total----->	58	3.879

Responses in Table 8 from district population categories 1, 3, and 4 on each of the four attributes remained approximately three tenths point above the mean when compared with each other, while the category 2 population group scored a mean which was approximately five tenths of a point below the mean on all four attributes.

Expert Response Data

There were 24 expert responses with two "no-data" surveys returned, for a total expert response (out of 43) or 55.81%. One-third (33.33%) of the institutions

responding were private, the other two-thirds (66.66%) were state-owned. Among the private institutions, the response rate was 75% (6 out of 8) compared to 46% (16 out of 35) for state schools. Sixteen (73%) of experts who responded were male while six (23%) were female. About half (54.5%) possessed instructional teaching certificates the rest (45.5) had no certification. Of the certificate holders, five (43%) were in science, four (33%) elementary, and one each (8%) in mathematics, English and social studies. Three of the certificated respondents had three years of teaching experience while the other nine had only one year each. Fifty percent of the respondents had between twenty and thirty years of experience as professional educators. Appendix D contains the demographic tabular breakdown for the entire expert sample.

Professional Competencies and Their Importance as Perceived by Experts

General research question three, "What is the relative importance, perceived by experts, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?" was

answered by using the means of the experts' responses on each of the surveyed competency area content attributes. A table of competency area attributes and importance values in rank order by mean was generated (Table 7) with attributes listed from most important to least important. The column with the asterisk indicates the competency area to which the attribute belongs.

There were no competency attributes perceived as "critically important" (M = 5.000). Forty-three competency attributes (52%) ranked in the range from "very important" to "critically important" (M = 4.000 to 5.000). Of these, nine (21%) were Selection and Utilization/Integration competency attributes, eight (19%) were Resource Management and/or Administration competency attributes, three (7%) Technical competency attributes, two (5%) were Interactive/Multimedia competency attributes, five (12%) Historical/Social Impact competency attributes, nine (21%) were Systems Approach to Instructional Design competency attributes, four (9%) Research Competencies, one (2%) was a Library/Information Science competency attribute, and four were Evaluation of Media and Computers for Instruction competency attributes.

Thirty-four competency attributes (41%) were ranked in the range from "important" to "very important" (M = 3.000 to 4.000). Of these, two (6%) were Selection and Utilization/Integration competency attributes, six (18%) were Resource Management and/or Administration competency attributes, three (9%) were Technical competency attributes, three (9%) were Interactive/Multimedia competency attributes, three (9%) were Historical/Social Impact competency attributes, two (6%) were Systems Approach to Instructional Design competency attributes, six (18%) were Research competency attributes, three (9%) were Library/Information Science competency attributes, (9%) were Evaluation of Media and Computers for Instruction competency attributes. There were no Mass Communication competency attributes in this range.

Four competency attributes (5%) were ranked in the range from "somewhat important" to "important" (M = 2.000 to 3.000). Of these, one (25%) was a Technical competency attribute, and three (75%) were Evaluation of Media and Computers for Instruction competency attributes.

There was one Technical competency attribute with a mean of 1.909, in the "not important" to "somewhat important" range.

Table 9

Relative Importance by Rank, Classification, and Mean for Competency Area Attributes based on Expert Responses

Rank	*	Competency Area Attributes	Mean
1	S	integrate computerized teaching materials into a course to enrich instructional programs	4.682
2	I	construct the elements of a lesson on the basis of a model which represents a systematic approach to teaching and learning	4.591
3	S	identify sources of educational materials including computer software and videodiscs	4.545
4	S	effectively utilize the computer as an instructional aid, and to develop basic skills such as keyboarding	4.545
5	R	use sources of information about technology for professional development (i.e. journals, associations, seminars, conferences and on-line services)	4.545
6	I	formulate educational goals and learning objectives which specify student outcomes, achievements, and evaluations	4.545
7	I	formulate objectives and strategies for utilizing educational technologies in teaching/learning situations	4.545
8	S	verify the appropriateness of educational materials for a specified teaching/learning situation by analyzing sophistication, cost, availability and technical quality	4.500
9	H	determine the impact of media on learners from a psychological perspective	4.500
10	M	be able to integrate the computer with other A/V instructional media, such as videodiscs, video tapes, animation, still images, 3D models etc., for more efficient, meaningful instruction	4.455

Table 9 (continued)

Rank	*	Competency Area Attributes	Mean
11	A	describe the role of an educational technology supervisor in providing services for classroom teachers	4.455
12	S	recommend applications of the computer to motivate student learning	4.364
13	A	design and implement staff development programs for effective orientation, training, and skills upgrade in the use of technologies	4.364
14	A	employ management systems and methods that use spread sheets, data bases, and word processors on the computer	4.364
15	T	demonstrate functional knowledge of technical terminology associated with educational computing and technology	4.364
16	M	be able to describe the basic operation of an interactive multimedia workstation and how it can affect conditions of teaching and learning	4.364
17	H	recognize the capabilities and limitations of a computer and the misleading myths and misconceptions associated with it	4.364
18	H	assess the complexity of introducing educational change into the system through technology	4.364
19	I	develop and design a variety of alternate teaching strategies using the computer and other electronic technologies	4.364
20	E	direct and assist teachers and students in preparation of their own media	4.364
21	A	apply the computer to administrative tasks such as attendance, grades, and student records)	4.318
22	L	be able to explain rights, limitations, and responsibilities of users of copyrighted material as outlined in the Copyright Law	4.318
23	E	describe the major characteristics and appropriate teaching/learning situations for computer assisted instruction	4.318

Table 9 (continued)

Rank	*	Competency Area Attributes	Mean
24	A	effectively interpret and/or write policy for technology integration and modernization	4.318
25	S	develop students' abstract reasoning ability and general problem-solving skills through computer studies	4.273
26	T	be able to operate, most common types of A/V equipment such as projectors, tape recorders, disc players and cameras	4.273
27	I	utilize the three domains of learning (cognitive, affective, psychomotor) when developing technology-based instruction	4.273
28	E	produce instructional media such as graphics, video recordings slides and transparencies etc for a specified learning objective, with evidence of technical quality	4.273
29	S	use instructional games and simulations appropriately and effectively in teaching	4.227
30	H	discuss privacy, security, and moral issues resulting from the widespread use of computers	4.227
31	R	evaluate the effectiveness of an instructional computer program	4.227
32	R	assess media utilization procedures in terms of student growth and achievement according to specified instructional objectives	4.182
33	R	interpret the adequacy of research findings in education	4.182
34	H	understand the influence of the computer, its impact on modern society, and its future trends	4.182
35	I	apply the basics of computer assisted instruction (CAI), and apply its meaning and function to educational practice	4.182
36	A	effectively budget the use of internal and external funding to purchase technology hardware and software	4.136

Table 9 (continued)

Rank	*	Competency Area Attributes	Mean
37	E	design, implement, and evaluate instructional materials which use the computer	4.136
38	S	develop strategies for utilizing visual literacy skills for a specified group of learners	4.091
39	A	describe procedures of basic utilization plans (select, preview, use, follow-up, and evaluate) for educational media	4.091
40	S	identify software resources for teaching students how to select applications to solve academic and daily living problems	4.045
41	A	address problems of equal access and scheduling for technology use	4.045
42	T	solve simple computer related problems such as printers not on line, booting up, etc	4.000
43	E	identify and demonstrate the elements of composition in the preparation of visuals	4.000
44	I	design, construct, and validate a self-instructional module	3.955
45	I	design teaching/learning strategies for incorporating the use of technologies with a specified group of learners (ie. handicapped)	3.955
46	A	write grant proposals to effectively compete for available public and private resources	3.909
47	M	incorporate computer applications with networking to promote instructional interaction	3.909
48	R	develop, and use behavioral models to improve the integration of technologies for instruction	3.909
49	S	have knowledge and skills in computer assisted/managed instruction (CAI/CMI)	3.864

Table 9 (continued)

Rank	*	Competency Area Attributes	Mean
50	Ma	display functional knowledge of utilization of telecommunications for information sharing, remote information access and retrieval, broadcast resources, and distance learning	3.864
51	A	maintain organization, management, security, and inventory of supplies and equipment	3.864
52	L	have a detailed understanding of the principles of information processing, its contribution to teaching in general and specific subject areas	3.818
53	Ma	display functional knowledge of telecommunications tools and resources	3.773
54	T	be able to perform simple maintenance operations such as replacing bulbs	3.773
55	M	be able to render advice regarding the use of computer assisted/managed technologies for special needs instruction (ie.handicapped, gifted)	3.773
56	L	have knowledge of data bases and the importance of standardization of documentation	3.773
57	L	possess skills in data storage/retrieval which would make information immediately available for instructional purposes and productivity enhancement	3.773
58	Ma	demonstrate an understanding of current and expected developments in the satellite, telecommunications and computer technologies	3.727
59	H	discuss the uses of computers and other technologies in business, industry, and society	3.727
60	E	apply computer graphics techniques as needed to teach specific subjects	3.682
61	R	devise and employ validation procedures for teacher-made and commercially prepared materials	3.636

Table 9 (continued)

Rank	*	Competency Area Attributes	Mean
62	E	effectively use the computer for diagnosis and remediation of learning problems	3.591
63	R	develop programs in the school district which benefit research for development of new approaches to instruction using technology	3.545
64	T	be able to set up, operate, and maintain all types of computer hardware and make recommendations concerning system configurations including networking	3.500
65	H	associate automation and artificial intelligence issues with teaching	3.500
66	E	devise media presentations to accompany commercial programs or textbooks	3.500
67	R	develop survey instruments to determine effectiveness of instruction using technology	3.455
68	M	be knowledgeable regarding the use of computers with authoring languages (such as QUEST, PILOT, MediaScript, etc.) to facilitate lesson design for individualized instruction	3.318
69	H	provide career guidance and information through the use of computers	3.273
70	R	effectively utilize the computer to perform statistical analysis of data collected from regular classes and to interpret the results	3.273
71	S	have a basic understanding of computer aided design/manufacturing (CAD/CAM)	3.227
72	Ma	analyze the impact of mass media (TV, radio, newspapers, etc.) on society, schools, and students	3.227
73	Ma	identify, analyze, and utilize nonverbal forms of communication	3.227
74	E	make necessary modifications in existing computer programs to meet instructional needs	3.227

Table 9 (continued)

Rank	*	Competency Area Attributes	Mean
75	Ma	define components of the communication process and identify factors which enhance accurate transmission of messages	3.091
76	R	administer tests through the use of the computer to insure a bias-free test environment for students	3.045
77	T	possess some experience with systems analysis to provide for the most effective, trouble-free operation	3.000
78	T	possess some knowledge of main frame computers, local area networks, and their operations	2.818
79	E	display functional knowledge of program verification and debugging techniques	2.818
80	E	display functional knowledge of structured programming concepts and design of algorithms	2.591
81	E	display functional knowledge of at least one programming language and the ability to compare languages commonly used in education (i.e. structured BASIC, Logo, and/or Pascal)	2.545
82	T	possess some background in electronics and logic circuitry	1.909

As was the case with the supervisors, each of the ten competency areas of the survey contained an overall question which indicated the expert's opinion of the importance of the area overall. This mean value was used as a tie breaker in the event that the mean value of two or more content attributes from different competency areas were the same. If there were tie mean values in

the same area, they were considered to be equally important and listed alphabetically. Table 10 lists the rank order of the competency areas as determined by the mean of the overall question.

Table 10

Expert's Rank Order of Competency Area Importance by the Mean of the Overall Question Response

Rank	*	Competency Area	Mean
1	S	Selection and Utilization/Integration Competencies	4.455
2	I	Systems Approach to Instructional Design Competencies	4.227
3	A	Resource Management and/or Administration Competencies	4.182
4	M	Interactive/Multimedia Competencies	4.091
5	H	Historical/Social Impact Competencies	4.045
6	R	Research Competencies	3.818
7	L	Library/Information Science Competencies	3.773
8	Ma	Mass Communications Competencies	3.636
9	E	Evaluation of Media and Computers for Instruction Competencies	3.636
10	T	Technical Competencies	3.136

Differences Between Supervisors' and Experts' Perceptions of Importance

General research question four "Is there a significant mean difference in the relative importance perceived by supervisors and experts as to the competencies required by school personnel to coordinate

and/or direct the integration of educational technologies in the public school districts of Pennsylvania?" was answered using multiple analysis of variance (MANOVA) to determine if there was any significant difference in the perceived competencies. The means of the ten competency areas were compared with respect to respondent identity (ID), either supervisor or expert. Working at the .05 level of significance, the null hypothesis "There is no significant mean difference in the perceived relative importance by supervisors and experts as to the competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania" was addressed.

The MANOVA which tested the hypothesis of no overall difference between the perceptions of experts and supervisors was performed using the SPSS statistical computer software package. The tests indicated no significance and therefore resulted in acceptance of the hypothesis.

Upon review of the univariate F-tests for the ten competency areas, significance was found in four of the competency areas: "Interactive/Multimedia Competencies," "Research Competencies," "Selection and

Utilization/Integration Competencies," and "Systems Approach to Instructional Design Competencies." This indicated that there were competency attributes in the four areas on which the respondents' perceptions of importance differed. The differences were insufficient to cause overall significance, but a further post hoc analysis was conducted using a separate MANOVA procedure on the four competency areas above. The examination showed no significance at the .05 level for two of the areas: Interactive/Multimedia Competencies, and Selection and Utilization/Integration Competencies. There was, however significance found for the remaining two: Research Competencies, and Systems Approach to Instructional Design Competencies. A closer look at the univariate F-tests for the individual competency attributes of both Research competencies and Systems Approach to Instructional Design competencies indicated three of the ten Research competency attribute perceptions and four of the eight Systems Approach to Instructional Design competency attribute perceptions were found to be significantly different.

The three Research competency attributes in question are depicted in Table 11 and are numbered as they appeared on the competency survey instrument.

Table 11

Attributes for Research Competency Area With Respect Respondent ID

Attribute 1

Interpret the adequacy of research findings in education

Respondent ID	Number of Respondents	Mean of Importance Value
Supervisor	58	3.534
Expert	22	4.182
Total----->	80	

Attribute 9

Use sources of information about technology for professional development (i.e. journals, associations, seminars, conferences and on-line services)

Respondent ID	Number of Respondents	Mean of Importance Value
Supervisor	58	3.793
Expert	22	4.545
Total----->	80	

Table 11 (continued)

Attribute 10

Assess media utilization procedures in terms of student growth and achievement according to specified instructional objectives

Respondent ID	Number of Respondents	Mean of Importance Value
Supervisor	58	3.707
Expert	22	4.182
Total----->	80	

The four Systems Approach to Instructional Design Research competency attributes in question are depicted in Table 20 and are numbered as they appeared on the competency survey instrument.

Table 12

Attributes for Systems Approach to Instructional Design Competency Area With Respect to Respect Respondent ID

Attribute 4

Construct the elements of a lesson on the basis of a model which represents a systematic approach to teaching and learning

Respondent ID	Number of Respondents	Mean of Importance Value
Supervisor	58	3.879
Expert	22	4.591
Total----->	80	

Attribute 6

Apply the basics of computer assisted instruction (CAI), and apply its meaning and function to educational practice

Respondent ID	Number of Respondents	Mean of Importance Value
Supervisor	58	3.603
Expert	22	4.182
Total----->	80	

Table 12 (continued)

Attribute 7

Develop and design a variety of alternate teaching strategies using the computer and other electronic technologies

Respondent ID	Number of Respondents	Mean of Importance Value
Supervisor	58	3.879
Expert	22	4.364
Total----->	80	

Attribute 8

Design, construct, and validate a self-instructional module

Respondent ID	Number of Respondents	Mean of Importance Value
Supervisor	58	3.190
Expert	22	3.955
Total----->	80	

The experts scored higher on all of the attributes in table 12 as opposed to the supervisors, but since many of their assessments reflected an administrative point of view, it is reasonable that they would favor activities with a research and/or instructional design emphasis.

Overall, the experts scored almost every single competency attribute higher than the supervisors thereby assigning a higher importance to each. This is direct opposition to the findings of Lacina (1984) who discovered that college program directors scored seventeen of the twenty items tested to be lower in perceived importance value than computer coordinators.

Chapter V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary and Conclusions

The purpose of this study was to identify the perceived relative importance of a set of professional competencies required for the successful coordination and/or integration of educational technologies in the public school districts of Pennsylvania.

According to Allen, Dodge and Saba (1989), the "convergent technologies" (p. 47) made possible by computerized digital processing, have created the need for a new breed of supervisor with expertise in various areas of educational technology. Berbeckar, (1986); Waggoner and Goldberg, (1986); Dana, Warner and Dames, (1987); Hutchenson and Rankin (1989); and ISTE (1993) implied in their investigations that educational technology supervisors require many of the following special skills to carry out their duties and responsibilities: (1) curriculum construction; (2) educational administration; (3) design, production, and evaluation of instructional materials and/or programs; (4) media utilization for education (i.e. telecommunications, computers); (5) library and information science; (6) areas of psychology (including

cognitive psychology) and sociology (with diffusion and adoption of innovations); and (7) instructional systems design. Berbeckar described the "desirable" educational technologist as an "individual who possesses extraordinary qualities" [with] "ample theoretical knowledge and practical educational experience" (p. 99).

This study found the typical district-level educational technology supervisor to be a male (69%) who is (or was) a mathematics, science, or elementary teacher for an average of fourteen years. He has been a professional educator for approximately twenty four years and has earned a master's degree (71%). He spends the majority of his time training teachers to use technology and evaluating, recommending and purchasing software and hardware. He performs administrative tasks, conducts research, attends conferences and seminars, and provides support for integration of technology into the district's curricula.

This study determined that many of the skill and knowledge areas mentioned above are indispensable to technology supervisors in the school districts of Pennsylvania. A total of eighty two competency items were identified, synthesized, and categorized into ten competency areas using material from the literature.

This represents a broader scope of competencies than earlier studies. The competency areas are as follows:

1. Technical Competencies
2. Historical/Social Impact Competencies
3. Interactive/Multimedia Competencies
4. Library/Information Science Competencies
5. Research Competencies
6. Selection and Utilization/Integration Competencies
7. Mass Communications Competencies
8. Systems Approach to Instructional Design Competencies
9. Evaluation of Media and Computers for Instruction Competencies
10. Resource Management and/or Administration Competencies

In answering research question one, "What is the relative importance, perceived by supervisors, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies in the public school districts of Pennsylvania?", it was discovered that the competency areas of greatest perceived importance for supervisors ($\underline{M}$ = 4.000 to 5.000)

were in Resource Management and/or Administration, and Selection and Utilization/Integration. These two areas consist of student/teacher-based activities familiar to most supervisors who had been classroom teachers. Furthermore, this orientation is consistent with what Kerr (1989) described as "the teacher's view of technology" (p. 8).

The next perceived most important areas for supervisors ($\underline{M}$ = 3.000 to 4.000) were curriculum oriented. Systems Approach to Instructional Design, Research, Historical/Social Impact, and Library/Information Science competencies were considered to be tools in the integration of computers and other technologies in the curriculum. This finding supports Chen (1984) who concluded that "practicing secondary school teachers and principals feel a critical need to develop and/or improve skills in educational computing" (p. 114).

Mass Communications, Interactive/Multimedia, Evaluation of Media and Computers for Instruction, and Technical competency areas exhibited lower levels of perceived importance for supervisors. Similar findings by Chen (1984) indicated that several items of an equivalent nature showed levels of "moderate importance"

and "may be needed" (p. 116). Technical competencies were perceived particularly low in importance both in this study and in the Chen study. Supervisors are still very intimidated by the idiosyncrasies, incompatibilities, and outright failures of educational technology hardware. Many former teachers harbor fears of helplessness at the failure of a device or system and are therefore unwilling to attempt corrective measures, preferring to turn such responsibilities over to another expert or a technician. In the Berbeckar (1986) study, one respondent's anecdotal comment was "...educational technologists should refuse to fix equipment - that is the job of the technician" (p. 102). According to Ernest (1982), many of these feelings are remnants from teaching years but can be overcome with greater "exposure to and familiarity with" (p. 20) the technology.

The answer to research question two provided a comparison of the relative importance, perceived by supervisors, of competencies required by school personnel to coordinate and/or direct the integration of educational technologies among the four categories of school district population ranges listed in Table 7. Although results of the MANOVA procedure showed no overall significance of mean difference among the ten

competency areas and four population groups tested, there was a significant mean difference of perception noted in one of the univariate F-tests performed on the Systems Approach to Instructional Design competency area. A post-hoc MANOVA of the eight attributes in the Systems Approach to Instructional Design area showed no overall significance among the four population groups tested. Once again looking at the univariate F-tests for each of the eight competency attributes within the area, four of them (1,2,3, and 7) were significantly different. The significance appeared to be the result of means expressed by population category two, showing a mean value approximately five tenths of a point lower than the means of categories 1,3, and 4 on all four of the attributes listed in Table 8. Why the disparity exists is unknown and is not within the scope of this study.

The analysis of research question three revealed that experts considered 51% of the competency attributes surveyed to be in the "very important" to "critically important" (M = 4.000 to 5.000) range. A wide variety of competency areas were included in this range represented by nine out of the ten areas. The greater number of competency areas included Selection and Utilization/Integration, Systems Approach to

Instructional Design, Resource Management and/or Administration, Historical/Social Impact, and Evaluation of Media and Computers for Instruction. These results are consistent with Chen's (1984) findings of 49% of respondents placing similar items in the "extremely important" to "mandatory" range (p. 114).

Thirty-four percent of the 82 competency attributes were placed in the "important" to "very important" ($\underline{M}$ = 3.000 to 4.000) range. Only four appeared in the "somewhat important" to "important" ($\underline{M}$ = 2.000 to 3.000) range. One competency attribute was considered "not important" to "somewhat important." As above, the representative distribution of skills deemed important at the $\underline{M}$ = 3.000 to 4.000 level were widespread, including all ten of the competency areas surveyed. Selection and Utilization/Integration, Research, and Mass Communications were the most frequently cited competency areas in the category of "important" to "very important". Once again, these results are consistent with Chen's (1984) findings where 51% of respondents placed similar items in the middle range of importance. Lacina (1984) found evaluation of software and computer assisted instruction to be in the higher categories of importance in her study.

The final five items were categorized in the "not important" to "somewhat important" range. Three of five were in Evaluation of Media and Computers for Instruction area and two were Technical attributes. Chen listed the same two technical items: "possess some knowledge of main frame computers, local area networks, and their operations" and "possess some background in electronics and logic circuitry" in his "not important" or "not needed" category (p. 119). The three remaining Evaluation of Media and Computers for Instruction items all dealt with computer languages and programming. These items were perceived low in importance value because the general trend in teacher education has been toward computer applications and away from programming activities (Lacina, 1984).

Research question four was answered by generating a comparison between the perceptions of supervisors and the perceptions of experts on the relative importance of competency areas and their associated attributes. A MANOVA which tested the hypothesis of no overall difference between the perceptions of experts and supervisors indicated no significance and therefore resulted in acceptance of the hypothesis.

Appendix E.01 lists the combined mean rank of all 82 competency attributes as well as the assignment of rank given each attribute by both supervisors and experts. Furthermore, the table was broken down into individual competency areas to get an idea of relative differences in rank order with respect to area (Appendix E.02 - E.12).

Although experts consider more items in ranges of greater importance than did supervisors, they perceived the importance of almost every competency attribute to be at higher levels across the board. Lacina (1984) found opposite results in her study. This study may reflect a change of attitude on the part of present day teacher preparation program directors to address technology integration more aggressively.

Most of the importance ranking by supervisors and experts followed the same trend (Appendix E.01). For example, supervisors ranked Systems Approach to Instructional Design, Selection and Utilization/Integration, and Resource Management and/or Administration areas among the most important overall. By the same token, the Technical area was regarded as "not important" by both groups.

There were, however, some individual competency attributes on which opinion of importance varied greatly. Supervisors ranked combined rank item fifteen (Appendix E.01) "construct the elements of a lesson on the basis of a model which represents a systematic approach to teaching and learning" twenty-seventh overall while experts ranked it second. Supervisors ranked combined rank item twenty-two "use sources of information about technology for professional development (i.e. journals, associations, seminars, conferences and on-line services)" thirty-third while experts ranked it fifth. The item that supervisors ranked fifth was: "employ management systems and methods that use spread sheets, data bases, and word processors on the computer." Other combined rank items on which supervisors and experts differed widely were 32, 33, 35, 37, 47 and 52. Many of the wide perception discrepancies may be the result of the halo effect described by McCutcheon (1984) where respondents complete a survey "...in a manner that would best enhance their self-image" (p. 112)

In spite of perception variations by respondents on the rank order of surveyed competency areas and attributes, the supervisor and expert mean perceptions agreed, more often than not, on most items. The

literature indicates that both convergent and parallel thinking are required to provide stability for the difficult task of integrating technology into the realm of education.

Recommendations

It is recommended that competencies listed in Appendix E.01 with combined levels of importance of $\underline{M}$ = 3.500 or greater be used as guidelines for school district technology supervisor position descriptions. It is further recommended that school districts use the results of this study to base content decisions for inservice education efforts on the part of their teachers, supervisors, and administrators.

Because expert respondents from schools of education have favorably agreed with the importance of the competency areas and attributes as presented, it is recommended that the findings of this study be embodied into teacher preparation programs as a basis for preservice experiences (Thomas, 1991).

Based on the findings of this study, it is recommended that the Pennsylvania Department of Education include data from this study as part of a new certificate or category of certificates for educational technology

supervisors and/or coordinators. It is further recommended that the study findings be used as a guide for future certification needs such as upgrading current certification in content areas to include an educational technology component (Lacina, 1984; ISTE, 1993).

If this study is replicated it is recommended that a more comprehensive sample of supervisors and experts be selected. Although the persons selected for this study were outstanding with respect to academic preparation and experience in education, a larger and more equally numbered sample of each group will provide a greater potential for statistical significance.

If this study is replicated it is recommended that the instrument be made more concise and shortened in length. A different kind of measurement scale should be used that would ask respondents to indicate how much time they spend on each attribute, instead of an importance value. This may help to eliminate some of the suspected halo effect. Furthermore, a more definitive method of statistical categorization of competencies into areas should be applied since none of the studies conducted thus far had done so.

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Appendix A

A.001 Random Numbers for Four Population Groups

RUN RANDOM 1-125

42	12	99	117	56	15	65
113	70	104	29	103	30	122
119	66	97	14	58	3	79
64	85	120	31	108	21	106
54	32	101	36			

RUN RANDOM 126-250

125	224	240	183	232	147	144
186	194	182	220	128	146	222
172	136	176	236	168	212	247
150	249	185	187	208	139	196
129	202	184	237			

RUN RANDOM 251-375

285	296	363	255	346	282	314
340	305	297	337	274	287	343
347	289	301	374	253	334	308
335	359	356	269	263	323	350
360	352	317	339			

RUN RANDOM 376-500

419	473	386	466	413	393	437
462	492	454	424	471	481	453
482	486	490	404	442	476	410
415	429	487	406	436	472	421
445	427	418	479			

A.01 Supervisor Cover Letter

Lehigh University
Educational Technology Center
111 Research Drive MTC-A
Bethlehem, PA 18015-4793
September 2, 1992

Supervisor
School District
City, Pennsylvania Zip

Dear Supervisor:

I am requesting your voluntary participation in the dissertation study of one of my graduate students in the Educational Technology program at Lehigh University. The doctoral student, Jamie Kline, is conducting this study to identify the competencies perceived by district level supervisors, to be essential for school personnel who supervise and/or direct the integration of educational technologies in the public school districts in Pennsylvania.

Please designate the appropriate district-level person responsible for supervision and/or direction of district-level educational technology, to complete the enclosed survey instrument. Despite its length, the questionnaire has been designed in such a way that it can be quickly completed. Please advise the designee to enclose the completed questionnaire in the envelope provided by October 24, 1992. Upon conclusion of this study, results will be made available to you.

Your cooperation in fulfilling this request will be greatly appreciated.

Sincerely,

Dr. Leroy Tuscher

A.02 Supervisor Demographic Instrument

ID #_____

1. Your occupational title:_____

   _____

2. Certification:

   Please indicate below which type of Pennsylvania teaching certificate(s) you currently hold, the level (I or II), the certification area(s) (math, science, etc) and the number of years you served under each:

	Certificate	Level	Areas	Years
a.	Instructional	____	_____	____
b.	Vocational	____	_____	____
c.	Specialist	____	_____	____
d.	Supervisory or Administrative	____	_____	____
e.	School Program Specialist	____	_____	____
f.	Other_____	____	_____	____

3. Indicate how many years of professional experience you have in education as follows:

   a._____ years as a professional educator
   b._____ years as an educational technology supervisor/coordinator

4. Indicate the percentage of time you spend in each major occupational activity:

   a._____% teaching (specify content area) _____
   b._____% faculty/staff development
   c._____% administration
   d._____% audio-visual media
   e._____% library/media specialist
   f._____% technology coordinator/director
   g._____% other (please specify): _____

5. Indicate the highest degree attained, the type (PhD, MEd, etc), your major area of study.

	Highest Degree	Type	Major
a.	HS Diploma	_____	_____
b.	Bachelors	_____	_____
c.	Masters	_____	_____
d.	Doctorate	_____	_____
e.	Other_____	_____	_____

6. Educational technology courses taken. Please indicate the course, the type of credit (i.e. inservice, university, etc), and number of credits earned.

	Name of Course	Credit Type	Credits
a.	_____	_____	_____
b.	_____	_____	_____
c.	_____	_____	_____
d.	_____	_____	_____
e.	_____	_____	_____

7. We feel it will help this study if we know the percentages of men and women involved in the integration of educational technologies in the school districts. If you agree please indicate your gender below:

Male_____ Female_____

A.03 Expert Cover Letter

Lehigh University
Educational Technology Center
111 Research Drive MTC-A
Bethlehem, PA 18015-4793
September 2, 1992

Expert
School District
City, Pennsylvania Zip

Dear Expert:

I am requesting your participation in the dissertation study of one of my graduate students in the Educational Technology program at Lehigh University. The doctoral student, Jamie Kline, is conducting a study to identify the competencies perceived by experts in the field of educational technology to be essential for school personnel who supervise and/or direct the integration of educational technologies.

Despite its length, the questionnaire has been designed in such a way that it can be quickly completed. Please return the completed questionnaire in the envelope provided by October 24, 1992. Upon conclusion of this study, results will be made available to you.

Your cooperation in fulfilling this request will be greatly appreciated.

Sincerely,

Leroy J. Tuscher, Director
Educational Technology Center

A.04 Expert Demographic Instrument

ID #_____

1. Your occupational title:_____

_____

2. Certification:

Please indicate below which type of Pennsylvania teaching certificate(s), if any, you currently hold, the level (I or II), the certification area(s) (math, science, etc) and the number of years you served under each:

	Certificate	Level	Areas	Years
a.	Instructional	____	_____	____
b.	Vocational	____	_____	____
c.	Specialist	____	_____	____
d.	Supervisory or Administrative	____	_____	____
e.	School Program Specialist	____	_____	____
f.	Other_____	____	_____	____

3. Indicate how many years of professional experience you have in education as follows:

a._____ years as a professional educator
b._____ years of educational technology experience

4. Indicate the percentage of time you spend in each major activity:

a._____% teacher supervisor (specify content area) _____
b._____% faculty/staff development
c._____% administration/supervision instruction
d._____% audio-visual media instruction
e._____% library/media instruction
f._____% technology coordinator/director
g._____% other (please specify): _____

5. Indicate the type degree attained (PhD, MEd, etc) and your major area of study.

	Highest Degree	Type	Major
a.	HS Diploma	_____	_____
b.	Bachelors	_____	_____
c.	Masters	_____	_____
d.	Doctorate	_____	_____
e.	Other_____	_____	_____

6. Educational technology courses taught. Please indicate the course, the type of credit (i.e. graduate, inservice, etc), and number of credits earned on completion of the course.

	Name of Course	Credit Type	Credits
a.	_____	_____	_____
b.	_____	_____	_____
c.	_____	_____	_____
d.	_____	_____	_____
e.	_____	_____	_____
f.	_____	_____	_____
g.	_____	_____	_____

7._____ We feel it will help this study if we know the percentages of men and women involved in providing teachers with educational technology experiences in teacher preparation programs. If you agree please indicate your gender below:

Male_____ Female_____

A.05 Competency Instrument

This portion of the survey instrument is designed to determine your perceptions of which duties and responsibilities are most important for the position of district-level technology supervisor. Please indicate the relative importance by circling the appropriate number based on the scale below.

1. Not Important
2. Somewhat Important
3. Important
4. Very Important
5. Critically Important

I. Technical Competencies

A. Technical competencies are described by (but not limited to) the following items. Indicate the relative importance of each of the following technical competency attributes.

Supervisors should:

1.	be able to operate, most common types of A/V equipment such as projectors, tape recorders, disc players and cameras.	**1 2 3 4 5**
2.	be able to perform simple maintenance operations such as replacing bulbs.	**1 2 3 4 5**
3.	be able to set up, operate, and maintain all types of computer hardware and make recommendations concerning system configurations including networking.	**1 2 3 4 5**
4.	possess some experience with systems analysis to provide for the most effective, trouble-free operation.	**1 2 3 4 5**
5.	possess some background in electronics and logic circuitry.	**1 2 3 4 5**
6.	possess some knowledge of main frame computers, local area networks, and their operations.	**1 2 3 4 5**

7.	solve simple computer related problems such as printers not on line, booting up, etc.	1	2	3	4	5
8.	demonstrate functional knowledge of technical terminology associated with educational computing and technology.	1	2	3	4	5
B.	Overall, indicate the relative importance of having technical competencies in your occupation.	1	2	3	4	5

II. Historical/Social Impact Competencies

A. Historical/social impact competencies are described by (but not limited to) the following items. Indicate the relative importance of each of the following historical/social impact competency attributes.

Supervisors should be able to:

1.	discuss the uses of computers and other technologies in business, industry, and society.	1	2	3	4	5
2.	determine the impact of media on learners from a psychological perspective.	1	2	3	4	5
3.	assess the complexity of introducing educational change into the system through technology.	1	2	3	4	5
4.	understand the influence of the computer, its impact on modern society, and its future trends.	1	2	3	4	5
5.	recognize the capabilities and limitations of a computer and the misleading myths and misconceptions associated with it.	1	2	3	4	5
6.	associate automation and artificial intelligence issues with teaching.	1	2	3	4	5
7.	discuss privacy, security, and moral issues resulting from the widespread use of computers.	1	2	3	4	5

8. provide career guidance and information through the use of computers. 1 2 3 4 5

B. Overall, indicate the relative importance of having historical/social impact competencies in your occupation: 1 2 3 4 5

III. Interactive/Multimedia Competencies

A. Interactive/Multimedia competencies are described by (but not limited to) the following items. Indicate the relative importance of each of the following Interactive/Multimedia competency attributes.

Supervisors should:

1. be able to integrate the computer with other A/V instructional media, such as videodiscs, video tapes, animation, still images, 3D models etc., for more efficient, meaningful instruction. 1 2 3 4 5

2. be able to describe the basic operation of an interactive multimedia workstation and how it can affect conditions of teaching and learning. 1 2 3 4 5

3. be knowledgeable regarding the use of computers with authoring languages (such as QUEST, PILOT, MediaScript, etc.) to facilitate lesson design for individualized instruction. 1 2 3 4 5

4. be able to render advice regarding the use of computer assisted/managed technologies for special needs instruction (ie.handicapped, gifted). 1 2 3 4 5

5. incorporate computer applications with networking to promote instructional interaction. 1 2 3 4 5

B. Overall, indicate the relative importance of having interactive/multimedia competencies in your occupation: 1 2 3 4 5

IV. Library/Information Science Competencies

A. Library/information science competencies are described by (but not limited to) the following items. Indicate the relative importance of the following library/information science competency area attributes

Supervisors should:

1.	be able to explain rights, limitations, and responsibilities of users of copyrighted material as outlined in the Copyright Law.	1	2	3	4	5
2.	have a detailed understanding of the principles of information processing, its contribution to teaching in general and specific subject areas.	1	2	3	4	5
3.	possess skills in data storage/retrieval which would make information immediately available for instructional purposes and productivity enhancement.	1	2	3	4	5
4.	have knowledge of data bases and the importance of standardization of documentation.	1	2	3	4	5

B. Overall, indicate the relative importance of library/information science competencies in your occupation: 1 2 3 4 5

V. Research Competencies

A. Research competencies are described by (but not limited to) the following items. Indicate the relative importance of the following research competency area attributes

Supervisors should be able to:

1.	interpret the adequacy of research findings in education.	1	2	3	4	5
2.	develop, and use behavioral models to improve the integration of technologies for instruction.	1	2	3	4	5

3.	effectively utilize the computer to perform statistical analysis of data collected from regular classes and to interpret the results.	1 2 3 4 5
4.	administer tests through the use of the computer to insure a bias-free test environment for students.	1 2 3 4 5
5.	develop programs in the school district which benefit research for development of new approaches to instruction using technology.	1 2 3 4 5
6.	develop survey instruments to determine effectiveness of instruction using technology.	1 2 3 4 5
7.	evaluate the effectiveness of an instructional computer program.	1 2 3 4 5
8.	devise and employ validation procedures for teacher-made and commercially prepared materials.	1 2 3 4 5
9.	use sources of information about technology for professional development (i.e. journals, associations, seminars, conferences and on-line services).	1 2 3 4 5
10.	assess media utilization procedures in terms of student growth and achievement according to specified instructional objectives.	1 2 3 4 5
B.	Overall, indicate the relative importance of having research competencies in your occupation.	1 2 3 4 5

VI. Selection and Utilization/Integration Competencies

A. Selection and utilization/integration competencies are described by (but not limited to) the following items. Indicate the relative importance of the following selection and utilization/integration competency area attributes

Supervisors should be able to:

1.	effectively utilize the computer as an instructional aid, and to develop basic skills such as keyboarding.	1	2	3	4	5
2.	develop strategies for utilizing visual literacy skills for a specified group of learners.	1	2	3	4	5
3.	recommend applications of the computer to motivate student learning.	1	2	3	4	5
4.	integrate computerized teaching materials into a course to enrich instructional programs.	1	2	3	4	5
5.	use instructional games and simulations appropriately and effectively in teaching.	1	2	3	4	5
6.	develop students' abstract reasoning ability and general problem-solving skills through computer studies.	1	2	3	4	5
7.	identify software resources for teaching students how to select applications to solve academic and daily living problems.	1	2	3	4	5
8.	have a basic understanding of computer aided design/manufacturing (CAD/CAM).	1	2	3	4	5
9.	have knowledge and skills in computer assisted/managed instruction (CAI/CMI).	1	2	3	4	5
10.	identify sources of educational materials including computer software and videodiscs.	1	2	3	4	5

11. verify the appropriateness of educational materials for a specified teaching/learning situation by analyzing sophistication, cost, availability and technical quality. **1 2 3 4 5**

B. Overall, indicate the relative importance of having selection and utilization/integration competencies in your occupation. **1 2 3 4 5**

VII. Mass Communications Competencies

A. Mass communications competencies are described by (but not limited to) the following items. Indicate the relative importance of the following mass communications competency area attributes

Supervisors should be able to:

1. analyze the impact of mass media (TV, radio, newspapers, etc.) on society, schools, and students. **1 2 3 4 5**

2. identify, analyze, and utilize nonverbal forms of communication. **1 2 3 4 5**

3. define components of the communication process and identify factors which enhance accurate transmission of messages. **1 2 3 4 5**

4. demonstrate an understanding of current and expected developments in the satellite, telecommunications and computer technologies. **1 2 3 4 5**

5. display functional knowledge of telecommunications tools and resources. **1 2 3 4 5**

6. display functional knowledge of utilization of telecommunications for information sharing, remote information access and retrieval, broadcast resources, and distance learning. **1 2 3 4 5**

B. Overall, indicate the relative importance of having mass communications competencies in your occupation. **1 2 3 4 5**

VIII Systems Approach to Instructional Design Competencies

A. Systems approach to instructional design competencies are described by (but not limited to) the following items. Indicate the relative importance of the following systems approach to instructional design competency area attributes

Supervisors should be able to:

1. formulate educational goals and learning objectives which specify student outcomes, achievements, and evaluations. **1 2 3 4 5**

2. formulate objectives and strategies for utilizing educational technologies in teaching/learning situations. **1 2 3 4 5**

3. utilize the three domains of learning (cognitive, affective, psychomotor) when developing technology-based instruction. **1 2 3 4 5**

4. construct the elements of a lesson on the basis of a model which represents a systematic approach to teaching and learning. **1 2 3 4 5**

5. design teaching/learning strategies for incorporating the use of technologies with a specified group of learners (ie. handicapped). **1 2 3 4 5**

6. apply the basics of computer assisted instruction (CAI), and apply its meaning and function to educational practice. **1 2 3 4 5**

7. develop and design a variety of alternate teaching strategies using the computer and other electronic technologies. **1 2 3 4 5**

8. design, construct, and validate a self-instructional module. **1 2 3 4 5**

B. Overall indicate the relative importance of having systems approach to instructional design competencies in your occupation. **1 2 3 4 5**

IX. Evaluation of Media and Computers for Instruction Competencies

A. Media and computers for instruction competencies are described by (but not limited to) the following items. Indicate the relative importance of the following evaluation of media, computers, and instruction competency area attributes

Supervisors should be able to:

1. describe the major characteristics and appropriate teaching/learning situations for computer assisted instruction. **1 2 3 4 5**

2. produce instructional media such as graphics, video recordings slides and transparencies etc for a specified learning objective, with evidence of technical quality. **1 2 3 4 5**

3. identify and demonstrate the elements of composition in the preparation of visuals. **1 2 3 4 5**

4. direct and assist teachers and students in preparation of their own media. **1 2 3 4 5**

5. devise media presentations to accompany commercial programs or textbooks. **1 2 3 4 5**

6. make necessary modifications in existing computer programs to meet instructional needs. **1 2 3 4 5**

7. effectively use the computer for diagnosis and remediation of learning problems. **1 2 3 4 5**

8. apply computer graphics techniques as needed to teach specific subjects. **1 2 3 4 5**

9.	display functional knowledge of at least one programming language and the ability to compare languages commonly used in education (i.e. structured BASIC, Logo, and/or Pascal).	**1 2 3 4 5**
10.	design, implement, and evaluate instructional materials which use the computer.	**1 2 3 4 5**
11.	display functional knowledge of program verification and debugging techniques	**1 2 3 4 5**
12.	display functional knowledge of structured programming concepts and design of algorithms.	**1 2 3 4 5**
B.	Overall, indicate the relative importance of having evaluation of media and computers for instruction competencies in your occupation:	**1 2 3 4 5**

X. Resource Management and/or Administration Competencies

A. Resource management and/or administration competencies are described by (but not limited to) the following items. Indicate the relative importance of the following evaluation of resource management and/or administration competency area attributes

Supervisors should be able to:

1.	describe the role of an educational technology supervisor in providing services for classroom teachers.	**1 2 3 4 5**
2.	apply the computer to administrative tasks such as attendance, grades, and student records).	**1 2 3 4 5**
3.	employ management systems and methods that use spread sheets, data bases, and word processors on the computer.	**1 2 3 4 5**
4.	maintain organization, management, security, and inventory of supplies and equipment.	**1 2 3 4 5**

5.	effectively budget the use of internal and external funding to purchase technology hardware and software.	1	2	3	4	5
6.	write grant proposals to effectively compete for available public and private resources.	1	2	3	4	5
7.	effectively interpret and/or write policy for technology integration and modernization.	1	2	3	4	5
8.	describe procedures of basic utilization plans (select, preview, use, follow-up, and evaluate) for educational media.	1	2	3	4	5
9.	address problems of equal access and scheduling for technology use.	1	2	3	4	5
10.	design and implement staff development programs for effective orientation, training, and skills upgrade in the use of technologies.	1	2	3	4	5
B.	Overall, indicate the relative importance of having resource management and/or administration competencies in your occupation:	1	2	3	4	5

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A.06 Teacher Preparation Institutions Represented by Expert Population

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Clarion University of Pennsylvania
Clarion, PA 16214

Dr. David Crossman, Professor of Education
College of Education
University of Pittsburgh
Pittsburgh, PA 15260

Dr. Henry Dobson, Professor of Education
Dept. of Curriculum/Foundations
Bloomsburg University of Pennsylvania
Bloomsburg, PA 17815

Dr. Chick Empfield, Professor of Education
College of Education & Human Services
Lock Haven University
Lock Haven, PA 17745

Dr. Terry Giffel, Professor of Education
School of Professional Studies
East Stroudsburg University
East Stroudsburg, PA 18301

Dr. Bob Gray, Professor of Education
Dept. of AV Communications
Kutztown University
Kutztown, PA 19530

A.06 Teacher Preparation Institutions Represented by Expert Population (continued)

Dr. Gail Grejda, Professor of Education
College of Education & Human Services
Clarion University of Pennsylvania
Clarion, PA 16214

Dr. James Hamilton, Professor of Education
College of Education & Human Services
Lock Haven University
Lock Haven, PA 17745

Dr. Janice Handler, Professor of Education
College of Education
Indiana University of Pennsylvania
Indiana , PA 15705

Dr. Elizabeth Joseph, Professor of Education
College of Professional Studies
Slippery Rock University of Pennsylvania
Slippery Rock, PA 17870

Dr. Denise Keltz, Professor of Education
Education Department
Alvernia College
Reading, PA 19607

Dr. Paul Kornfeld, Professor of Education
College of Education
Indiana University of Pennsylvania
Indiana , PA 15705-1087

Dr. Denise LePage, Professor of Education
School of Professional Studies
East Stroudsburg University
East Stroudsburg, PA 18301

A.06 Teacher Preparation Institutions Represented by Expert Population (continued)

Dr. Lynn Milet, Director of Media Services
Fairchild/Martindale Library #8
Lehigh University
Bethlehem, PA 18015

Dr. Boyd Fox, Professor of Education
Department of Education
Elizabethtown College
Elizabethtown, PA 17022

Dr. Kyle Peck, Professor of Education
College of Education
The Pennsylvania State University
University Park, PA 16802

Dr. Donald Pratt, Professor of Education
Dept. of Curriculum/Foundations
Bloomsburg University of Pennsylvania
Bloomsburg, PA 17815

Dr. George Ristvey, Professor of Education
Department of Professional Studies
Edinboro University
Edinboro, PA 16444

Dr. Elton Robertson, Professor of Education
College of Education, Department of Ed Media
Temple University
Philadelphia, PA 19122

Dr. Charles Roth, Professor of Education
College of Education, Deptartment of AV Comm.
Kutztown University
Kutztown, PA 19530

A.06 Teacher Preparation Institutions Represented by Expert Population (continued)

Dr. Nancy Rumfield, Professor of Education
School of Education
West Chester University of Pennsylvania
West Chester, PA 19380

Dr. Daniel Shelley, Professor of Education
Department of Professional Studies
Edinboro University
Edinboro, PA 16444

Dr. Robert Siegfried, Director of Graduate Faculty
Department of Education
Rosemont College
Rosemont, PA 19010

Dr. Kathleen Smith, Chair
Education Department
Clarion University of Pennsylvania
Clarion, PA 16214

Dr. Joseph Spieker, Professor of Education
Dept. of Instructional Media
West Chester University of Pennsylvania
West Chester, PA 19380

Dr. Margaret Tassia, Chairperson
School of Education
Millersville University
Millersville, PA 17551

Dr. Frank Viggiano, Professor of Education
College of Education
Indiana University of Pennsylvania
Indiana, PA 15705

A.06 Teacher Preparation Institutions Represented by Expert Population (continued)

Dr. Paul Welliver, Professor of Education
College of Education
The Pennsylvania State University
University Park, PA 16802

Dr. Mark Wiener, Professor of Education
School of Education
West Chester University of Pennsylvania
West Chester, PA 19380

Dr. David Dunlop, Academic Dean/ITEC Director
College of Education
University of Pittsburgh at Johnstown
Johnstown, PA 15904

Dr. John Kerrigan, Professor of Education
Department of Education
West Chester University of Pennsylvania
West Chester, PA 19380

Dr. Kenneth Mechling, Chairman
Department of Biology & Education
Clarion University of Pennsylvania
Clarion, PA 16214

Dr. Donna Oliver, Professor of Education
Department of Education
Clarion University of Pennsylvania
Clarion, PA 16214

Dr. Terry Olivier, ITEC Director
Department of Education
Philadelphia College of Textiles and Science
Philadelphia, PA 19144-5497

A.06 Teacher Preparation Institutions Represented by Expert Population (continued)

Dr. Ward Cates, Professor of Education
School of Education
Lehigh University
Bethlehem, PA 18105-4793

Dr. Evelyn Werner, Acting Division Director
PDE Resource Center
Pennsylvania Department of Education
Harrisburg, PA 17126-0333

Dr. Donald Johnson, Professor of Education
College of Education
The Pennsylvania State University
University Park, PA 16802

Dr. James Randall, Professor of Education
Center for Education
Widener University
Chester, PA 19013

Dr. George Ristvey, Professor of Education
Department of Professional Studies
Edinboro University
Edinboro, PA 16444

Dr. John Sweeder, Professor of Education
Department of Education
LaSalle University
Philadelphia, PA 19141

Dr. Al Nous, Director ITEC Center
College of Education
University of Pittsburgh
Pittsburgh, PA 15260

A.07 Reminder Letter

Lehigh University
Educational Technology Center
111 Research Drive MTC-A
Bethlehem, PA 18015-4793
30 October 1992

Expert/Supervisor
School District/Institution
City, Pennsylvania Zip

Dear Expert/Supervisor:

Approximately three weeks ago a survey instrument was sent to you to get your perceptions of the importance of competencies believed to be necessary for educational technology supervisors to perform their duties and responsibilities. Since we have not received your response to this date, could I impose once again on your time to complete the instrument sent to you and return it by November 24, 1992?

We need and appreciate your input to successfully complete our investigation and hope this will not be too much of an inconvenience. Thank you again for your help.

Sincerely,

Jamie J. Kline
Educational Technology Center
Lehigh University

Appendix B

B.01 Pilot Supervisor Cover Letter

Lehigh University
Educational Technology Center
111 Research Drive MTC-A
Bethlehem, PA 18015-4793
September 2, 1992

Supervisor
School District
City, Pennsylvania Zip

Dear Supervisor:

As director of the Educational Technology program at Lehigh University's College of Education, I am requesting your voluntary participation in the dissertation study of one of my students. The doctoral student, Jamie Kline, is conducting a **pilot** study to identify the competencies perceived by district-level practitioners to be essential for school personnel who coordinate and/or direct the integration of educational technologies in the public school districts in the Commonwealth of Pennsylvania. Data collected will be referenced only to your district and not to you personally. The results of the pilot study will be used to develop a final instrument to gather data from persons, such as yourself, across the Commonwealth of Pennsylvania.

We ask that you, as a district-level technology coordinator, please complete the enclosed copy of the pilot Competency Survey Instrument. Despite its length, the questionnaire has been designed in such a way that it can be quickly completed. It is very important for us to have your comments and recommendations regarding the competencies herein and/or changes in the design or layout of the instrument. Please enclose the completed questionnaire in the envelope provided by October 24, 1992. Upon conclusion of this study, results will be made available to you.

Your cooperation in fulfilling this request will be greatly appreciated.

Sincerely,

Dr. Leroy Tuscher

B.03 Pilot Supervisor Demographic Instrument

1. Your occupational title:_____

   _____

2. Certification:

   Please indicate below which type of Pennsylvania teaching certificate(s) you currently hold, the level (I or II), the certification area(s) (math, science, etc) and the number of years you served under each:

	Certificate	Level	Areas	Years
a.	Instructional	____	_____	____
b.	Vocational	____	_____	____
c.	Specialist	____	_____	____
d.	Supervisory or Administrative	____	_____	____
e.	School Program Specialist	____	_____	____
f.	Other_____	____	_____	____

3. Indicate how many years of professional experience you have in education as follows:

   a._____ years as a professional educator
   b._____ years as an educational technology coordinator

4. Indicate the percentage of time you spend in each major occupational activity:

   a._____% teaching (specify content area) _____
   b._____% faculty/staff development
   c._____% administration
   d._____% audio-visual media
   e._____% library/media specialist
   f._____% technology coordinator/director
   g._____% other (please specify): _____

5. Indicate the highest degree attained, the type (PhD, MEd, etc), your major area of study.

	Highest Degree	Type	Major
a.	HS Diploma	_____	_____
b.	Bachelors	_____	_____
c.	Masters	_____	_____
d.	Doctorate	_____	_____
e.	Other_____	_____	_____

6. Educational technology courses taken. Please indicate the course, the type of credit (i.e. inservice, university, etc), and number of credits earned.

	Name of Course	Credit Type	Credits
a.	_____	_____	_____
b.	_____	_____	_____
c.	_____	_____	_____
d.	_____	_____	_____
e.	_____	_____	_____

Please attach a separate sheet if necessary to list additional courses or other information that you think may be pertinent to this pilot study. Thank You.

B.02 Pilot Expert Cover Letter

Lehigh University
Educational Technology Center
111 Research Drive MTC-A
Bethlehem, PA 18015-4793
September 2, 1992

Expert
Teacher Preparation Institution
City, Pennsylvania Zip

Dear Expert:

As director of the Educational Technology program in Lehigh University's College of Education, I am requesting your voluntary participation in the dissertation study of one of my students. The doctoral student, Jamie Kline, is conducting a **pilot** study to identify the competencies perceived by experts in the field of educational technology, to be essential for school personnel who coordinate and/or direct the integration of educational technologies in the public school districts.in the Commonwealth of Pennsylvania. Data collected will be referenced only to your institution and not to you personally. The results of the pilot study will be used to develop a final instrument to gather data from persons, such as yourself, across the Commonwealth of Pennsylvania.

We ask that you assume the role of expert and please complete the enclosed copy of the pilot Competency Survey Instrument. Despite its length, the questionnaire has been designed in such a way that it can be quickly completed. It is very important for us to have your comments and recommendations regarding the competencies herein and/or changes in the design or layout of the instrument as you see it. Please enclose the completed questionnaire in the envelope provided by October 24, 1992. Upon conclusion of this study, results will be made available to you.

Your cooperation in fulfilling this request will be greatly appreciated.

Sincerely,

Dr. Leroy Tuscher

B.04 Pilot Expert Demographic Instrument

1. Your occupational title:_____

   _____

2. Certification:

   Please indicate below which type of Pennsylvania teaching certificate(s), if any, you currently hold, the level (I or II), the certification area(s) (math, science, etc) and the number of years you served under each:

	Certificate	Level	Areas	Years
a.	Instructional	____	_____	____
b.	Vocational	____	_____	____
c.	Specialist	____	_____	____
d.	Supervisory or Administrative	____	_____	____
e.	School Program Specialist	____	_____	____
f.	Other_____	____	_____	____

3. Indicate how many years of professional experience you have in education as follows:

   a._____ years as a professional educator
   b._____ years of educational technology experience

4. Indicate the percentage of time you spend in each major activity:

   a._____% teacher supervisor (specify content area) _____
   b._____% faculty/staff development
   c._____% administration/supervision instruction
   d._____% audio-visual media instruction
   e._____% library/media instruction
   f._____% technology coordinator/director
   g._____% other (please specify): _____

5. Indicate the highest degree attained, the type (PhD, MEd, etc), your major area of study.

	Highest Degree	Type	Major
a.	HS Diploma	_____	_____
b.	Bachelors	_____	_____
c.	Masters	_____	_____
d.	Doctorate	_____	_____
e.	Other_____	_____	_____

6. Educational technology courses taught. Please indicate the course, the type of credit (i.e. Undergraduate, Graduate, etc), and number of credits.

	Name of Course	Credit Type	Credits
a.	_____	_____	_____
b.	_____	_____	_____
c.	_____	_____	_____
d.	_____	_____	_____
e.	_____	_____	_____

Please attach a separate sheet if necessary to list additional courses or other information that you think may be pertinent to this pilot study. Thank You.

B.04 Pilot Competency Instrument

This portion of the survey instrument is designed to determine which competencies are perceived by district level practitioners, and various experts from the field of educational technology, to be essential for school personnel who coordinate and/or direct the integration of educational technologies in the Commonwealth of Pennsylvania.

Please indicate the relative importance of the following attributes by circling the appropriate number based on the scale below.

1. Not Important
2. Somewhat Important
3. Important
4. Very Important
5. Critically Important

I. Technical Competencies

A. Technical competencies are described by (but not limited to) the following items.

1.	ability to operate, most common types of A/V equipment such as projectors, tape recorders, disc players and cameras.	**1**	**2**	**3**	**4**	**5**
2.	ability to perform simple maintenance operations such as replacing bulbs.	**1**	**2**	**3**	**4**	**5**
3.	ability to set up, operate, and maintain all types of computer hardware and make recommendations concerning system configurations including networking.	**1**	**2**	**3**	**4**	**5**
4.	have experience with systems analysis to provide for the most effective, trouble-free operation.	**1**	**2**	**3**	**4**	**5**
5.	possess some knowledge of electronics and logic circuitry.	**1**	**2**	**3**	**4**	**5**

6.	solve simple computer related problems such as printers not on line, booting up, etc.	1 2 3 4 5
7.	other:_____ _____	1 2 3 4 5
B.	Overall, indicate the relative importance of having technical competencies in your occupation.	1 2 3 4 5

II. Historical/Social Impact Competencies

A. Historical/social impact competencies are described by (but not limited to) the following items.

1.	analyze the impact of mass media (TV, radio, newspapers, etc.) on society, schools, and students.	1 2 3 4 5
2.	determine the impact of media on learners from a psychological perspective.	1 2 3 4 5
3.	assess the complexity of introducing educational change into the system through technology.	1 2 3 4 5
4.	understand the influence of the computer, its impact on modern society, and its future trends.	1 2 3 4 5
5.	recognize the capabilities and limitations of a computer and the myths and misconceptions associated with it.	1 2 3 4 5
6.	associate automation and artificial intelligence issues with teaching.	1 2 3 4 5
7.	discuss privacy, security, and moral issues resulting from the widespread use of computers.	1 2 3 4 5
8.	provide career guidance and information through the use of computers.	1 2 3 4 5
9.	other:_____ _____	1 2 3 4 5

B. Overall, indicate the relative importance of having historical/social impact competencies in your occupation: **1 2 3 4 5**

III. Interactive/Multimedia Competencies

A. Interactive/Multimedia competencies are described by (but not limited to) the following items. Indicate the relative importance of each of the following Interactive/Multimedia competency attributes.

1. integrate the computer with other A/V instructional aids, such as videodiscs, video tapes, animation, still images, etc., for more efficient, meaningful instruction. **1 2 3 4 5**

2. describe the basic operation of an interactive multimedia workstation and how it can affect conditions of teaching and learning **1 2 3 4 5**

3. use computers with authoring languages (such as QUEST, PILOT, MediaScript, etc.) to facilitate lesson design for individualized instruction. **1 2 3 4 5**

4. ability render advice regarding the use of computer assisted/managed technologies for special needs instruction (ie.handicapped, gifted). **1 2 3 4 5**

5. other:_____ **1 2 3 4 5**
_____

B. Overall, indicate the relative importance of having interactive/multimedia competencies in your occupation: **1 2 3 4 5**

IV. Library/Information Science Competencies

A. Library/information science competencies are described by (but not limited to) the following items. Indicate the relative importance of the following library/information science competency area attributes

1.	ability to explain rights, limitations and responsibilities of users of copyrighted material as outlined in the Copyright Law.	1	2	3	4	5
2.	ability to explain the principles of information processing, its contribution to teaching in general and specific subject areas.	1	2	3	4	5
3.	possess skills in data storage/retrieval which would make information immediately available for instructional purposes.	1	2	3	4	5
4.	have knowledge of data bases and the importance of standardization of documentation.	1	2	3	4	5
5.	other:_____ _____	1	2	3	4	5

B. Overall, indicate the relative importance of library/information science competencies in your occupation: 1 2 3 4 5

V. Research Competencies

A. Research competencies are described by (but not limited to) the following items. Indicate the relative importance of the following research competency area attributes

1.	utilize the computer to perform statistical analysis of data collected from regular classes and to interpret the results.	1	2	3	4	5
2.	develop and use behavioral models to improve the integration of technologies to instruction.	1	2	3	4	5
3.	administer tests through the use of the computer to insure a bias-free test environment for students.	1	2	3	4	5

4. develop programs in the school district which benefit research using new approaches to instruction through technology integration. 1 2 3 4 5

6. develop survey instruments to determine effectiveness of instruction using technology. 1 2 3 4 5

7. other:_____ 1 2 3 4 5
_____

B. Overall, indicate the relative importance of having research competencies in your occupation. 1 2 3 4 5

VI. Selection and Utilization/Integration Competencies

A. Selection and utilization/integration competencies are described by (but not limited to) the following items. Indicate the relative importance of the following selection and utilization/integration competency area attributes

1. integrate computerized teaching materials into a course to enrich instructional programs and motivate student learning. 1 2 3 4 5

2. develop strategies for utilizing visual literacy skills for a specified group of learners. 1 2 3 4 5

3. use instructional games and simulations appropriately and effectively in teaching. 1 2 3 4 5

4. incorporate computer applications with networking to promote instructional interaction. 1 2 3 4 5

5. develop students' abstract reasoning ability and general problem-solving skills through computer studies. 1 2 3 4 5

6. identify software resources for teaching students how to select applications to solve academic and daily living problems. 1 2 3 4 5

7.	evaluate the effectiveness of an instructional computer program.	1 2 3 4 5
8.	have a basic understanding of computer aided design/manufacturing (CAD/CAM).	1 2 3 4 5
9.	have knowledge and skills in computer assisted/managed instruction (CAI/CMI).	1 2 3 4 5
10.	identify sources of educational materials including computer software and videodiscs.	1 2 3 4 5
11.	other:_____ _____	1 2 3 4 5
B.	Overall, indicate the relative importance of having selection and utilization/integration competencies in your occupation.	1 2 3 4 5

VII. Mass Communications

A. Mass communications competencies are described by (but not limited to) the following items. Indicate the relative importance of the following mass communications competency area attributes

1.	identify, analyze, and utilize nonverbal forms of communication.	1 2 3 4 5
2.	define components of the communication process and identify factors which enhance accurate transmission of messages.	1 2 3 4 5
3.	demonstrate an understanding of current and expected developments in the satellite, telecommunications and computer technologies.	1 2 3 4 5
4.	other:_____ _____	1 2 3 4 5
B.	Overall, indicate the relative importance of having mass communications competencies in your occupation.	1 2 3 4 5

VIII. Systems Approach to Instructional Design

A. Systems approach to instructional design competencies are described by (but not limited to) the following items. Indicate the relative importance of the following systems approach to instructional design competency area attributes

1.	formulate educational goals and learning objectives which specify student outcomes, achievements, and evaluations.	1 2 3 4 5
2.	formulate objectives and strategies for utilizing educational technologies in teaching/learning situations.	1 2 3 4 5
3.	utilize the three domains of learning (cognitive, affective, psychomotor) when developing technology-based instruction.	1 2 3 4 5
4.	construct the elements of a lesson on the basis of a model which represents a systematic approach to teaching and learning.	1 2 3 4 5
5.	design teaching/learning strategies for incorporating the use of technologies with a specified group of learners (ie. handicapped).	1 2 3 4 5
6.	other:_____ _____	1 2 3 4 5

B. Overall indicate the relative importance of having systems approach to instructional design competencies in your occupation. 1 2 3 4 5

IX. Media and Computers, for Instruction

A. Media and computers, for instruction competencies are described by (but not limited to) the following items. Indicate the relative importance of the following evaluation of media, computers, and instruction competency area attributes

1.	apply as appropriate all current forms of instructional media such as still and motion pictures, video and audio recordings, 3D models, games, simulations and computer programmed instruction.	**1**	**2**	**3**	**4**	**5**
2.	assess media utilization procedures in terms of student growth and achievement according to specified instructional objectives.	**1**	**2**	**3**	**4**	**5**
3.	verify the appropriateness of educational materials for a specified teaching/learning situation by analyzing sophistication, cost, availability and technical quality.	**1**	**2**	**3**	**4**	**5**
4.	describe procedures of basic utilization plans (select, preview, use, follow-up, and evaluate) for educational media.	**1**	**2**	**3**	**4**	**5**
5.	devise and employ validation procedures for teacher-made and commercially prepared materials.	**1**	**2**	**3**	**4**	**5**
6.	describe the major characteristics and appropriate teaching/learning situations for computer assisted instruction.	**1**	**2**	**3**	**4**	**5**
7.	produce instructional media such as graphics, video recordings slides and transparencies etc for a specified learning objective, with evidence of technical quality:	**1**	**2**	**3**	**4**	**5**
8.	direct and assist teachers and students in preparation and validation of their own media.	**1**	**2**	**3**	**4**	**5**

9.	devise or modify media presentations to accompany commercial programs or textbooks.	1 2 3 4 5
10.	design, construct, and validate a self-instructional module.	1 2 3 4 5
11.	effectively use the computer for diagnosis and remediation of learning problems.	1 2 3 4 5
12.	other:_____ _____	1 2 3 4 5

B. Overall, indicate the relative importance of having media and computers, for instruction competencies in your occupation: 1 2 3 4 5

X. Resource Management and/or Administration

A. Resource management and/or administration competencies are described by (but not limited to) the following items. Indicate the relative importance of the following evaluation of resource management and/or administration competency area attributes

1.	describe the role of an educational technology specialist in providing services for classroom teachers.	1 2 3 4 5
2.	apply the computer to administrative tasks such as attendance, grades, and student records).	1 2 3 4 5
3.	use management systems and methods that use the computer such as spread sheets and data bases.	1 2 3 4 5
4.	maintain an inventory of supplies and equipment.	1 2 3 4 5
5.	effectively budget the use of internal and external funding.	1 2 3 4 5
6.	write grant proposals to effectively compete for available public and private resources	1 2 3 4 5

7.	effectively interpret and/or write policy for technology integration and use.	1 2 3 4 5
8.	design and implement a staff development programs for effective orientation and training in the use of technologies.	1 2 3 4 5
9.	other:_____ _____	1 2 3 4 5
B.	Overall, indicate the relative importance of having resource management and/or administration competencies in your occupation:	1 2 3 4 5

B.05 Pilot Pennsylvania School Districts

Mr. John Sopko, IMS Director
Colonial-Northampton Intermediate Unit 20
6 Danforth Driven PO Box 3060
Easton PA 18043-3060

Mr. Michael J. Tobias, IMS Director
Carbon-Lehigh Intermediate Unit 21
200 Orchard Road
Schnecksville PA 18078-9301

Mr Donald Horst, District-Wide Computer Coordinator
Bethlehem Area School District
Freedom High School
3149 Chester Avenue
Bethlehem PA 18017-2896

Mr. Danny Dieffender, Computer Coordinator
Northampton Area School District
School District Administration Building
1617 Laubach Avenue
Northampton PA 18067-0118

B.06 Pilot Teacher Preparation Institutions

Mr. Scott Garrigan, Instructor
Educational Technology Center
Lehigh University
111 Research Drive, MTC-A
Bethlehem PA 18015-4792

Mrs. Pricilla D'Annabale, Instructor
Education Department
Allentown College of St. Francis de Sales
Center Valley PA 18034

Appendix C

C.01: Number and Percentage of Respondents With Respect to District Population Category

District Population Category	Student Population Range	Number of Respondents	Percent of Total
1	3,470-13,577	18	31.0%
2	3,465-2,328	15	25.9%
3	1,486-2,327	14	24.1%
4	540-1,469	11	19.0%
Total--->	28,662	58	100.0%

C.02: Number and Percentage of Respondents With Respect to Type of Teaching Certificate Held

Type of Certificate	Number of Respondents	Percent of Total
Instructional	51	87.9
Supervisory	4	6.9
Vocational	1	1.7
Specialist	1	1.7
Other	1	1.7
Total-------->	58	100.0

C.03: Number and Percentage of Respondents With Respect to Content Area of Teaching Certificate

Content Area of Certificate	Number of Respondents	Percent of Total
Mathematics	12	20.7
Elementary Education	11	19.0
Science	10	17.2
English	7	12.1
Social Studies	6	10.3
Library	5	8.6
Secondary Education	3	5.2
Physical Education	1	1.7
None	3	5.2
Total------->	58	100.0

C.04: Number and Percentage of Respondents With Respect to Years of Teaching in Content Area

Years Teaching	Number of Respondents	Percent of Total	Cumulative Percent
0	2	3.4	3.4
3	4	6.9	10.3
5	8	13.8	24.1
6	1	1.7	25.9
8	2	3.4	29.3
9	2	3.4	32.8
10	4	6.9	39.7
11	1	1.7	41.4
12	2	3.4	44.8
13	3	5.2	50.0
14	1	1.7	53.4
16	2	3.4	56.9
17	4	6.9	63.8
18	2	3.4	67.2
19	2	3.4	70.7
20	5	8.6	79.3
22	1	1.7	81.0
23	1	1.7	82.8
24	1	1.7	84.5
25	1	1.7	86.2
26	2	3.4	89.7
27	2	3.4	93.1
28	1	1.7	94.8
30	1	1.7	96.6
32	2	3.4	100.0
Total--->	58	100.0	

C.05: Number and Percentage of Respondents With Respect to Years as a Professional Educator

Years as an Educator	Number of Respondents	Percent of Total	Cumulative Percent
0	1	1.7	1.7
5	1	1.7	3.4
6	1	1.7	5.2
12	2	3.4	8.6
15	1	1.7	10.3
16	1	1.7	12.1
17	2	3.4	15.5
18	3	5.2	20.7
19	4	6.9	27.6
20	3	5.2	32.8
21	1	1.7	34.5
22	4	6.9	41.4
23	6	10.3	51.7
24	2	3.4	55.2
25	3	5.2	60.3
26	1	1.7	62.1
27	4	6.9	69.0
28	2	3.4	72.4
29	1	1.7	74.1
30	4	6.9	81.0
31	2	3.4	84.5
32	1	1.7	86.2
33	1	1.7	87.9
34	3	5.2	93.1
35	1	1.7	94.8
37	1	1.7	96.6
38	1	1.7	98.3
42	1	1.7	100
Total--->	58	100.0	

C.06: Number and Percentage of Respondents With Respect to Years as a Technology Supervisor

Years as Supervisor	Number of Respondents	Percent of Total	Cumulative Percent
0	13	22.4	22.4
1	1	1.7	24.1
2	8	13.8	37.9
3	5	8.6	46.6
4	7	12.1	58.3
5	8	13.8	72.4
6	4	6.9	79.3
8	1	1.7	81.0
10	2	3.4	84.5
11	2	3.4	87.9
15	1	1.7	89.7
17	1	1.7	91.4
18	1	1.7	93.1
20	3	5.2	98.3
23	1	1.7	100.0
Total--->	58	100.0	

C.07: Number and Percentage of Respondents With Respect to Percent of Time Spent Teaching

Percent of Time Spent on Teaching Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	34	58.6	58.6
2	1	1.7	60.3
10	1	1.7	62.1
12	2	3.4	65.5
15	1	1.7	67.2
20	3	5.2	72.4
25	2	3.4	75.9
40	2	3.4	79.3
50	6	10.3	89.7
70	1	1.7	91.4
75	2	3.4	94.8
80	1	1.7	96.6
90	1	1.7	98.3
100	1	1.7	100.0
Total-->	58	100.0	

C.08: Number and Percentage of Respondents With Respect to Percent of Time Spent in Faculty-Staff Development

Percent of Time Spent on Faculty-Staff Development	Number of Respondents	Percent of Total	Cumulative Percent
0	26	44.8	44.8
4	1	1.7	46.6
5	4	6.9	53.4
10	11	19.0	72.4
15	3	5.2	77.6
18	1	1.7	79.3
20	5	8.6	87.9
25	1	1.7	89.7
30	1	1.7	91.4
40	1	1.7	93.1
50	1	5.2	98.3
100	1	1.7	100.0
Total-->	58	100.0	

C.09: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing Administrative Tasks

Percent of Time Spent on Administrative Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	18	31.0	31.0
2	1	1.7	32.8
5	2	3.4	36.2
8	1	1.7	37.9
10	1	1.7	39.7
15	1	1.7	41.4
20	3	5.2	46.6
25	3	5.2	51.7
30	1	1.7	53.4
40	1	1.7	55.2
45	1	1.7	56.9
50	1	1.7	58.6
60	2	3.4	62.1
70	2	3.4	65.5
72	1	1.7	67.2
75	3	5.2	72.4
76	1	1.7	74.1
80	2	3.4	77.6
90	2	3.4	81.0
97	1	1.7	82.8
100	10	17.2	100.0
Total-->	58	100.0	

C.10: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing Audio/Visual Media Related Tasks

Percent of Time Spent on A/V,Media Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	45	77.6	77.6
2	3	5.2	82.8
5	4	6.9	89.7
10	2	3.4	93.1
15	1	1.7	94.8
20	1	1.7	96.6
25	2	3.4	100.0
Total-->	58	100.0	

C.11: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing Library- Media Related Tasks

Percent of Time Spent on Library-Media Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	51	87.9	87.9
2	2	3.4	91.4
5	2	3.4	94.8
20	1	1.7	96.6
35	1	1.7	98.3
100	1	1.7	100.0
Total-->	58	100.0	

C.12: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing the Duties of Technology Supervisor.

Percent of Time Spent on Technology Supervisor Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	21	36.2	36.2
3	1	1.7	37.9
5	5	8.6	46.6
6	1	1.7	48.3
10	8	13.8	62.1
15	1	1.7	63.8
20	3	5.2	69.0
25	3	5.2	74.1
35	1	1.7	75.9
40	2	3.4	79.3
50	5	8.6	87.9
70	2	3.4	91.4
75	1	1.7	93.1
80	1	1.7	94.8
100	3	5.2	100.0
Total-->	58	100.0	

C.13: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing Other Tasks

Percent of Time Spent on Other Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	50	86.2	86.2
5	3	5.2	91.4
10	1	1.7	93.1
20	1	1.7	94.8
35	1	1.7	96.6
50	2	1.7	100.0
Total-->	58	100.0	

C.14: Number and Percentage of Respondents Highest Academic Degree

Degree	Number of Respondents	Percent of Total	Cumulative Percent
Masters	41	70.7	70.7
Doctorate	12	20.7	91.4
Bachelors	4	6.9	98.3
H.S. Diploma	1	1.7	100.0
Total-->	58	100.0	

C.15: Number and Percentage of Respondents With Respect to Total Graduate Credits Earned

Total Credits Earned	Number of Respondents	Percent of Total	Cumulative Percent
0	19	32.8	32.8
1	1	1.7	34.5
3	5	8.6	43.1
4	2	3.4	46.6
6	4	6.9	53.4
7	1	1.7	55.2
8	1	1.7	56.9
9	2	3.4	60.3
10	1	1.7	62.1
12	2	3.4	65.5
13	1	1.7	67.2
15	2	3.4	70.7
16	1	1.7	72.4
18	1	1.7	74.1
19	1	1.7	75.9
23	1	1.7	77.6
24	4	6.9	84.5
30	3	5.2	89.7
33	1	1.7	91.4
34	1	1.7	93.1
36	1	1.7	94.8
39	1	1.7	96.6
41	1	1.7	98.6
45	1	1.7	100.0
Total-->	58	100.0	

Appendix D

D.01: Number and Percentage of Respondents With Respect to Type of Teaching Certificate Held

Type of Certificate	Number of Respondents	Percent of Total
Instructional	12	54.5
None	10	45.5
Total-------->	22	100.0

D.02: Number and Percentage of Respondents With Respect to Content Area of Teaching Certificate

Content Area of Certificate	Number of Respondents	Percent of Total
Science	5	22.7
Elementary Education	4	18.2
Mathematics	1	4.5
English	1	4.5
Social Studies	1	4.5
None	10	45.5
Total------->	22	100.0

D.03: Number and Percentage of Respondents With Respect to Years of Teaching

Years Teaching	Number of Respondents	Percent of Total	Cumulative Percent
0	10	45.5	45.5
3	3	13.6	59.1
4	1	4.5	63.6
5	1	4.5	68.2
7	1	4.5	72.7
16	1	4.5	77.3
19	1	4.5	81.8
20	1	4.5	86.4
22	1	4.5	90.9
26	1	4.5	95.5
27	1	4.5	100.0
Total--->	22	100.0	

D.04: Number and Percentage of Respondents With Respect to Years as a Professional Educator

Years as an Educator	Number of Respondents	Percent of Total	Cumulative Percent
0	1	4.5	4.5
10	1	4.5	9.1
15	1	4.5	13.6
16	1	4.5	18.2
17	1	4.5	22.7
19	1	4.5	27.3
20	1	4.5	31.8
22	2	9.1	40.9
24	1	4.5	45.5
25	2	9.1	54.5
26	3	13.6	68.2
27	2	9.1	77.3
30	1	4.5	81.8
32	1	4.5	86.4
33	1	4.5	90.9
34	1	4.5	95.5
36	1	4.5	100.0
Total--->	22	100.0	

D.05: Number and Percentage of Respondents With Respect to Years Educational Technology Experience

Years as Educational Technologist	Number of Respondents	Percent of Total	Cumulative Percent
0	1	4.5	4.5
2	1	4.5	9.1
6	1	4.5	13.6
7	1	4.5	18.2
8	2	9.1	27.3
9	3	13.6	40.9
10	1	4.5	45.5
11	1	4.5	50.0
13	1	4.5	54.5
16	1	4.5	59.1
18	2	9.1	68.2
19	2	9.1	77.3
22	1	4.5	81.8
24	1	4.5	86.4
29	1	4.5	90.9
30	1	4.5	95.5
34	1	4.5	100.0
Total--->	22	100.0	

D.06: Number and Percentage of Respondents With Respect to Percent of Time Spent Teaching

Percent of Time Spent on Teaching Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	13	59.1	59.1
10	1	4.5	63.6
20	1	4.5	68.2
25	1	4.5	72.7
30	2	9.1	81.8
60	1	4.5	86.4
80	1	4.5	90.9
100	2	9.1	100.0
Total-->	22	100.0	

D.07: Number and Percentage of Respondents With Respect to Percent of Time Spent in Faculty-Staff Development

Percent of Time Spent on Faculty-Staff Development	Number of Respondents	Percent of Total	Cumulative Percent
0	15	68.2	68.2
3	1	4.5	72.7
5	2	9.1	81.8
10	2	9.1	90.9
70	1	4.5	95.5
100	1	4.5	100.0
Total-->	22	100.0	

D.08: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing Administrative Tasks

Percent of Time Spent on Administrative Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	15	68.2	68.2
5	2	9.1	77.3
10	1	4.5	81.8
25	2	9.1	90.9
60	1	4.5	95.5
80	1	4.5	100.0
Total-->	22	100.0	

D.09: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing Audio/Visual Media Related Tasks

Percent of Time Spent on A/V,Media Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	11	50.0	50.0
10	2	9.1	59.1
20	1	4.5	63.6
25	1	4.5	68.2
50	1	4.5	72.7
60	1	4.5	77.3
74	1	4.5	81.8
75	1	4.5	86.4
90	1	4.5	90.9
95	1	4.5	95.5
97	1	4.5	100.0
Total-->	22	100.0	

D.10: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing Library- Media Related Tasks

Percent of Time Spent on Library-Media Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	20	90.9	90.9
2	1	4.5	95.5
10	1	4.5	100.0
Total-->	22	100.0	

D.11: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing the Duties of Technology Supervisor.

Percent of Time Spent on Technology Supervisor Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	14	63.6	63.6
6	1	4.5	68.2
10	3	13.6	81.8
20	1	4.5	86.4
70	2	9.1	95.5
80	1	4.5	100.0
Total-->	22	100.0	

D.12: Number and Percentage of Respondents With Respect to Percent of Time Spent Performing Other Tasks

Percent of Time Spent on Other Tasks	Number of Respondents	Percent of Total	Cumulative Percent
0	12	54.5	54.5
10	1	4.5	59.1
15	2	9.1	68.2
20	1	4.5	72.7
25	1	4.5	77.3
30	1	4.5	81.8
75	1	4.5	86.4
78	1	4.5	90.9
80	1	4.5	95.5
90	1	4.5	100.0
Total-->	22	100.0	

D.13: Number and Percentage of Respondent's Highest Academic Degree

Degree	Number of Respondents	Percent of Total	Cumulative Percent
Masters	1	4.5	4.5
Doctorate	21	95.5	100.0
Total-->	22	100.0	

Appendix E

E.01: Relative Importance by Rank, Classification, and Mean for Competency Area Attributes based on Supervisor, Expert and Combined Means of Responses

Comb Rank	Supv Rank	Expt Rank	*	Competency Area Attributes	Comb Mean
1	2	4	S	effectively utilize the computer as an instructional aid, and to develop basic skills such as keyboarding	4.275
2	4	7	I	formulate objectives and strategies for utilizing educational technologies in teaching/learning situations	4.275
3	1	36	A	effectively budget the use of internal and external funding to purchase technology hardware and software	4.250
4	6	6	I	formulate educational goals and learning objectives which specify student outcomes, achievements, and evaluations	4.263
5	9	3	S	identify sources of educational materials including computer software and videodiscs	4.238
6	8	8	S	verify the appropriateness of educational materials for a specified teaching/learning situation by analyzing sophistication, cost, availability and technical quality	4.238
7	3	12	S	recommend applications of the computer to motivate student learning	4.225
8	7	11	A	describe the role of an educational technology supervisor in providing services for classroom teachers	4.225

E.01 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Competency Area Attributes	Comb Mean
9	5	14	A	employ management systems and methods that use spread sheets, data bases, and word processors on the computer	4.213
10	13	17	H	recognize the capabilities and limitations of a computer and the misleading myths and misconceptions associated with it	4.163
11	15	1	S	integrate computerized teaching materials into a course to enrich instructional programs	4.175
12	11	31	R	evaluate the effectiveness of an instructional computer program	4.138
13	12	13	A	design and implement staff development programs for effective orientation, training, and skills upgrade in the use of technologies	4.163
14	14	15	T	demonstrate functional knowledge of technical terminology associated with educational computing and technology	4.100
15	27	2	I	construct the elements of a lesson on the basis of a model which represents a systematic approach to teaching and learning	4.075
16	16	18	H	assess the complexity of introducing educational change into the system through technology	4.075
17	21	16	M	be able to describe the basic operation of an interactive multimedia workstation and how it can affect conditions of teaching and learning	4.037
18	18	24	A	effectively interpret and/or write policy for technology integration and modernization	4.037

E.01 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Competency Area Attributes	Comb Mean
19	10	51	A	maintain organization, management, security, and inventory of supplies and equipment	4.037
20	20	22	L	be able to explain rights, limitations, and responsibilities of users of copyrighted material as outlined in the Copyright Law	4.037
21	28	19	I	develop and design a variety of alternate teaching strategies using the computer and other electronic technologies	4.013
22	33	5	R	use sources of information about technology for professional development (i.e. journals, associations, seminars, conferences and on-line services)	4.000
23	24	25	S	develop students' abstract reasoning ability and general problem-solving skills through computer studies	4.000
24	22	21	A	apply the computer to administrative tasks such as attendance, grades, and student records)	4.013
25	30	27	I	utilize the three domains of learning (cognitive, affective, psychomotor) when developing technology-based instruction	3.975
26	34	10	M	be able to integrate the computer with other A/V instructional media, such as videodiscs, video tapes, animation, still images, 3D models etc., for more efficient, meaningful instruction	3.975

E.01 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Competency Area Attributes	Comb Mean
27	23	40	S	identify software resources for teaching students how to select applications to solve academic and daily living problems	3.938
28	25	34	H	understand the influence of the computer, its impact on modern society, and its future trends	3.975
29	26	42	T	solve simple computer related problems such as printers not on line, booting up, etc	3.925
30	35	23	E	describe the major characteristics and appropriate teaching/learning situations for computer assisted instruction	3.938
31	29	39	A	describe procedures of basic utilization plans (select, preview, use, follow-up, and evaluate) for educational media	3.925
32	17	56	L	have knowledge of data bases and the importance of standardization of documentation	3.900
33	48	9	H	determine the impact of media on learners from a psychological perspective	3.850
34	38	26	T	be able to operate, most common types of A/V equipment such as projectors, tape recorders, disc players and cameras	3.875
35	19	57	L	possess skills in data storage/retrieval which would make information immediately available for instructional purposes and productivity enhancement	3.888
36	39	32	R	assess media utilization procedures in terms of student growth and achievement according to specified instructional objectives	3.838

E.01 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Competency Area Attributes	Comb Mean
37	47	20	E	direct and assist teachers and students in preparation of their own media	3.825
38	31	59	H	discuss the uses of computers and other technologies in business, industry, and society	3.800
39	39	30	H	discuss privacy, security, and moral issues resulting from the widespread use of computers	3.800
40	36	52	L	have a detailed understanding of the principles of information processing, its contribution to teaching in general and specific subject areas	3.788
41	37	47	M	incorporate computer applications with networking to promote instructional interaction	3.788
42	51	29	S	use instructional games and simulations appropriately and effectively in teaching	3.763
43	40	45	I	design teaching/learning strategies for incorporating the use of technologies with a specified group of learners (ie. handicapped)	3.763
44	50	35	I	apply the basics of computer assisted instruction (CAI), and apply its meaning and function to educational practice	3.763
45	46	37	E	design, implement, and evaluate instructional materials which use the computer	3.763
46	45	41	A	address problems of equal access and scheduling for technology use	3.738

E.01 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Competency Area Attributes	Comb Mean
47	32	64	T	be able to set up, operate, and maintain all types of computer hardware and make recommendations concerning system configurations including networking	3.738
48	52	38	S	develop strategies for utilizing visual literacy skills for a specified group of learners	3.713
49	43	46	A	write grant proposals to effectively compete for available public and private resources	3.713
50	53	33	R	interpret the adequacy of research findings in education	3.713
51	41	58	Ma	demonstrate an understanding of current and expected developments in the satellite, telecommunications and computer technologies	3.700
52	60	28	E	produce instructional media such as graphics, video recordings slides and transparencies etc for a specified learning objective, with evidence of technical quality	3.688
53	49	49	S	have knowledge and skills in computer assisted/managed instruction (CAI/CMI)	3.675
54	54	50	Ma	display functional knowledge of utilization of telecommunications for information sharing, remote information access and retrieval, broadcast resources, and distance learning	3.625
55	57	48	R	develop, and use behavioral models to improve the integration of technologies for instruction	3.613

E.01 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Competency Area Attributes	Comb Mean
56	59	53	Ma	display functional knowledge of telecommunications tools and resources	3.575
57	55	55	M	be able to render advice regarding the use of computer assisted/managed technologies for special needs instruction (ie.handicapped, gifted)	3.588
58	66	43	E	identify and demonstrate the elements of composition in the preparation of visuals	3.550
59	42	69	H	provide career guidance and information through the use of computers	3.563
60	58	63	R	develop programs in the school district which benefit research for development of new approaches to instruction using technology	3.513
61	67	54	T	be able to perform simple maintenance operations such as replacing bulbs	3.463
62	61	65	H	associate automation and artificial intelligence issues with teaching	3.450
63	69	61	R	devise and employ validation procedures for teacher-made and commercially prepared materials	3.431
64	63	67	R	develop survey instruments to determine effectiveness of instruction using technology	3.425
65	62	73	Ma	identify, analyze, and utilize nonverbal forms of communication	3.375
66	74	44	I	design, construct, and validate a self-instructional module	3.400
67	70	60	E	apply computer graphics techniques as needed to teach specific subjects	3.375

E.01 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Competency Area Attributes	Comb Mean
68	56	77	T	possess some experience with systems analysis to provide for the most effective, trouble-free operation	3.363
69	65	70	R	effectively utilize the computer to perform statistical analysis of data collected from regular classes and to interpret the results	3.350
70	64	72	Ma	analyze the impact of mass media (TV, radio, newspapers, etc.) on society, schools, and students	3.350
71	73	62	E	effectively use the computer for diagnosis and remediation of learning problems	3.325
72	71	74	E	make necessary modifications in existing computer programs to meet instructional needs	3.250
73	68	75	Ma	define components of the communication process and identify factors which enhance accurate transmission of messages	3.275
74	72	71	S	have a basic understanding of computer aided design/manufacturing (CAD/CAM)	3.225
75	78	66	E	devise media presentations to accompany commercial programs or textbooks	3.088
76	75	78	T	possess some knowledge of main frame computers, local area networks, and their operations	3.025
77	79	68	M	be knowledgeable regarding the use of computers with authoring languages (such as QUEST, PILOT, MediaScript, etc.) to facilitate lesson design for individualized instruction	2.975

E.01 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Competency Area Attributes	Comb Mean
78	76	79	E	display functional knowledge of program verification and debugging techniques	2.950
79	77	81	E	display functional knowledge of at least one programming language and the ability to compare languages commonly used in education (i.e. structured BASIC, Logo, and/or Pascal)	2.863
80	80	80	E	display functional knowledge of structured programming concepts and design of algorithms	2.810
81	81	76	R	administer tests through the use of the computer to insure a bias-free test environment for students	2.787
82	82	82	T	possess some background in electronics and logic circuitry	2.138

E.02: Rank Order of Administrative Area Attributes by Mean

Comb Rank	Supv Rank	Expt Rank	*	Resource Management and/or Administration Competency Attributes	Comb Mean
3	1	36	A	effectively budget the use of internal and external funding to purchase technology hardware and software	4.250
8	7	11	A	describe the role of an educational technology supervisor in providing services for classroom teachers	4.225
9	5	14	A	employ management systems and methods that use spread sheets, data bases, and word processors on the computer	4.213
13	12	13	A	design and implement staff development programs for effective orientation, training, and skills upgrade in the use of technologies	4.163
18	18	24	A	effectively interpret and/or write policy for technology integration and modernization	4.037
19	10	51	A	maintain organization, management, security, and inventory of supplies and equipment	4.037
24	22	21	A	apply the computer to administrative tasks such as attendance, grades, and student records)	4.013
31	29	39	A	describe procedures of basic utilization plans (select, preview, use, follow-up, and evaluate) for educational media	3.925
46	45	41	A	address problems of equal access and scheduling for technology use	3.738

E.02 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Resource Management and/or Administration Competency Attributes	Comb Mean
49	43	46	A	write grant proposals to effectively compete for available public and private resources	3.713

E.03: Rank Order of Evaluation of Media and Computers Area Attributes by Mean

Comb Rank	Supv Rank	Expt Rank	*	Evaluation of Media and Computers for Instruction Competency Attributes	Comb Mean
30	35	23	E	describe the major characteristics and appropriate teaching/learning situations for computer assisted instruction	3.938
37	47	20	E	direct and assist teachers and students in preparation of their own media	3.825
45	46	37	E	design, implement, and evaluate instructional materials which use the computer	3.763
52	60	28	E	produce instructional media such as graphics, video recordings slides and transparencies etc for a specified learning objective, with evidence of technical quality	3.688
58	66	43	E	identify and demonstrate the elements of composition in the preparation of visuals	3.550
67	70	60	E	apply computer graphics techniques as needed to teach specific subjects	3.375
71	73	62	E	effectively use the computer for diagnosis and remediation of learning problems	3.325
72	71	74	E	make necessary modifications in existing computer programs to meet instructional needs	3.250
75	78	66	E	devise media presentations to accompany commercial programs or textbooks	3.088
78	76	79	E	display functional knowledge of program verification and debugging techniques	2.950

E.03 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Evaluation of Media and Computers for Instruction Competency Attributes	Comb Mean
79	77	81	E	display functional knowledge of at least one programming language and the ability to compare languages commonly used in education (i.e. structured BASIC, Logo, and/or Pascal)	2.863
80	80	80	E	display functional knowledge of structured programming concepts and design of algorithms	2.810

E.04: Rank Order of Historical/Social Impact Area Attributes by Mean

Comb Rank	Supv Rank	Expt Rank	*	Historical/Social Impact Competency Attributes	Comb Mean
10	13	17	H	recognize the capabilities and limitations of a computer and the misleading myths and misconceptions associated with it	4.163
16	16	18	H	assess the complexity of introducing educational change into the system through technology	4.075
28	25	34	H	understand the influence of the computer, its impact on modern society, and its future trends	3.975
33	48	9	H	determine the impact of media on learners from a psychological perspective	3.850
38	31	59	H	discuss the uses of computers and other technologies in business, industry, and society	3.800
39	39	30	H	discuss privacy, security, and moral issues resulting from the widespread use of computers	3.800
59	42	69	H	provide career guidance and information through the use of computers	3.563
62	61	65	H	associate automation and artificial intelligence issues with teaching	3.450

E.05: Rank Order of Systems Approach to Instructional Design Area Attributes by Mean

Comb Rank	Supv Rank	Expt Rank	*	Systems Approach to Instructional Design Competency Attributes	Comb Mean
2	4	7	I	formulate objectives and strategies for utilizing educational technologies in teaching/learning situations	4.275
4	6	6	I	formulate educational goals and learning objectives which specify student outcomes, achievements, and evaluations	4.263
15	27	2	I	construct the elements of a lesson on the basis of a model which represents a systematic approach to teaching and learning	4.075
21	28	19	I	develop and design a variety of alternate teaching strategies using the computer and other electronic technologies	4.013
25	30	27	I	utilize the three domains of learning (cognitive, affective, psychomotor) when developing technology-based instruction	3.975
43	40	45	I	design teaching/learning strategies for incorporating the use of technologies with a specified group of learners (ie. handicapped)	3.763
44	50	35	I	apply the basics of computer assisted instruction (CAI), and apply its meaning and function to educational practice	3.763
66	74	44	I	design, construct, and validate a self-instructional module	3.400

E.06: Combined Rank Order of Library/Information Science Area Attributes by Mean

Comb Rank	Supv Rank	Expt Rank	*	Library/Information Science Competency Attributes	Comb Mean
20	20	22	L	be able to explain rights, limitations, and responsibilities of users of copyrighted material as outlined in the Copyright Law	4.037
32	17	56	L	have knowledge of data bases and the importance of standardization of documentation	3.900
35	19	57	L	possess skills in data storage/retrieval which would make information immediately available for instructional purposes and productivity enhancement	3.888
40	36	52	L	have a detailed understanding of the principles of information processing, its contribution to teaching in general and specific subject areas	3.788

E.07: Combined Rank Order of Interactive/Multimedia Area Attributes by Mean

Comb Rank	Supv Rank	Expt Rank	*	Interactive/Multimedia Competency Attributes	Comb Mean
17	21	16	M	be able to describe the basic operation of an interactive multimedia workstation and how it can affect conditions of teaching and learning	4.037
26	34	10	M	be able to integrate the computer with other A/V instructional media, such as videodiscs, video tapes, animation, still images, 3D models etc., for more efficient, meaningful instruction	3.975
41	37	47	M	incorporate computer applications with networking to promote instructional interaction	3.788
57	55	55	M	be able to render advice regarding the use of computer assisted/managed technologies for special needs instruction (ie.handicapped, gifted)	3.588
77	79	68	M	be knowledgeable regarding the use of computers with authoring languages (such as QUEST, PILOT, MediaScript, etc.) to facilitate lesson design for individualized instruction	2.975

E.08: Combined Rank Order of Mass Communications Area Attributes by Mean

Comb Rank	Supv Rank	Expt Rank	*	Mass Communications Competency Attributes	Comb Mean
51	41	58	Ma	demonstrate an understanding of current and expected developments in the satellite, telecommunications and computer technologies	3.700
54	54	50	Ma	display functional knowledge of utilization of telecommunications for information sharing, remote information access and retrieval, broadcast resources, and distance learning	3.625
56	59	53	Ma	display functional knowledge of telecommunications tools and resources	3.575
65	62	73	Ma	identify, analyze, and utilize nonverbal forms of communication	3.375
70	64	72	Ma	analyze the impact of mass media (TV, radio, newspapers, etc.) on society, schools, and students	3.350
73	68	75	Ma	define components of the communication process and identify factors which enhance accurate transmission of messages	3.275

E.09: Combined Rank Order of Research Area Attributes by Means

Comb Rank	Supv Rank	Expt Rank	*	Research Competency Attributes	Comb Mean
12	11	31	R	evaluate the effectiveness of an instructional computer program	4.138
22	33	5	R	use sources of information about technology for professional development (i.e. journals, associations, seminars, conferences and on-line services)	4.000
36	39	32	R	assess media utilization procedures in terms of student growth and achievement according to specified instructional objectives	3.838
50	53	33	R	interpret the adequacy of research findings in education	3.713
55	57	48	R	develop, and use behavioral models to improve the integration of technologies for instruction	3.613
60	58	63	R	develop programs in the school district which benefit research for development of new approaches to instruction using technology	3.513
63	69	61	R	devise and employ validation procedures for teacher-made and commercially prepared materials	3.431
64	63	67	R	develop survey instruments to determine effectiveness of instruction using technology	3.425
69	65	70	R	effectively utilize the computer to perform statistical analysis of data collected from regular classes and to interpret the results	3.350
81	81	76	R	administer tests through the use of the computer to insure a bias-free test environment for students	2.787

E.10: Combined Rank Order of Selection and Utilization/Integration Area Attributes by Mean

Comb Rank	Supv Rank	Expt Rank	*	Selection and Utilization/Integration Competency Attributes	Comb Mean
1	2	4	S	effectively utilize the computer as an instructional aid, and to develop basic skills such as keyboarding	4.275
5	9	3	S	identify sources of educational materials including computer software and videodiscs	4.238
6	8	8	S	verify the appropriateness of educational materials for a specified teaching/learning situation by analyzing sophistication, cost, availability and technical quality	4.238
7	3	12	S	recommend applications of the computer to motivate student learning	4.225
11	15	1	S	integrate computerized teaching materials into a course to enrich instructional programs	4.175
23	24	25	S	develop students' abstract reasoning ability and general problem-solving skills through computer studies	4.000
27	23	40	S	identify software resources for teaching students how to select applications to solve academic and daily living problems	3.938
42	51	29	S	use instructional games and simulations appropriately and effectively in teaching	3.763
48	52	38	S	develop strategies for utilizing visual literacy skills for a specified group of learners	3.713
53	49	49	S	have knowledge and skills in computer assisted/managed instruction (CAI/CMI)	3.675

E.10 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Selection and Utilization/Integration Competency Attributes	Comb Mean
74	72	71	S	have a basic understanding of computer aided design/manufacturing (CAD/CAM)	3.225

E.11: Combined Rank Order of Technical Area Attributes by Mean

Comb Rank	Supv Rank	Expt Rank	*	Technical Competency Area Attributes	Comb Mean
14	14	15	T	demonstrate functional knowledge of technical terminology associated with educational computing and technology	4.100
29	26	42	T	solve simple computer related problems such as printers not on line, booting up, etc	3.925
34	38	26	T	be able to operate, most common types of A/V equipment such as projectors, tape recorders, disc players and cameras	3.875
47	32	64	T	be able to set up, operate, and maintain all types of computer hardware and make recommendations concerning system configurations including networking	3.738
61	67	54	T	be able to perform simple maintenance operations such as replacing bulbs	3.463
68	56	77	T	possess some experience with systems analysis to provide for the most effective, trouble-free operation	3.363
76	75	78	T	possess some knowledge of main frame computers, local area networks, and their operations	3.025

E.11 (continued)

Comb Rank	Supv Rank	Expt Rank	*	Technical Competency Area Attributes	Comb Mean
82	82	82	T	possess some background in electronics and logic circuitry	2.138

E.12: Combined Rank Order of Competency Area by the Mean of the Overall Question Response

Comb Rank	Supv Rank	Expt Rank	*	Competency Area	Comb Mean
1	2	1	S	Selection and Utilization/Integration Competencies	4.211
2	1	3	A	Resource Management and/or Administration Competencies	4.126
3	3	5	H	Historical/Social Impact Competencies	3.971
4	8	4	M	Interactive/Multimedia Competencies	3.873
5	7	6	R	Research Competencies	3.754
6	6	7	L	Library/Information Science Competencies	3.740
7	9	8	Ma	Mass Communications Competencies	3.560
8	4	10	T	Technical Competencies	3.508
9	10	9	E	Evaluation of Media and Computers for Instruction Competencies	3.465
10	5	2	I	Systems Approach to Instructional Design Competencies	3.036

Vita

MR. JAMIE J. KLINE

Experience:

01/92 - pres. Adult Education Instructor: East Penn School District, Emmaus PA

01/92 - 12/92 ITEC Instructor: Educational Technology Center, Lehigh University, Bethlehem, PA

05/89 - 12/91 Research Associate: Educational Technology Center, Lehigh University, Bethlehem, PA

09/86 - 05/89 Graduate Assistant: Regional Computer Resource Center (RCRC), Educational Technology Center, Lehigh University, Bethlehem, PA

08/88 - 11/88 Educational Program Specialist: Lehigh County Community College, Schnecksville, PA

08/80 - 07/86 Program Coordinator, Applied Technologies: Department of Applied Technologies, Montgomery College, Rockville, MD

07/78 - 08/79 Teacher: Audio-Visual Communications, Lehigh County Area Vocational-Technical School,Schnecksville, PA

01/75 - 01/78 Instructor: Automotive Service Technologies, Lehigh County Community College, Schnecksville, PA

06/66 - 01/75 Sales Representative: Federated Purchaser Inc., Allentown, PA

Education:

Ed.D. Educational Technology: Lehigh University, Bethlehem, PA, 1993

M.Ed. Instruction and Curriculum: Lehigh University, Bethlehem, PA, 1980

B.S. Industrial Education: Temple University, Philadelphia, PA, 1978

Associate in Electrical Engineering: The Pennsylvania State University, State College, PA, 1972.

Special Recognition and/or Certification:

Licensed Radio Operator: Commercial radiotelephone operator with broadcast endorsement

Licensed Commercial Pilot: Instrument rated, commercial/multi-engine airplane pilot

Certified General Automobile Mechanic: National Institute for Automotive Service Excellence (ASE)

Certified Automotive Machinist: National Institute for Automotive Service Excellence

Special Projects:

LaserGallery: an Art videodisc production, Summer 1988:

1. Video production and editing of motion video segments
2. Audio production, editing and special effects for digitized audio
3. Technical production consultant

HyperMedia: applications on CD-ROM, 1988:

1. Audio production and editing of analog music segments
2. Digitization of original music scores for CD-ROM production
3. High speed analog mastering for CD quality audio for the Lehigh School Disc project

Digital Dinosaurs: a DVI interactive multimedia project for K-6, 1989:

1. Voice narration of story lines for "Expert-A-Saur"

2. Music selection, production, and editing for introduction screens

Context Incorporated: a DVI interactive multimedia production, "Egyptian Civilization" for teaching home-bound students, 1989:
1. Voice narration of story lines in all presentation screens
2. Music and sound effects selection, mixing and editing

Digital Dinosaurs: Expanded K-6 learning project, Fall 1991

Publications and/or Presentations:

Kline J.J. (1990). The Emergence of The Educational Technologist: A Standard for Certification. Proceedings of the 32nd International ADCIS Conference, San Diego, CA, 1990.

The School Disc, A CD-ROM project description presented to the Eastern Pennsylvania Educational Computing Conference, Valley Forge, PA, 1990, co-presenter.

Multimedia and CD-ROM, Presentation at the Multimedia Conference, Doylestown, PA, 1989.

CD-ROM in Multimedia Presentations, Presentation at the Pennsylvania Association for Educational Communications and Technology conference, Hershey, PA, 1989

Desktop Multimedia, Presentation at the Pennsylvania Association for Educational Communications and Technology conference, Hershey, PA, 1989, co-presenter.

Optical Disc Technologies, Presentation at the Eastern Pennsylvania Educational Computing Conference, 1989, co-presenter.

Professional Memberships:

Association for Educational Computing and Technology (AECT)

International Society for Technology in Education (ISTE)