University of Tennessee, Knoxville
Trace: Tennessee Research and Creative Exchange

Doctoral Dissertations | Graduate School

8-2003

Protocol and Training of Educators for the Use of Technology to Enhance Learning in Tennessee Certified Schools

Joe M. Wilson
University of Tennessee - Knoxville

Recommended Citation

Wilson, Joe M., "Protocol and Training of Educators for the Use of Technology to Enhance Learning in Tennessee Certified Schools. " PhD diss., University of Tennessee, 2003.
https://trace.tennessee.edu/utk_graddiss/2357

This Dissertation is brought to you for free and open access by the Graduate School at Trace: Tennessee Research and Creative Exchange. It has been accepted for inclusion in Doctoral Dissertations by an authorized administrator of Trace: Tennessee Research and Creative Exchange. For more information, please contact trace@utk.edu.

To the Graduate Council:

I am submitting herewith a dissertation written by Joe M. Wilson entitled "Protocol and Training of Educators for the Use of Technology to Enhance Learning in Tennessee Certified Schools." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Education.

Dr. Edward L. Counts, Jr, Major Professor

We have read this dissertation and recommend its acceptance:

Dr. John R. Ray, Dr. Mary Jane Connelly, Dr. Vickie J. Stout

Accepted for the Council:
Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

To the Graduate Council:

I am submitting herewith a dissertation written by Joe M. Wilson entitled "Protocol and Training of Educators for the Use of Technology to Enhance Learning in Tennessee Certified Schools." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Education.

Dr. Edward L. Counts, Jr.
Major Professor

We have read this dissertation
and recommend its acceptance:

Dr. John R. Ray

Dr. Mary Jane Connelly

Dr. Vickie J. Stout

Acceptance for the Council:

Dr. Anne Mayhew
Vice Provost and
Dean of Graduate Studies

(Original signatures are on file with official students records.)

PROTOCOL AND TRAINING OF EDUCATORS FOR THE USE OF TECHNOLOGY TO ENHANCE LEARNING IN TENNESSEE CERTIFIED SCHOOLS

A Dissertation
Presented for the
Doctor of Education Degree
The University of Tennessee, Knoxville

Joe M. Wilson
August 2003

Copyright © 2003 by Joe M. Wilson
All rights reserved.

DEDICATION

To My N, With Love

With love to Nancy and Zachary
for all they have done to keep me
on task and for making life fun.

With Love to Wendy, who is
always in my mind and heart.

With love to Mother and Dad…
I miss you both!

ACKNOWLEDGMENTS

In William Shakespeare's, *Love's Labour's Lost. Act IV, Scene 3,* he wrote, *"*Learning is but an adjunct to ourself" and that may well be true until one takes that "Learning" and shares it with another.

As I consider the many individuals in my life who have shared their "Learning" unselfishly and with love, devotion, and dedication, they have ALL been teachers of information or of necessary lessons for life.

Since there was no opportunity in my day (at least at the appropriate age) to go to kindergarten, I "learned everything I needed to know" before first grade from Mother, Dad, my sisters, Patsy and Betty Lou, and my brothers, Gene and Larry. In addition to my immediate family, my Grandparents (Dad's parents), Dad's sister, Lula Belle, and her daughter, Mary Jo, and Dad's sister, Thelma, all lived in our household and were mentors and teachers for me.

When I was in the second grade, Dr. Nancy Sterling, principal of the first elementary school I attended, taught me a life lesson that every teacher of children should know. Trying to *Make* someone learn to do something can result in the very opposite effect. I still do not eat potato salad.

Both Ms. Snyder, my teacher in the first and second grades, and Mrs. Gray, in the third and fourth are remembered with great thoughts almost 60 years later. I can remember detailed things these teachers taught me in the classroom. In the fifth, sixth, and seventh grades, I went to a different elementary school… one teacher teaching eight grades in one classroom. I had the same teacher for three years and cannot even recall

her name. Ralph, a student at Sevier County High School, had the job of picking me up to drive me to and from school each day.

Robert "Rob" Howard, principal at Sevier County High School had an everyday smile that brightened the world and said to the students, "It's a great day to be alive and learn." Marie Johnson Temple taught me Latin and Spanish but, in doing so, was the greatest English grammar teacher anyone could possibly have. Many other individual teachers at the school stand out in my mind and in the lessons I learned: Ms. Margaret Hammer, Mr. Bob Davis, Mr. Paul Bogart, Mrs. Nelle Brasher, and Mrs. Rhea McCall, just to mention a very special few.

Mr. Jack King, my high school band director, Dr. Calvin Huber, my undergraduate college band director, and Dr. Charles Isley, my mentor during my Masters Degree studies and Teaching Fellowship assignment, as well as, Tom O'Neal, former band director at the University of South Carolina and close personal friend, have all had profound influences on my life. I spent twenty-four years playing, singing, creating, arranging, making, directing, competing, judging, and teaching music in almost every position of the public education system from K to 12. Any credit that might be gleaned from my twenty-four years of work in the field has to be shared with the people who created such a deep love of music within me.

It is this group of individuals and others from the past who spent their time preparing me, in part, to be here at The University of Tennessee, Knoxville, writing this dissertation; but I would be amiss if I failed to mention the individuals at the University who have had such a tremendous influence on my life and work here.

In the summer of 1996, I came to The University of Tennessee *only* to finish the fourteen graduate hours I needed for a pay raise; but, when one runs into great teachers, learning becomes fun and seems to be somewhat like an incurable disease… a need to learn more… a desire to learn as much as possible about one's field of interest.

My first encounter with a professor here at the University was a telephone conversation with Dr. John Ray. I had received special permission from the Graduate School to take the fourteen hours that summer and needed a one-hour independent study. Without knowing anything about me and without hesitation, Dr. Ray replied, "Yes, what would you like to do?" I wrote a paper on the use of technology in music. Since that time, I have had many occasions to need his help, his advice, and/or his wisdom. Just as with all other students, he has always been available to me with unquestionable guidance.

Dr. Julie Little was the instructor for the first face-to-face course I took. It was a two-week workshop in which the work got "kicked up a notch or two," as she said… but it was more like three! Dr. Little is a superior teacher and information source for anyone wanting to learn. Many hours have been spent here at The University of Tennessee, Knoxville, in additional classes she has taught.

Dr. Dale Doak has been a great mentor for me. He guided me through the completion of my Educational Specialist degree and finally offered the Instructional Technology doctoral program to interested students, which was the open door to get me to this point in my work. Many hours have been spent in courses with Dr. Doak. Every single moment of those hours is a cherished one.

In many instances, Dr. Mary Jane Connelly has assisted me in working through circumstances in which help was required to successfully complete the tasks at hand. Her expert advice and help grounded in her calm demeanor have been invaluable.

Every time I had cause to call on Dr. Everett Myer or meet with him for any reason, whether it be scheduling, information, or help in an area of concern, he always gave me the feeling that, whatever the cause of our meeting, it was the most important meeting in his schedule for the day. If anything surpasses his ability to problem solve, it is his genuine concern for the people with whom he works.

Jean Kidwell, secretary for the Instructional Technology Curriculum and Evaluation (ITCE) Department, is another individual who has always been knowledgeable for any task, kind to everyone, available to help in any way, and totally able to solve almost any problem. Thank you, Jean, for all your help and for the wonderful, kind attitude with which you offer that help.

In my collateral studies, Human Resource Development, Dr. Vickie Stout has been my mentor and guide, as well as the Professor involved in my studies in the department. She has selflessly given hours of her time and effort to help in a multitude of ways to myself, and others, as we have strived to complete our work on this degree. Her understanding and support have been invaluable. As is the case for many that procrastinate once getting to the point of writing the dissertation to finish the degree… Dr. Stout has continued to nudge, push, and even shove a little in a truly concerned effort to initiate and to get the dissertation *and* the degree completed. Thank you, Dr. Stout, for your help and wonderful guidance.

From the very first course to the very last course and beyond, Nancy Knox was the motivator and inspiration to continue the plan to fruition. Her constant help and encouragement to finish the task has been irreplaceable. A simple "thank you" seems hardly enough, but it is totally heartfelt.

Finally, a very special "thank you" goes to Dr. Ed Counts. Dr. Counts came to the university and took over my program after the retirement of Dr. Doak. He has become my mentor, leader, and committee chair, of which all three tasks have been made more difficult because they all involved transitions on several levels for him, as well as for me, but Dr. Counts has the ability to "see the good side" of every situation. He has been available whenever needed and has helped me in every way he possibly could as I have worked to complete this degree. His guidance, leadership, and friendship have been invaluable, as I have worked toward this goal.

ABSTRACT

The purposes of this study were (a) to determine the Tennessee protocol and standards for the initial certification of teachers and re-certification of experienced teachers, (b) to determine the technology skills necessary and competency level of these skills needed to meet and/or exceed the levels that are mandated by the individual curriculum frameworks and standards of Tennessee, and (c) how this technology use is evaluated in the classroom.

This was based on published information on the State of Tennessee Department of Education website. Additionally, information was secured from other reliable sources with pertinent data required to fully examine and answer the questions of this research regarding course and/or technology curriculum standards for all grade levels and the use of technology to enhance learning. Interviews with county school district personnel in a representative group of the twelve counties in an extended East Tennessee area were used in this study to establish the details of "what is really being done" in the local school districts. Analyzation of the personal interviews and a review of County Technology Plans and other significant information from the county websites provided interesting and pertinent information. This information could be considered a reliable representative sampling of what is being done across all of Tennessee since the counties selected for this study were chosen for their significance of the array of variables that might influence technology use and their demographic representation of all areas of the state.

While findings of this study did indicate positive results in the use of technology to enhance instruction techniques or for the enhancement of student learning in the classroom, there is still one area that must receive considerable attention before

meaningful results can ever become a reality. Infrastructure and the computer to student ratio (less than 5:1) in most school districts investigated in this study are in place, indicating, at the very least, the ability for significant inroads into the use of technology to enhance learning, but with one monumental holdup… the inability of a large percentage of teachers to use the available equipment.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION TO THE STUDY

Introduction

Chartered in August 1981 with completion in April 1983, a report to the nation and to the Secretary of Education entitled A Nation at Risk: The Imperative for Educational Reform was created by The National Commission on Excellence in Education for the United States Department of Education. The Commission was created as a result of the Secretary's concern about "the widespread public perception that something is seriously remiss in our educational system." In the recommendations, one of the items the Commission concluded is "The teaching of computer science in high school should equip graduates to: (a) understand the computer as an information, computation, and communication device; (b) use the computer in the study of the other Basics and for personal and work-related purposes; and (c) understand the world of computers, electronics, and related technologies" (Recommendation #5, p. 2).

In May of 1989, an effort organized by the United States Department of Labor and instigated by the former Secretary of Labor, Lynn Martin, was begun on a report later entitled the Secretary's Commission on Achieving Necessary Skills (SCANS). The SCANS Commission, composed of members from American government, education, business, and labor, was carefully selected to conduct a wide-ranging study on the success or failure of the American school system to prepare its students with skills necessary for entering the work force. This extensive study is noteworthy because it was the first time American business was awarded the ability to openly speak to educators

about the knowledge and skills students need to possess to be successful in the workplace.

The SCANS Report analyzed and outlined the demands of the nation's workplace and concluded that "...more than half our young people leave school without the knowledge or foundation required to find and hold a good job." Obviously, the SCANS Report created a relatively large disturbance in education, precipitated by the implication that school boards, administrators, and educators were failing to teach the students of our nation the knowledge and skills they need to know in order to be prepared for the work force of today -- the work force of the 21st century.

In November of 1990, under the leadership of the new Secretary of Labor, Elizabeth Dole, the Secretary's Commission on Achieving Necessary Skills (SCANS) was initiated to consider the abilities of the American worker to meet the needs of the employer. Secretary of Labor Dole announced that, "Simply put, America's work force is in a state of unreadiness... unready for the new jobs, unready for the new realities, and unready for the new challenges of the '90s" (SCANS-Roadmap to the future, p. 1).

The explanation for this "unreadiness," created by revolutionary changes over the past several years in the workplace and the lack of related skills necessary for doing the required tasks, is that the jobs require better reading, writing, reasoning, and technology skills, as well as more knowledge in math and science. The Secretary's Commission on Achieving Necessary Skills developed initiatives to establish "national competency guidelines for work readiness."

As an example to illustrate this fact, Secretary Dole explained that a car mechanic needed to understand about 5,000 pages of service manuals in 1965 as compared to

465,000 pages of technical text today. As this trend continues, the job markets that will experience “the most growth will be in the service, managerial and skilled technical fields” (p.1), which will require even greater technology skills.

Secretary Dole stated that the required skills of the workplace are not being met for the individual member of the work force, quoting the following statistics for illustration:

- Twenty-five percent of our young people - perhaps as many as one million students a year - drop out of high school
- Seventy percent of all high school seniors can't write a basic letter seeking employment
- Sixty percent of them can't correctly add up their own lunch bill
- A large number of current workers' skills are obsolete or soon will be

Dole explained that, “we are now in danger of losing the dream that any American could, through hard work and dedication, rise to the top and succeed in building a better life for himself and his children....” If a person does not possess the required skills to survive in today's world, that person will not be able to get into the system, will not be able to secure and keep a job, and will not be able to succeed. The results of this “not being able to get into and/or stay in the system means that person will spend a lifetime on the outside looking in." (p.1)

Since the SCANS report was published, the government, as well as, many independent organizations concerned about the teaching, knowledge, and use of technology has continued to establish goals and objectives for the acquisition of

knowledge in the use of technology and for the use of technology to enhance learning in the classroom.

With great concern for student achievement, as indicated by test scores, Congress, in 1994, under the leadership of Former President Bill Clinton, passed the law, H. R. 1890 Goals 2000: Educate America Act, which was, in part, an attempt to establish national goals, objectives, and standards for education. The motivation to entice individual school districts to participate was monetary in nature through grants and incentives. Technology was seen as an important educational tool for the classroom, which led to the establishment of the Office of Educational Technology within the Department of Education (Part C, Sec. 233). In the Goals 2000: Educate America Act, there is a statement of purpose of the Leadership in Educational Technology to provide leadership on the federal level to:

- "Infuse technology and technology planning into all educational programs,"
- "Insure training functions carried out within school systems at the State and local level,"
- "Coordinate educational technology activities,"
- "Establish working guidelines to ensure maximum interoperability nationwide and ease of access for the emerging technologies so that no school system will be excluded from the technological revolution,"
- "Insure that Federal technology-related policies and programs facilitate the use of technology in education,"

- "Demonstrate ways in which technology can be used to improve teaching and learning, and to help ensure that all students have an equal opportunity to meet state education standards." (Part C Sec. 231)

In yet another federal law passed by the One Hundred Seventh Congress of the United States of America under the leadership of President George W. Bush in January, 2002, the statistics leading to the No Child Left Behind Act of 2001 (NCLB) (Enhancing Education Through Technology – Title II-D-1&2), it is stated that even as technology becomes more ubiquitous in classrooms, teachers' preparation to use technology for teaching lags behind access in technology, suggesting that in 2000, only 27 percent of the teachers reported they were fully prepared to integrate technology in their instruction.

In Section 2113 STATE USE OF FUNDS of the No Child Left Behind Act of 2001 there are specific guidelines for technology literacy related to teacher certification and re-certification. Area 10 of this section encourages and supports the training of teachers and administrators to effectively integrate technology into curricula and instruction, including training to improve the ability to collect, manage, and analyze data to improve teaching, decision-making, school improvement efforts, and accountability. Further, this area of the NCLB Act requires teachers have the subject matter knowledge and teaching skills, including technology literacy necessary to help students meet challenging state student academic achievement standards.

The Problem

At the *East Tennessee Administrator's Academy* held in Anderson County on March 26, 2002, the theme of the Academy was to "focus on technology and curriculum"

and the participants “can expect to learn new and innovative ways to use technology to improve student learning.” (Conference CD). Many of the "new" ideas were to be put into action immediately upon returning to the participants’ districts. This Academy showcased many great ways for using technology in the curriculum that would enhance learning in the classroom. The Academy outlined specific steps necessary for implementing this learned technology. The consensus of a large number of the administrators in attendance indicated difficulty in hiring new teachers with technology skills for use in the classroom to enhance learning. It was also stated as a point of concern from close to 100% of the administrators present that the experienced teachers were lacking technology skills and/or the ability to incorporate technology in lesson planning and classroom use.

Although the use of technology has been addressed on the federal, state, county and local area levels for over twenty years, the educational system still lacks the ability to use and teach technology effectively to its teachers as well as its students.

The Purpose

The purpose of this study is to determine what technology codes, standards, and regulations are required and/or expected of teachers in Tennessee based on information published on the Tennessee Department of Education websites regarding teacher certification and curriculum standards and to determine what is being done to prepare experienced teachers with appropriate technology skills to meet the needs of the individual teacher in the classroom, who is using the state framework and standards for teaching the course. By researching and synthesizing the International Society for

Technology in Education Standards, the National Educational Technology Standards, the National Business Education Association Standards, Tennessee Department of Education Academic and Vocational Curriculum Standards, as well as other published research on technology and its use in the classroom, one can establish a variety of technology skills needed by classroom teachers to support the curriculum standards in the State of Tennessee and to effectively use technology to enhance and/or improve learning in the classroom. Experienced teachers will be considered in the overall purpose of this study to get a true picture of the Tennessee system and how it uses technology in the classroom.

Any resources available from the Tennessee Department of Education that do not yet appear on the state website but are reliable, current, and up-to-date information will be used to make the results of this study more applicable and correct.

Previous Research

In the review of literature, tremendous varieties spanning a wide field of technologies are available but, for the purpose of this study, only the areas dealing with computer technology will be considered. Research dealing with computer technology is more germane to the desired information and, therefore, will be the main topic of interest.

In a study by Henry Jay Becker entitled Internet Use By Teachers the Internet is regarded as an important teacher's aid. The article recognizes that the potential impact of computer technologies in the classroom on teaching as well as learning reaches far beyond the Internet. The rapid growth of the Internet over the past two to three years

demands that one dedicate time to survey the Internet use by teachers and their students. This paper provides extended analysis, and includes information about:

- How frequently teachers and students use the Internet and in what ways
- To what extent teachers value having the Internet in their own classroom
- Variations in Internet use and perceived value by the teacher's level of Internet access
- Internet use and value by professional experience and technology expertise
- Internet use and value by whether teachers participated in staff development
- Internet use and value by the school professional climate.

In an article by Henry Jay Becker and Margaret M. Riel, a very important quote that represents the ideal answer for the training of experienced teachers to learn the use of technology is:

> Research on professional development argues that instructional reform is most successfully accomplished when a practitioner culture emerges that recognizes the need for change and takes responsibility for that change.

David K. Cohen (1988) argues that technology is likely to remain relegated to the margins of American education. If technology is viewed only as an instrument for enhancement or remediation, it will not progress the agenda of systemic development. In the examples of valid technology utilization, teachers and students brought technology into the essential activities in their curriculum and made them accessible to all students rather than just a handful.

Barbara Means, John Blando, Kerry Olson, and Teresa Middleton indicate that the primary driving force for using technologies in education is the concept that technologies will strengthen advanced forms of learning. For this reason, theory and research in learning offer an enormously important source of ideas. Advances in cognitive psychology have enhanced our perception of the characteristics of skilled intellectual implementation and present a basis for designing environments beneficial to learning. A widespread agreement is that superior skills of comprehension, reasoning, composition, and experimentation are acquired not through the communication of information but through the learner's interface with subject matter. This *constructivist* view of learning provides the source of ideas for many of the curriculum and instruction changes and improvements.

Considerable research has been performed in broad area topics such as:

- Technology and Education Reform,
- Technology Use in the Classroom,
- Best Practices for Technology in the Classroom,
- Traditional Uses of Technology,
- Bringing Technology into Schools,
- Technology for Students, and
- Technology for Teachers.

All of these topics and the research done within the scope of each of them add great insight into the importance of teacher preparation for the use of technology in the

classroom. Exploration of pertinent, previous research will reveal important information to be considered in this study.

Importance/Need of the Study

If one accepts the evidence from government and other resources and research studies presented above, it appears new teachers continue to enter the field of education throughout the United States with less than desirable skills for using technology in the classroom and that there is a failure on the part of experienced teachers to acquire the technology skills necessary to meet the required use of technology in the classroom as dictated by the state curriculum standards. This study has the potential to establish to what degree technology is being used in the classroom in Tennessee. The possibility exists that the correlation between beginning teacher preparedness in technology skills and its classroom use, compared to technology use and the acquisition of needed skills for its use by experienced teachers, can be established. A teacher must reach a "comfort zone" in the use of technology for its successful employment in the classroom; otherwise, the teacher will continue to struggle with technology or refuse to use it. The possibility exists that this study could indicate the need for institutions of higher learning in the State of Tennessee to initiate changes in curriculum, offering additional technology courses to students planning to enter the educational system as teachers or, at a minimum, the use of technology to enhance learning in the courses presently required of education students. The possibility also exists this study may prove significant by pointing out that teachers are being very well prepared for the use of technology in Tennessee and that continued opportunities for the acquisition of technology skills are available to all Tennessee

teachers, which would suggest better use of technology for the future in our state classrooms.

Assumptions

The following assumptions apply to this study:

The information available on the Internet from the State Department of Education websites for Tennessee used in this study and the furnished written materials from the county sites used in this study are accurate and contain up-to-date information regarding all available and pertinent information used in the analysis of the materials for this study.

The information available on the Internet from the United States Department of Education and other national organizations and the links to supporting written materials from the U. S. Department of Education and other national organization sites used in this study are accurate and contain correct and up-to-date information regarding all topics used in any way for this study.

Limitations

There is a population limitation based on the use of twelve counties of an extended East Tennessee area chosen to represent the counties across the State of Tennessee supported by the demographic information of the counties.

Delimitations

The counties of Tennessee used in this study were selected to compose over 26% of the population in the State of Tennessee. These counties are diversified in varied

ways… populations from small to large, rural to urban, agricultural to industrial, and small towns to large cities, which should make the results of this study representative of the counties, population, and school districts of the other 74% of the population across the State of Tennessee.

Only information available from Federal Government sites, National Organizations with goals of educational improvement, State Government site, and other well documented expert sources on the World Wide Web portion of the Internet will be deemed reliable and used in the development of this study.

Definition of Terms

Definitions for important terminology used in this study will be furnished to guide the reader in the intended direction of this study. Additional clarification will be given, if needed, for a smooth reading transition from one topic or area to another.

- Beginning teacher – a new teacher who has completed all the coursework in a certified institution of higher learning, has completed practice teaching or an internship, has taken the required tests for certification in the State of Tennessee, and has been certified in an acceptable area of instruction by the state, but does not possess a professional teacher's license.
- Counties of this study – twelve counties of an extended East Tennessee area used in this study.

- Course curriculum standards -- general materials to be taught in a given subject area based on a scope and sequence for covering that material, resulting in a list of skills or course-specific knowledge students should learn during the suggested time in the course, usually determined by the state or school district.
- Experienced teacher – a teacher with a minimum of three years experience, holds a Professional Teaching Credential issued by the State of Tennessee, and is generally tenured (although an experienced teacher who has moved from one school district to another may not be tenured).
- Pre-service teacher – a student having been accepted into the College of Education at a state approved institution of higher learning and currently enrolled in coursework and/or internship, which, with successful completion, lead to professional teaching licensure in the State of Tennessee.
- Protocol – codes or standards dictating strict adherence to regulation, conduct, or procedure prescribed by authority as acceptable practice.
- Technology requirements – any published standards or suggested use of technology by a national, state, or local organization mentioned in this study related to or associated with schools, teachers, and/or students.
- Technology skills – knowledge and/or abilities in computer techniques necessary to meet or exceed any published standard or suggested use by teachers or students.

Questions

According to the current published information on the Tennessee Department of Education website regarding course and/or technology curriculum standards for all grade levels and the use of technology to enhance learning:

1. What are beginning and experienced teachers doing in the classroom to fulfill the course and/or technology curriculum standards requirements for the use of technology to enhance learning?
2. How are beginning and experienced teachers acquiring the necessary skills required for the use of technology in the classroom to enhance learning?
3. Does the use of technology show up in the teacher evaluation process and, if so, how?

Methods and Procedures

A variety of approaches is necessary to answer this question. A review of the websites for teacher certification by the State of Tennessee will determine which, if any, courses that teach technology skills and computer techniques as well as the use of a variety of software programs used for production and presentation are being required for initial and/or re-certification in the State of Tennessee. Additionally, state and county education sites will be researched for workshops, clinics, and training in computer skills offered for experienced teachers. Tennessee Frameworks and Standards for the Core Curriculum will be investigated for the required use of technology to meet the standards for each course to determine the importance and need for each individual teacher to acquire an assortment of technology skills.

A review of literature should determine a comprehensive list of technology skills deemed essential by experts in the field of education and/or technology that teachers should possess to effectively use technology in the classroom to enhance teaching and learning. Once these necessary technology skills have been established, one can determine what is being done on the local level to train teachers in these skills and how to incorporate them into lesson plans and the classroom. Interviews with and/or questionnaires completed by Technology Coordinators and/or Curriculum Specialists in each of the counties will establish the details of "what is really being done" in the local area. Analyzation of the personal interviews with County Technology Coordinators and Curriculum Specialists, County Technology Plans, and other significant information from all twelve counties should give pertinent information related to all of East Tennessee and, most probably, be representative of what is being done across the State of Tennessee.

Most of the documents with relevant data related to and suggested for consideration in this study are available for inspection and download from the Internet. Typically, information sites of this nature include the very latest updates to Internet published material. The Technology Plan of each of the counties will be examined and compared to establish the overall direction of technology for the future.

Organization of the Study

This study will be organized into the following five chapters: Chapter One will introduce the problem and provide background information on technology and its changing role in education through the years. The problem will be stated along with the purpose of the study, including previous research information that will include the

importance and need for this study. The question proposed for the study will be stated with the methods and procedures used to secure reliable responses. All necessary assumptions, limitations, delimitations and definitions to clarify and characterize terminology and aspects of this study will be included in this chapter. Chapter Two will be presented as a significant review of pertinent literature that is directly related to the uses of technology in Tennessee, as it relates to education, the teacher, the student, and the enhancement of learning in the classroom in certified public school systems. Chapter Three will contain the detailed results and descriptions of the following methods and procedures, following as closely as possible the listed tasks:

1. A review of pertinent literature categories:
    - State protocol and teacher training that outlines the use of technology.
    - Course(s) in technology offered and/or required for graduation in a state certified institution of higher learning.
    - Course(s) in technology required for state teacher certification and/or re-certification.
    - Literature of national protocol, guidelines, and/or standards addressing the use of technology in the classroom to enhance learning.

2. The creation of a flowchart instrument based on interviews and review of materials.
3. An expert's review of information and categories – add, revise, delete, combine.
4. Development of valid instruments of table and figure forms to visually display important information gleaned from the review of literature.

5. Utilization of the created instruments and textually indication of the important results.

Figure 1 is a flowchart illustrating that the federal government is the ultimate influence on the classroom. As the organizations and entities in the figure move in toward the classroom, the influence and control become less and less.

Chapter Four will present a synopsis of applicable data and consequences of the discovered relationship of the counties in Tennessee and the correlation of the data to improve protocol and teacher training to use technology in the classroom to enhance learning. Chapter Five will offer a summary of this study with conclusions and the consequential implications derived from the research. A bibliographic or reference section will follow the main chapters of the study and the final area of the work will be a relative appendix containing forms, charts, and other material related to the study.

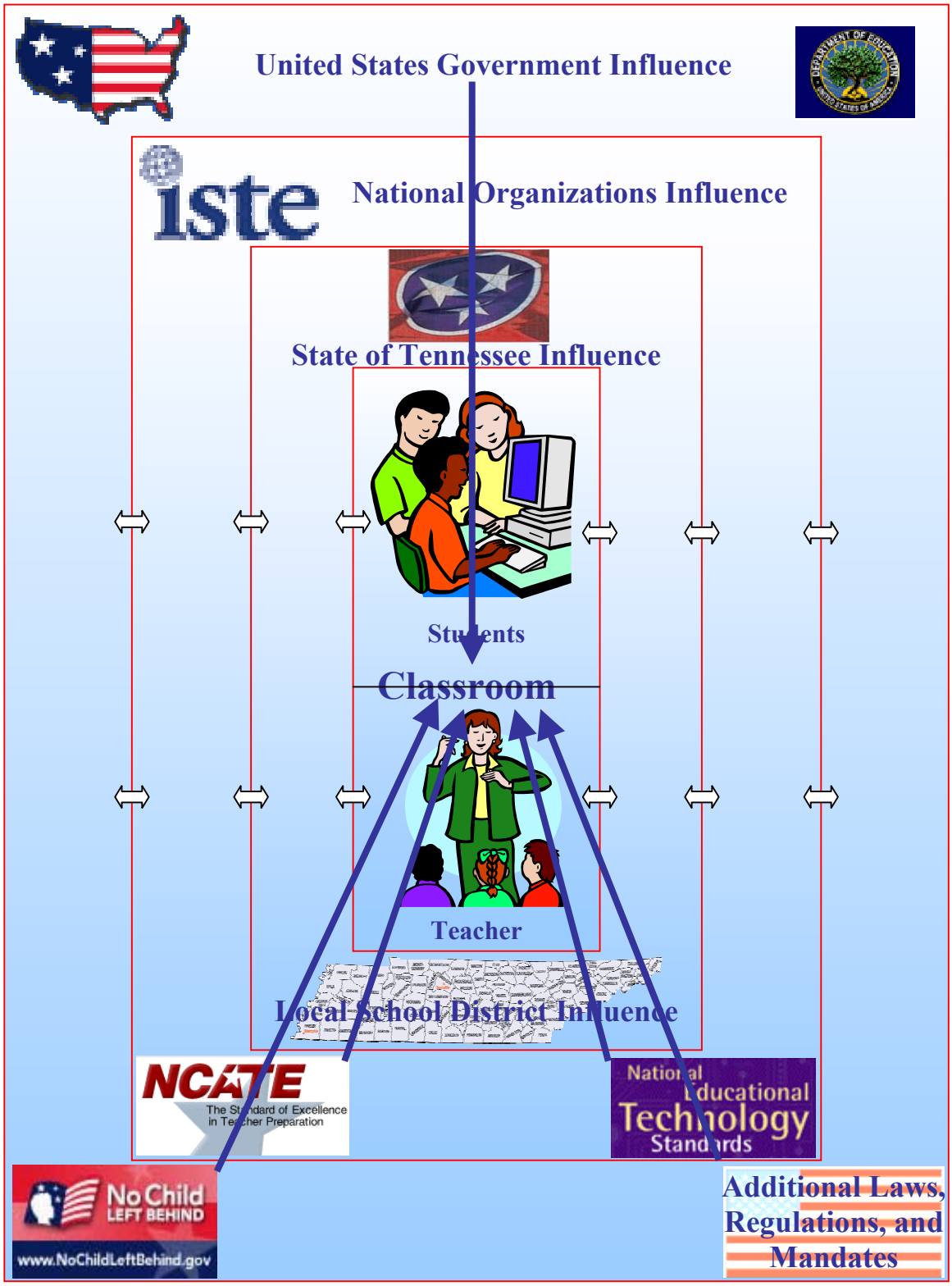

Figure 1. Influences on the Classroom

CHAPTER 2

REVIEW OF LITERATURE

Background

When one considers the report to the nation and to the Secretary of Education entitled A Nation at Risk: The Imperative for Educational Reform begun in 1981 and the effort organized in May of 1989 by the United States Department of Labor, instigated by the former Secretary of Labor, Lynn Martin, and completed under the new Secretary of Labor, Elizabeth Dole, later entitled the Secretary's Commission on Achieving Necessary Skills (SCANS) that analyzed and outlined the demands of the nation's workplace and concluded that "...more than half our young people leave school without the knowledge or foundation required to find and hold a good job," one can ascertain a tremendous amount of concern on the part of individuals as well as the government on the state of the educational system in the United States. An alarming concern for student achievement as indicated by test scores was again recognized and addressed, when in 1994 under the leadership of Former President Bill Clinton, Congress passed the law, Goals 2000: Educate America Act.

In January 2002, yet another federal law was passed by the One Hundred Seventh Congress of the United States of America under the leadership of President George W. Bush, the No Child Left Behind Act of 2001 (NCLB), which once again indicated this continued concern of individuals and government agencies on the failure of the educational system in the United States to curtail declining test scores. This tremendous concern for the educational system has spanned greater than a twenty-year period of time;

and, very nearly, the greatest change we can establish with unquestionable certainty is the numbers on the calendar.

Over twenty years ago the above mentioned report to the nation and to the Secretary of Education concluded that, "The teaching of computer science in high school should equip graduates to: (a) understand the computer as an information, computation, and communication device; (b) use the computer in the study of the other Basics and for personal and work-related purposes; and (c) understand the world of computers, electronics, and related technologies" (Recommendation #5, p. 2); and the very latest attempt at solving the problems in education, No Child Left Behind concludes in the Enhancing Education Through Technology – Title II-D-1&2 sections that "even as technology becomes more ubiquitous in classrooms, teachers' preparation to use technology for teaching lags behind access in technology, suggesting that in 2000, only 27 percent of the teachers reported they were fully prepared to integrate technology in their instruction" (Enhancing Education Through Technology – Title II-D-1&2).

All of the above federal government reports and laws recognize the importance of using technology in the educational process and herald its importance for the enhancement of learning and as necessary skills for all students to learn, but the years have failed to make it so. It should be noted that although the legality of the No Child Left Behind Act of 2001 is being challenged in many areas, it is still in effect even though there is very little money from the federal government level of administration to support the state and local implementation of this legislation.

From the National Center for Education Statistics (NCES), which is the "primary federal entity for collecting, analyzing, and reporting data related to education," the latest

publication of September 2002, Internet Access in U.S. Public Schools and Classrooms: 1994-2001, yields very interesting information on technology connectivity in the United States in a variety of areas.

Since 1994, this organization, NCES, has conducted national surveys in a representative group of public schools, approximately 1000 schools, to closely estimate connectivity to information technology through the Internet in schools and classrooms, questioning Internet access and Internet related topics. In the main, connectivity of schools and classrooms has remained constant on the surveys; the changes in technology itself in speed and new issues have demanded the addition of survey topics and modification of others. The Fall 2001 survey added topics on Internet connectivity outside regular school hours, technologies and procedures used to prevent student access to inappropriate material on the Internet (which, by the way, is now in question and may go to the Supreme Court for a ruling), software and hardware for students with disabilities, and several other items related to instructional computers, school websites and school laptops for student loan.

In Fall 2001, ninety-nine percent of public schools in the United States had access to the Internet, a considerable growth from the 35 percent report in the first year of this report in 1994. The first report in 1994 indicated a mere 3 percent of connectivity in the instructional classroom, which, in addition to the regular classroom, included technology labs and library/media centers. In the 2002 report this figure had grown to 87 percent in 2001.

The speed of connectivity has radically changed during the NCES reporting time from 1994 to the present from dialup Internet connections (74 percent in 1996) to 85

percent use of much faster, more reliable, and continuous Internet broadband connections of T1/DS1 lines in 2001.

The ratio of students to instructional computers according to this statistical report from NCES has seen a remarkable increase from 12.1 to 1 ratio in 1998, the first year this was included in the report to 5.4 to 1 in 2001. The calculation of this ratio was made by taking the total number of students in all the public schools used for the basis of this report, including schools that reported no Internet access, divided by the total number computers with Internet access that are used for instruction in the schools.

The availability of computers with Internet access beyond the regular school day has experienced a phenomenal increase just in the last two years. In 2000, 21 percent of the children of our nation had access to the Internet at home to perform school related tasks such as homework. Just one year later, over 70 percent of all children ages 3-17 had computer access in their homes. Children in this age group are using the computer for educational programs, including school work (68 percent), games (11 percent), access to the Internet for email (73 percent) and research (33 percent) outside of schoolwork, and word processing, and checking the news, weather, and sports (20 percent).

According to the Child Trends DataBank, research on children and the effects of Internet-access computers is limited but does provide some insight into some probable benefits for the students using home computers. In general, white, higher socioeconomic groups tend to perform better in mathematics and reading.

In a report by the U.S. Department of Commerce entitled A Nation Online: How Americans Are Expanding Their Use of the Internet, the above statistics about the 3-17 year old computer use, connectivity and Internet use are documented in the most wide

reaching and reliable survey to secure datasets that has been gathered on computer connectivity, broadband, computer use, and the Internet. In this report that surveyed approximately 57,000 households and over 137,000 people across the nation, the results indicate that children and young adults are most likely to use the computer and the Internet for the production of schoolwork. More than 50 percent of children over 10 years of age, 75 percent of all young adults in school, and almost 20 percent of all elementary school students use the Internet for schoolwork. Using the computer to play games peaks among the 14-17 year old group, and as these children grow older they tend to use the Internet for more varied types of activities.

Creation of Technology Standards

Goal 3 of the report A Nation at Risk (National Commission on Excellence in Education, 1983):

> By the year 2000, American students will leave grades 4, 8, and 12 having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy.

The conclusion of many educators knowledgeable of the national report, A Nation at Risk (National Commission on Excellence in Education, 1983), deem its publication as the primary incident that began the movement for educational standards. "The educational foundations of our society are presently being eroded by a rising tide of mediocrity that

threatens our very future as a nation and a people… We have, in effect, been committing an act of unthinking, unilateral educational disarmament" (National Commission on Excellence in Education, 1983, p.5) which was and still is a call to the ominous need of total system revamping and overall modification.

It would be an understatement of fact if one did not credit the publication of Curriculum and Evaluation Standards for School Mathematics in 1989 by the National Council of Teachers of Mathematics (NCTM) for creating the dawn of a new era in the function and importance of national organizations as an imposing force in the application of schooling. With the creation of the Standards document, NCTM molded a new perception on how national subject-area organizations can contribute to the development of the educational system when such an organization sets forth, for three levels (K-4, 5-8, and 9-12), an outline of standards indicating what students should know, what skills students should possess, and how this learning might best be proven or demonstrated in the classroom. Within a very short period of time, other national organizations made their mark in the standards arena, following the lead of NCTM.

"Since 1985, the American Association for the Advancement of Science (AAAS) Project 2061 has worked to reform K-12 education so that all high-school graduates are science literate—that is, prepared to live interesting, responsible, and productive lives in a world increasingly shaped by science and technology." The primary publication leading to significant contribution toward the development of standards in the field of science comes from the AAAS in their work, Science for All Americans: A Project 2061 Report (1992). In this report, the Project 2061 which began in 1985, the year Halley's Comet was visible from earth, derives its name for the Project 2061 from the year in

which the comet will return. AAAS offers more than 60 "literacy goals" for the curricula of science, mathematics, technology, and the social sciences. These standard type goals are soundly articulated across group levels of K-2, 3-5, 6-8, and 9-12. In yet a third effort published as Benchmarks for Science Literacy (1993), the benchmarks outline steps (which would now be called standards) as to how students should advance on the way to science literacy, outlining what students must know and understand by the time they obtain specific grade levels. The AAAS includes discussions and presentations of the research base online used by the individuals who created the project (AAAS, online).

The International Technology Education Association (ITEA), in collaboration with and funded by the National Science Foundation and the National Aeronautics and Space Administration, published Technology for All Americans: A Rationale and Structure for the Study of Technology in 1996, after which time a period of four years lapsed as a period of review, evaluation, and revision. In 2000, ITEA published Standards for Technological Literacy: Content for the Study of Technology, which, as the name clearly indicates, and the preface of the work outlines in some detail, includes standards for technological literacy addressing "what students should know and be able to do in order to be technologically literate" (p. vii). The twenty standards comprehensively outlined in the publication include five general areas dealing with the nature of technology, technology and society, understanding of design, abilities needed in a technological world, and understanding the designed world. An introductory narrative prefaces each standard explaining the grade-level benchmarks and outlining content appropriate materials for the grade range. Each of the basic standards has a breakdown for all categories of related technology skills at the K-2, 3-5, 6-8, and 9-12 grade levels.

The International Society for Technology in Education (ISTE) published National Educational Technology Standards for Students: Connecting Curriculum and Technology in 2000. In this work, ISTE provides ten performance skills that should be achieved for each grade group, K-2, 3-5, 6-8, and 9-12. These measures of expected learning are broken down into one or more of the following six broad area categories: basic operations and concepts; social, ethical, and human issues; technology productivity tools; technology communication tools; technology research tools; and technology problem-solving and decision-making tools. A noteworthy segment of the information is focused on supplying sample curriculum lessons that provide effective use of technology in teaching and learning. An activity and directory of resources is furnished for each grade group in each of the five subject matter areas of English language arts, foreign language, mathematics, science, and social studies.

Advancement was also being made by attempts to answer such questions as: "What are workplace skills? What skills will prepare our youth to participate in the modern workplace? What skill levels do entry-level jobs require?" In an attempt to answer these questions and outline the knowledge and skills students should possess to experience success and be productive in the workplace, the Secretary's Commission on Achieving Necessary Skills (SCANS) and the report the commission produced, What Work Requires of Schools (1991), has been a tremendous facilitator for pinpointing the center of attention on the development of standards that address higher-order thinking and reasoning skills, as well as personal traits and interpersonal skills that students should acquire throughout the years of their education. The SCANS document strengthens the call for some type of wide-reaching regulations or standards that attend to the

development of each student's critical thinking skills, each student's ability to communicate, and the ability of each student to work in groups.

As the task of creation, development, and refinement of standards continues by varied local, state, national governments and organizations for almost all curriculum areas, there is a constant array of revised sets of standards published each year by one or more nationally recognized organizations of subject-area experts. In addition to all of these organizations that publish their own sets of standards, every state and the District of Columbia has published their own sets of subject matter related curriculum standards in all offered curriculum areas. It does not take one long to conclude that the educational learning process of all students taking National Placement Tests should be driven by one basic, well-defined set of standards for each subject matter area. Whether these standards are created, developed, and refined on a school, district, state, or national level is of little significance to the individual student as long as all these efforts are reconciled to some degree with alignment to the national tests required of the students.

The Need For Improvement

The "are we there yet" phenomenon is one that anyone, who has spent time traveling for fairly long distances with children, will certainly understand (Tolar, 2002). It is unquestionably factual that, for over 20 years, reports written from quality research, laws passed based on quality research, and edicts of nearly limitless national educational alliances and organizations based on quality research herald the importance of technology's use in the educational system. This use of technology in the educational system serves multi-purposes to the administrator, and even more so to the teacher, in and

out of the classroom, for management as well as instruction to enhance learning, and is an extremely necessary teaching tool for the enrichment and retention of learning. When one views technology's use in the educational system through the "are we there yet phenomenon" the answer is a resounding "No!" It has been said that, if all the computers in business were to crash, business would shut down; but, if all the computers in education were to crash, education would go on as normal.

Previously, many of the federal programs have focused on increasing access to more technology. In the No Child Left Behind Law, it is reported that even as technology and Internet connection becomes more accessible in classrooms, the preparation of teachers to use this available technology as a teaching tool and for the enhancement of learning continues to lag behind access to technology. As previously stated from NCLB, only 27 percent of teachers reported they were fully prepared to integrate technology in their instruction. Technology can be used to enhance curricula and engage students in learning. In addition, the job market increasingly demands technology skills for new workers (NCLB: Desktop Reference).

The No Child Left Behind Act Focuses on What Works:

- Emphasizes implementation of proven strategies by requiring participating district to base the strategies they use for integrating technology into curricula and instruction on reviews of relevant research.
- Supports high-quality professional development activities by requiring that at least 25 percent of funds received by districts be used for high-quality professional development in the integration of technology into instruction.

- Mandates a national study to examine the conditions under which technology is effective in increasing student achievement and the ability of teachers to teach. (NCLB, 2001)

It is not sufficient merely to have a computer and an Internet connection in the classroom if they are not used in a way that makes them an important part of the learning process. Technology is nothing but a teaching/learning tool much like any other, and the benefits are not derived from simply having access to it, but the ultimate value comes from how that technology is used. This graphic depiction recreated from the No Child Left Behind web pages and included as Figure 2 indicates the percentage of students by grade level who reported computer use at school at least one time a week between 1984 and 1996.

The implications of the chart do not speak well for the use of the computer by the students for such low utilization, which reaches its highest level in Grade 4 at less than

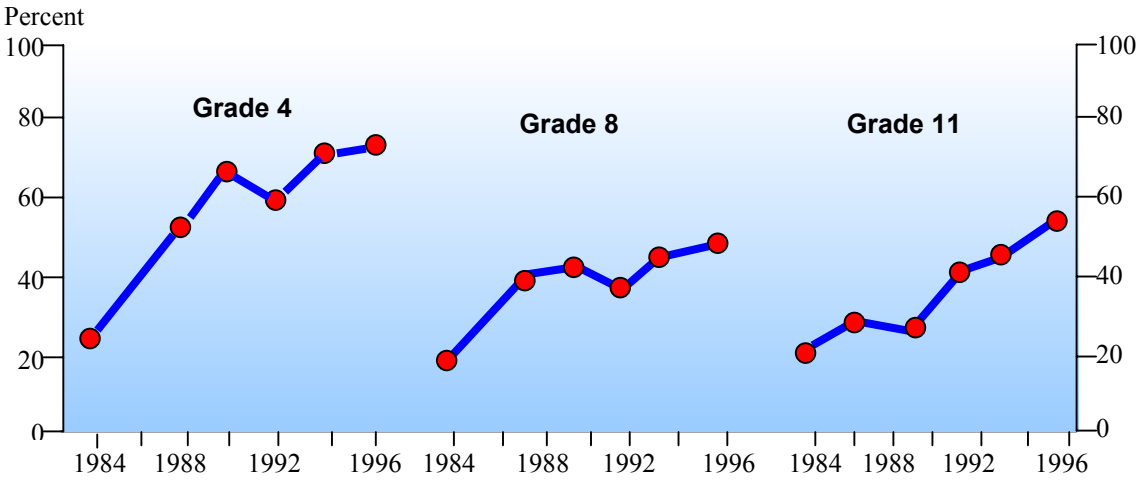

Figure 2. Percentage of students who reported using a computer at school at least once a week, by grade

80%. In an attempt to increase the use of technology for enhancing education through Title II-D-1&2 of the No Child Left Behind Act, the Educational Technology State Grants Program funds are designed with the intent of supporting improved student academic achievement through the use of technology in schools by supporting high-quality professional development; increased access to technology and the Internet; the integration of technology into curricula; the use of technology for promoting parental involvement; and managing data for informed decision-making for state-level activities.

State education agencies are obligated to have state technology plans in place that incorporate state goals for the utilization of technology and the strategies the states will use to train teachers to employ technology in the classroom. This course of action emphasizes using both established and inventive strategies for the use of technology. The main focus areas of the Educational Technology State Grants Program is on the use of technology to "support improved curricula, instruction and, ultimately, student achievement" by making available "the resources necessary for integrating technology into the instructional program, which includes funds for Internet connections and services, professional development for teachers, and technology applications" (NCLB: Desktop Reference).

In a second article asking the question "Are we there yet?" the resounding reply echoes throughout every state that, "Schools still face challenges in using technology to improve student achievement" although standards, assessments and accountability procedures are published and available on state websites of every state with supposedly required use by local school districts across the nation — and the latest comprehensive reauthorization of the Elementary and Secondary Education Act promises to "leave no

child behind." Yet schools nationwide are still incapable of taking the comprehensive benefits of technology, according to a 2002 survey performed by Grunwald Associates for the National School Boards Foundation.

Schools ultimately must surmount extensive shortcomings before the realization of the benefits on technology investments. It is not sufficient to simply invest in computers and connect schools and classrooms to the Internet. The center of attention requires investigation into how schools, and, even more important, how teachers and students are using technology in the classroom. An overwhelming number of teachers, according to the Grunwald Associates study (seventy-three percent by the No Child Left Behind figures), currently feel unprepared in the necessary skills to incorporate technology into their classroom instruction process. Leaders in local school districts suggest that the primary use of the Internet continues to be as a research tool, not an opportunity for interactive instruction, learning, communication, and/or collaboration (National School Board Foundation, 2002).

Training, What Are the Necessary Tools?

In the article "Are we there yet?" published online by the National School Board Foundation in 2002, which provides information on the result of national survey by Grunwald Associates, "a leading market research firm specializing in technology," and generously supported by the Corporation for Public Broadcasting, AT&T, and PLATO Learning, it is stated that the focus on technology needs to expand to how it is being used in schools. It further reports that many teachers do not have the skills needed to integrate technology into their instruction.

However, in a published chart in the NSBF article, recreated and included as Table 1, related to the question, "How do district teachers use the Internet for instructional purposes?" the responses indicate seventy-four percent of the teachers use technology for Internet searches and seventy-two percent use it for teacher research. If it is surmised from the figures in the chart that over seventy percent of teachers nationally possess the ability to search and research the Internet for information, one questions why only thirty-eight percent of the teachers in this survey use the discovered information in their lesson planning activities.

Table 1. Teacher's use of the Internet

How do district teachers use the Internet for instructional purposes?	**Percentage of respondents**
Internet searches	74%
Teacher research	72%
Lesson planning	38%
Demonstrations, presentations	18%
Utilizing Internet services	10%
Student projects	8%
Student research	7%
E-mail	5%
Videoconferencing	5%
Class Web pages	4%

The survey findings produced five guidelines school leaders must think about for extending the competence of schools and educators to achieve better use of technology for instructional results:

- Consider technology an essential tool for education and management —it is crucial to effectual teaching and educational strength.
- Make use of the Internet as an indispensable instructive tool of significant value to learner success.
- Provide extensive specialized development for administrators and teachers. Specifically, teachers need assistance in integrating the Internet into customary classroom lessons as an effective, interactive tool for teaching, learning, and communicating.
- Anticipate and prepare for circumstances that enhanced employment of the Internet will produce for schools, such as the way teachers and students interact and, ultimately, the culture of the school. These changes in roles may yield benefits for both students and teachers as they learn and explore technology — and academic subjects — together.
- Extend neighborhood participation in educational technology policies and practices to discover how business is incorporating technology on a daily basis (National School Board Foundation, 2002).

Fear, anxiety, and concern, three characteristics generated by change of any kind, must be addressed since the use of technology as a teaching and learning tool in the classroom generates fear, anxiety, and concern in even larger quantities because it entails

new classroom procedures and the employment of unknown technologies. Dealing with this fear, anxiety, and concern is an extremely crucial step in helping teachers acquire the necessary skills for the use of technology in the classroom to enhance learning.

Technology instruction should offer teachers the familiarity of basic computer use. Teachers should possess a rudimentary comprehension of computer operation, such as standard input and output hardware, which includes the mouse, disk drives, printers, and speakers as well as other similar devices. Equally important is the performance of basic systems operations like the ability to install and/or delete programs, file manipulation, and backing up files. Additionally, understanding the basics of file commands like Save, Delete, and Rename as well as the basics of directory structures is essential. One can easily ignore the necessity for very fundamental computer training of teachers because the assumption many times is that their computer knowledge is at some advanced level, regardless of whether or not that is the case (Bitner & Bitner, 2002).

A study conducted for the United States Congress in 1995 by Kathleen Fulton, who was the associate director of the Center for Learning and Educational Technology in the College of Education at the University of Maryland, reported that most school systems were spending a smaller amount than 15 percent of their technology budgets on teacher training. With the realization that technology alone is not a national remedy within itself and for technology to work well for teachers and students, there must be a human infrastructure put into place at the same rate computers and wiring are being installed. It is a breakdown on the human infrastructure aspects of technology that continues to halt the effectiveness of the computers and wiring. Fulton's

recommendation in this study was that "this percentage should be doubled to reflect something more like a third of expenditures going for training."

Much research has been done that addresses teacher computer training and experience. One can assemble information from previous research on teacher computer training and experience that supports the concept that teachers are mostly self-taught, spending their own capital and time to develop their comprehension of technology to the idea that it takes 1,000 hours of training and practice time for a novice computer using teacher to feel capable of handling curriculum change for computer-based instruction. In support of the "mostly self-taught" idea, teachers have always gone the "extra mile" to secure needed materials and information to enhance learning in their classrooms. That is why in Chapter One the quote from an article by Henry Jay Becker and Margaret M. Riel represents the ideal answer for the training of experienced teachers to learn the use of technology. Quoting Becker and Riel:

> Research on professional development argues that instructional reform is most successfully accomplished when a practitioner culture emerges that recognizes the need for change and takes responsibility for that change.

Educators have always been that "practitioner culture" who has recognized "the need for change and takes responsibility for that change." The problem with taking this responsibility for change with the use of technology is that taking a teacher through computer literacy to competent user of technology is a daunting task as revealed above when addressing the anxiety, fear, and concern of the new learner/teacher… from "in charge" to not knowing.

Technology itself is not the problem. The overhead projector was technology one could dream about to enhance learning in the classroom because it enhanced teacher effectiveness on several levels. With a certain amount of care, notes prepared once are available forever. Graphics can be displayed, talked about, written on, cleaned, and reused in ways never before possible. It became, and still is, a tool for almost every classroom. It was and is an effective, efficient, low-cost, easy-to-learn, easy-to-use, teacher-enhancer, learner enhancing educational tool. Anxiety, fear, and concern involved in its use were negligible because it is impossible to delete its hard drive, since it does not have one, and if one destroys a slide or even the projector, it can be replaced very economically.

Realizing that the problem is not the use of technology itself, the issue about teaching teachers to use technology can be broken down to all the usual questions of what, where, when, why, and how this computer literacy to competent user needs to be approached. As any good educator would inform us, extensive research should be conducted to determine and develop major goals for the quest of educating teachers to use technology effectively in the classroom to enhance learning. Each of these goals should then be broken down into specific objectives that need to be mastered for the use of technology in the classroom to be successful in the task of enhancing student comprehension. In the past, a lack of general agreement on the important computer competencies and skills teachers should possess limited the effective design and delivery of curricula for teacher preparation and professional development (Scheffler & Logan, 1999).

Presently, the International Society for Technology Education (ISTE), whose goal is to "provide leadership and service to improve teaching and learning by advancing the effective use of technology in education," has done the research over many years and has developed the goals and objectives related to the important computer competencies and skills teachers must possess to use technology effectively in the classroom to enhance learning. According to published material on the ISTE website, "At the state level, 45 of the 51 states have adopted, adapted, aligned with, or otherwise referenced at least one set of standards in their state technology plans, certification, licensure, curriculum plans, assessment plans, or other official state documents."

In an updated list published online on March 17, 2003, over eighty-eight percent of the states of the U.S. acknowledge ISTE in some way as the benchmark for at least one set of standards in their state technology plans, certification, licensure, curriculum plans, assessment plans, or other official state documents. With this in mind, one could, with some comfort, build a local curriculum for professional training of essential computer competencies and skills for its system's teachers around the ISTE Teacher Standards.

Necessary Skills for Technology Use in the Classroom

As one considers the necessary skills for technology use in the classroom, the word "necessary" looms in the mind as if it were a neon sign flashing off and on in the dark, questioning the "Why" of the usual questions of computer literacy. In an article by Raskoph written in 1996, he alludes to the fact that, "If you fell asleep 100 years ago 'a la Rip Van Winkle' and woke up in a modern hospital, you would have no idea where you were. If you woke up on an airplane, you would be terrified, but, if you'd emerged from

this slumber in almost any classroom in the U.S., you'd know exactly where you were." If he had been a physician, a farmer, or an engineer, he would be unemployable if he awoke today. If he had been a good elementary school teacher in the 19th century, he would probably be a good elementary school teacher today (Dede, 1998), because if Rip Van Winkle awoke today, he would recognize almost nothing in modern society--except schools (Slavin, 2002).

"At the dawn of the 21st century, education is finally being dragged, kicking and screaming, into the 20th century. The scientific revolution that utterly transformed medicine, agriculture, transportation, technology, and other fields early in the 20th century almost completely bypassed the field of education" (Slavin, 2002). After years of attempts, it is way past time for technology to be used in the classroom as the educator's greatest teaching tool in history. The effectiveness of technology can transform every classroom into a media center and library of its very own with more information available than any library in existence could ever accumulate or even hold.

With a few clicks of a mouse a Latin teacher can secure information for developing a dynamic lesson plan, or send students to a location on the Web that allows them to view graphics of places the class studies in Ancient Rome; a science teacher can secure the very latest information about the space program or have students watch video and access data on the terrible Columbia Shuttle disaster. The availability of information in text, graphics, sound, and video are nearly limitless. Searchable online databases offer teachers and/or students a plethora of information on almost any topic the imagination can fathom. With all of this in mind, the question is no longer "Why?" but should be

"Why not?" Why not take every advantage of technology for the benefit of educators and students in all areas of teaching and learning for the benefit of both groups?

Through research that spans several years ISTE has developed and updated six basic goals that address needed competencies for the teacher to successfully use technology in the classroom. The six areas of standards with performance indicators are designed to be general enough to be customized to fit state, university, or district guidelines and yet specific enough to define the scope of the topic. Performance indicators for each standard provide specific outcomes to be measured when developing a set of assessment tools. The standards and the performance indicators also provide guidelines for teachers currently in the classroom. The information about the standards as well as the standards with performance indicators is included below:

I. TECHNOLOGY OPERATIONS AND CONCEPTS. Teachers demonstrate a sound understanding of technology operations and concepts. Teachers:

   A. Demonstrate introductory knowledge, skills, and understanding of concepts related to technology (as described in the ISTE National Education Technology Standards for Students).
   B. Demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.

II. PLANNING AND DESIGNING LEARNING ENVIRONMENTS AND EXPERIENCES. Teachers plan and design effective learning environments and experiences supported by technology. Teachers:

A. Design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.

B. Apply current research on teaching and learning with technology when planning learning environments and experiences.

C. Identify and locate technology resources and evaluate them for accuracy and suitability.

D. Plan for the management of technology resources within the context of learning activities.

E. Plan strategies to manage student learning in a technology-enhanced environment.

III. TEACHING, LEARNING, AND THE CURRICULUM. Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning. Teachers:

A. Facilitate technology-enhanced experiences that address content standards and student technology standards.

B. Use technology to support learner-centered strategies that address the diverse needs of students.

C. Apply technology to develop students' higher order skills and creativity.

D. Manage student learning activities in a technology-enhanced environment.

IV. ASSESSMENT AND EVALUATION. Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies. Teachers:

A. Apply technology in assessing student learning of subject matter using a variety of assessment techniques.

B. Use technology resources to collect and analyze data, interpret results, and communicate findings to improve instructional practice and maximize student learning.

C. Apply multiple methods of evaluation to determine students' appropriate use of technology resources for learning, communication, and productivity.

V. PRODUCTIVITY AND PROFESSIONAL PRACTICE. Teachers use technology to enhance their productivity and professional practice. Teachers:

A. Use technology resources to engage in ongoing professional development and lifelong learning.

B. Continually evaluate and reflect on professional practice to make informed decisions regarding the use of technology in support of student learning.

C. Apply technology to increase productivity.

D. Use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning.

VI. SOCIAL, ETHICAL, LEGAL, AND HUMAN ISSUES. Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in K-12 schools and apply those principles in practice. Teachers:

A. Model and teach legal and ethical practice related to technology use.

B. Apply technology resources to enable and empower learners with diverse backgrounds, characteristics, and abilities.

C. Identify and use technology resources that affirm diversity

D. Promote safe and healthy use of technology resources.

E. Facilitate equitable access to technology resources for all students.

(International Society for Technology Education, 2003)

Detailed competencies are available from ISTE created by the National Educational Technology Standards (NETS) Project, which is an ongoing initiative of the International Society for Technology in Education (ISTE).

The entity of the International Society for Technology in Education (ISTE) called NETS for Teachers Project, a Preparing Tomorrow's Teachers to Use Technology grant funded by the US Department of Education, produced in a sequence of actions and procedures with significant results that led to a national consensus on the skills teachers should possess regarding technology and what they should be able to do with technology in the classroom to enhance management and instruction. Ultimately, a major goal of the project will be to provide guides to assist teachers in preparing for technology use and information on how to incorporate technology into the teacher planning process as well as disseminating these promising procedures for the preparation of pre-service teachers

for the use of technology in the classroom to effectively enhance learning. The main purposes of the NETS for Teachers Project are to:

1. Develop a comprehensive set of performance-based technology foundation standards for all teachers reflecting fundamental concepts and skills for using technology to support teaching and learning;
2. Define essential conditions for teacher preparation and school learning environments necessary for effective use of technology to support teaching, learning, and instructional management;
3. Develop standards-based performance assessment tools for measuring the achievement of the technology foundation standards and as a basis for certification, licensing, and accreditation;
4. Identify and disseminate models of teacher preparation where candidates receive experiences preparing them to effectively apply technology to support student learning; and
5. Establish a National Center for Preparing Tomorrow's Teachers to Use Technology (NCPT3), which will provide coordination, leadership, and support for the PT3 initiative and dissemination of program results.

The mission of this US Department of Education financed project is to determine standards, evaluations, and circumstances that support the implementation of technology to strengthen and/or enhance student learning. Nationwide consensus will be cultivated through face-to-face discussion conferences as well as through online communications. Evaluation methods will be devised to aid teacher preparation curriculums in determining

the success of their course of study for training their pre-service teachers and graduates for the use of technology to strengthen and/or enhance student learning. The teacher education programs acknowledged as successfully preparing their students with the ability to incorporate the use of technology in the classroom to strengthen and/or enhance student learning will be encouraged to reveal the innovative practices developed within their own programs through an online community of teacher education institutions. The National Center for Preparing Tomorrow's Teachers to Use Technology (NCPT3) and its management commission will supply direction to the US Department of Education and the teacher educational community offering support and direction for the implementation of technology in the classroom to strengthen and/or enhance student learning.

The Results of Technology Use

> *Teachers use new technologies for the same reason they use books, worksheets, and other teaching tools—to help their students learn. When technology is integrated into the curriculum in a comprehensive way, and when teachers feel comfortable and confident about using it, myriad changes occur that may ultimately redefine the roles of teachers.* (U.S. Congress, 1995, p. 57 & 69)

At the time the U.S. Congress was making the above statement in 1995, there was very little evidence that technology as a teaching tool was actually making a measurable difference in the learning that was taking place in the classroom. There was CAD, CAI, CBL, CBT, CMI and other acronyms which were "buzz words" or tech-talk that stood for Computer-aided design, Computer-aided instruction, Computer-based learning, Computer-based training, and Computer-managed instruction, respectively, all having important roles as technology went to school, and even today, but to find hard evidence…

"cold hard facts," as the terminology goes, that technology was actually enhancing the learning that was previously going on in the classroom was pretty much impossible.

Although there was that group mentioned in Chapter One, "the practitioner culture… that recognizes the need for change and takes responsibility for that change" that was already using technology very successfully in the classroom in a multitude of ways to enhance teaching styles and effectiveness and more importantly to enhance learning in the classroom. One name that may "ring the proverbial bell" for most educators is Kathy Schrock, currently the Administrator for Technology for the Nauset Public Schools on Cape Cod, Maine. Previously, as a library media specialist, her interest in technology throughout all areas of the curriculum at all grade levels led to the beginning of her world famous website, Kathy Schrock's Guide for Educators, which began in 1993 and has year after year gained traffic, momentum, interest, and use from and by educators interested in using technology in their classrooms as a tool to support and enhance instruction and learning.

In 1991, Tim Berners-Lee, working with Robert Cailliau at CERN, a European Organization for Nuclear Research and the world's largest particle physics center, projected a distributed information structure, based on "hypertext" linking, a way of connecting associated pieces of information stored on computers by concealing network addresses behind highlighted items on the screen by which information can be linked between several computers. The name "World-Wide Web" was chosen. Although it was initially developed only to provide a distribution hypermedia system for easy access to information anywhere in the world, with the creation of the graphical user interface (GUI) to the World-Wide Web (WWW) named MOSAIC in 1993 by Marc Andreessen,

the National Center for Supercomputing Applications (NCSA), and the University of Illinois, the door was opened that revolutionized modern communications and even our way of life and more importantly for the benefit of this research, Education (Gromov, 2002).

With a few keystrokes in one of thousands of search engines, one can immediately access information on almost any topic. No library in the world could possibly afford the student such a vast amount of accessible knowledge for the enhancement of learning. One final note on this point is that with technology in each classroom connected to the Internet, this vast amount of information dealing with nearly unlimited topics is immediately available to every student inside the classroom and just as significant and, perhaps even more so, the teacher has all this information and nearly unlimited resources available for lesson planning and preparation.

Preparation for and purposeful employment of technology in education to improve and augment instructional performance that results in the enhancement of learning for the individual student are nearly unlimited. Technology can supply the teacher with abundant opportunities to formulate lessons that expose the students to theory, subject matter, proficiencies, and practices that expand the curriculum. One prime example of the value of technology to enhance learning in the classroom would be to go online and watch full color video with sound of the current events being studied. Another example would be the use of the Virtual Frog site generated from the University of Virginia that allows students to practice dissecting a frog virtually before going into the laboratory to actually do the work.

In an attempt to support the idea that teachers should gain knowledge and an appreciation for the value of using technology in the classroom, in their book, Integrating Educational Technology Into Teaching, Roblyer and Edwards (2000) present five reasons to integrate technology as part of the learning environment (p. 13):

1. Motivation
2. Linking learners to information sources
3. Support for new instructional approaches
4. Increased teacher productivity
5. Required skills for an information age

However, the sole rationale that it is important to integrate technology into the classroom is not sufficient. Fundamental to the successful employment of technology in the classroom is more comprehensive planning and lesson design, which entails the actual practice of technology utilization in the classroom.

The Milken Exchange on Education Technology is a national organization whose fundamental purpose and research interests are to discover under what conditions technology effectually enhances teaching and learning in the classroom. After hearing about a West Virginia study on National Public Radio (NPR) quite some time ago, a mental note was made of the existence of this valuable research by Dr. Dale Mann and his associates funded by the Milken Family Foundation. Recently, the paper was located on the Internet and the report was examined. This research involved students in schools across the entire state of West Virginia for a period of ten years, using data collected from all fifth graders from eighteen elementary schools, chosen for the significance of the array of variables that might influence technology use and student achievement and

surveyed 290 teachers associated with the study for pertinent data. The resulting data were of both a quantitative and qualitative nature.

As a result of this study, "West Virginia's Basic Skills/Computer Education Program – which is considered the nation's most comprehensive statewide approach to computer education – is cited for its effective use of technology that led directly to significant gains in math, reading, and language arts skills for elementary students." Further, Dr. Henry Marockie, West Virginia Superintendent of Schools, said, "The objective of this program was to use the computer as a tool for improving basic skills and to provide comprehensive teacher training on using the computers in the classroom. The study noted that educational gains through technology are cost-effective and increased socio-economic and gender equity" (Mann, 1999).

Computer Use in the U.S.

According to A Nation Online: How Americans Are Expanding Their Use of The Internet published online by the Economics and Statistics Administration and the National Telecommunications and Information Administration the U.S. Department Of Commerce in February 2002, few technologies have spread as quickly, or become so widely used, as computers and the Internet. These information technologies are rapidly becoming common fixtures of modern social and economic life, opening opportunities and new avenues for many Americans. A Nation Online: How Americans Are Expanding Their Use of the Internet shows the rapidly growing use of new information technologies across all demographic groups and geographic regions. Not only are many more Americans using the Internet and computers at home, they are also using them at

work, school, and other locations for an expanding variety of purposes. In the last few years, Americans' use of the Internet and computers has grown substantially.

The rate of growth of Internet use in the United States is currently two million new Internet users per month.

- More than half of the nation is now online. In September 2001, 143 million Americans (about 54 percent of the population) were using the Internet — an increase of 26 million in 13 months. In September 2001, 174 million people (or 66 percent of the population) in the United States used computers.
- Children and teenagers use computers and the Internet more than any other age group.
- Ninety percent of children between the ages of 5 and 17 (or 48 million) now use computers.
- Seventy-five percent of 14-17 year olds and 65 percent of 10-13 year olds use the Internet.
- Family households with children under the age of 18 are more likely to access the Internet (62 percent) than family households with no children (53 percent), and non-family households (35 percent).
- Computers at schools substantially narrow the gap in computer usage rates for children from high- and low-income families.

Summary

Over twenty years ago, visionaries had seen the value and importance of the use of technology in the educational system and were forecasting the need of technology skills to be taught. For over twenty years the federal government has tried over and over by way of reports, mandates, laws, and/or acts to legislate in some way the use of technology in the educational system. After this twenty year period, technology is totally immersed into the world of business, and it seems safe to forecast that even the educational system has successfully incorporated technology into the "business" side of education, with finance, scheduling, attendance, record keeping, and reports all being online with the Intranet of an individual school district and in many cases statewide. In the Figure 3 flowchart one can follow this twenty-year period as part of the overall approach and administration of this qualitative research study.

It is obvious from viewing the EdTech Tennessee Online Technology Evaluation System (E-TOTE) that nearly ninety percent of technology-use across the State of Tennessee falls into the beginning or developing categories. It is also obvious from the emphasis placed on training, whether it is online from the state or the local school district or whether it is in a face-to-face setting sponsored by the state or local school district that there is finally a sense of the importance for the use of technology in the classroom as an enhancement tool for teacher presentation and lessons as well as for the enhancement of student learning.

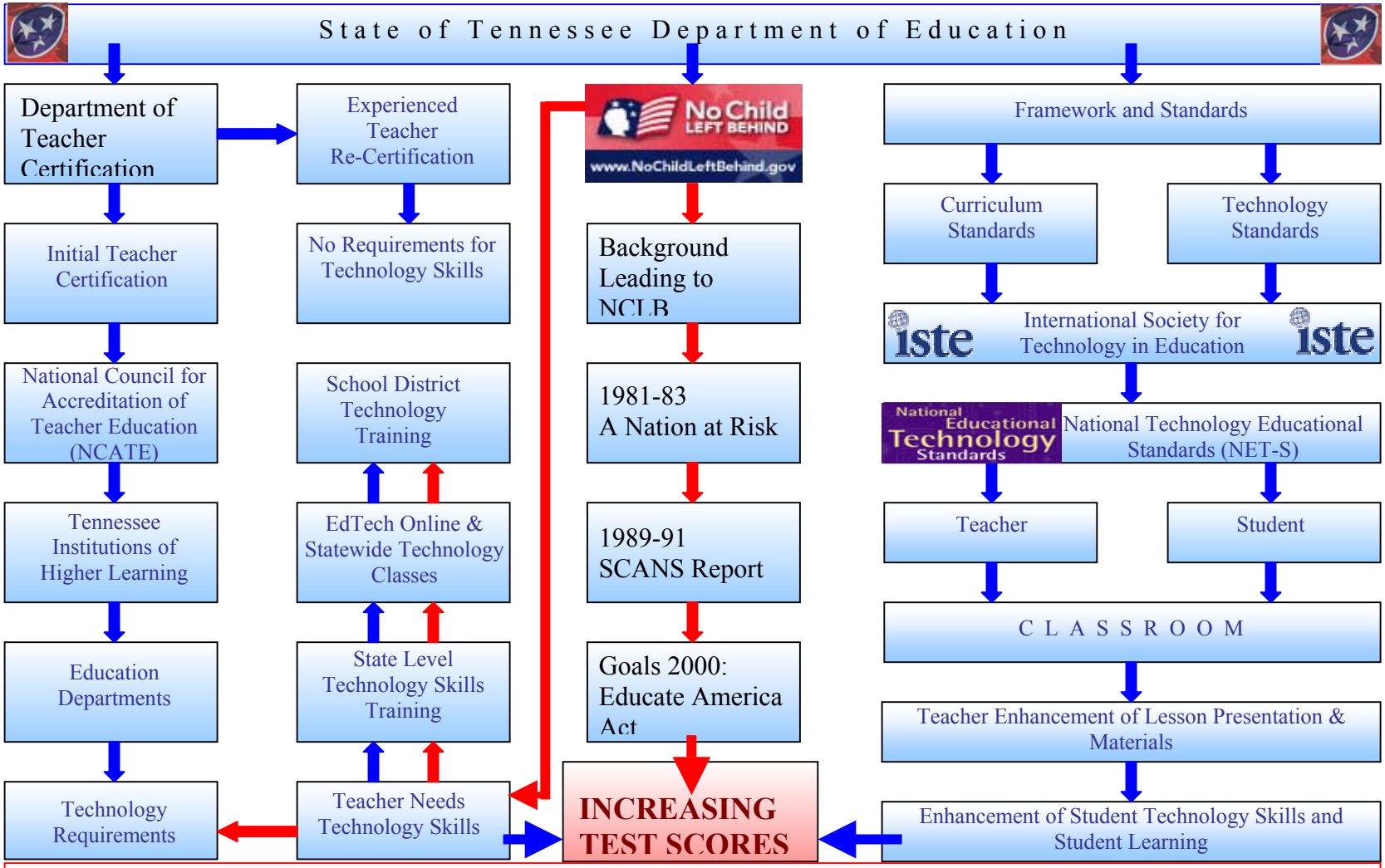

Figure 3. Flowchart Indicating the Approach and Administration of Study

CHAPTER 3

METHODOLOGY AND PROCEDURE

Introduction

The purpose of this study was to examine the current published information on the Tennessee Department of Education website regarding course curriculum standards for each discipline of study and grade level to discover the expected use of technology by beginning and experienced teachers to meet the state technology and/or published state curriculum standards to enhance learning and technology skills in the classroom. The related tasks of this research were to determine what technology skills the beginning and experienced teachers should possess, to discover how these technology skills were to be obtained, and to establish what the beginning and experienced teachers were actually doing in the classroom.

Investigation into course standards revealed a dual set of standards of which the classroom teacher in the State of Tennessee must be aware and address. The first set of standards referred to above is the set of curriculum framework standards developed for each course discipline of the school curriculum. Additionally, this investigation of standards revealed a set of K-12 Technology Standards that involve all courses of the curriculum requiring the use of technology in the framework standards. For a teacher to meet or exceed the technology standards and to meet or exceed the curriculum framework standards in the classroom, the teacher should be using technology to augment lesson presentation and require student use of technology to supplement and enhance learning. Since the course curriculum standards did indicate an expected use of

technology by beginning and experienced teachers to enhance learning in specific grade levels and course disciplines, the final purpose of this study was to conclude if and/or how this required use of technology was valued in the teacher evaluation process.

National Affiliation

A variety of approaches was necessary to establish reliable, pertinent data upon which these points of enquiry could be ascertained. This research was begun by looking on the national level to determine the organizations, laws, regulations, and mandates that are in place dealing with the use of technology in education. Once this goal was established it was necessary to verify the effects of these entities on the local school systems and, more importantly for this study, the classroom teacher and the enhancement of student learning in the classroom.

The four major national influences on education in the last twenty years were:

1. A Nation at Risk: The Imperative for Educational Reform from the U.S. Department of Education with its inception in 1981,
2. The Secretary's Commission on Achieving Necessary Skills (SCANS) in May of 1989 by the United States Department of Labor,
3. Passed by Congress in 1994, the law Goals 2000: Educate America Act, and
4. The most recent movement for educational reform, in January 2002, passed by the One Hundred Seventh Congress of the United States of America under the leadership of President George W. Bush, the No Child Left Behind Act of 2001 (NCLB).

All of these items heralded the importance of using and teaching technology in the educational system; and, although some did it more subtly than others, the visionaries of the time, even as early as 1981, realized the importance and scope of technology. By 1981, technology already had established its value in business and industry and its use was escalating very quickly throughout the world. Even as late as 1994 when the Goals 2000: Educate America Act became law there was relatively little, if any, proof that the use of technology was effective in the classroom, although the use of technology was the heart and brain of the very existence of business and industry.

Since the influence of the International Society for Technology in Education (ISTE), the National Council for Accreditation of Teacher Education (NCATE), and the National Educational Technology Standards (NETS), and other various organizations which fall under the wide umbrella of ISTE, as well as many other national independent organizations shows up in the classroom, it was necessary to research each tentacle of the ISTE organization and other organizations to establish the extent of their influence on the use of technology by teachers and students in the classroom. It was easy to determine by persistent investigation that the multi-faceted organizations of ISTE were unquestionably woven into the framework of the educational system from the national level to the local school district level and that the persuasive attitudes of additional multiple national organizations were also present.

State Association

Once a relationship in the form of laws, regulations, and mandates from the national level was established, first to the State of Tennessee (and all other states in some

instances), and ultimately to the classroom teacher and to his or her students, it was necessary to follow the line of investigation to the maze of websites for the Tennessee Department of Education. Examination of online materials published by the State of Tennessee Department of Education to determine what measurement the national organizations and national laws and regulations have on the local classroom by means of teacher certification evidenced significant authority. Beginning teachers enter their careers in education having had at least one course that taught technology skills and computer techniques through the use of a variety of software programs used for production and presentation. Presently, at least one technology course from a Tennessee certified education program of higher learning is being required for initial certification in the State of Tennessee.

A similar search of the State of Tennessee Department of Education website was necessary to determine what technology skills, if any, were required of experienced teachers for re-certification. Additionally, state and county education sites were investigated to ascertain what workshops, clinics, and training in computer skills were being offered to beginning and experienced teachers for the enhancement of personal technology skills. This investigation ended in the successful location on both the state and local county levels for opportunity to enrich computer skills and understanding.

Tennessee Frameworks and Standards for the core curriculum were explored to discover what required use of technology was necessary to meet the standards for each course discipline and to determine the importance and the need for each individual teacher to acquire an assortment of technology skills. This search yielded a pronounced alignment between the state standards and those of national organizations.

The review of literature determined a comprehensive list of skills deemed essential by experts in the field of education and/or technology that teachers should possess to effectively use technology in the classroom to enhance teaching and learning. Once these necessary skills had been established, one could determine what is being done on the local level to train teachers in these necessary skills and how to incorporate them into lesson planning and the classroom.

Teacher Certification

Teacher Certification was, and will continue to be, a very important national issue that has to be addressed here in Tennessee and by each state because, as it is proposed in NCLB, each state education agency (SEA) must develop a plan to ensure that all teachers are "highly qualified" no later than the end of the 2005-06 school year. The concern of this study is limited to certification of teachers in Tennessee, but since this NCLB mandate for “highly qualified” teachers does involve certification in Tennessee it was necessary to institute two major investigations to establish the NCLB requirements for “highly qualified” and to determine what and if the regulations for teacher certification in Tennessee meet the NCLB requirements.

Other concerns of this study were to determine the technology skills requirements for teacher certification in Tennessee. Researching the technology skills aspect of this study involved resolving several basic issues from what are the “necessary skills” required of a teacher to effectively use technology in the classroom to enhance both teaching and learning to what are the steps to effectively get technology into the classroom with the final question being, “Was it there?” An Apprentice Teacher License

is a full Tennessee teacher license issued to an educator who has completed an approved teacher preparation program that offers the holder five years to teach three years in a Tennessee public or state-accredited private school. A school district in Tennessee must then submit evidence of "a positive local evaluation" in terms from Certification area of the State of Tennessee Department of Education website (which actually means three classroom evaluations a year for three consecutive years in the same local school district for a total of nine evaluations of the teacher in action) at which time the Apprentice Teacher License of the holder will be upgraded to the Professional License.

The opportunity to answer the "Was it there?" question comes from the results of the nine "teacher in action" classroom evaluations. That question was asked of the Curriculum Supervisors in the interviews.

Data From Conversations

Interviews with and questionnaires completed by Technology Coordinators and Curriculum Specialists in a representative group of the twelve counties of Tennessee used in this study established the details of "What is really being done" in the local school districts. Analyzation of the personal interviews with County Technology Coordinators and Curriculum Specialists and a review of County Technology Plans, and other significant information from the county educational or district websites of all twelve counties provided interesting and pertinent information. This information related to all of East Tennessee and, most probably, could be considered a reliable representative sampling of what is being done across all of Tennessee since the counties selected for this

study were chosen for their significance of the array of variables that might influence technology use and their demographic representation of all areas of the state.

Most of the documents with relevant data related to and suggested for consideration in this study were available for inspection and download from the Internet. Typically, information sites of this nature include the very latest updates to Internet published material. The Technology Plan for each of the counties was examined and compared to establish the overall direction of technology for the future.

Description of the Counties

Twelve counties were selected for this study based on their demographic characteristics so the counties involved in the study would be representative of counties across the State of Tennessee. The twelve counties selected from an extended East Tennessee area were chosen first on the basis of population so they would include well over 26% of the population for the State of Tennessee and then by the other demographic properties listed below so they were also representative properties of all other counties throughout the state:

- K-12 instructional levels,
- School enrollments of less than 300 to more than 1000,
- Locale characteristics contain agricultural, rural, town, urban fringe, industrial, and city,
- Varied percents of minority enrollments,
- Varied percents of income levels, and
- An element of tourism that is an important element in the State of Tennessee.

Data Collection Processes

After each superintendent of the selected East Tennessee counties granted approval for participation in writing to conduct research with their staff, and after an initial telephone conversation requesting the participation of those county school system Technology Coordinators and Curriculum Specialists had been made individually, personal interviews by telephone or by face-to-face meetings at their offices were conducted. These meetings lasted approximately 15-30 minutes with each participating Technology Coordinator and Curriculum Specialist. A copy of the Informed Consent Form with original signatures from each of the participants had to be returned to the principal investigator before interviews could take place with each of the Technology Coordinators and Curriculum Specialists from the participating counties in East Tennessee.

Participation was voluntary and the participants could drop out of the study at any time. Specific questions pertinent to this study were derived from the research of literature and were asked of all participants in the form of a questionnaire. A questionnaire was developed mainly from the EdTech Tennessee Online Technology Evaluation System (E-TOTE) for the Technology Coordinator dealing with areas of his/her expertise. Similarly, a specific questionnaire was developed for the Curriculum Specialist participants dealing with topics more germane to curriculum and evaluation. The dialogue about the questionnaires with each of the Technology Coordinators and the Curriculum Specialists interviewed and how the questions related specifically to his or her county school district were the most important parts of the interview results.

Each of the counties of the extended East Tennessee area that was selected for this study as a representative sampling had a County Department of Education website available on the Internet. Each of these websites was explored thoroughly to be somewhat informed about each of the counties before permission was sought from the Director of Schools and the interviews were completed. Additionally, each of the counties of the extended East Tennessee area that was selected for this study as a representative sampling had a five-year state-required technology plan available on its Internet website that was downloaded and printed for a better understanding of what had taken place in each of the counties in technology as well as what each county had in its plans for the future.

Data Evaluation

The first part of the research of literature dealing with laws, regulations, and mandates was completed from the United States Government, the U.S Department of Education, and the U.S. Department of Technology on the federal level. With the second part of the research dealing with laws, regulations, and mandates involving the national organizations like the International Society for Technology in Education (ISTE), the National Educational Technology Standards (NETS), and the National Council for Accreditation of Teacher Education (NCATE) it is more than obvious that all of these entities have a very large influence on every level of education from kindergarten through every area of higher education in almost every state. With further research completed on the state level and a thorough investigation of the State of Tennessee Department of Education website it was easy to determine that much of the national influence filters

through the state level all the way down to the pre-service teacher, the beginning teacher, the experienced teacher, and into the classroom. Even though the local district board of education is the responsible entity for the day by day operation of all schools existing in its district, every edict of that school board must comply with the laws, regulations, and mandates of all the government and regulatory organizations mentioned above. The Figure 4 flowchart is a graphic depiction of this national entity to classroom effect. The level of Classroom Teacher in the chart is meant to cover all three occurrences of experience (or the lack of it) mentioned above.

It is important to keep this order of origination in mind to realize that many requirements made on the teacher that manifest themselves in the classroom emanate from the influences of sources outside the classroom, the teacher, and the school. As the chart indicates, the students in the classroom have an influence in a backward, bottom to top, flow concerning the growing issue of accountability in the classroom, pressure for change on several levels, weighted demands on in-school curriculum to a small degree, and, to some extent, system policy.

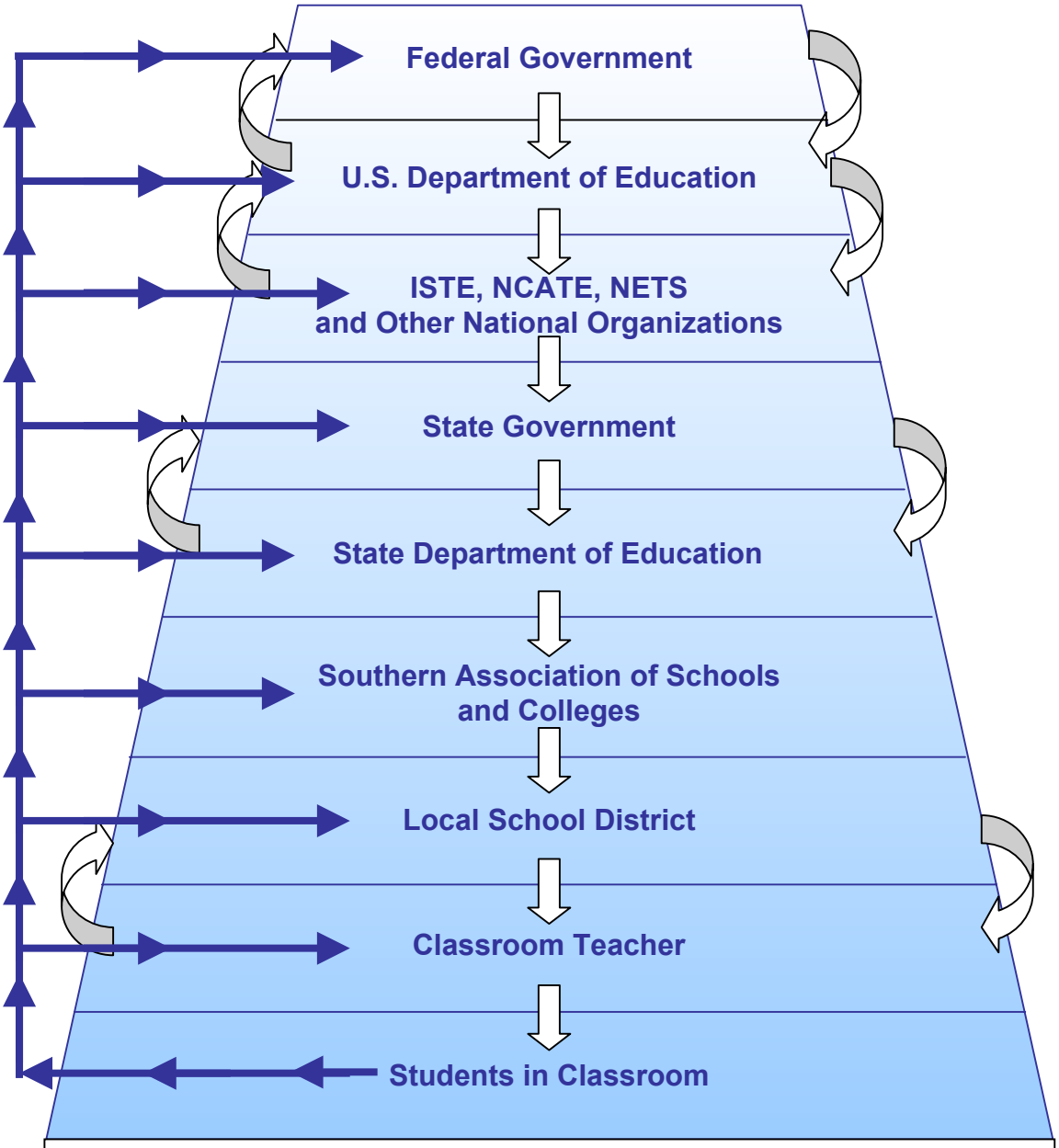

Figure 4. Flowchart From the National Level to the Student

- Indicates general flow

- Indicates collaboration

- Indicates student influence based on test scores

CHAPTER 4

RESULTS

Introduction

This study used a qualitative research methodology for the collection of narrative data to establish what was currently taking place in regards to the use of technology in the classrooms across Tennessee. Several approaches were used to retrieve information for the collection of pertinent data concerning the requirements for the implementation of technology, if, in fact, it were required. This data helped to determine what was actually taking place in the classroom to enhance teacher presentation and student learning. It was also analyzed to distinguish what course and/or technology curriculum standards were in place for Tennessee schools. The desired results of this study were divided into three distinct areas.

According to the current published information on the Tennessee Department of Education website regarding course and/or technology curriculum standards for all grade levels and the use of technology to enhance learning:

1. What are beginning and experienced teachers doing in the classroom to fulfill the course and/or technology curriculum standards requirements for the use of technology to enhance learning?
2. How are beginning and experienced teachers acquiring the necessary skills required for the use of technology in the classroom to enhance learning?
3. Does the use of technology show up in the teacher evaluation process and, if so, how?

Findings

This qualitative research study was undertaken to answer three important questions concerning the use of technology in the classroom to enhance learning. Although the study was divided into three questions, there was a great difference in the ease of discovering the responses to the individual questions. The first question was the most difficult to establish because of its maze of related materials that could potentially control the response.

Procedures for Answering Research Question One

The first question was: What are beginning and experienced teachers doing in the classroom to fulfill the course and/or technology curriculum standards requirements for the use of technology to enhance learning?

The procedure for collecting data relevant to answering this first question began with a review of the State of Tennessee Department of Education websites for teacher certification to determine the requirements for initial and/or re-certification in Tennessee. Additionally, state and county education sites were examined to discover what workshops, clinics, and training in computer skills were offered for teachers. Tennessee Frameworks and Standards for the Core Curriculum were investigated to determine the required utilization of technology by teachers to meet the standards for each course.

Review of literature established a comprehensive list of technology skills deemed essential by experts in the field of education and/or technology that teachers should possess to effectively use technology in the classroom to enhance teaching and learning. Once these necessary skills were established, the task turned to one of detection on the

state and local levels to establish the technology training available for teachers in the skills necessary to incorporate technology into lesson planning and the classroom. Interviews with Technology Coordinators and/or Curriculum Specialists in each of the counties were used to confirm details on "what was really being done" in the local area.

Most of the documents with relevant data related to and suggested for consideration in this study were available for inspection and download from the Internet. Typically, information sites of this nature include the very latest updates to school district published material. The Technology Plan of each of the counties was evaluated and compared to establish the overall direction of technology for the future.

The Standards for Computer Technology based on The Tennessee STaR Chart: A Tool for Planning and Assessing School Technology and Readiness are broken down into six distinct areas. The first area is Impact of Technology on Teacher Role and Collaborative Learning.

- Teacher-centered lectures
- Students use technology to work on individual projects
- Teacher-directed learning
- Students use technology for cooperative projects in their own classroom
- Teacher facilitated learning
- Students use technology to create communities of inquiry within their own community
- Student-centered learning, teacher as mentor/facilitator with national/international business, industry, university communities of learning

Moving from the top of this list, Teacher Role of P*assive Learning* to Student Centered Learning, which initiates *Active Learning*, one can immediately see one of the great uses of technology in the classroom. Each of the additional measures of technology use in the classroom moves the teacher toward facilitator and the student more and more into an active learning atmosphere. Additionally, the teacher gradually moves through progressive steps from Patterns of Teacher Use of Technology of "using technology as a supplement" to the "integration of evolving technologies that transforms the teaching process by allowing for greater levels of interest, inquiry, analysis, collaboration, creativity and content production."

Frequency/Design of Instructional Setting Using Digital Content, Curriculum Areas, Technology Applications Assessment, and Patterns of Student Use of Technology all move the teacher and student from what could be total boredom to exciting classes everyday with students eager to get started. Each of the steps through the above mentioned categories of The Tennessee StaR Chart takes the teacher to a higher level of creativity and challenges the student to develop his/her high order thinking skills (HOTS) as each one moves through these areas of technology use. The combination of "*Early*," "*Developing*," and "*Advanced*" levels eventually, according to published statistics, points toward an eighty to ninety percent technology use for these three categories. With continued use and practice, the "*Target*" is not far away (E-TOTE, 2003).

From an analysis of the statewide results as well as the individual results of the twelve counties used in this study, it was indicated by The Tennessee STaR Chart, the information pointed to Early and Developing technology utilization in the classroom to enhance teaching and learning. Also, as indicated, there were small percentages of

technology leaders in the Advanced and Target areas. On the county level, some of the highly technologically skilled teachers were the individuals appointed as building technical support specialists.

Procedures for Answering Research Question Two

The second question of this study was: How are beginning and experienced teachers acquiring the necessary skills required for the use of technology in the classroom to enhance learning?

The procedure for collecting the data valid for answering the second question involved exploration of many of the same web pages on the State of Tennessee Department of Education websites. Establishing the criteria for initial teacher certification was necessary to determine the specific requirements in technology education in Tennessee for original certification. Additionally, state and county education sites were examined to discover what workshops, clinics, and training in computer skills were offered for teachers. On the state level EdTech Leaders Online (ETLO), a link from the Department of Education website and powered by Blackboard, is "designed for K-12 school districts, teacher training institutions, State Departments of Education, and other organizations that provide professional development for teachers."

All county school districts used in this study offered courses, taught by County Technology Trainers and other highly technologically-skilled county employees. A few clicks of the mouse and a teacher could be at the county school district website that offered a variety of technology classes. Educators needed only to be interested enough in increasing technology skills to attend. Also, the State Department of Education offered

several technology courses open to educators that register. Once again these courses were free and could make huge differences in one's computer skills. There are also online courses in the form of software tutorials that are available around the clock, all year long. An educator with minimal computer skills can add a variety of technology skills to his/her abilities with persistence and regular work. Of course, as has been pointed out in prior chapters, beginning teachers should have become quite astute at the computer through required coursework at their college or university. With a good beginning of computer techniques, regular work at a variety of tasks will increase skills very quickly and reinforce skills already acquired.

Procedures for Answering Research Question Three

Does the use of technology show up in the teacher evaluation process and, if so, how?

The procedure for collecting the necessary information for answering the third question involved examination of The Framework for Evaluation and Professional Growth web pages on the State of Tennessee Department of Education website. On The Framework for Evaluation and Professional Growth web pages there were forty-one forms, charts and instruction sheets to be examined on Comprehensive Assessment--Teacher and Evaluator Activities. Although almost every subject area indicates the use of technology as part of its course Framework and Standards, there is no requirement that teachers demonstrate the ability to fulfill the requirement to use technology to enhance the course. A teacher can indicate the use of technology in the lesson plan and use it very successfully in the lesson itself and the use of technology is notated in the evaluation by

the evaluator's review notes of the class. Besides the teacher lesson plan, this is the only other place technology is observed or notated in the classroom. The use of technology is not a requirement for the evaluation process to be successful.

In a recent article published online by T.H.E. Journal, the question was asked, "Why hasn't technology revolutionized education as it has other aspects of our lives?" The response to answer the question posed by the article is, "because education entities have not completed any of the job." Acquisition of technology hardware, currently at a 5.2:1 ratio in Tennessee, as well as the infrastructure on which to run this needed network are still considerably below that of business, which operates on a 1-to-1 - or better ratio. The article, alluding to the business community, indicates that business expenditures for training of its employees in the use of technology range from 1 to 3% of its payroll outlay each year and that this training is geared to hardware and software specific to the tasks an individual is to perform. Technology replacement is usually based on a three-year cycle and the replacement includes new or updated software that is improved, faster, and with additional tools. The users are taught to utilize the new equipment and/or software effectively and proficiently. To this date, the technology tools necessary to completely challenge students have not totally been available in the classroom for activities that give the students the ability to produce their own individual technology-based creations (Fletcher, 2003).

Beginning Teacher Standards and Certification

"An important division of the State of Tennessee Department of Education is the Office of Teacher Education and Accreditation. This office is responsible for the implementation of the approval process that evaluates the professional education units in Tennessee teacher preparation colleges and universities and the state licensure programs offered by those units. The approval process is part of the State Board of Education's Tennessee Education Policy. The standards used to evaluate the professional education units are the National Council for Accreditation of Teacher Education (NCATE) standards. The standards used to evaluate state licensure programs are the Tennessee State Licensure Standards and Guidelines. The evaluation procedures include on-campus evaluation visits conducted by Board of Examiner teams and the adoption of approval recommendations by the State Board of Education" (Tennessee Department of Education, Office of Teacher Education and Accreditation, 2003). The following standards are the NCATE Standards adopted by and as the Tennessee Department of Education Standards dealing with the expected technology skills of the beginning teacher qualified by education and testing and ready for certification. These standards are taken directly from the Tennessee Standards And Induction Guidelines:

Standard 11 - Technology

11.a. Candidates use technology and technology based resources to facilitate developmentally appropriate student learning.

Supporting Explanation

Candidates use technology resources to guide classroom decisions regarding student learning. They integrate instructional technology to facilitate interdisciplinary teaching and learning in their classrooms, to supplement instructional strategies, to design instructional materials, and to enhance hands-on experiences and problem solving activities. Candidates select and use grade-level and content-specific technology resources, including assistive technology, to increase student participation in the total curriculum. They apply technology to analyze assessment data and to target individual student learning needs.

11.b. Candidates use technology to enhance their professional growth and productivity.

Supporting Explanation

Candidates use technology in their own learning process and to change their current educational practice. They use technology to gather, sort, and analyze information needed for their own research projects and to communicate and collaborate effectively with other professionals. Candidates use tools such as databases and spreadsheets for sorting, compiling, and analyzing data gathered from a variety of sources. They use presentation tools in a networked environment for sharing information in multiple professional formats.

11.c. Candidates effectively use and manage all technology available to them and explore uses of emerging resources. They promote the equitable, ethical and legal use of technology resources.

Supporting Explanation

Candidates design effective environments for using and managing technology in the classroom. They are able to perform minor trouble-shooting operations. When planning units of instruction, candidates address software-purchasing agreements, copyright laws, issues related to intellectual property, the importance of virus protection, and policies for acceptable use of Internet resources. Candidates seek information from technical manuals and journals as well as on-line resources to learn about emerging technologies and to explore their possible educational applications. They model the legal and ethical use of technology resources (Tennessee Department of Education, Office of Teacher Education and Accreditation, 2003).

Grade Level Technology Standards

After consideration of the beginning teacher standards and the expected technology skills for certification, which should have been attained through coursework at their institution of higher learning, the switch is to the student side of the teacher/student equation. By addressing these two categories, the reader is given an opportunity to appraise how the requirements for beginning teacher certification fulfill the need for these technology skills on the student side. One can easily detect from the

initial digit on the standard the indicated grade level for the following Tennessee Standards from Kindergarten to Eighth Grade taken from the Standards, Learning Expectations and Draft Performance Indicators for English and Language Arts. The English and Language Arts Curriculum and Standards were selected as the example because it is a course of study that every student must take during each year he/she is in school. The information of standards supplied here allows the reader to view the related role of technology for nine of the twelve-year period in the English and Language Arts Curriculum.

K.1.10c. Recognize sources of information (e.g., books, graphs and computers)

K.2.06c. Make use of technology to publish writing

1.1.10d. Use graphic organizers to aid in understanding material from informational text (e.g., charts, graphs, web)

1.2.04b. Use classroom resources (e.g., word walls, picture dictionaries, teacher, peers, appropriate technology, student generated word books) to support the writing process

1.2.06b. Use technology to publish writing

2.2.04d. Use classroom resources (e.g., word walls, picture dictionaries, teacher, peers, appropriate technology, student generated word books) to aid in proofreading

2.2.06c. Use technology to publish writing

3.1.01b. Use media sources to access information (e.g., online catalog, non-fiction books, encyclopedias, CD-ROM references, Internet)

3.2.tpi.15. Use resources such as dictionaries and computers as aids in the writing process

3.2.03g. Use resources (e.g., dictionaries, thesaurus, computer) to aid in the writing process

3.2.06b. Use technology to publish writing

4.1.tpi.24. Use library media sources to access information (e.g., encyclopedias, Internet, electronic catalog)

4.1.09b. Use media (e.g., photographs, films, videos, the arts, on-line catalogs, non-fiction books, encyclopedias, CD-ROM references, internet) to view, read, and represent information

4.1.09c. Use current technology as a research and communication tool for personal interest, research, and clarification

4.1.09d. Understand a variety of informational texts, which include primary sources (e.g., autobiographical sketches, letters, and diaries; and internet sites)

4.2.04c. Use a computer or other technological tools as editing tools

4.2.06c. Use technology for publishing individual and group work

4.2.06d. Identify and explore opportunities for publication (e.g., local and national contests, internet web sites, newspapers/periodicals, school displays)

5.1.tpi.29. Use media and current technology as a research and communication tool to view, read, and represent information

5.1.09a. Use and discern appropriate reference sources in various formats (e.g., interviews with family, community leaders and government leaders; encyclopedias, card/electronic catalogs, almanacs, newspapers, and periodicals)

5.1.09b. Use media (e.g., photographs, videos, films, the arts, on-line catalogs, non-fiction books, encyclopedias, CD-ROM references, internet) to view, read, and represent information

5.1.09c. Use current technology as a research and communication tool for personal interest, research, and clarification

5.1.09d. Understand a variety of informational texts which include primary sources (e.g., autobiographical sketches, letters, and diaries, directions, and internet sites)

5.1.09i. Develop an awareness of the effects of media (e.g., television, print materials, radio, internet, newspapers, periodicals) on daily life

5.2.04b. Proofread using reference materials and technology

5.2.06c. Use technology for publishing individual and group work

5.2.06d. Identify and explore opportunities for publication (e.g., local and national contests, internet web sites, newspapers/periodicals)

6.1.spi 6. Use context clues, dictionaries, thesauruses, electronic sources, and glossaries as aids in determining the meanings of unfamiliar words

6.1.spi.19. Select sources from which to gather information on a given topic and determine their reliability

6.1.tpi.25. Use media and current technology as a research and communication tool to view, read, and represent information

7.1.tpi.19. Use technology as a research and communication tool

7.2.spi.14. Identify levels of reliability among resources (e.g., eyewitness account, newspaper account, supermarket tabloid account, and Internet source)

7.2.07b. Use multiple technological sources to prepare and present work and to add graphs, tables, and/or illustrations

7.2.13e. Continue to use computer technology to find information, to create reports and presentations, and to support research

7.2.07c. Identify opportunities for publication (e.g., school bulletin boards and publications, local and national contests, internet websites, newspaper/periodicals)

7.2.09a. Continue to produce a variety of creative works utilizing knowledge from the content areas (e.g., journals, magazines, poems, letters to the editor, dialogues between famous people, WebPages)

8.1.06d. Continue to determine the meaning of unfamiliar words using context clues, dictionaries, electronic sources, glossaries, and other resources

8.1.09a. Determine appropriate reference sources in various formats (e.g., encyclopedias, card/electronic catalogs, almanacs, periodicals, Internet)

8.1.09b. Use media (e.g., films, video, the visual and performing arts, on-line catalogs, non-fiction books, encyclopedias, CD-ROMs, references, Internet) to view, read, and represent information

8.1.09c. Use current technology (e.g., the Internet, CD-ROMs, online catalogs) as a research communication tool

8.2.tpi.19. Use multiple sources of technology to prepare and present works, and to add photographs, graphs, tables, and/or illustrations to support the focus of the writing

8.2.09a. Continue to produce a variety of creative works utilizing knowledge from the content areas (e.g., journals, magazines, poems, letters to the editor, dialogues between famous people, WebPages)

Secondary Level Standards for English Language Arts

On the secondary level the standards for English Language Arts suggest an immersion of technology for each of the courses with four units of credit in English Language Arts required for graduation. Literature shall be drawn from diverse cultures. Only the ninth-grade standard dealing with the use of technology related materials will be included as documentation for this study, but the requirement for the use of technology in the English Language Arts courses for the enhancement of learning is quite high.

Content Standard: The student will use, read, and view media/technology and analyze content and concepts accurately.

Goal Statement: Visual communication is becoming an essential element of today's rapidly changing technological society, and students must be prepared for the demands they will face in the twenty-first century. Students must learn how to communicate effectively using visual media for specific purposes and audiences.

Furthermore, as consumers, they must develop the skills to discern and evaluate the persuasive devices inherent in multimedia and technology. Educators must provide students with the necessary tools to function productively in tomorrow's world.

Learning Expectations:

- Access and demonstrate multiple technological reference sources
- Develop media applications for a variety of audiences and purposes
- Use media to view, to read, to write, to communicate, and to create
- Analyze the impact of media on daily life
- Research, organize, interpret, and present information from print and non-print media
- Utilize multimedia to create, to display, and to explain information
- Explore the advantages and limitations of the computer as a communication tool
- Recognize the differences between using print and non-print media as a means of communication
- Explain creative strategies used in the production of print and non-print media

Subjects/Content With/Without End-of-Course Tests

The State of Tennessee website divides the curriculum into two parts for displaying the subjects or content area Curriculum Standards for Subjects/Content with End-of-Course Tests and Curriculum Standards for Subjects/Content without End-of-Course Tests. "These standards contain the goals and objectives which identify the minimum content required at each grade level and for each course. The approved standards shall be the basis for planning instructional programs in each local school

system. In most of the courses being offered in the State of Tennessee with listed standards on the Curriculum Standards for Subjects/Content websites for courses with and without End-of-Course Tests, the use of technology takes its place in almost all, if not all, these approved standards. A list of the subjects or course content areas with the required types of testing in a breakdown by subject or content areas of the curriculum and course can be viewed in Table 2. While viewing these standards one continues to find

Table 2. Subjects/Content with End-of-Course Tests

Subjects/Content with End-of-Course Tests		
Curriculum Standards for Subjects/Content with State Tests	**Gateway Test Standards**	**End of Course Standards**
English/Language Arts	Language Arts	English I
Mathematics	Mathematics	Foundations II
		Algebra II
		Geometry
Science	Science	Physical Science
		Chemistry
Social Studies		United States History
Related Standards (not tested)		
WW II Memorial Lessons		
Content Area Reading 3081*		

* Full or Half Credit Elective Course Option
Taught by certified teacher of language arts, mathematics, science, or social studies
Course Description: The students will learn, practice, and internalize strategies that are essential lifelong learning skills for reading, writing, understanding, and interpreting content specific materials. The strategies will be applied in the content areas of English, mathematics, science, and social studies. Skills will include previewing and reviewing print and non-print text, activating prior knowledge, processing and acquiring new vocabulary, organizing information, understanding visual representations, self-monitoring, and reflecting.
Source: Tennessee Department of Education Website online at http://www.state.tn.us/education/ci/cicurassessedstandards.htm

phrases like “while using appropriate technology” or “examine how technology can be used in the field” as terminology that points to the use of technology to enhance learning and understanding.

At the online Tennessee Department of Education Website, all of the curriculum courses mentioned at the appropriate Internet location address are hypertext items that link to the specific standards for each subject listed on both the Subjects/Content with End-of-Course Tests and the Subjects/Content without End-of-Course Tests websites. In each of the list of courses one click of the mouse takes the viewer to a website that reveals the basic information that are the standards containing the goals and objectives of each class, which categorize the minimum subject matter necessary at each grade level and for each course. These approved standards are the basic guiding principles not only for the development of instructional programs in each school district but are also the classroom teacher’s guide and outline for the development of lesson plans for classroom instruction.

In Figure 5, a list of the Curriculum Standards for Subjects/Content without End-of-Course Tests offers a list of the subjects or course content areas with the appropriate grade level and a breakdown of the subject areas. These standards contain the goals and objectives, which identify the minimum content required at each grade level and for each course. The approved standards are expected to be the basis for planning instructional programs in each local school system.

Subjects/Content without End-of-Course Tests					
Subject/Grade	**K-2**	**3-5**	**6-8**	**9-12**	**K-12**
Comprehensive Health K-8					☐
Computer Technology	☒	☒	☒	☒	☐
Dance					
Dance	☒	☒	☒	☒	☐
Dance Glossary	☐	☐	☐	☐	☒
ESL					
Goal 1	☐	☐	☐	☐	☒
Goal 2	☐	☐	☐	☐	☒
Goal 3	☐	☐	☐	☐	☒
Foreign Language	☐	☐	☐	☒	☐
Music					
General Music	☒	☒	☒	☒	☐
Instrumental Music	☐	☐	☒	☒	☐
Music History	☐	☐	☐	☒	☐
Music Theory	☐	☐	☐	☒	☐
Vocal/Choral Music	☐	☐	☒	☒	☐
Class Piano	☐	☐	☐	☒	☐
Music Glossary	☐	☐	☐	☐	☒
Physical Education & Lifetime Wellness	☒	☒	☒	☒	☒
Tennessee School Counseling And Career Guidance Standards K-12					
Service Learning	☐	☐	☐	☒	☐
Theatre					
Theatre K	☒	☐	☐	☐	☐
Theatre 1-3	☒	☒	☐	☐	☐
Theatre 4-5	☐	☒	☐	☐	☐
Theatre 6-8	☐	☐	☒	☐	☐
Theatre 9-12	☐	☐	☐	☒	☐
Theatre Glossary	☐	☐	☐	☐	☒
Visual Art					
Visual Art	☒	☒	☒	☒	☐
Art History	☐	☐	☐	☒	☐
Visual Art Glossary	☐	☐	☐	☐	☒

Figure 5. Subjects/Content without End of Course Tests

X - indicates grade level of course offering

Source: Tennessee Department of Education Website online at http://www.state.tn.us/education/ci/cicurassessedstandards.htm

Standards for Computer Technology

While Computer Technology is not really a course within itself for students to take from kindergarten to twelfth grade there is a series of standards spanning the student's total education from kindergarten to twelfth grade. Step-by-step use of technology through the progression of grades that gradually employs more and more technology utilization with certain grade levels designated as testing levels.

- Standard 1. The student will explore the history of technology in our society.
- Standard 2. The student will analyze the social impact and explore ethical issues of Technology usage.
- Standard 3. The student will develop a vocabulary to communicate effectively in a technological society.
- Standard 4. The student will demonstrate proficiency in the care and use of computer based technology.
- Standard 5. The student will use a variety of technologies to improve classroom learning, increase productivity, and support creativity.
- Standard 6. The student will use technology as a tool to conduct and evaluate research and to communicate effectively information and ideas.
- Standard 7. The student will use technology resources to develop problem solving strategies, improve decision making, and support real world applications.

In addition to each of these seven standards for Computer Technology for eighth grade, there are Learning Expectations, Performance Indicators: Evidence Standard Is Met,

Sample Performance Task, and Integration/Linkages associated with each individual standard. The standards in this case are like goals and objectives for the course, a map for the destination, but it is the teacher's responsibility to determine the route or pathway for successful implementation of the standards.

Education is not just the school, the teacher, the classroom and the student in today's world, but it's a plethora of federal government agencies, national organizations, national educational organizations, state government agencies, state organizations, state educational organizations, county government agencies, county organizations, county educational organizations, a school, a teacher, the classroom, and the student. No wonder we read so much about overcrowding in the classroom! Standards are the most visible influence of all of these entities working together as a unit that reaches the classroom in an attempt to ensure a quality education for every student.

Many legislative laws and regulations have attempted to place technology in the classroom as a major teaching/learning tool, but the dedication to the task of learning the necessary skills for the comfortable use of this technology has not fallen into place. With state and local technology workshops offered to learn or increase technology skills, technology is still waiting for "that instructional reform that is most successfully accomplished when a practitioner culture emerges that recognizes the need for change and takes responsibility for that change" (Becker & Riel, 1999) and experienced teachers, in particular, have failed to become members of that "practitioner culture" in sharpening their technology skills.

What Is the Status in 2003?

What is the status in 2003 as far as teachers and students using technology in the classroom? What skills do the teachers and students have in using technology to enhance instruction and learning on each side of the teacher/student relationship? The answers to each part of this question directly address a major query of this study, "What are beginning and experienced teachers doing in the classroom to fulfill these requirements" of using technology to enhance learning?. Two distinct individual documents of published information regarding the use of technology throughout Tennessee as well as information that targets the individual counties of an extended East Tennessee area will be used to determine a reasonable and factual response. In Table 3 the results of one part of the Tennessee Online Technology Evaluation System dealing with computer use in the classroom reveals technology implementation in several different areas of opportunity for the teacher and the student. The tabular information in Table 3 indicates teaching and Learning technology first on the state level and a similar depiction based on identical topics of information on the twelve counties of the extended East Tennessee area used in this study as a representative sampling with a county-by-county breakdown in Figure 6. The heading categories and the specifics of each rating are explained in Figure 7.

The information in the graphical information depiction is broken down into six distinct areas. The first area is Impact of Technology on Teacher Role and Collaborative Learning. From Figure 3 one can clearly see that on the state level as well as the county school district level, there is a vast amount of room at the top, the "*Target*" area. But there is excellent news to be gleaned from this area and the Patterns of Teacher Use of Technology area, as well as, the other areas of Frequency/Design of Instructional Setting

Table 3. I: Teaching and Learning - from the Tennessee Technology Inventory Report
Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003?
Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

I: Teaching and Learning – State of Tennessee						
I. Teaching and Learning	**Q.A**	**Q.B**	**Q.C**	**Q.D**	**Q.E**	**Q.F**
Early	44%	25%	25%	3%	57%	51%
Developing	47%	40%	37%	55%	28%	41%
Advanced	7%	33%	33%	33%	13%	8%
Target	3%	3%	5%	10%	3%	1%
State Averages	Developing	Developing	Developing	Advanced	Developing	Developing
Key Area	**Developing**					

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

I: Teaching and Learning – Average of 12 Counties Used in Study						
I. Teaching and Learning	**Q.A**	**Q.B**	**Q.C**	**Q.D**	**Q.E**	**Q.F**
Early	49.29%	22.60%	25.88%	1.40%	57.31%	55.13%
Developing	43.17%	47.41%	41.14%	51.48%	27.68%	38.55%
Advanced	5.73%	28.11%	29.41%	34.88%	12.34%	5.90%
Target	1.81%	1.88%	3.56%	11.69%	2.68%	.42%
State Averages	Developing	Developing	Developing	Advanced	Developing	Developing
Key Area	**Developing**					

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

I: Teaching and Learning - Average of Counties													
	Q-A	Q-B	Q-C	Q-D	Q-E	Q-F			Q-A	Q-B	Q-C	Q-D	Q-E	Q-F
Early #1	65	35	53	0	82	71		Advanced#1	0	35	6	29	12	0
Early #2	42	16	21	0	68.5	52.5		Advanced#2	5.25	31.5	31.5	42.25	15.75	5.25
Early #3	83	33.5	50	0	83	83		Advanced#3	0	25	8.5	8.5	8.5	0
Early #4	47	13	7	0	47	60		Advanced#4	0	20	20	33	13	0
Early #5	50	10	25	5	40	45		Advanced#5	5	30	45	35	15	5
Early #6	42.5	30	25	3.75	65	42.5		Advanced#6	10	30	31.25	38.75	6.25	10
Early #7	64.7	23.5	23.5	0	35.3	58.8		Advanced#7	0	35.3	35.3	41.2	0	5.9
Early #8	36	0	18	0	64	64		Advanced#8	9	9	27	18	9	9
Early #9	48.8	38.6	32.9	8	65.8	56.8		Advanced#9	6.8	20.5	23.9	25	11.4	5.7
Early #10	28.6	42.8	0	0	42.8	42.9		Advanced#10	14.3	28.6	42.9	71.4	28.6	0
Early #11	37.9	13.8	24.2	0	48.3	31		Advanced#11	10.4	41.4	27.6	37.9	20.6	7
Early #12	46	15	31	0	46	54		Advanced#12	8	31	54	38.5	8	23
Average	49.29	22.60	25.88	1.40	57.31	55.13		Average	5.73	28.11	29.41	34.88	12.34	5.90
Developing#1	35	30	41	71	6	29		Target#1	0	0	0	0	0	0
Developing#2	47.5	52.5	42.25	47.5	15.75	42.25		Target#2	5.25	0	5.25	10.5	0	0
Developing#3	17	41.5	41.5	91.5	8.5	17		Target#3	0	0	0	0	0	0
Developing#4	53	67	73	67	40	40		Target#4	0	0	0	0	0	0
Developing#5	40	50	20	45	35	45		Target#5	5	10	10	15	10	5
Developing#6	46.25	38.75	41.25	55	26.25	47.5		Target#6	1.25	1.25	2.5	2.5	2.5	0
Developing#7	35.3	41.2	41.2	41.2	58.8	35.3		Target#7	0	0	0	17.6	5.9	0
Developing#8	46	82	46	64	18	27		Target#8	9	9	9	18	9	0
Developing#9	43.2	38.6	37.5	62.5	21.6	37.5		Target#9	1.2	2.3	5.7	4.5	1.2	0
Developing#10	57.1	28.6	57.1	0	28.6	57.1		Target#10	0	0	0	28.6	0	0
Developing#11	51.7	44.8	37.9	34.5	27.6	62		Target#11	0	0	10.30	20.6	3.5	0
Developing#12	46	54	15	38.5	46	23		Target#12	0	0	0	23	0	0
Average	43.17	47.41	41.14	51.48	27.68	38.55		Average	1.81	1.88	3.56	11.69	2.68	0.42
Average of Counties														
Early	49.29	22.60	25.88	1.40	57.31	55.13								
Developing	43.17	47.41	41.14	51.48	27.68	38.55								
Advanced	5.73	28.11	29.41	34.88	12.34	5.90								
Target	1.81	1.88	3.56	11.69	2.68	0.42								
	100.00	100.00	100.00	99.44	100.00	100.00								

Figure 6. I: Teaching and Learning – Average of 12 counties used in this study from the extended East Tennessee area
Source of information: Tennessee Technology Evaluation System: Where Do We Stand in 2003?
from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003 (Original Graphic created by Joe M. Wilson, 2003)

KEY AREAS:	I. Teaching and Learning					
Focus: Levels of Progress	(A) Impact of Technology on Teacher Role and Collaborative Learning	(B) Patterns of Teacher Use of Technology	(C) Frequency/ Design of Instructional Setting Using Digital Content	(D) Curriculum Areas	(E) Technology Applications Assessment	(F) Patterns of Student Use of Technology
Early Tech (1 pt)	Teacher-centered lectures Students use technology to work on individual projects	Use technology as a supplement	Occasional computer use in library or computer lab setting	No technology use or integration occurring in the core curriculum subject areas	*Campuses that serve grades K-8:* Within each grade level cluster (K-2, 3-5, 6-8), some but not all Technology standards are met *High School Campuses:* At least 4 Technology Applications courses offered	Students occasionally use software applications and/or use tutorial software for drill and practice
Developing Tech (2 pts)	Teacher-directed learning Students use technology for cooperative projects in their own classroom	Use technology to streamline administrative functions (i.e., grade book, attendance, word processing, E-mail, etc.)	Regular weekly computer use to supplement classroom instruction, primarily in lab and library settings	Use of technology is minimal in core curriculum subject areas	*Campuses that serve grades K-8:* Within each grade level cluster (K-2, 3-5, 6-8), most Technology standards are met *High School Campuses:* At least 4 Technology Applications courses offered and at least 2 taught	Students regularly use technology on an individual basis to access electronic information and for communication and presentation projects
Advanced Tech (3 pts)	Teacher facilitated learning Students use technology to create communities of inquiry within their own community	Use technology for research, lesson planning, multimedia and graphical presentations and simulations, and to correspond with experts, peers, and parents	Regular weekly technology use for integrated curriculum activities utilizing various instructional settings (i.e., classroom computers, libraries, labs, and portable technologies)	Technology is integrated into core subject areas, and activities are separated by subject and grade	*Campuses that serve grades K-8:* Within each grade level cluster (K-2, 3-5, 6-8), all Technology standards are met Grade-level benchmarks (K-8) are established *High School Campuses:* At least 4 Technology Applications courses offered and at least 4 taught	Students work with peers and experts to evaluate information, analyze data and content in order to problem solve Students select appropriate technology tools to convey knowledge and skills learned
Target Tech (4 pts)	Teacher as facilitator, mentor, and co-learner Student-centered learning, teacher as mentor/facilitator with national /international business, industry, university communities of learning	Integration of evolving technologies transforms the teaching process by allowing for greater levels of interest, inquiry, analysis, collaboration, creativity and content production	Students have on-demand access to all appropriate technologies to complete activities that have been seamlessly integrated into all core curriculum areas	Technology is integral to all subject areas	*Campuses that serve grades K-8:* Within each grade level cluster (K-2, 3-5, 6-8), all Technology standards are met Grade-level benchmarks (K-8) are met *High School Campuses:* All Technology Applications courses offered with a minimum of 4 taught, or included as new courses developed as local elective or included as independent study course	Students work collaboratively in communities of inquiry to propose, assess, and implement solutions to real world problems Students communicate effectively with a variety of audiences
TOTAL SCORE FOR KEY AREA I:				**Teaching and Learning**		

Figure 7. Tennessee STaR Chart: A tool for planning and assessing school technology and readiness - An Explanation of *Early*, *Developing*, *Advanced*, and *Target* and the specifics of each rating

Source: http://www.state.tn.us/education/acctstar-campus-portrait.doc

Using Digital Content, Curriculum Areas, Technology Applications Assessment, and Patterns of Student Use of Technology. In all six of these areas of technology use, the combination of "*Early*," "*Developing*," and "*Advanced*" levels point toward an eighty to ninety percent technology use for these three categories (E-TOTE, 2003).

Using Technology in Everyday Teaching and Learning

The second of the two distinct individual documents of published information regarding the use of technology throughout Tennessee that also targets the individual counties of the extended East Tennessee area used in this study is the visionary attempt of establishing attainable yet challenging goals and objectives for guiding the future use, training, and direction of technology, entitled the "Master Plan for Tennessee Schools Preparing for the 21st Century" on the state level and the School District Technology Plan on the county or school district level. The Master Plan for Tennessee Schools addresses technology with only one goal: Technology will be used to improve student learning and analyze data. In covering the "current status" of technology this master plan reiterates information that could have come from NCLB: "The recent focus has been for teachers to develop performance competency in using technology. Federal competitive grants funded a pilot project which produced schools now poised to mentor others in using technology in everyday teaching and learning."

In the strategies section of this state master plan, one of the items addresses the development of content-appropriate technology learning expectations and appropriately aligned technology resources in core content curriculum standards. An interesting endnote to this information is that in the area of "Costs" it states, "To be determined."

With the budget cuts proposed for the future, it probably should have read, "To be determined or not to be determined, that is the question."

One additional way to verify the response to this first question is to look at the Tennessee Technology Inventory Summary Report in the "Whole-School Student Technology Literacy" area for some extremely pertinent information. In answer to the question, "What percent of all of the students in your school have demonstrated competence in each of the following competencies?" the response percentages are listed in Table 4. The same question, "What percent of all of the students in your school have demonstrated competence in each of the following competencies?" was also asked of students in the eighth grade. The response percentages for each topic are listed in Table 5, and the actual topics in question remain the same for both tables. Again, it is extremely important to realize that every topic requiring a response is directly linked to a

Table 4. Whole-School Student Technology Literacy - from the Tennessee Technology Inventory Report indicates the average percent of technology across the state per school

Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

State	Ans1	Ans2	Ans3	Ans4	Ans5	Ans6	Ans7	Ans8	Ans9	Ans10
Tennessee Totals	23%	25%	53%	36%	31%	20%	19%	33%	23%	22%

Table 5. Eighth Grade Student Technology Literacy - from the Tennessee Technology Inventory Report indicates the average percent of technology across the state per school

Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

State	Ans1	Ans2	Ans3	Ans4	Ans5	Ans6	Ans7	Ans8	Ans9	Ans10
Tennessee Totals	36%	38%	63%	48%	44%	33%	30%	50%	35%	36%

Table 6. Technology Competencies and Tennessee Standards Literacy - from the Tennessee Technology Inventory Report

Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

What percent of all of the students in your school have demonstrated competence in each of the following competencies?
Ans1: Applying strategies for identifying and solving routine hardware and software problems that occur during everyday use. (TN Standard 4)
Ans2: Demonstrating knowledge of current changes in information technologies and the effect those changes have on the workplace and society (TN Standard 1)
Ans3: Exhibiting legal and ethical behaviors when using information and technology, and discussing consequences of misuse (TN Standard 2)
Ans4: Using content-specific tools, software, and simulations (e.g., environmental probes, graphing calculators, exploratory environments, Web tools) to support learning and research (TN Standard 6)
Ans5: Applying productivity/multimedia tools and peripherals to support personal productivity, group collaboration, and learning throughout the curriculum (TN Standard 5, 6)
Ans6: Designing, developing, publishing, and presenting products (e.g., Web pages, videotapes) using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom (TN Standard 7)
Ans7: Collaborating with peers, experts, and others using telecommunications and collaborative tools to investigate curriculum-related problems, issues, and information, and to develop solutions or products for audiences inside and outside the classroom (TN Standard 3)
Ans8: Selecting and using appropriate tools and technology resources to accomplish a variety of tasks and solve problems (TN Standard 5)
Ans9: Demonstrating an understanding of concepts underlying hardware, software, and connectivity, and of practical applications to learning and problem solving (TN Standard 4)
Ans10: Researching and evaluating the accuracy, relevancy, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems (TN Standard 2)

Tennessee Standards for Computer Technology. By reviewing the actual topics in question that are displayed in Table 6, one can detect a comforting amount of technology knowledge signified by the eighth grade responses. It is important to notice that every topic requiring a response is a Tennessee Standards for Computer Technology.

Acquiring Technology Skills

There is but one primary technology goal in the No Child Left Behind Act of 2001 and that Primary Goal is to improve student academic achievement through the use of technology in elementary schools and secondary schools. Only one Primary Goal, but there are additional goals of the NCLB Act:

- The first additional goal is to assist every student in crossing the digital divide by ensuring that every student is technologically literate by the time the student finishes the eighth grade, regardless of the student's race, ethnicity, gender, family income, geographic location, or disability.
- The second additional goal is to encourage the effective integration of technology resources and systems with teacher training and curriculum development to establish research-based instructional methods that can be widely implemented as best practices by State educational agencies and local educational agencies.

One article investigated for this research reported that in 2000, only 27 percent of teachers felt comfortable and prepared to use technology in the classroom to enhance learning. Another article, using the same information reported that 27 percent of teachers

felt very thoroughly prepared for the use of computers and the Internet for instruction in the classroom, and another thirty-nine percent felt moderately prepared.

Most states, forty-eight of the fifty-one, have adopted, adapted, or aligned with, or otherwise referenced at least one set of standards in their state technology plans, certification, licensure, curriculum plans, assessment plans, or other official state documents. These states require technology training from institutions of higher learning as part of the pre-service teacher's course work for an initial teacher license. The results of this requirement should guarantee that beginning teachers are equipped to various degrees of ability with *some* basic computer skills. The key for these beginning teachers who have just had a semester course in the use of technology in the classroom is to continue the use of the things they learned in the course and to build on that knowledge to establish higher levels of technology skills.

In the past three months, the State of Tennessee Department of Education has offered three technology-training courses in the immediate area of the counties used in this study and in other areas throughout the state as well, which Tennessee teachers could take at no cost. One important element of a county technology coordinator's position is for the planning and scheduling of technology training. Most county websites post schedules of such events. With the NCLB Act, there is a provision for grants to be spent on the training of system teachers. In fact, there is one area of NCLB with requirements on state education agencies to have state technology plans that include state goals for the use of technology and specific strategies the state will use to prepare teachers to use technology. The Educational Technology State Grants Program includes funds for

Internet connections and services, professional development for teachers, and technology applications (NCLB, 2001).

Many of the websites for the counties used in the research maintain online tutorials and training to help teachers build technology skills. Additionally, most of the counties used in this study maintain year-round classes in technology, covering a wide range of computer techniques and software tools. An additional perk of the NCLB Act is for the county system to use grant money in new ways to establish teacher training. Many counties have established a way for teachers with technology skills to train other teachers. In one county this team of technology staff members is called the Core Team. In another county system they are called Technology Support Teachers.

The Core Team concept in many of the counties meets on an individual or group basis with teachers in the school. The Core Team member and teacher(s) agree on the topic(s) with which the teacher(s) would like assistance. The Core Team member has a substitute for the day and goes from classroom to classroom helping teachers in the building, using the "floating" substitute teacher(s) to cover classes for the teacher(s) currently being assisted. Attempts are being made on every level to give teachers the ability to acquire technology skills but there must be an effort on the part of teachers to take advantage of the opportunities for technology training afforded them. In many cases, students are the teachers for the teacher in the acquisition of technology skills.

Teacher Evaluation and Technology

In an explanation of the Tennessee Framework for Evaluation and Professional Growth, it is stated that the school system is presented an amount of flexibility for itself

and the educator. "The Comprehensive Assessment and Professional Growth is the only required component of the framework. School systems may choose to implement the Focused Assessment and Professional Growth component in order to more effectively tailor the evaluation to align with identified student needs, educator needs, school improvement plans, and system needs as well as build on the existing knowledge of an educator's performance" (Tennessee Department of Education, 2003).

In an exhausting search of *all* the forms involved in, or possibly involved in, the Tennessee Framework for Evaluation and Professional Growth, there is no place in any forms that specifically calls for or addresses the use of technology in lesson planning or teaching the lesson, not even for evaluation. Of course, the teacher could have a lesson plan that specifies the use of technology for a lesson or lessons on which the teacher is being evaluated. In that case, the use of technology could have an effect on the evaluation of the teacher, but only as far as the successful use of technology by the teacher… Not on the merits of using technology for teaching and for the enhancement of learning on the part of the student.

CHAPTER 5

CONCLUSIONS, CONVERSATIONS, AND RECOMMENDATIONS

Introduction

The rationale for this study was to first validate several items directly related to the main questions of discovery. Investigation of published information on the Tennessee Department of Education website revealed documentation that broadens the scope of the search to involve federal government websites, ISTE, NET-S, and NCATE websites regarding course and/or technology curriculum standards for all grade levels, and the use of technology to enhance learning. It was necessary to establish how and to what degree each of these entities influenced the research on the three questions of this study:

1. What are beginning and experienced teachers doing in the classroom to fulfill the course and/or technology curriculum standards requirements for the use of technology to enhance learning?
2. How are beginning and experienced teachers acquiring the necessary skills required for the use of technology in the classroom to enhance learning?
3. Does the use of technology show up in the teacher evaluation process and, if so, how?

Analysis of Data That Answers Questions

Data were collected and organized from every available source with which the State of Tennessee aligns itself within the field of education. Government agencies were also examined to the extent that any pertinent data that were found with major or minor influences on this study were measured for their degree of value. Information from all found sources with a direct or indirect attachment to the questions of this research most probably appears in or manifests its influences some way in this study.

Certification was examined from the standpoint that beginning teachers qualifying for first time licensure are destined to meet the requirement of technology course credit, which heralds a deep-seated affiliation with NCATE although it may be an indirect attachment. The educated guess would have it that the end result of the No Child Left Behind Act will ultimately end in technology skills requirements for the re-certification of experienced teachers, if this law survives the current litigation questioning its legality. Several states have already moved in that direction and others are sure to follow.

Included in many of the areas discussed throughout this work are the close alignment with ISTE, NETS, and NCATE, all integrated organizations of ISTE. At the present time, Tennessee is listed as having adopted, adapted, or aligned with the National Educational Technology Standards (NETS) for teachers and has referenced their standards for administration. The latest version of "Use of NETS by State" dated June 17, 2003 is included in this document as Appendix D (p.131).

Summary of Findings

This study was undertaken to answer three important questions concerning the use of technology in the classroom to enhance learning. Even though the study was divided into three questions, there was a great difference in the ease of discovering the responses to each of the individual questions. The first question was the most difficult to establish because of its massive web of related materials that could potentially control the response.

Findings Pertaining to Research Question One

What are beginning and experienced teachers doing in the classroom to fulfill the suggested use of technology in the required course curriculum standards?

The Standards for Computer Technology are broken down into six distinct areas. The first area is Impact of Technology on Teacher Role and Collaborative Learning.

- Teacher-centered lectures
- Students use technology to work on individual projects
- Teacher-directed learning
- Students use technology for cooperative projects in their own classroom
- Teacher facilitated learning
- Students use technology to create communities of inquiry within their own community
- Student-centered learning, teacher as mentor/facilitator with national/international business, industry, university communities of learning

Moving from the top of this Teacher Role and passive learning to the Student Centered Learning with active learning, one can immediately see one of the great uses of technology in the classroom. Each of the additional measures of technology use in the classroom moves the teacher toward facilitator and the student more and more into a more active learning atmosphere. Additionally, the teacher gradually moves through progressive steps through Patterns of Teacher Use of Technology of "using technology as a supplement" to the "integration of evolving technologies that transforms the teaching process by allowing for greater levels of interest, inquiry, analysis, collaboration, creativity and content production."

Frequency/Design of Instructional Setting Using Digital Content, Curriculum Areas, Technology Applications Assessment, and Patterns of Student Use of Technology all move the teacher and student from what could possibly be total boredom in the classroom to exciting classes everyday with students eager to get started and to learn. As mentioned earlier, in all six of these areas of technology use, the combination of "*Early*," "*Developing*," and "*Advanced*" levels point toward an eighty to ninety percent technology use for these three categories. With continued use and practice the "*Target*" is not far away (E-TOTE, 2003).

Findings Pertaining to Research Question Two

How are beginning and experienced teachers acquiring the necessary skills required for the use of technology in the classroom to enhance learning?

Many county school districts offer courses throughout the year. A few clicks of the mouse and one can be at a county school district website that is offering over twenty, free-to-educators, technology classes. Educators need only to be interested enough in increasing technology skills to attend. Also, the State Department of Education is has offered a variety of technology courses in different areas of the state throughout the year, open to educators that register. Once again these courses are free but can make a huge difference in one's computer skills. There are also online courses in the form of software tutorials that are available around the clock all year long. An educator with minimal computer skills can add a variety of technology skills to his/her abilities with persistence and regular work. Of course, as has been pointed out in prior chapters, beginning teachers should have become quite astute at the computer through required coursework at their college or university. With a good beginning of computer techniques, regular work at a variety of tasks will increase skills very quickly.

Findings Pertaining to Research Question Three

Does the use of technology show up in the teacher evaluation process and, if so, how?

Very succinctly put, the answer to this question is no… not at all. Although almost every subject area indicates the use of technology as part of its course Framework and Standards, there is no requirement that teachers demonstrate the ability to fulfill the requirement to use technology to enhance the course. A teacher can indicate the use of technology in the lesson plan and use it very successfully in the lesson itself and that gets written into the evaluator's notes for the class.

Analysis of Interview Conversations

A very informative process of data collection for this research venture included conversations with twelve Curriculum Supervisors and/or Technology Coordinators of the representative counties selected for this study. The attempt on the part of the researcher was to separate the number of individual Curriculum Supervisors and/or Technology Coordinators into two groups, using two different types of communication avenues of interviewing, by face-to-face visits in the offices of the individuals or by telephone conversation. These two avenues of interviewing were used as an attempt to determine if one could identify any detectable differences in the interviews based on the method used. This was not an attempt at a second type of research but simply an attempt to determine which of the two modes of communication resulted in the most relevant information from the interviews, although the possibility for additional research does exist. Surprisingly evident to me was the fact that the telephone conversations yielded more dialogue with a greater amount of pertinent information directed to the main points of discovery toward this study.

It seems that the next school year is "the year of infrastructure." Much of the allotted budget for technology in many of the counties involved in this study will be consumed by the purchase of "a few of our favorite things," servers, routers, and switches. Some hardware is scheduled for replacement but grave concern over the budget situation in Tennessee for the 2003-04 school year has the Curriculum Supervisors that are big supporters of technology in the classroom worried about this situation. Newer, better, and faster are not always best for the situation at hand. In every county interviewed, there was talk of problems created by upgraded hardware or

upgraded software by one or both of the individuals questioned. Some spoke of a $20,000 (or more) solution with no choice but to repair the condition. In the interview conversations by either method, telephone or face-to-face, one could hear the concern in voices.

When one individual was asked about the computer experience of the teachers in his district, he responded with the four types of user in the system… "Super Highways, Two Lane Highways, One Lane Highways, and Road Kill." But quizzing this individual further, as was the case in this and every other county school district, it was revealed that there were tremendous opportunities for the classroom teacher to gain technology skills in the enhancement of lesson preparation, presentation, and delivery that would result in the enhancement of student learning in the classroom.

One individual responded to the question of "what is actually happening in the classroom?" with the statement that technology in the classroom is "just beginning." With an additional comment that, "we went about it all wrong in the beginning!" This sentiment was voiced by many of the interviewees, agreeing that although the 21st Century Classroom idea did work to some degree, that the computers should have been placed in the classrooms of the teachers that really wanted them. That way the teachers that used them to their greatest benefit would have spread the word of the wonders of technology in the classroom instead of the critical reports about the inability to use the 21st Century computers based on the lacking technology skills.

One large point discussed was No Child Left Behind … the problems created as well as the benefits being experienced. The main problem was the bottom line. In the very latest edition of the National Education Association Journal (NEA Journal)

discussed, only a very small portion (6-8%) of the expense associated with the benefits of the NCLB Act are actually financed by U.S. Government financial resources. Although almost every individual seemed to think the basics of the NCLB Act had merit, there was concern once again for an economy of budget cuts in a time of blossoming technology interest. More than one of the Curriculum Supervisors felt there needed to be a directive from the state that mandates training and the use of technology in the classroom to enhance both teaching and learning, which has already happened in several states across the nation.

For instance, the website of South Carolina addresses the need for technology graduate hours for experienced teachers seeking re-certification. North Carolina and Virginia websites indicate the possibility of some variation of this idea for re-certification.

Summary

One could possibly get total agreement from successful technology users for the idea that technology in the form of computers is the greatest teaching tool the teacher and the student have ever had available to them in the classroom. Both teachers and students require training for the ultimate use of this tremendous teaching/learning tool. As with any other teaching tool there are "good-times" to use the computer in instruction and in learning and there are "not-so-good times" only technology training and the development of technology skills will let the teacher distinguish between the two. The greater the technology skills and abilities, the greater the degree technology becomes a tool for the enhancement of instruction and learning.

Recommendations for Additional Research

A small portion of the counties school districts used for the representative sampling of counties across the state indicated advanced teacher skills or above… even the *Target* area in some cases. Research on what these school districts are doing for the training of teachers for such a successful acquisition of technology skills would be an asset to the entire state.

Controlled research of a technologically skilled and otherwise successful teacher offering the same class two different periods where the use of technology would be the central tool of instruction in one of the class periods with abstention from the use technology in the other could provide very informative consequences. The results should tender an adequate representation of the value of technology, not just in test results but also in attitudes about the course.

Conclusions

From the results of this study, there seems to be an emerging attitude among teachers that the use of technology as a teaching tool might be an advantage… not from the standpoint of the coerced or mandated attitude at all, but perhaps from that "practitioner culture" recognizing the need for the use of technology in the classroom to enhance learning (and possibly raise test scores in the world of accountability). Then again, the emerging attitude that technology could be worth the time spent to acquire the necessary technology skills could stem from the placement of importance on the use of technology in the classroom by the local school district and by the Curriculum Supervisors, the Technology Coordinators, Technology Trainers, and the identifying of

school building technology teams. This emerging attitude could be the results of the investment of substantial amounts of money by the local school districts in system-wide software programs like Plato, Riverdeep, and Accelerated Learning Systems just to mention a few software programs being used by the counties used in this study.

Whatever the cause for this emerging trend, as one Curriculum Supervisor reported, "We are just beginning the use of technology in the classroom. Great things are ahead of us for the teacher and the student." Accepting this as fact puts teachers in a very exciting era of education

REFERENCES

REFERENCES

Adams, A., Starcke, L., and Pierson, M. (2001). *Transforming the Face of Computer Coursework for Pre-Service Teachers – A Working Model.* Retrieved January 17, 2003, from ERIC database.

Adamy, P., & Kellogg, T. (2001). *Contextual Levers: An Embedded Approach to Faculty Technology Development.* Retrieved January 17, 2003, from ERIC database.

Albion, P.R., et. al. Beyond the foundations: The role of vision and belief in teachers' preparation for integration of technology. TechTrends v. 46 no. 5 (September/October 2002) p. 34-8

Alexander, N. C., Allen, M., Nelson, E., & Sisk, P. *Technology Education in the United States: A National Survey.* Tech Directions 57, no9, 16-19. Retrieved on January 18, 2003 from WilsonWeb database.

Aligning Technology Practices in the Schools and the University (2001). National Council for Accreditation of Teacher Education, Washington, DC. Retrieved January 20, 2003, from http://www.ncate.org/accred/projects/tech/current.htm

Amburgey, V. (2001). *Teaching, Learning, and Technology: Providing for Higher Education Faculty Professional Development.* Retrieved January 17, 2003, from ERIC database.

Anderson, J. R., & North, A. B. (2001). Computer Use Confidence and Skill Level Gain in Lecture-Based and Text-Based Instruction: An Action Research Study. *Delta Pi Epsilon National Conference Book of Readings* November, 2001, 11-15. Retrieved January 11, 2003 from ERIC database.

Anderson, R. E., et al. (2000). School Technology Leadership: Incidence and Impact Teaching, Learning, and Computing: 1998 National Survey Report #6, Center for Research on Information Technology and Organizations, University of California, Irvine and University of Minnesota. Retrieved January 19, 2003, from http://www.crito.uci.edu/tlc/findings/report_6/startpage.html

Archambault, F.X., Jr., Kulikowich, J. M., Brown, S. W., & Rezendes, G. J. (2002). Developing Performance Assessments to Measure Teacher Competency in the Use of Educational Technology. Retrieved January 18, 2003, from http://tigersystem.net/aera2002/viewproposaltext.asp?propID=4360

Are We There Yet? (2002). Retrieved March 23, 2003, from National School Boards Foundation Web site: http://www.nsbf.org/thereyet/index.htm

Becker, H. J. (1999). Internet use by teachers (Report No. 1). Irvine, CA: Teaching Learning & Computing. Retrieved January 30, 2003, from http://www.crito.uci.edu/TLC/FINDINGS/internet-use/

Becker, H. J. & Riel, M. M. (1999). The Beliefs, Practices, and Computer Use of Teacher Leaders. University of California, Irvine. Revised version of a paper presented at the 1999 meetings of the American Educational Research Association (September). Retrieved January 30, 2003, from http://www.crito.uci.edu/tlc/findings/aera/

Becker, H. J. & Riel, M. M. (2000). Teacher Professional Engagement and Constructivist-Compatible Computer Use. University of California, Irvine. Revised version of a paper presented at the 1999 meetings of the American Educational Research Association (September). Retrieved January 30, 2003, from http://www.crito.uci.edu/tlc/findings/report_7

Becket, E. C., et al. (2001). *Preservice and Inservice Teachers Collaborate to Integrate Technology into K-8 Classrooms.* Retrieved January 17, 2003, from ERIC database.

Bitner N.,.,Bitner, Joe, Southeastern Louisiana University, USA Journal of Technology and Teacher Education, Vol. 10, Issue. 1, 2002, pp. 95-100.

Blassinggame, K. M. (2000). SCANS Success Story. *Techniques*, 75, no1, 32-35, January 2000. Retrieved April 12, 2003, from WilsonWeb database.

Brinkerhoff, J. D., Ku, H-Y., Glazewski, K., and Brush, T. (2001). *An Assessment of Technology Skills and Classroom Technology Integration Experience in Preservice and Practicing Teachers.* Retrieved January 17, 2003, from ERIC database.

Burke, J. (1998). Technology Standards for teachers. Retrieved March 22, 2003, from http://www.sreb.org/programs/EdTech/pubs/techstandards.asp

Cafolla, R., Hettenger, G., & Shockley, R. (1999). *Technology and Teacher Education: Policy Recommendations for the New Millennium.* Retrieved January 18, 2003, from http://pegasus.cc.ucf.edu/~facte/documents/TECHNOLOGYPOLICYSUMMARY2page.PDF

Calhoun, R., McC., & Crews, T. B. (2001). Computer Application Skills of High School Students in Georgia. *Delta Pi Epsilon National Conference Book of Readings* November, 2001, 11-15. Retrieved January 11, 2003, from ERIC database.

Cattagni, A., & Westat, E. F. (2001). *Internet Access in U. S. Public Schools and Classrooms: 1994-2001.* Retrieved April 12, 2003 from http://nces.ed.gov/pubs2002/internet/

Chalupa, M., et al. Alternative Licensure/Certification Assessment of State Specialists. Delta Pi Epsilon Conference. Book of Readings (Nashville, Tennessee, November, 2001), pp. 3-9

Charp, S. Technology Integration in Teaching and Learning. T.H.E. Journal v. 30 no. 1 (March, 2003) Editorial. Retrieved April 30, 2003, from http://www.thejournal.com/magazine/vault/A4341.cfm

Clabaugh, G. K. (2003). *What Doesn't Work?* Educational Horizons, 81, no2, 58-60, Winter 2003. Retrieved April 12, 2003, from WilsonWeb database.

Clark, A. C. and Wiebe, E. N. (2001). *Comparing C*omputer Usage by Students in Education Programs to Technology Education Majors. Journal of Technology Education, 13, no 1, Fall, 2001. Retrieved April 12, 2003, from WilsonWeb database.

Cohen, D. K. (1988). Educational technology and school organization. In R. S. Nickerson & P. P. Zodhiates (Eds.), Technology in education: Looking toward 2020 (pp. 231-264). Hillsdale, NJ: Erlbaum.

Collins, A. (1990). The role of computer technology in restructuring schools. In K. Sheingold & M. S. Tucker (Eds.), *Restructuring for learning with technology*. New York: Center for Technology in Education, Bank Street College of Education; and Rochester, NY: National Center on Education and the Economy.

Cooper, J, M , and Bull, G. (1997). *Technology and Teacher Education: Past Practice and Recommended Directions.* Action in Teacher Education v. 19 (Summer 1997) p. 97-106.

Cornett, L. (2001). Teacher Supply and Demand in Tennessee. Retrieved January 30, 2003, from http://www.sreb.org/main/highered/leadership/tn_teachersupplyanddemand.asp

Cornett, L. M., & Gaines, G. F. (2002). Quality Teachers: Can Incentives Make a Difference? Retrieved February 22, 2003 http://www.sreb.org/main/HigherEd/leadership/Quality_Teachers.asp

Csapo, N. Certification of computer literacy. T.H.E. Journal v. 30 no. 1 (August 2002) p. 46-51

Day Two Template: Documenting Key Ideas from the Sessions and Discussions from the Secretary's Conference on Educational Technology 2000 (2000). Retrieved January 18, 2003, from http://www.ed.gov/Technology/techconf/2000/template_two.html

Delgado, M. (2001). Technology Application Standards. Retrieved March 22, 2003, from http://education.ollusa.edu/student/udelgmi/technology_application_standards.htm

Dugger, W.E.J., et al. Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards. The Technology Teacher v. 62 no. 5 (February 2003) p. 24-8

Duncan, J. et al. Online Course Delivery: A Qualitative Review of Policy and Theory Using WebCT. Delta Pi Epsilon Conference. Book of Readings (Nashville, Tennessee, November, 2001), pp. 113-20.

Durnin, J. H. (2002). *In-Service Teachers Teaching Pre*-Service Teachers Technology. Retrieved January 18, 2003, from http://www.techinteaching.villanova.edu/AACE.htm

Erthal, M. et al. Learning Styles and Computer Success. Delta Pi Epsilon Conference. Book of Readings (Nashville, Tennessee, November, 2001), pp. 57-60.

Ertmer, P. A., et al. Increasing Preservice Teachers Capacity for Technology Integration through the Use of Electronic Models. Teacher Education Quarterly v. 30 no. 1 (Winter 2003) p. 95-112

E-TOTE (2003). Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved June 13, 2003, from http://tn.ontargetus.com/tnreports/Totals_State.sap

Fletcher, G. (2003). EZedia. T.H.E. Journal. Retrieved June 14, 2003, from http://www.thejournal.com/thefocus/24.cfm

Fulford, C. P. and Ho, C. P. (2002). Creating a Model for Technology Integration Through a "Technology Intensive" Course. TechTrends v. 46 no. 4 (July/August 2002) p. 11-7

Gillingham, MG., et. al. Technology in teacher preparation: preparing teachers for the future. Journal of Technology and Teacher Education v. 7 no. 4 (1999) p. 303-21

Glenn, J. M. (2001, October). Serving all students: NBEA releases revised national standards for business education. Business Education Forum, 56 (1), 8-11

Glenn, J. M. *Serving All Students: NBEA Releases Revised National Standards for Business Education.* Retrieved May 11, 2002, from http://www.nbea.org/marketfbef.html

Gonzales, C., Pickett, L., and Hupert, N. (2002). *The Regional Educational Technology Assistance Program: Its Effects on Teaching Practices*. Retrieved January 30, 2003, from http://www2.edc.org/CCT/admin/publications/feature/jrte_nm_article.pdf

Gromov, G. R. (2002). History of Internet and WWW: The Roads and Crossroads of Internet History. Retrieved June 14, 2003, from http://www.netvalley.com/intval1.html

Grant, D., Bryant, G., and Gilley, D. (1999). *An Interstate Collaborative Approach to Web-Based Instruction.* Retrieved January 30, 2003, from http://80-www.edrs.com.proxy.lib.utk.edu:90/members/sp.cfm?AN=ED436113

Gunter, G., Gunter, R., & Wiens, G. A. (1998). Teaching Pre-Service Teachers Technology: An Innovative Approach. SITE 98: Society for Information Technology & Teacher Education International Conference, March 10-14, 1998. Retrieved January 18, 2003, from ERIC database.

Hall, T.J.K. Should technological literacy be a mandate for technology education programs? Journal of Industrial Teacher Education v. 38 no. 2 (Winter 2001) p. 99-107

Hawley, W. D. (2002). The Keys to Effective Schools: Educational Reform as Continuous Improvement. In Database: The ERIC Database 1992-2002/12. Retrieved January 30, 2003, from http://80-www.edrs.com.proxy.lib.utk.edu:90/members/sp.cfm?AN=ED461940

International Society for Technology in Education (ISTE). *National Educational Technology Standards for Administrators*. Eugene, OR: ISTE, NETS Project, 2002.

International Society for Technology in Education (ISTE). *National Educational Technology Standards for Teachers*. Eugene, OR: ISTE, NETS Project, 2000

International Society for Technology in Education (ISTE). *National Educational Technology Standards for Teachers: Preparing Teachers to Use Technology*. Eugene, OR: ISTE, NETS Project, 2002.

International Technology Education Association (2002). Presentation of Standards for Technological Literacy. Retrieved March 23, 2003, from http://www.iteawww.org/TAA/PPt/Presentationweb.ppt

International Technology Education Association (2002). Technology Education versus Educational Technology. Retrieved March 23, 2003, from http://www.iteawww.org/TAA/PPt/TechEdvsEdTech.ppt

International Technology Education Association (2002). What Is Technology? Retrieved March 23, 2003, from http://www.iteawww.org/TAA/Whatis.htm

Schrock, K. (2003). Kathy Schrock's Home Page, a portal of possibilities for effective infusion of technology into the curriculum! Retrieved June 14, 2003, from http://kathyschrock.net/about.htm

Kayworth, T. R. *Teaching Information Technology in a Business Classroom.* Journal of Business and Training Education v. 8, Fall, 1999, pp. 77-92

Lankard, B. A. (1995). SCANS and the New Vocationalism. Retrieved on April 12, 2003, from http://www.ericfacility.net/databases/ERIC_digests/ed389879.html

LeFevre, A. T., & Hederman R, S., Jr. (2001). Report Card on American Education: A State-by-State Analysis 1976-2001. Retrieved on January 17, 2003, from http://www.alec.org/meSWFiles/pdf/Education_Report_Card.pdf

Lewis, M. B. (1997). A Study of 21st Century Classroom Teachers' Perceptions Regarding the Training and Use of Technology in K-12 Public Schools in Tennessee. Retrieved January 30, 2003, from http://80-www.edrs.com.proxy.lib.utk.edu:90/members/sp.cfm?AN=ED415831

McNabb, M. et al. (1999). Critical Issues in Evaluating the Effectiveness of Technology. Retrieved January 30, 2003, from http://www.ed.gov/Technology/TechConf/1999/confsum.html

Means, B., Blando, J., Olson, K., &Middleton, T. (1993). Using Technology to Support Education Reform. The conduct of this study and preparation of this report were sponsored by the U.S. Department of Education, Office of Educational Research and Improvement. Retrieved January 30, 2003, from http://www.ed.gov/pubs/EdReformStudies/TechReforms/

Murray, J. (2003). *Contemporary Literacy: Essentials for the 21st Century.* Multimedia Schools, 10, no. 2, 14-18, Mar/Apr, 2003. Retrieved April 12, 2003, from WilsonWeb database.

National Commission on Excellence in Education, The (1983). A Nation at Risk: The Imperative for Educational Reform. A Report to the Nation and the Secretary of Education United States Department of Education. Retrieved January 30, 2003, from http://www.ed.gov/pubs/NatAtRisk/

National Conference on Education Technology (1999). Remarks as prepared for delivery by U.S. Secretary of Education Richard W. Riley. Retrieved January 30, 2003, from http://www.ed.gov/Speeches/07-1999/990712.html

National Council for Accreditation of Teacher Education. A List of Professionally Accredited Schools, Colleges, and Departments of Education. February, 2002. Retrieved January 30, 2003, from http://www.ncate.org/accred/list-institutions/the_list.htm

National Council for Accreditation of Teacher Education. Initial/Continuing/Probation Protocol: State Program Approval and NCATE Unit Accreditation for Professional Education Units in the State of Tennessee. April, 2000. Retrieved January 30, 2003, from http://www.ncate.org/accred/boevisit/protocols/states.htm

National Council for Accreditation of Teacher Education. Nationally Recognized Programs at the Advanced Level. November, 2002. Retrieved March 30, 2003, from http://www.ncate.org/recognized_programs/adv_prog.pdf

National Council for Accreditation of Teacher Education. State Protocols. April, 2003. Retrieved January 30, 2003, from http://www.ncate.org/partners/benefits.htm

National Council for Accreditation of Teacher Education. Understanding the Partnership Program. December, 2002. Retrieved January 30, 2003, from http://www.ncate.org/accred/boevisit/protocols/states.htm

National Education Association (2002). Teacher and Paraprofessional Quality, Washington, DC. Retrieved January 30, 2003, from http://www.nea.org/esea/eseateach.html

National Education Association. (2002) Technology in Schools, Washington, DC. Retrieved January 30, 2003, from http://www.nea.org/technology/

National Science Teachers Association (2000). Views on Science and Technology Education. Retrieved January 30, 2003, from http://list.k12.ar.us/pipemail/science/2000-October/000715.html

Penner, N. B. et al. Employment Attributes. Delta Pi Epsilon Conference. Book of Readings (Nashville, Tennessee, November, 2001), pp. 35-40.

Perry, L. (2002). Teacher Technology Proficiency Links. Adult Literacy and Technology network. Retrieved March 23, 2003, from http://www.altn.org/techtraining/techprof.html

Rader, M. et al. Needed Research in Business Education. Delta Pi Epsilon Conference. Book of Readings (Nashville, Tennessee, November, 2001), pp. 135-142.

Randall, F. A. (2001). Assessing Online Instruction Self-Efficacy. *Delta Pi Epsilon National Conference Book of Readings.* November, 2001, 11-15. Retrieved January 11, 2003 from ERIC database.

Reed, R. (2003, February). Streaming Technology Improves Student Achievement. *T.H.E. Journal Online.* Retrieved March 15, 2003, from http://www.thejournal.com/magazine/vault/articleprintversion.cfm?aid-4320

Reilly, R. (1999). Policy Schmolicy: It's the Architecture! Retrieved April 12, 2003, from http://www.infotoday.com/MMSchools/nov99/reilly.htm

Reilly, Rob (2002). Technology Integration Has No Hope of Succeeding. Retrieved April 12, 2003, from http://teachers.net/gazette/FEB02/reilly.htm

Roblyer, M., & Edwards, J. (2000). Integrating Educational Technology Into Teaching (2nd edition). Columbus, OH: Prentice Hall. p. 13

Rudnesky, F. (2003). *From Vision to Classroom.* Retrieved on January 30, 2003, from, http://www.nassp.org/news/pl_vision_to_classroom_0203.html

Secretary's Conference on Educational Technology (2000). Measuring Impacts and Shaping the Future: Evaluating the Effectiveness of Technology. Retrieved January 30, 2003, from http://www.ed.gov/Technology/techconf/2000/report.html

Sivin-Kachala, K. & Bialo, E.R. *2000 Research Report on the Effectiveness of Technology in Schools.* Washington, DC: Software and Information Industry Association (SIIA), 2000.

Slavin, R.E. Evidence-Based Education Policies: Transforming Educational Practice and Research. Educational Researcher v. 31 no. 7 (October 2002) p. 15-21. Retrieved May 4, 2003, from WilsonWeb database.

Sparks, D. (1998). Using Technology to Improve Teaching and Staff Development: An Interview with Kathleen Fulton. Journal of Staff Development, Winter 1998 (Vol. 19, No. 1). Retrieved May 4, 2003, from http://www.nsdc.org/library/jsd/fulton191.html

Stetson, R. H., et al., Technology and teacher preparation: an oxymoron?. Journal of Technology and Teacher Education v. 7 no. 2 (1999) p. 145-52

Stokes, D. K., Woodbury, S., & Jenkins, C. (2001). *Preparing Pre-Service Teachers for Integrating Technology into Science Instruction: a PT3 Project.* Retrieved January 17, 2003, from ERIC database.

Teacher and Paraprofessional Quality (2003). National Education Association, Washington, DC. Retrieved April 30, 2003, from http://www.nea.org/esea/eseateach.html#highlyqualified

Teacher Education and Technology (2002). Rector and Visitors of the University of Virginia, Charlottesville, VA. Retrieved January 30, 2003, from http://curry.edschool.virginia.edu/teachered/tech.html

Technology and Teacher Education (2001). National Council for Accreditation of Teacher Education, Washington, DC. Retrieved January 30, 2003, from http://www.ncate.org/accred/projects/tech/current.htm

Technology Applications Standards (2002). Retrieved March 23, 2003, from http://I-folios.coe.tamu.edu.standards/tchapall.html

Technology Applications Standards (2002). Retrieved March 23, 2003, from http://faculty.tamu-commerce.edu/espinoza/TechApps/TechApps01-5.pdf

Tennessee Board of Education (2003). Professional Education Licensure Standards. Retrieved April 12, 2003, from http://www.state.tn.us/profeduclicensure.htm

Tennessee Department of Education (2003). Office of Teacher Education and Accreditation. Retrieved April 12, 2003, from http://www.state.tn.us/education/accttchreducation.htm

Tennessee Department of Education (2003). Office of Teacher Education and Accreditation. Teacher Licensure Standards. Retrieved April 12, 2003, from http://www.state.tn.us/education/accttchlicstds.pdf

Thompson, G., Hoskisson, D., Bass, D., & Grooters, L. (2001). *Integrating Technology into the K-6 Classroom.* Retrieved January 17, 2003, from ERIC database.

Thompson, M. et al. (2001). *Pre-Service Teacher Responses to the Restructuring of the Traditional Educational Computing Course.* Retrieved January 17, 2003, from ERIC database.

Thompson, S. W., & Hawk, P. P. (1996). Project Dist-Ed: Teleconferencing as a Means of Supporting and Assisting Beginning Teachers. *Action in Teacher Education*, 17, 1996, 9-17. Retrieved January 17, 2003, from WilsonWeb database.

Tolar, S. R. (2002). *Are We There Yet?* Journal of Technology Education, 13, no2, Spring, 2002. Retrieved April 12, 2003, from http://scholar.lib.vt.edu/ejournals/JTE/v13n2/editor.html

Tolbert, M. (2001). Professional Development for Adult Education Instructors. Retrieved January 18, 2003, from http://www.nifl.gov/nifl/policy/development.pdf

Transforming Learning: Technology Integration Across the Teacher Education Curriculum (2001). National Council for Accreditation of Teacher Education, Washington, DC. Retrieved January 30, 2003, from http://www.ncate.org/accred/projects/tech/current.htm

United States Department of Education (2000). *E-Learning: Putting a World-Class Education at the Fingertips of All Children.* Retrieved January 17, 2003, from http://www.ed.gov/technology/elearning/e-learning.pdf

United States of America Congress (1994). Goals 2000: Educate America Act, Washington, D.C. 20202. Retrieved January 30, 2003, from http://www.ed.gov/legislation/GOALS2000/TheAct/

United States of America Congress (1994). Improving America's Schools Act of 1994, Washington, D. C. 20202. Retrieved January 30, 2003, from http://www.ed.gov/legislation/ESEA/

United States of America Congress (2001). No Child Left Behind Act of 2001, Washington, D.C., 20202. Retrieved January 30, 2003, from http://www.ed.gov/legislation/ESEA02/

United States of America Congress (2001). No Child Left Behind: A Desktop Reference Enhancing Education Through Technology (II-D-1&2), Washington, D.C., 20202. http://www.ed.gov/offices/OESE/reference/2d.html

Vidanagama, K., et al. Learning Styles and the Learning Curve: A Comparison of Knowledge Gained from Research Projects for Classes and a Research Project for Publication. Delta Pi Epsilon Conference. Book of Readings (Nashville, Tennessee, November, 2001), pp. 109-12.

Volk, K. S. (1996). *Trends in U. S. Technology Teacher Education Programs: Home Thoughts From Abroad.* Journal of Industrial Teacher Education, 37, no3, Spring, 2000. Retrieved January 17, 2003, from WilsonWeb database.

Web-Based Education Commission (2000, December). *The Power of the Internet for Learning: Moving from Promise to Practice.* Report of the Commission to the President and the Congress of the United States. Retrieved January 17, 2003, from http://www.ed.gov/offices/AC/WBEC/FinalReport/

Whetzel, D. (1992). The Secretary of Labor's Commission on Achieving Necessary Skills. Retrieved April 12, 2003, from http://www.ericfacility.net/ericdigests/ed339749.html

Wicklein, R. C. (1989). *A process for changing teacher education programs in Technology Education.* The Technology Teacher, 49(2), 23-26. Retrieved January 30, 2003, from http://www.arches.uga.edu/~wickone/Research/CHANGING.html

Wicklein, R.C. Certifying technology education teachers. The Technology Teacher v. 50 (January 1991) p. 23-5.

Wicklein, R. C., Hames, C. D., & Rufo, K. (2001). Book Review: *Are We Thinking About Technology?* Journal of Technology Education, 13, no. 1, Fall, 2001. Retrieved April 12, 2003, from WilsonWeb database.

Wilkinson, Kelly & Wiedmaier, Cheryl. (2001). The Status of High-End Technology Skills Taught in Business Teacher Education Programs. *Delta Pi Epsilon National Conference Book of Readings* November, 2001, 11-15. Retrieved January 11, 2003, from ERIC database.

Working Together to Achieve the Vision (2000). Retrieved March 23, 2003, from http://www.standards.nctm.org/document/chapter8/index.htm

Xu Di, et.al. An integrated approach to instructional technology. Action in Teacher Education v. 22 no. 2A (Summer 2000) p. 1-13.

Yang, H & Shindler, J. (2001). Applied Instructional Technology for Student Teachers. Retrieved January 18, 2003, from http://www.oswego.edu/~hyang2/aaer99.pdf

Yang, H. H. et al. (1999). An Investigation of Computer Anxiety Among Vocational-Technical Teachers. Journal of Industrial Teacher Education v. 37, no. 1, pp. 64-82, Fall, 1999.

Zhao, J. J. & Alexander, M. W. (2001). Recommended Computer End-User Skills for Business Students by *Fortune 500* Executives—2001 Report. *Delta Pi Epsilon National Conference Book of Readings* November, 2001, 11-15. Retrieved January 11, 2003, from ERIC database.

APPENDICES

APPENDIX A

Authorization Letter for Superintendent And Permission Form

Authorization Letter for Superintendent

Joe M. Wilson, Graduate Student
The University of Tennessee, Knoxville
Department of Education - Instructional Technology, Curriculum, and Instruction
442 Claxton Complex Knoxville, Tennessee 37996

Dear Mr. Gillis:

For the past four years, I have served as a business information technology teacher at Pigeon Forge High School in Pigeon Forge, TN and am pursuing my doctoral degree at the University of Tennessee, Knoxville. The perception of the impact technology has had and continues to have on the enhancement of teacher instruction and student learning in Kindergarten through twelfth grade is essential to a research study currently being conducted as part of my dissertation requirements entitled Protocol and Training of Educators for the Use of Technology to Enhance Learning in Tennessee Certified Schools.

Only twelve counties in an extended East Tennessee area that include over 26% of the total population for the State of Tennessee have been selected as a representative sampling. These twelve counties were selected on the following demographics, which make them representative of counties throughout the State of Tennessee:

- K-12 instructional levels
- School enrollments of less than 300 to more than 1000
- Locale characteristics contain agricultural, rural, town, urban fringe, industrial, and city as well as areas of tourism
- Varied percents of minority enrollments, and
- Varied percents of income levels

Due to the importance of keeping this demographic information representative of all areas of the state and the fact that only twelve counties are included, the participation of your school district is extremely important. The participation requested for the benefit of this study is the opportunity to interview the Curriculum Supervisor and Technology Coordinator in your school district. The interview will be 15-20 minutes in length, based on a questionnaire derived from the State Technology Plan. No school district or participant will be identified in this study and participation is strictly voluntary.

Your permission to talk with these two employees of your school district would be greatly appreciated, since their perception of technology and its use in the classroom as to the impact technology has had and is having on the enhancement of instruction and/or learning in Tennessee classrooms is extremely important.

Sincerely yours,
Joe M. Wilson

Permission Form

To Whom It May Concern:

This letter is written to acknowledge the approval of Joe M. Wilson, a Doctoral student at the University of Tennessee, to interview the following Your County School System personnel as part of his dissertation research:

Technology Supervisor and Technicians
Supervisor of Curriculum

Sincerely yours,

Superintendent's Name
Director of Schools

APPENDIX B

Letter to Curriculum Specialists and Technology Coordinators

Letter to Curriculum Specialists

Dear Curriculum Supervisor,

With new laws, regulations, and standards in place, especially the No Child Left Behind Act (NCLB) of 2002, and more specifically in Tennessee the grade by grade technology standards, educational technology reform has taken on a sense of urgency in Tennessee and across America. One large education issue addressed in somewhat explicit detail in Title II, Part D of NCLB – Enhancing Education Through Technology is the use of technology in the classroom as well as teacher training and preparation for this use. Previously, the State of Tennessee has appropriated millions of dollars for educational technology and additional money is now available through the NCLB Act for teacher training and other technological uses to enhance learning in the classroom. Have these investments paid off? What impact has technology had on the enhancement of instruction and/or learning in Tennessee classrooms?

For the past four years, I have served as a business information technology teacher at Pigeon Forge High School in Pigeon Forge, TN and am pursuing my doctoral degree at the University of Tennessee. Your perception of the impact technology has had and continues to have on the enhancement of teacher instruction and student learning in Kindergarten through twelfth grade is essential to a research study currently being conducted as part of my dissertation requirements entitled Protocol and Training of Educators for the Use of Technology to Enhance Learning in Tennessee Certified Schools.

You are invited and encouraged to take part in this study. As the Curriculum Supervisor in your County, your perceptions concerning the impact technology has had on the enhancement of instruction and learning are an important and necessary part of this investigation.

Only twelve counties in an extended East Tennessee area that include over 26% of the total population for the State of Tennessee have been selected as a representative sampling. These twelve counties were selected on the following demographics, which make them representative of counties throughout the State of Tennessee:

- K-12 instructional levels
- School enrollments of less than 300 to more than 1000
- Locale characteristics contain agricultural, rural, town, urban fringe, industrial, and city as well as areas of tourism
- Varied percents of minority enrollments, and
- Varied percents of income levels

Due to the importance of keeping this demographic information representative of all state areas and the fact that only twelve counties are included, your participation is extremely important.

Enclosed is a questionnaire, which serves as a data collection instrument for this research, but the most important part of this study is a personal interview of 15-20 minutes (in person or by phone call) about your personal thoughts on the status of technology in your School District and what your district is doing to promote the use of technology to enhance classroom management, educational instruction, and the student learning. Please take a few minutes to respond to the questionnaire and return it in the enclosed stamped, addressed envelope with a signed copy of the consent form.

Your participation in this study is strictly confidential with no names of participants or even the names of the counties mentioned and your participation is voluntary. Your return of the completed form constitutes your informed consent. The data will be reported only in aggregate form. Please return the survey and consent form as soon as possible. Thank you for your participation in this important research study. Your time and effort in responding to the survey is greatly appreciated and I am eager to talk to you to hear your perceptions of what impact technology is having and will continue to have on instruction to enhance management learning in the classroom.

Sincerely,

Joe M. Wilson

Enclosures: Questionnaire
Consent Form
Self-addressed reply envelope

Letter to Technology Coordinators

Dear Technology Coordinator,

With new laws, regulations, and standards in place, especially the No Child Left Behind Act (NCLB) of 2002, and more specifically in Tennessee the grade by grade technology standards, educational technology reform has taken on a sense of urgency in Tennessee and across America. One large education issue addressed in somewhat explicit detail in Title II, Part D of NCLB – Enhancing Education Through Technology is the use of technology in the classroom as well as teacher training and preparation for this use. Previously, the State of Tennessee has appropriated millions of dollars for educational technology and additional money is now available through the NCLB Act for teacher training and other technological uses to enhance learning in the classroom. Have these investments paid off? What impact has technology had on the enhancement of instruction and/or learning in Tennessee classrooms?

For the past four years, I have served as a business information technology teacher at Pigeon Forge High School in Pigeon Forge, TN and am pursuing my doctoral degree at the University of Tennessee. Your perception of the impact technology has had and continues to have on the enhancement of teacher instruction and student learning in Kindergarten through twelfth grade is essential to a research study currently being conducted as part of my dissertation requirements entitled Protocol and Training of Educators for the Use of Technology to Enhance Learning in Tennessee Certified Schools.

You are invited and encouraged to take part in this study. As the Technology Coordinator in your County, your perceptions concerning the impact technology has had on the enhancement of instruction and learning are an important and necessary part of this investigation.

Only twelve counties in an extended East Tennessee area that include over 26% of the total population for the State of Tennessee have been selected as a representative sampling. These twelve counties were selected on the following demographics, which make them representative of counties throughout the State of Tennessee:

- K-12 instructional levels
- School enrollments of less than 300 to more than 1000
- Locale characteristics contain agricultural, rural, town, urban fringe, industrial, and city as well as areas of tourism
- Varied percents of minority enrollments, and
- Varied percents of income levels

Due to the importance of keeping this demographic information representative of all state areas and the fact that only twelve counties are included, your participation is extremely important.

Enclosed is a questionnaire, which serves as a data collection instrument for this research, but the most important part of this study is a personal interview of 15-20 minutes (in person or by phone call) about your personal thoughts on the status of technology in your School District and what your district is doing to promote the use of technology to enhance classroom management, educational instruction, and the student learning. Please take a few minutes to respond to the questionnaire and return it in the enclosed stamped, addressed envelope with a signed copy of the consent form.

Your participation in this study is strictly confidential with no names of participants or even the names of the counties mentioned and your participation is voluntary. Your return of the completed form constitutes your informed consent. The data will be reported only in aggregate form. Please return the survey and consent form as soon as possible. Thank you for your participation in this important research study. Your time and effort in responding to the survey is greatly appreciated and I am eager to talk to you to hear your perceptions of what impact technology is having and will continue to have on instruction to enhance management learning in the classroom.

Sincerely,

Joe M. Wilson

Enclosures: Questionnaire
Consent Form
Self-addressed reply envelope

APPENDIX C

Questionnaires for Curriculum Specialists and Technology Coordinators

Questionnaire for Curriculum Specialist

From School District Technology Plan

Goals and Strategies

1. What specific goals, aligned with State academic standards, are in place for using advanced technology to improve student academic achievement?

2. What strategies does your system have for improving academic achievement, teacher effectiveness, the technology literacy of all students, and to improve the capacity of all teachers to integrate technology effectively into curriculum and instruction?

3. What is the strategy of the school district for using information technology and telecommunications to improve education or library services?

4. What steps is the school district taking to ensure that all students and teachers have increased access to technology?

5. How will the school district encourage the development and use of innovative strategies for the delivery of specialized curricula through the use of technology?

Telecommunications Assessment

6. What plan does the school district have for the improvement of telecommunication services, hardware, software, and other services that will ultimately improve education or library services?

Promotion of curricula and teaching strategies that integrate technology

7. How does the school district identify and promote curricula and teaching strategies that integrate technology effectively into curricula and instruction that:
   a. Is based on a review of relevant research
   b. Is aligned to Tennessee Instructional Technology Standards
   c. Will lead to improvements in student academic achievement
   d. Includes a timeline for this integration

Professional development

8. How does the school district plan to provide ongoing, sustained professional development for all school professionals to further the effective use of educational technology?

Evaluation & Accountability

9. What evaluation process does the district/schools use to monitor progress toward the specified goals for the effective use of educational technology and make mid-course corrections in response to new developments and opportunities as they arise?

10. What process does the school district use to monitor progress and to evaluate the effectiveness of the funded activities in:
    a) Integrating technology into classrooms
    b) Increasing the effectiveness of teachers
    c) Enabling students to reach challenging State academic standards

Questionnaire for Technology Coordinator

Adapted from E-TOTE - Tennessee Technology Evaluation System

School District Technology Plan

1 - How many students in the school system per instructional computer?

☐ a) More than 10:1 ☐ b) 10:1 or less ☐ c) 5:1 or less ☐ d) 1:1 student per instructional computer

2 - How many students in the school system per instructional computer connected to the Internet?

☐ a) More than 10:1 ☐ b) 10:1 or less ☐ c) 5:1 or less ☐ d) 1:1

3 - How long does it take to receive technical support from the time a problem or question is reported?

☐ a) Takes several days ☐ b) Takes place next day
☐ c) Takes place same day ☐ d) Tech support available 24/7

4 - What percent of instructional classrooms and administrative offices are connected to the Internet?

☐ a) More than 25% ☐ b) 50% or more ☐ c) 75% or more
☐ d) 100% or more of all instructional rooms and administrative offices are connected to the Internet

5 - What is the type/quality of the Internet connection in the schools of your system?

☐ a) Slow connection, e.g., 56Kbps ☐ b) Always connected/Graphics are slow
☐ c) Video is possible/Broadband is possible ☐ d) Broadly available video and broadband

6 - What is the use and availability of other forms of technology hardware in the system? (Check all that apply.)

☐ a) VCRs, cable TV, projection devices, calculators
☐ b) Telephones, voicemail, digital cameras
☐ c) Random access video, scanners
☐ d) There is broad use of a wide variety of other technologies such as two-way video conferencing, VCRs, cable TV, telephones, voicemail, random access video, personal digital assistants, projection devices, digital cameras, scanners, calculators, etc.

7 - What are the technology skills of teachers in the school system?

☐ a) Basic technical skills including applications such as word processing but modest or no use in instruction
☐ b) Utilize standalone software and employ some Internet and e-mail
☐ c) Integrate digital content into instruction and enhances classroom learning with technology
☐ d) Enhances learning by using a digital instructional environment

8 - What are the technology skills of administrators in the school system?

☐ a) Basic technical skills including applications such as word processing
☐ b) Utilize standalone software and employ some Internet and e-mail
☐ c) Use accounting software and manage student information systems
☐ d) Support a digital learning environment and institute data driven decision making

9 - What forms do delivery and format of professional development take for teacher training and instruction?

☐ a) Group/Face-to-face
☐ b) Group/One-on-one/Face-to-face/Use embedded help within applications
☐ c) Group/One-on-one/Face-to-face/Online
☐ d) Group/One-on-One/Face-to-face/Online/Anytime, anywhere/Customized

10 - What percent of the total technology budget is allocated to professional development?
☐ a) Less than 5% ☐ b) 6-10% ☐ c) 25-29% ☐ d) 30%

Definitions for QUESTION 11: Understanding and Use of Digital Content for instruction*(Not in the online form.)*

"Entry"	"Adoption"	"Adaptation"	"Appropriation"	"Invention"
Educators struggle to learn the basics of using technology.	Educators move from the initial struggles to successful use of technology on a basic level (e.g., correlation of drill and practice software into classroom instruction).	Educators move from basic use to discovery of its potential for increased productivity (e.g., use of word processors for student writing, and research on the Internet).	Having achieved complete mastery over the technology, educators use it effortlessly as a tool to accomplish a variety of instructional and management goals.	Educators are prepared to develop entirely new learning environments that utilize technology as a flexible tool. Learning becomes more collaborative, interactive, and customized.

11 - What is the understanding and use of digital content by educators? (NOTE: See definitions above.)
a) ☐ 25% ☐ 50% ☐ 75% ☐ 100% - At entry or adoption phase/A few use for lesson planning
b) ☐ 25% ☐ 50% ☐ 75% ☐ 100% - At adaptation phases/Some begin to use with students
c) ☐ 25% ☐ 50% ☐ 75% ☐ 100% - At appropriation phases
d) ☐ 25% ☐ 50% ☐ 75% ☐ 100% - At appropriation or invention phases

12 - What are the educational objectives for the use of technological content in instruction?
☐ a) 25% or more of teachers identify educational objectives that could be better met by digital content
☐ b) 50% or more of teachers identify educational objectives and integrate digital content into instruction
☐ c) 75% or more of teachers identify educational objectives and integrate digital content into instruction
☐ d) 100% of teachers use digital content when appropriate to meet individual student learning needs, and state and local education objectives

13 – What and/or how is the budget allocation used to purchase digital content?
☐ a) Use some supplemental instructional materials funds only
☐ b) Use significant instructional materials budget, but little to no textbook budget
☐ c) Scrutinize entire budget and shifting funds from textbook budget to acquire digital content
☐ d) 100% instructional materials budget is available to purchase "most appropriate" content

14 – What are the software formats used or purchased for instruction:
☐ a) Prepackaged software
☐ b) CD-ROM/Searchable, online content
☐ c) Manipulatable digital content and tools available commercially and on the Web
☐ d) Full range of digital content and tools structured to support production and collaboration

15- Gauge the parental and community technological involvement with the school system:
☐ a) School web page communicates one-way with parents and community
☐ b) Limited access to two-way communications link via email, web tools (e.g., attendance data)
☐ c) Two-way communications link parents and community with some school technologies available at home
☐ d) Seamless integration of feedback loops among parents, community and school where parents, community, and school system interact to create content with students where learning at school and at home occurs seamlessly

APPENDIX D

Use of NETS by States

Use of NETS by State

National Educational Technology Standards (NETS) and the States

The *NETS for Students* were released in June 1998, *NETS for Teachers* in June 2000, and *NETS for Administrators (TSSA)* in November 2001. At the state level, 48 of the 51 states have adopted, adapted, aligned with, or otherwise referenced at least one set of standards in their state technology plans, certification, licensure, curriculum plans, assessment plans, or other official state documents. States that have adopted, adapted, aligned with, or referenced the NETS in state department of education documents are listed below. *Updated: June 17, 2003*

STU	TCH	ADM	(A=adopted, adapted, or aligned with; R=referenced)	STATE	STU	TCH	ADM	(A=adopted, adapted, or aligned with; R=referenced)	STATE
A	A	A		Alabama	A	A	A		Missouri
R	R	R		Alaska	A	A	A		Nebraska
A	A	A		Arizona		A			Nevada
A	A	A		Arkansas	R	A	A		New Hampshire
		R		California	A	A	A		New Jersey
A	A			Colorado		A			New Mexico
A	A	A		Connecticut	A	A	A		New York
A	A	A		Delaware	A		A		North Dakota
	A			District of Columbia	A		A		Ohio
A	A			Florida	A				Oklahoma
	A	A		Georgia	A		A		Oregon
A				Hawaii			A		Pennsylvania
	A			Idaho	A				Rhode Island
A	A	A		Illinois	A	A			South Carolina
	R	R		Indiana		A	A		South Dakota
A	A	A		Kansas		A	R		Tennessee
A	A	A		Kentucky	R	A	R		Texas
A	A	A		Louisiana	A				Utah
		R		Maine	A	A	A		Vermont
R	A	A		Maryland	A	R	R		Virginia
A	A			Massachusetts	A	A	A		Washington
A	A	A		Michigan	A	A	A		West Virginia
A	A	A		Minnesota	A		A		Wisconsin
A	A	A		Mississippi			A		Wyoming

APPENDIX E

E-TOTE, Tennessee Technology Evaluation System:
Where Do We Stand in 2003?
Graphically displayed by each of the counties of the extended
East Tennessee area used in this study

Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

I: Teaching and Learning – County #1						
Number of Schools Reporting: 17						
	A	**B**	**C**	**D**	**E**	**F**
Early	65%	35%	53%	0	82%	71%
Developing	35%	30%	41%	71%	6%	29%
Advanced	0	35%	6%	29%	12%	0
Target	0	0	0	0	0	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

I: Teaching and Learning – County #2						
Number of Schools Reporting: 19						
	A	**B**	**C**	**D**	**E**	**F**
Early	42%	16%	21%	0	68.5%	52.5%
Developing	47.5%	52.5%	42.25%	47.5%	15.75%	42.25%
Advanced	5.25%	31.5%	31.5%	42.25%	15.75%	5.25%
Target	5.25%	0	5.25%	10.5%	0	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

I: Teaching and Learning – County #3						
Number of Schools Reporting: 12						
	A	**B**	**C**	**D**	**E**	**F**
Early	83%	33.5%	50%	0	83%	83%
Developing	17%	41.5%	41.5%	91.5%	8.5%	17%
Advanced	0	25%	8.5%	8.5%	8.5%	0
Target	0	0	0	0	0	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

I: Teaching and Learning – County #4						
Number of Schools Reporting: 15						
	A	**B**	**C**	**D**	**E**	**F**
Early	47%	13%	7%	0	47%	60%
Developing	53%	67%	73%	67%	40%	40%
Advanced	0	20%	20%	33%	13%	0
Target	0	0	0	0	0	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

I: Teaching and Learning – County #5						
Number of Schools Reporting: 20						
	A	**B**	**C**	**D**	**E**	**F**
Early	50%	10%	25%	5%	40%	45%
Developing	40%	50%	20%	45%	35%	45%
Advanced	5%	30%	45%	35%	15%	5%
Target	5%	10%	10%	15%	10%	5%

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

I: Teaching and Learning – County #6						
Number of Schools Reporting: 80						
	A	**B**	**C**	**D**	**E**	**F**
Early	42.5%	30%	25%	3.75%	65%	42.5%
Developing	46.25%	38.75%	41.25%	55%	26.25%	47.5%
Advanced	10%	30%	31.25%	38.75%	6.25%	10%
Target	1.25%	1.25%	2.5%	2.5%	2.5%	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

I: Teaching and Learning – County #7						
Number of Schools Reporting: 17						
	A	**B**	**C**	**D**	**E**	**F**
Early	64.7%	23.5%	23.5%	0	35.3%	58.8%
Developing	35.3%	41.2%	41.2%	41.2%	58.8%	35.3%
Advanced	0	35.3%	35.3%	41.2%	0	5.9%
Target	0	0	0	17.6%	5.9%	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

I: Teaching and Learning -- County #8						
Number of Schools Reporting: 11						
	A	**B**	**C**	**D**	**E**	**F**
Early	36%	0	18%	0	64%	64%
Developing	46%	82%	46%	64%	18%	27%
Advanced	9%	9%	27%	18%	9%	9%
Target	9%	9%	9%	18%	9%	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

I: Teaching and Learning – County #9						
Number of Schools Reporting: 88						
	A	**B**	**C**	**D**	**E**	**F**
Early	48.8%	38.6%	32.9%	8%	65.8%	56.8%
Developing	43.2%	38.6%	37.5%	62.5%	21.6%	37.5%
Advanced	6.8%	20.5%	23.9%	25%	11.4%	5.7%
Target	1.2%	2.3%	5.7%	4.5%	1.2%	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

I: Teaching and Learning – County #10						
Number of Schools Reporting: 7						
	A	**B**	**C**	**D**	**E**	**F**
Early	28.6%	42.8%	0	0	42.8%	42.9%
Developing	57.1%	28.6%	57.1%	0	28.6%	57.1%
Advanced	14.3%	28.6%	42.9%	71.4%	28.6%	0
Target	0	0	0	28.6%	0	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

Source: E-TOTE, Tennessee Technology Evaluation System: Where Do We Stand in 2003? Retrieved from http://tn.ontargetus.com/tnreports/Totals_State.asp, June, 2003

I: Teaching and Learning – County #11						
Number of Schools Reporting: 29						
	A	**B**	**C**	**D**	**E**	**F**
Early	37.9%	13.8%	24.2%	0	48.3%	31%
Developing	51.7%	44.8%	37.9%	34.5%	27.6%	62%
Advanced	10.4%	41.4%	27.6%	37.9%	20.6%	7%
Target	0	0	10.3%	20.6%	3.5%	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

I: Teaching and Learning – County #12						
Number of Schools Reporting: 13						
	A	**B**	**C**	**D**	**E**	**F**
Early	46%	15%	31%	0	46%	54%
Developing	46%	54%	15%	38.5%	46%	23%
Advanced	8%	31%	54	38.5%	8%	23%
Target	0	0	0	23%	0	0

A: Impact of Technology on Teacher Role and Collaborative Learning.
B: Patterns of Teacher Use of Technology.
C: Frequency/ Design of Instructional Setting Using Digital Content.
D: Curriculum Areas.
E: Technology Applications Assessment.
F: Patterns of Student Use of Technology.

Tennessee STaR Chart:
A Tool for Planning and Assessing
School Technology and Readiness[1]

The Tennessee STaR Chart, patterned after the *CEO Forum STaR Chart* (with the additional work done by Texas' Education Agency's Educational Technology Advisory Committee) has been developed around four key areas: Teaching and Learning, Educator Preparation and Development, Administration and Support Services, and Infrastructure for Technology. The Tennessee STaR Chart is designed to help campuses and districts determine their progress toward meeting long-range technology goals. The Tennessee STaR Chart will also assist in the measurement of the impact of state and local efforts to improve student learning through the use of technology.

The Tennessee STaR Chart will help campuses and districts answer some critical questions:

1) What are your campuses' and district's current educational technology profiles?
2) What evidence can be provided to demonstrate their progress in meeting long-range technology goals?
3) What areas should your campus and district focus on to improve its level of technology integration to ensure the best possible teaching and learning?

The Tennessee STaR Chart can be used:

* To create and/or to update the district's Technology Plan
* To set benchmarks and goals. Campuses and districts may use the chart to identify current education technology profiles, establish goals, and monitor progress.
* To create individualized assessment tools. Education administrators and policymakers may use the Tennessee STaR chart as the basis for technology assessments and to evaluate varied perspectives of different staff and clientele.
* To apply for grants. The Tennessee STaR chart will help schools identify their educational technology needs as they apply for grants.
* To determine funding priorities. Education administrators and policymakers can use the Tennessee STaR Chart to determine where to allocate funds.
* To use the Tennessee STaR Chart for a historical perspective. Campuses and districts can complete the survey and then use the profile annually to gauge their progress. The data can be reported to school boards, and community, campus or district planning committees to gauge progress and align with national and state standards.
* To help conceptualize your campus' or district's vision of technology.

[1] Available online: http://www.state.tn.us/education/acctstar-campus-portrait.doc

Instructions for Completing a Campus Tennessee STaR Chart Profile

The printed STaR Chart materials may be used for discussion and collection of data. Use the instructions below to develop your campus STaR profile.

1. Four Key Areas are identified: Teaching and Learning, Educator Preparation and Development, Administration and Support Services, and Infrastructure for Technology.
2. Each Key Area is divided into Focus Areas. Within each Focus Area, indicators are provided for assessing the campus' Level of Progress. It is possible that the campus may have indicators in more than one Level of Progress. Select the one Level of Progress that best describes your campus.
3. The number of points for each level of progress is given on the grid. Total the numbers of points for each key area; then use the scoring table (below) to determine your school's "Level of Progress".
4. When the online Tennessee OnTarget system is available, you will enter your STaR Chart responses into the OnTarget system. Summary reports and graphs will then be available.

The Tennessee STaR Chart is a tool to help Tennessee school districts and campuses develop their own long-range technology plan. Campuses and districts can use this data to perform a needs assessment, judge progress, set benchmarks and goals, determine funding priorities, provide information for technology planning, and measure the impact of state and local efforts to improve student learning through the use of technology. Districts will be able to view this data by school, district, and district type (urban, rural, etc.) This data will not be used as an evaluation measure of individual campuses or districts.

Impact of the Tennessee STaR Chart

Future applications for state funded technology grants under the Enhancing Education Through Technology Act will request a completed campus or district Tennessee STaR Chart profile to be filed with the application as an indicator of current status and progress and as a formative and/or summative evaluation tool.

Use the completed surveys, the reports and charts to compare your campus' progress to like-sized campuses and to the statewide profile. Your data will be compiled with those of other campuses to provide an overall picture of the state of technology in Tennessee. Additional statewide aggregated data will be available in the Spring of 2003.

Adapted by the Tennessee Department of Education with permission from (1) the Texas STaR Chart (developed by the Educational Technology Advisory Committee of the Texas Education Agency) and (2) the STaR Chart originally created by the CEO Forum. Find the [original] STaR Chart online at ww2.iste.org/starchart. Copyright © 2002, ISTE (International Society for Technology in Education), 800.336.5191 (U.S. & Canada) or 541.302.3777 (Int'l), iste@iste.org, www.iste.org. All rights reserved. Permission does not constitute an endorsement by ISTE.

Tennessee STaR Chart Scoring Table

Key Area	Total Numeric Score	*Look up the numeric score for each key area in the grid below to determine the "Level of Progress"*				Your School's Level of Progress
		Early Tech	**Developing**	**Advanced**	**Target**	
I: Teaching and Learning		6-8	9-14	15-20	21-24	
II: Educator Preparation and Development		6-8	9-14	15-20	21-24	
III: Administration and Support Services		5-7	8-12	13-17	18-20	
IV: Infrastructure for Technology		5-7	8-12	13-17	18-20	

KEY AREAS:	**I. Teaching and Learning**					
Focus: Levels of Progress	(A) Impact of Technology on Teacher Role and Collaborative Learning	(B) Patterns of Teacher Use of Technology	(C) Frequency/ Design of Instructional Setting Using Digital Content	(D) Curriculum Areas	(E) Technology Applications Assessment	(F) Patterns of Student Use of Technology
Early Tech (1 pt)	Teacher-centered lectures Students use technology to work on individual projects	Use technology as a supplement	Occasional computer use in library or computer lab setting	No technology use or integration occurring in the core curriculum subject areas	*Campuses that serve grades K-8:* Within each grade level cluster (K-2, 3-5, 6-8), some but not all Technology standards are met *High School Campuses:* At least 4 Technology Applications courses offered	Students occasionally use software applications and/or use tutorial software for drill and practice
Developing Tech (2 pts)	Teacher-directed learning Students use technology for cooperative projects in their own classroom	Use technology to streamline administrative functions (i.e., grade book, attendance, word processing, E-mail, etc.)	Regular weekly computer use to supplement classroom instruction, primarily in lab and library settings	Use of technology is minimal in core curriculum subject areas	*Campuses that serve grades K-8:* Within each grade level cluster (K-2, 3-5, 6-8), most Technology standards are met *High School Campuses:* At least 4 Technology Applications courses offered and at least 2 taught	Students regularly use technology on an individual basis to access electronic information and for communication and presentation projects

Advanced Tech (3 pts)	Teacher facilitated learning Students use technology to create communities of inquiry within their own community	Use technology for research, lesson planning, multimedia and graphical presentations and simulations, and to correspond with experts, peers, and parents	Regular weekly technology use for integrated curriculum activities utilizing various instructional settings (i.e.,: classroom computers, libraries, labs, and portable technologies)	Technology is integrated into core subject areas, and activities are separated by subject and grade	*Campuses that serve grades K-8:* Within each grade level cluster (K-2, 3-5, 6-8), all Technology standards are met Grade-level benchmarks (K-8) are established *High School Campuses:* At least 4 Technology Applications courses offered and at least 4 taught	Students work with peers and experts to evaluate information, analyze data and content in order to problem solve Students select appropriate technology tools to convey knowledge and skills learned
Target Tech (4 pts)	Teacher as facilitator, mentor, and co-learner Student-centered learning, teacher as mentor/facilitator with national /international business, industry, university communities of learning	Integration of evolving technologies transforms the teaching process by allowing for greater levels of interest, inquiry, analysis, collaboration, creativity and content production	Students have on-demand access to all appropriate technologies to complete activities that have been seamlessly integrated into all core curriculum areas	Technology is integral to all subject areas	*Campuses that serve grades K-8:* Within each grade level cluster (K-2, 3-5, 6-8), all Technology standards are met Grade-level benchmarks (K-8) are met *High School Campuses:* All Technology Applications courses offered with a minimum of 4 taught, or included as new courses developed as local elective or included as independent study course	Students work collaboratively in communities of inquiry to propose, assess, and implement solutions to real world problems Students communicate effectively with a variety of audiences
TOTAL SCORE FOR KEY AREA I:				**Teaching and Learning**		

KEY AREAS:	**II. Educator Preparation and Development**					
Focus: Levels of Progress	(G) Content of Training	(H) Capabilities of Educators	(I) Leadership Capabilities of Administrators	(J) Models of Professional Development	(K) Levels of Understanding and Patterns of Use	(L) Technology Budget Allocated to Technology Professional Development
Early Tech (1 pt)	Technology literacy skills including multimedia and the Internet	10% meet ISTE technology proficiencies and implement in the classroom	Recognizes benefits of technology in instruction; minimal personal use	Whole group	Most at **entry** or **adoption** stage (Students learning to use technology; teachers use technology to support traditional instruction)	5% or less
Developing Tech (2 pts)	Use of technology in administrative tasks and classroom management; use of Internet curriculum resources	40% meet ISTE technology proficiencies and implement in the classroom	Expects teachers to use technology for administrative and classroom management tasks; uses technology in some aspects of daily work	Whole group, with follow-up to facilitate implementation	Most at **adaptation** stage (Technology used to enrich curriculum) Most beginning to use with students	6-24%
Advanced Tech (3 pts)	Integration of technology into teaching and learning; regularly uses internet curriculum resources to enrich instruction	60% meet ISTE technology proficiencies and implement in the classroom	Recognizes and identifies exemplary use of technology in instruction; models use of technology in daily work	Long term and ongoing professional development; involvement in a developmental / improvement process	Most at **appropriation** stage (Technology is integrated, used for its unique capabilities)	25-29%

Target Tech (4 pts)	Regular creation and communication of new technology-supported, learner-centered projects; vertical alignment of all Technology Application curriculum standards; anytime anywhere use of Internet curriculum resources by entire school community	100% meet ISTE technology proficiencies and implement in the classroom	Ensures integration of appropriate technologies to maximize learning and teaching; involves and educates the school community around issues of technology integration	Creates communities of inquiry and knowledge building; anytime learning available through a variety of delivery systems; individually guided activities	Most at **invention** stage (Teachers discover and accept new uses for technology)	30% or more
TOTAL SCORE FOR KEY AREA II:				**Educator Preparation and Development**		

KEY AREAS:	**III. Administration and Support Services**				
Focus: Levels of Progress	(M) Vision and Planning	(N) Technical Support	(O) Instructional and Administrative Staffing	(P) Budget	(Q) Funding
Early Tech (1 pt)	No campus technology plan; technology used mainly for administrative tasks such as word processing, budgeting, attendance, grade books	No technical support on-site; technical support call-in; response time greater than 24 hours	No full time dedicated district level Technology Coordinator Campus educator serving as local technical support	Campus budget for hardware and software purchases and professional development	Local fund raisers only
Developing Tech (2 pts)	Campus technology plan aligns with the TN Long Range Technology Plan; integrated into district plan; used for internal planning, budgeting, applying for external funding and discounts. Teachers/administrators have a vision for technology use for direct instruction and some student use	At least one technical staff to 750 computers Centrally deployed technical support call-in; response time less than 24 hours	Full-time district level Technology Coordinator/Assistant Superintendent for Technology Centrally located instructional technology staff; one for every 5,000 students Additional staff as needed, such as trainer, webmaster, network administrator	Campus budget for hardware and software purchases and professional development, minimal staffing support, and some ongoing costs	Fund raisers and minimum grants/ minimal local funding
Advanced Tech (3 pts)	In addition to the above, the campus technology plan is approved by the board and supported by Director of Schools Campus plan collaboratively developed, guiding policy and practice; regularly updated Campus plan addresses technology application essential knowledge and skills and higher order teaching and learning Administrators use technology tools for planning	At least one technical staff to 500 computers Central technology support use remote management software tools Centrally deployed and minimal campus-based technical support on-site; response time is less than 8 hours	Full-time district level Technology Coordinator/Assistant Superintendent for Technology Centrally located instructional technology staff; one for every 1,000 students Additional staff as needed	Campus budget for hardware and software purchases and professional development, adequate staffing support, and ongoing costs	Grants, E-Rate discounts applied to technology budget, locally supplemented through tax dollars

Target Tech (4 pts)	In addition to the above, the campus technology plan is actively supported by the board Campus plan is collaboratively developed, guiding policy and practice; updated at least annually The campus plan is focused on student success; based on needs, research, proven teaching an learning principles. Administrators use technology tools for planning and decision making	At least one technical staff to 350 computers; centrally deployed and dedicated campus-based Central technology support use remote management software tools Technical support on-site; response time is less than 4 hours	Full-time district level Technology Coordinator/Assistant Superintendent for Technology Dedicated campus-based instructional technology support staff—one per campus plus one for every 1,000 students Additional staff as needed	Campus budget for hardware and software purchases, sufficient staffing support, costs for professional development, facilities and other ongoing costs Appropriate budget to support the district technology plan	Other competitive grants, E-Rate discounts, locally supplemented through tax dollars Other state and federal programs directed to support technology funding, bond funds, business partnerships, donations, foundations, and other local funds designated for technology
TOTAL SCORE FOR KEY AREA III:				**Administration & Support Services**	

KEY AREAS:	**IV. Infrastructure for Technology**				
Focus: Levels of Progress	(R) Students per Computer	(S) Internet Access Connectivity/ Speed	(T) Distance Learning	(U) LAN/WAN	(V) Other Technologies
Early Tech (1 pt)	Ten or more students per Internet-connected multimedia computer Refresh cycle established by district/campus for every 6 or more years	Dial-up connectivity to the Internet available only on a few computers	No Web based/online learning available at the campus No satellite based learning available at the campus No two-way interactive video distance learning capabilities available at the campus	Limited print/file sharing network at the campus Some shared resources available on the campus LAN	Shared use of resources such as, but not limited to, TVs, VCRs, digital cameras, scanners, classrooms sets of programmable calculators

Developing Tech (2 pts)	Between 5 and 9 students per Internet-connected multimedia computer Refresh cycle established by district/campus is every 5 years	Direct connectivity to the Internet available at the campus in 50% of the rooms, including the library Adequate bandwidth to the campus to avoid most delays	Web-based/on-line learning available at the campus Satellite based learning available at the campus No two-way interactive video distance learning capabilities available at the campus, but available in the district	Most rooms connected to the LAN/WAN with student access Minimum 10/100 Cat 5 hubbed network High-end servers, such as Novell or NT servers, serving some applications	One educator per computer Shared use of resources such as TVs, VCRs, digital cameras, scanners, digital projectors, and analog video cameras; classrooms sets of programmable calculators
Advanced Tech (3 pts)	Four or less students per Internet-connected multimedia computer. Replacement cycle established by district/campus is every 4 years	Direct connectivity to the Internet in 75% of the rooms, including the library Adequate bandwidth to each classroom over the local area network (at least 10/100 MB LAN) to avoid most delays Easy access for students and teachers	Web-based/on-line learning available at the campus Satellite-based learning available at the campus Two-way interactive video distance learning capabilities available in at least one classroom	All rooms connected to the LAN/WAN with student access Minimum 10/100 Cat 5 switched network High-end servers, such as Novell or NT servers, serving multiple applications	One educator per computer Dedicated and assigned use of commonly used technologies such as computers with projection devices, TVs, VCRs, programmable calculators assigned to each student, and telephones in each classroom Shared use of specialized technologies such as digital cameras, scanners, document cameras and projectors, and digital video cameras
Target Tech (4 pts)	In addition to 4 or less students per Internet-connected multimedia computer, on-demand access for every student. Replacement cycle established by district/campus is 3 or less years	Direct connectivity to the Internet in all rooms on all campuses Adequate bandwidth to each classroom over the local area network (at least 100 MB or fiber network LAN) Easy access for students and teachers including some wireless connectivity	Web-based/on-line learning available at the campus Satellite-based learning available at the campus Two-way interactive video distance learning capabilities available at the campus in multiple classrooms	All rooms connected to the WAN sharing multiple district-wide resources Campus is connected to robust WAN with 100 MB/GB and/or fiber switched network that allows for resources such as, but not limited to, video streaming and desktop videoconferencing Easy access to network resources for students and teachers, including some wireless connectivity	One educator per computer Fully equipped class rooms with all the technology that is available to enhance student instruction readily available including all of the above as well as the use of new and emerging technologies
TOTAL SCORE FOR KEY AREA IV:				**Infrastructure for Technology**	

Standards

Profiles for Technology-Literate Students (National Educational Technology Standards for Students [NETS-S]) *

Prior to completion of Grade 8, students will:

1. Apply strategies for identifying and solving routine hardware and software problems that occur during everyday use.

2. Demonstrate knowledge of current changes in information technologies and the effect those changes have on the workplace and society.

3. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse.

4. Use content-specific tools, software, and simulations (e.g., environmental probes, graphing calculators, exploratory environments, Web tools) to support learning and research.

5. Apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration, and learning throughout the curriculum.

6. Design, develop, publish, and present products (e.g., Web pages, videotapes) using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom.

7. Collaborate with peers, experts, and others using telecommunications and collaborative tools to investigate curriculum-related problems, issues, and information, and to develop solutions or products for audiences inside and outside the classroom.

8. Select and use appropriate tools and technology resources to accomplish a variety of

Stages of Professional Development **

(CEO Forum STaR Chart)

Entry/Adoption Stage. Educators move from the initial struggles to learn the basics of using technology to successful use of technology on a basic level (e.g., integration of drill and practice software into instruction).

Adaptation Stage. Educators move from basic use of technology to discovery of its potential for increased productivity (e.g., use of word processors for student writing, and research on the Internet).

Appropriation Stage. Having achieved complete mastery over the technology, educators use it effortlessly as a tool to accomplish a variety of instructional and management goals.

Invention Stage. Educators are prepared to develop entirely new learning environments that utilize technology as a flexible tool. Learning becomes more collaborative, interactive and customized.

tasks and solve problems. 9. Demonstrate an understanding of concepts underlying hardware, software, and connectivity and of practical applications to learning and problem solving. 10. Research and evaluate the accuracy, relevance, appropriateness, comprehensiveness, and bias of electronic information sources concerning real-world problems.	

* For more information on Profiles for Technology-Literate Students, see http://cnets.iste.org/students/s_profiles.html
For Tennessee Student Technology Standards, see
http://www.state.tn.us/education/ci/cicomputered/cicompedk2.htm, cicomped35.htm, cicomped68.htm

** For ISTE Technology Proficiencies for Teachers (NETS), see http://cnets.iste.org/students/t_profiles.html

VITA

Joe Miller Wilson was born in Knoxville, Tennessee, on June 14, 1939. He attended public schools in Knoxville until the fourth grade at which time his family moved to Sevier Count. He continued his education in Sevier County, graduating in 1957 from Sevier County High School. He received a Bachelor of Science Degree in Music Education from Carson-Newman College in Jefferson City, Tennessee in 1962. Having been granted a Teaching Fellowship at Appalachian State University in Boone, North Carolina, he received his Master of Arts Degree in Junior College Education in 1963. After additional study at the University of South Carolina and East Tennessee State University, he received the Specialist in Education Degree from The University of Tennessee, Knoxville in 1997.

With 27 years of teaching experience and 14 years of business experience, he is presently pursuing his doctoral degree at The University of Tennessee, Knoxville, with a major in Instructional Technology and a collateral in Human Resource Development.