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Teachers' perceptions of computer technology's impact upon student achievement

James Clayton Lewis

TEACHERS' PERCEPTIONS OF COMPUTER TECHNOLOGY'S IMPACT UPON STUDENT ACHIEVEMENT

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ABSTRACT

The purpose of this study was to determine if teachers perceive that computer technology has a positive impact upon student achievement. First, this study sought to determine if teachers believed that they were prepared to incorporate computer technology into their instruction. Additionally, this study attempted to determine the extent of staff development and technology support available to teachers. And finally, this study sought to determine the extent to which teachers believed that computer technology could enhance classroom instruction, and improve student achievement. Literature relating to the above-mentioned factors was reviewed.

The population surveyed consisted of elementary school teachers within the Ontario-Montclair School District. The instrument used to gather the survey data was developed and tested by Middle Tennessee State University. A total of 70 survey instruments was completed and returned to the researcher. The study results indicated that most teachers believed that computer technology could enhance student learning, and further, that technology in the classroom can enhance student learning.

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I would like to first acknowledge the Lord Jesus Christ, for it is only by his strength that I can do all things. I would also like to acknowledge the support of my family, with a special thanks to my wife and children. Thanks "boys," for being patient while I worked through many a night (and day)!

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CHAPTER ONE

INTRODUCTION

Introduction

Chapter One presents an overview of the project. The contexts of the problem are discussed followed by the purpose, significance of the project, and assumptions. Next, the limitations and delimitations that apply to the project are reviewed. Finally, definitions of terms are presented.

The purpose of this study was to determine if computer technology is an effective tool for raising student achievement in education. Much of the related research indicated there is a pressing need for educators, at both the school site and district levels, to develop accurate assessment tools to accurately determine the most effective use of computers as it applies to instructional technology. This need becomes even greater as educators presently face ever-increasing standards of accountability.

Additionally, as technology continues to evolve, so too must its application and use in education. Educators must seek to match the type or mode of technology instruction applied to the needs of the individual

student. This will likely become more important as classroom educators are confronted with an increasingly diverse student population. Current research suggests that many educators continue to use technology primarily for drill and practice, in spite of current research indicating that drill and practice might be the least effective mode of instruction as it relates to computer technology.

Statement of the Problem

Along with an emphasis on using computer technology in the classroom, there has also been an increasing emphasis upon student achievement using standardized test measurements. Further, many teachers have been instructed and trained in methods and practices they can employ in their instruction to prepare students to achieve success on standardized testing. Also, teachers are now being asked to more seriously examine their own instructional practices as it relates to state mandated standards for increasing student achievement.

The problem with using computer technology to improve student achievement is that, according to research, there is not enough conclusive evidence proving that using computer technology helps with student achievement. In

fact, most studies that examine technology and student achievement are not able to isolate other factors that come into play when technology is integrated. Perhaps the more important question is not whether the use of technology improves student achievement, but rather, to what degree other changes are implemented in when it comes to the use of differing instructional strategies and content. Perhaps it is these factors that are influential in the generally positive impact that computer technology has upon student achievement (http://www.ed.gov/pubs/EdReformStudies/TechReforms/chap5a.html). For example, in a study of eighth graders using a hypertext/multimedia tool to design their own lessons about (historical topics), the scores of students using the multimedia tool did not differ from the control group. However, when tested one year later by an independent interviewer, the multimedia group displayed elaborate concepts and ideas that they had extended to other areas of history. In contrast, the control group remembered almost nothing about the historical content of the lessons, and could not make connections to other concepts (Lehrer, as cited in http://caret.iste.org).

Another problem in assessing student achievement using computer technology is that teachers often do not

infuse technology into all areas of their curriculum, or address the different learning styles of students when employing computer technology. As a result, many teachers do not use computer technology beyond basic drill and practice activities, although there is some research, (though limited in quantity and scope), that supports the usefulness of drill and practice activity using CAI, particularly with disadvantaged and low-achieving students (http://www.ed.gov/pubs/EdReformStudies/TechReforms/chap5a.html). Finally, many teachers do not use computer technology at all because their schools do not have clearly stated objectives on how to use or maintain the technology that is already in place. This lack of focus means that schools are spending a great deal of money on computer technology, yet they do not have any way to assess or monitor student achievement with that technology.

A further consideration is how teachers and students view the use of technology within the classroom. Often, teachers' perceptions and attitudes severely limit the use of technology amongst students because the technology often, is not perceived as having the supposed benefits that computer technology offers to instruction. If teachers fail to perceive any benefits for technology

usage, students will receive little if any encouragement in using computer technology as a viable tool to increase learning and student motivation.

Another important consideration in successful technology integration includes staff development. If teachers and educators are to successfully integrate computer technology into all areas of the curriculum, then educators must receive consistent training and support in successful integration of technology. This includes the opportunity to not only receive training in how technology is integrated, but support in hardware and software usage. In addition, teachers need opportunity to interface with each other in order to share and exchange ideas. This process can often lead to team-building opportunities, which can also increase teacher effectiveness.

Finally, the use of technology can often bring about change in instructional methods or practices that can, in some cases be beneficial to the student. For example, students oftentimes may experience greater opportunity for collaboration in situations in which technology is being integrated. This can prove highly beneficial, particularly some students whose learning style is more inter-communicative. Also, this particular learning format can be more beneficial for underachieving students.

Specifically, many students show an increase in student motivation when technology is integrated into the curriculum. This increase in motivation has been found to increase metacognition, which in turn increases student acquisition of knowledge (Billig, 2001). This increase in metacognition stimulates further developments in thinking and learning skills, which results in the development of expertise (Jesse & Sherry, 2002).

Significance of the Study

The study of computer technology and student achievement has been a relatively new endeavor. In fact, since the 1980's, less than half the studies on the connection between computer technology and student achievement has centered on how the tool of technology actually impacts student achievement. In terms of technology implementation, many schools and districts chose to embrace computer technology integration without determining what the academic goals were to be, nor prior to considering where technology would fit within the overall strategic plan of the school or district. Further, in many cases no thought was given to how teachers would be trained in using the technology, nor to what extent the

computer hardware and software would be maintained, and when necessary, upgraded.

Another key issue regarding computer technology integration in education centers on the issue of assessment. Once technology was implemented into schools and districts, in many cases there were no procedures in place to assess the effectiveness of that technology. Further, as current state mandates require greater student accountability, many schools have relied upon the use of standardized tests to assess student progress. This emphasis has made it difficult in many cases to assess the impact that technology may be having upon student achievement. Further, teachers and educators have struggled in many cases with trying to determine the best way to assess the effectiveness of computer technology.

A third issue related to computer technology implementation involves teachers' perceptions regarding computer technology's effectiveness in increasing student achievement. Invariably, the perception that teachers and educators have about computer technology in large part will determine the degree to which these tools are integrated into the day-to-day curriculum within the classroom. Students will inevitably be influenced by the amount of emphasis that is placed upon the integration of

technology in the classroom. Teachers and educators must become convinced of the benefits of technology integration in the classroom. However, this is not the whole picture. Educators must also be supported in their efforts to integrate this technology. They must be allowed to collaborate amongst fellow colleagues. In addition, they must be allowed time to create lessons, and modify curricula in order to effectively integrate computer technology into the instructional program.

Therefore, by determining the degree to which teachers and educators perceive the benefits of technology will in fact go a long way in determining what hinders further technology integration.

And finally, by learning about the beliefs and perceptions held by teachers, there can be a greater awareness of other key components that in fact may in large part influence teachers' perceptions. Specifically, if key pieces are missing in the technology integration plan, or if in fact, there is not one implemented, then the inevitable result will be that teachers will become discouraged and disillusioned. And further, for those who perceive no benefit regarding technology integration, then these factors can only serve to reinforce teachers' negative perceptions regarding technology integration.

Limitations and Delimitations

The limitations and delimitations of the study are presented in the next section. Clarification of the limited scope of the study is clearly defined.

Limitations

There were in fact a few limitations encountered in the course of this study. First, the time it took to survey teachers from different campuses that the researcher was not familiar with resulted in a few time delays in obtaining completed surveys. Second, many teachers surveyed obviously cared little about answering the surveys as accurately as possible. Also, because each survey contained some technological vocabulary, there may have been some confusion by respondents in determining the true meaning of each and every survey item. And finally, the return rate of surveys was less than seventy percent of the total population surveyed.

In addition, due to the size of the population to be surveyed, only a small percentage of teachers within the Ontario-Montclair School District were actually surveyed. Also, it is likely that the participating respondents were more likely to participate in the survey if they had made some prior use of computer technology within their own classrooms, or had a belief in the effectiveness of such,

and had a willingness to continue implementing computer technology within their own classrooms.

And finally, while teachers' beliefs in technology's effectiveness may not be an empirical measure, it nonetheless serves as a valid measure to determine to what extent computer technology integration can assist them in raising student achievement.

Delimitations

The participants in this study were delimited to those teachers that were on-track at the time the survey was given, as well as by those employed within the ten schools surveyed in January, February, and March of 2003.

Organization

This study is divided into five chapters. Chapter One provides the statement of the problem, significance of the study, the limitations and delimitations of the study, the definition of terms and the organization of the study. Chapter Two consists of a review of related literature. Chapter Three outlines the research design, the methodology, and the data collection procedures. Chapter Four presents the findings of the study. Chapter Five provides a review of the conclusions and the

recommendations. The appendices and the reference list follow Chapter Five.

The Appendices for the project consists of: Appendix A Technology Survey; Appendix B Permission to use Technology Survey; Appendix C Explanation Sheet; Appendix D Survey Results; Appendix E Experience Distribution; Appendix F Rank Distribution; Appendix G Grade Level Distribution. Finally, the references.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

In this chapter, there will be a discussion of computer technology and its history from an historical perspective. Then, computer technology and how it can be integrated using a number of instructional methodologies will be presented. And finally, instructional technology and student assessment will be the focus. Ultimately, each component is very important if instructional technology is to be successfully integrated into our school districts and individual school sites.

Instructional Technology: A Historical Perspective

Education today relies heavily on technology and over the past decade, schools have greatly invested in computers and networking to enhance instruction. As schools increase spending on computers, more thought needs to go into the process regarding their placement. Traditionally, computers have been placed in laboratories staffed by computer specialists. As teachers gain more experience and comfort with computers, there is a growing need to have more computers in each classroom. School administrators, according to Culbertson, (as cited in

Wellburn, 1996), are now faced with the dilemma of where to place newly purchased computers to best promote integration of technology with teaching and learning.

Early Use of Computers

Computers and related information technologies were first introduced into education as an instructional tool more than thirty years ago. Most computers at that time were placed in computer labs with computer specialists. According to Salomon, (as cited in Schacter, 1997), this was a bad idea. He believes that computers are not independent entities, but are actual tools to be used for doing, making and creating. Much like "intelligent" pencils, they should be used as handy tools, well integrated into daily learning activities. Also, computer use should not be learned as a topic in itself. One should learn how to use the computer not for the sake of mastering it, says Fiske (as cited in Lanunderville, LeClerc, & Stevens, 1999) but for the sake of creating something with it. Becker, (as cited in Culp, Honey, & Spielvogel, 1999), concludes that the amount of computers in a school building is not a true indicator of the ability of the teachers and students who actually use them. He feels strongly that computers belong in the classroom where teachers will find it easier to integrate

computer activities with other instructional and learning activities. Also, the only reason schools tend to integrate computers and place them in labs is to insure that these technological resources are accessible to more teachers and students.

Teacher Attitudes

As technology in education continues to grow into the future, it will become increasingly popular to integrate computers into the content areas. It is the consensus of some educators that administrators are realizing that computer skills should not be taught in isolation in separate "computer classes," but introduced into the content areas where teachers can help students apply their computer skills in meaningful ways (Clark, 2000). This is clearly a shift in approach and emphasis, and one that has been widely gaining acceptance. It will become increasingly important to have the necessary skills to survive in the technological future.

When planning to implement new instructional methods utilizing educational technology, administrators should consider the attitudes and needs of the teachers who will ultimately be the users and instructors of this new technology. The growth of technology as an instructional tool is definitely influenced by their attitudes and

ability to use them successfully. Teachers then, must be prepared and able to teach using technology, as it is an integral part of today's students' learning. According to the Office of Technology and Assessment, (as cited in www.wws.princeton.edu/~ota, 1982), to use technology effectively, teachers need more hands on learning time to experiment, easy access to equipment, and ready access to support personnel.

According to a 1999 survey commissioned by the National Center for Education Statistics (NCES), (as cited in Clark, 2000), 99% of full-time regular public school teachers reported they have access to computers and the Internet in their schools, either in their own classrooms and/or labs. This increase in accessibility has led to the necessity to evaluate the extent and types of teacher use of computers, and their perceptions of their own preparedness to use these technologies (Clark, 2000).

Although computer accessibility is high, its use as an effective and accepted teaching and learning tool is directly influenced by the attitudes of the teachers who use it. According to a study by Ravitz, Becker, and Wong (as cited by Clark, 2000), the subject matter taught clearly affects teachers' opinions on the relevance of computers to teaching and learning. Frequent use of

computers is more likely when they are conveniently located in teachers' classrooms.

While the integration of technology as an instructional tool can be viewed as an effective instructional strategy for teaching students, the teachers' attitudes toward these technologies and their ability to readily use them successfully are the true gauge of their effectiveness and acceptance. According to Akbaba and Kurubacak, (as cited by Clark, 2000), teachers' attitudes about technology are directly related to their training and comfort level, therefore their attitudes should be taken into consideration when planning technology strategies.

Effects of Technology Integration

For some time, there has been debate as to whether information technology can be an effective and economical tool for instruction. Many detractors of educational technology take the position that because education is a social process, it requires intervention strategies that are geared toward greater student-to-student interaction, or teacher-to-student interaction.

However, research exists which suggests that students do learn as well or better from education technology than from conventional means. Little evidence exists to the

contrary. Much of the past debate centered on whether technology was more effective than conventional means and hence warranted substitution for traditional classroom instruction. Also, costs for labor-intensive education and training methods continue to climb faster than the inflation rate, while costs for information technology continue to drop precipitously. These trends will result in a steadily growing number of applications in which technology-based instruction is clearly the most cost effective method.

Finally, for many educational and training needs, educational services to the homebound, to geographically isolated regions, or to the workplace-there are few viable alternatives to the use of technology, provided that it works adequately. In a growing number of instances, teachers qualified to teach in certain fields-such as science, mathematics, or bilingual education are difficult to find. In these cases, technology may be the only means by which such education can be provided.

This is not to say that there are no limitations or liabilities in the uncritical use of educational technology or that there is no need for additional research in the field. Some critics have argued that there are some questions that still go unanswered. For example,

will access to computers reduce the ability to practice basic skills? For instance, most modern word processors incorporate simple grammatical analysis and correction. Will the use of such technologies decrease a student's grasp of writing mechanics?

Also, does the medium have characteristics within it that distort the educational message or reduce side effects? For example, will such media shorten the attention spans of students to the point that they will be unwilling or unable to focus their attention on basic print media or conversational dialogue? This is the finding of some developers of interactive computer-based reading programs that, in order to maintain student attention, shorter passages must be used on video screens to maintain adequate attention spans.

Further, most research on technology-based education has focused on the development of well-defined skills such as mathematics. While proponents argue that computers can encourage the development of new problem-solving skills, critics suggest that education of the more general conceptual skills could suffer. For example, as some have pointed out, will mastery be achieved through decontextualized drill and practice, when the skill hasn't been mastered when taught by a human being first

(Thornburg, 2002)? Also, if over the long term, education is provided principally by technology, what are the long-term impact on social, cognitive, and psychological development?

Lastly, do particular characteristics of information technology subtly favor some types of students psychologically or cognitively? Do differences exist that tend to favor performance by sex, age, social class, or values? These are factors that must also be addressed as educators seek to determine the most effective use of instructional technology in the future.

Instructional Methodology and Content

Assessment

One critical factor in determining the effectiveness of instructional technology is to make use of appropriate assessment tools that allow for measurement of student acquired knowledge and skills using multiple measures, which may necessitate the use of student portfolios as just one component of alternative assessment (Dwyer, 1994). Researchers have begun to realize that technology cannot be treated as a single independent variable, and that student achievement is gauged not only by how well students perform on standardized tests but also by

students' ability to use higher-order thinking skills, such as thinking critically, analyzing, making inferences, and solving problems (Culp et al., 1999). However, some critics argue that in the current educational climate, teachers are pushed in the direction of narrowing instruction to what they think is on the test (http://www.iste.org). However, there is a growing body of evidence, which seems to indicate that, when used effectively, technology applications can support higher-order thinking by engaging students in authentic, complex tasks within collaborative learning contexts. The significance of this is that most curriculum grossly underestimates the capacity of students, even at a young age, to problem solve (Burns, 1981). And yet it is problem solving skills development that many students need, and what instructional technology offers.

Further, instead of focusing merely on isolated, skills-based uses of technology, education technologists are promoting the use of various technologies (ranging from word processors to modeling software to Internet-based research) that are integrated across the curriculum (Culp et al., 1999). In fact, according to the U.S. Department of Education (as cited in Lunenburg, 1998), while student learning of facts and basic skills

has improved slightly in some subject areas over the past two decades, the development of more advanced reasoning abilities has declined. This further supports the premise that technology can and does matter, but its infusion into education is highly dependent upon the context in which it is used (Latham, 1999). In addition, this model of integrated technology-supported learning emphasizes the ability to access, interpret, and synthesize information instead of rote memorization and the acquisition of isolated skills.

Technology Applications

Critical to this idea of technology is that it refers not to just one type of technology but to a wide variety of applications. This term can apply to the use of computers, but it can equally apply to video production, audio, multimedia, and distance learning to name a few. In fact, with rapid developments in telecommunication technologies, tightening budgets, and changes in student demographics, there will likely be increased interest in this area according to Honeyman and Miller, (as cited in Jackman & Swan, 2000).

In addition, when examining the different types of instructional media, we almost must take into account the method(s) of instruction that are to be employed. Many

educators today, in fact, feel that the humanistic nature of education makes computers and other technologies less valuable (Dorricott, 1994). However, one instructional strategy that has been of interest to educators since the 1960's is the idea of team-teaching, (Hecht, Roberts, & Schoon, 1996). Even today, many educators today feel that there is merit in having teachers working informally together in planning a curriculum, arranging for visitations to each other's classrooms, exchanging information about shared students, and trading knowledge and expertise regarding instructional practices. This practice may go as far as having teachers from different subject areas organized into groups of varying numbers with a common grade level, a common schedule, or a common subject matter. The expectation of course being that the team will work collectively, share ideas and resources to provide a broadened range of learning activities for students. Another important variable, it is believed, is that group interaction amongst staff members will positively influence the attitudes of the staff members, and by so doing, will have a positive influence on not only the quality of classroom instruction, but on room environment as well, hence, it is believed, students will learn more. Costell, (as cited in Hecht et al., 1996),

supported this claim by suggesting that the single most important influence upon student learning was not a handsomely functional building, a wealth of curriculum materials, or the state of the art equipment, but the competence of the classroom teachers and their motivation to act.

Team Teaching

The question ultimately is, what influence, if any, does team-teaching have on student learning when it is coupled with the integration of instructional technology? Unfortunately, very little research exists describing the interaction between computer technology and team teaching.

However, in one study, called Project Schoolroom, which examined the effects of team teaching on a group of high school students, four subject areas were examined to see what effects team teaching and technology integration would have upon student achievement.

Student academic records served as the primary source for this study, with quarterly grades in each course, grade point averages (overall and for just the four courses under study), and the numbers of excused and unexcused absences examined. This data was supported by occasional classroom observations of selected treatment group classes, periodic in-depth interviews with

participating teachers and an examination of courseware and other curricular artifacts (Hecht et al., 1996). This research was conducted from August 1993 through June 1994. Also, teachers in both the treatment groups spent several days during the prior year and summer planning curriculum and activities. Also, students in the project were required to participate in a short computer orientation camp instructed by the project teachers.

In terms of results, first, both excused and unexcused absences were accumulated for students in all three groups during the first and second semesters in each of the four subject areas. In almost every case, the students participating in the study had fewer absences, either excused or unexcused, than their counterparts. Further, grades were given in each subject at four different quarter points throughout the year. The results showed that the Project Schoolroom students outperformed the other two control groups in almost every subject at almost every grading period. In a few cases (second-quarter Algebra, third-quarter Biology, and the first two quarters of World Cultures), the Project Schoolroom students also achieved higher average grades than the other control group. In most cases, however,

their grades were not statistically different from each other (Hecht et al., 1996).

Next, grade point averages, overall for all courses taken and selecting just for the four subject courses, were computed and examined. Project Schoolroom students had a statistically significantly higher overall GPA than both of the control group students (Hecht et al., 1996). On the other hand, through one-on-one interviews, several additional factors, both positive and negative, were brought to the forefront. First, Project Schoolroom teachers reported an increase in the amount of time that they were able to spend with individual students as a result of the team approach. Two, teachers reported that through team-teaching, greater degrees of curriculum integration were achieved as a result of using this approach.

However, on the down side, teachers reported that students were not taught in the more traditional way, which might lend itself to greater success of students in their monthly CRT assessment tests. Also, as the year went on, teachers began to once again retreat into professional isolation, citing that professional differences began to become more of an issue as time went on, and that the time spent familiarizing students with computer technology

applications took away from traditional instructional practices, which, it was felt, would lend itself to greater success on the CRT assessment test at the year's end.

In conclusion, this study points to the need for computer technology to become an inclusive part of regular instruction and, more importantly, assessment, if teachers are to consider it of any value, (Hecht et al., 1996). The results of this study, show that it can be of value, yet teachers must also be given the freedom to include computer technology within the taught curriculum, and districts must add computer technology to the curriculum in meaningful ways with allow students to not only use technology as a tool, but will allow them to demonstrate knowledge of the technology itself in ways that relate directly back into academic content.

Instructional Media

In terms of instructional mediums, when assessing the effectiveness of technology, an important issue that must be addressed is the instructional objective being targeted, regardless of the medium being used (Ehrmann, 1995). If not, the use of computer technology has little hope of increasing student achievement. R. Clark, (as cited in Ehrmann, 1995) asserted that the medium is not

the message. But rather, that communications media and other technologies are so flexible that they do not dictate methods of teaching and learning. And further, that all the benefits attributed by previous research into "computers" or "video," could essentially be explained by the teaching methods they supported. Research, Clark says, should focus on specific teaching-learning methods, not on questions of media. On the other hand, Robert Kozma (as cited in Ehrmann, 1995), argues, that any particular technology is not irrelevant. But, that any particular technology may be well or poorly suited to support a specific teaching-learning method. There may indeed be a choice of technologies for carrying out a particular teaching task, he argues, but it isn't necessarily a large choice. Kozma, (as cited in Ehrmann, 1995), suggests that we do research on which technologies are best for supporting the best methods of teaching and learning. Too often, therefore, it is assumed that the mere purchase of additional computer technology will result in improvements in student achievement, when in fact all too often this infusion of technology funding is not accompanied by additional support and training for those who will be using the technology for instructional implementation.

So then, at this point, it may be advantageous to examine what type of computer technology may be most effective for meeting specific instructional objectives. And further, that before the introduction of computer technology into the curriculum, educators must decide what specific outcomes are desired before instruction is introduced. From a historical standpoint, the popular image of the computer revolution in education has rested on individualized computer-assisted instruction (Ehrmann, 1995). This type of software teaches by offering some text or multimedia instruction, asking the student questions, and providing feedback and new instructional material based on the student's answers. And, according to a Meta-analysis study by James Kulik, (as cited by Ehrmann, 1995), it was concluded that this model resulted in a substantial improvement in learning outcomes and speed, perhaps around 20% or more on average. Such instruction works best, of course, in content areas where the computer can tell the difference between a student's right answer and wrong answer, e.g., in mathematics and grammar exercises. However, one possible drawback from the use of such software is that it may lack universal usage amongst most educators. In addition, this type of software often lacks flexibility, so that an educator or instructor may

not be able to continually utilize this type of software if changes in course-work are implemented. However, in addressing one of the prior points, if in fact a piece of software gains widely accepted use, it often will also suffer from sudden obsolescence as computer hardware and interfaces change.

However, some universal types of software may in fact be highly suited for learning, and because they offer nearly universal technical support and continual upgrades, they are highly suited to use in instructional programs. The term for such software is Worldware. Word processors are Worldware. So are computer-aided design packages, in addition to electronic mail and Internet (Ehrmann, 1995). Worldware packages are viable for many reasons. First, they are already in instructional demand because students know they need to learn to use them and to think with them. Most educators are already familiar with them, though as Johnson (1996), points out, teachers will have to invest in the time and effort not only to learn the application, but in how to use it for instruction. And finally, vendors have enough demand for such packages to continually upgrade them to go along with improvement and innovation in computer hardware. In two studies cited by Ehrmann (1995), one using E-mail in teaching foreign

language students, and in another study, in using Worldware software as a tool for creating animation in molecular biology, it was found that students had higher levels of academic success when Worldware technology was used in instruction, as opposed to when it was not used.

These findings suggest that learning outcomes using technology can be improved, though in each case, instructional strategies, as opposed to mindless infusion of technology, was the key to student success. In the first case, students were able to work at their own pace, collaborate with colleagues, and obtain feedback in a non-threatening format (E-mail as opposed to face-to-face interaction). In the second case, students were given access to computer animation that added visualization to a difficult to understand concept (the movements of sub-atomic particles within an atom or molecule); and further, students had access to replay the animation as much as desired until greater understanding was gained. This additional tool, (which supplemented the instructor's normal chalk-talk lecture), helped students gain a greater understanding of the concept.

The final outcome from these studies was that it could be concluded that students using Worldware to create, modify, and finalize projects resulted in more

self-directed learning, and greater acquisition of technical skills as well. In addition, instructors felt that by students using Worldware to analyze, create, and communicate information, that they in essence became active learners as well as the students. This resulted in further evolution of courseware content, and a deepening of academic curriculum taught to succeeding groups of students.

Assessment of Instructional Technology

The study of instructional technology and assessment is an important one for several reasons. First, educators as well as administrators are interested in determining if instructional technology is an effective means for enhancing student achievement. Second, school districts as well as the communities they serve are stakeholders in this equation as well. Is there compelling data to indicate that computer technology increases student achievement, and to what extent? What population of students is best served by this infusion of technology? And finally, does technology increase student achievement in all content areas, and if so, what instructional strategies and software/hardware applications are most effective for targeting specific academic areas? These are

just some of the questions that must be addressed when the application of instructional technology is considered.

Researchers have begun to realize that technology cannot be treated as a single independent variable, and that student achievement is gauged not only by how well students perform on standardized tests but also by students' ability to use higher-order thinking skills, such as thinking critically, analyzing, making inferences, solving problems, and effectively communicating findings (Culp et al., 1999). Too often findings on the link between instructional technology and student achievement have been flawed in that contract vendors generated the research and the research failed the independence test (Johnson, 1995). At the same time, however, evidence further indicates that when used effectively, technology applications can support higher-order thinking by engaging students in authentic, complex tasks within collaborative learning contexts. This process in fact may require that the very process of student assessment evolve to include learning goals that go beyond the acquisition of mere facts, and demonstration of basic skills. Yet, some common themes do emerge.

First, technology generally improves performance when the application provides opportunities for student

collaboration. Secondly, when the technology application adjusts for student ability, and takes into account a student's prior experience, then there is usually a positive outcome to technology integration. And third, technology applications need to allow for integration into the normal instructional day (http://www.caret.iste.org).

Types of Assessment

In any event, the very process of assessing the effect of this technology integration on student achievement is a complex issue. Most research on technology and student achievement has used traditional standardized assessments to measure changes in student performance. This research often has focused on students' knowledge of isolated facts but has paid little attention to how well students think. In light of this, Glenn, Melmed, and Conte (as cited by Culp et al., 1999), assert that to measure the effect of specific technologies on student achievement, assessment methods and instruments should be appropriate to the learning outcomes promoted by those technologies. In addition, standardized tests may be appropriate if they fit in with the school's learning goals and are designed to measure the effects of technology use. In many cases, however, alternative assessment may be more suitable for meaningful research

about the relationship between technology and student achievement, (Culp et al., 1999).

Another important factor influencing the impact of technology on student achievement is that changes in classroom technologies correlate to changes in other educational factors as well. For example, changes in the way or method that students use technology can foster other changes as well. Students may begin to work in teams, or with a peer for example. This change in instructional strategy can impact the way that students learn as well as how they learn. In fact, students that work well in interpersonal settings may experience greater learning when working in teams. Conversely, intrapersonal learners may benefit by the inclusion of a technology that allows for independent, self-paced learning.

In realizing that the relationship between instructional technology integration and student achievement is a complex one, it nonetheless is an important consideration in deciding upon the importance of technology integration into education. Teachers and educators must determine what students need to learn, and how technology can promote those learning goals. Yet, beyond this, students, parents, and representatives need to become part of a team approach to successful technology

implementation. This team needs to develop a clear set of goals, expectations, and criteria for student learning that is based on national, state, and district standards, in addition to the student population and community concerns (Culp et al., 1999). Then, this team needs to determine the types of technology that best supports meeting those goals. The viewpoints of parents and community members are helpful in presenting a broader perspective of skills that students need to succeed after leaving the school. According to Cuban (as cited in Culp et al., 1999), if there is a clear understanding of the purpose of and type of technology used, evaluating the impact of technology upon student achievement is easier and more valuable. It is only with a clear understanding of the purpose of technology, and the type of technology to be used, that a clear picture of its impact upon student learning can be realized.

Further, there must be clear direction in terms of how students will learn. In other words, decision makers must decide what role students will take in the learning process. If, as most research suggests, students are to be self-directed learners, then students should become explorers, and even producers of knowledge. This may even necessitate students collaborating across all subject

areas, with teachers acting as guides and facilitators, as opposed to dispensers of knowledge. In addition, through this type of learning process, assessments must be modified to take into account a diversity of student projects which may in fact take many forms, yet be guided by teacher, or teacher-student developed performance rubrics.

Staff Development

Another consideration in the assessment of technology in education is in the area of staff development. If in fact teachers are to use technology in their teaching practices, then adequate staff development must be provided. Winglinsky (as cited in Culp et al., 1999), found that teachers who had received professional development with computers during the last five years were more likely to use computers in effective ways than those who had not participated in such training. Also, most teachers began this process simply out of a desire to become better teachers, and to learn basic skills (Mann, 1997).

In terms of teacher training, this type of staff development must exceed the typical one-shot training session. As pointed out by Hawkins & Honey (as cited by Wellburn, 1996), short workshop schemes are vastly

insufficient to enable beginning or veteran teachers to teach differently or to teach using technology. Instead, teachers must receive on-going staff development, which includes technical training in existing and new technologies, training in successful integration of technology in the content areas, as well as training in the development of alternative assessment practices.

Also, beyond the above-mentioned components, teachers also need time to become familiar with available products, software, and online resources (Culp et al., 1999). Included in this is time for discussion with other teachers and educators so that collaborative team building can be encouraged. This collaboration, according to some research, assists teachers in continuing to successfully implement technology over time. An indirect result of this enhanced use of technology will inevitably be the need for greater amounts of time for students to use technology as a tool for exploration. In fact, as students use technology, and teachers are able to find more ways to incorporate technology into their instruction, the problem, according to Becker (as cited in Culp et al., 1999), will no longer be not enough computers but not enough time to utilize them.

Finally, ongoing evaluation of technology applications and student achievement, based upon overall educational goals, helps to insure that the technology is appropriate, adaptable, and useful. Such evaluation also facilitates change if learning goals are not being met. Further, according to Heinecke, Blasi, Milman, and Washington (as cited in Culp et al., 1999), the overall focus of evaluation must be student learning, and that multiple quantitative and qualitative measures may be necessary to document student-learning outcomes. This qualitative measure may include teacher observations, which in fact may help to demonstrate an increase in student motivation, (which research suggests) plays a key role in student learning.

In sum, many of these issues are important in using technology to improve student achievement. Instructional technology is not transformative on its own. Yet, when the decision making process is strategic in nature, technology can play a critical role in enhancing student achievement.

Summary

The successful integration of computer technology, and its impact upon student achievement can only be achieved through careful planning at both the district and

school site level. In addition, teachers must receive adequate staff development in order to successfully integrate technology into the curriculum. Technology implementation into instruction will only increase with teacher training (Middleton, 1999). Successful implementation will also necessitate the formal evaluation of student needs, as well as hardware and software selection. Additionally, all stakeholders, (administrators, teachers, students, and community members), need an active involvement in determining the goals of computer technology implementation. And finally, educators must establish ways to assess student activities in using technology, so that student achievement can more accurately be assessed once computer technology has been infused into the curriculum.

CHAPTER THREE

METHODOLOGY

This chapter describes the research design and methodology employed to complete the study. Also, the participants are described and the rationale for their selection is addressed. The survey distribution and collection methods are presented in addition to the statistical treatments of survey responses. This research study utilized descriptive statistical methodologies, and employed random sampling.

Research Design

Survey research methodology was used to complete the study. In most cases, survey research consists of identifying and selecting a sample of participants to which a researcher administers a standardized questionnaire. Surveys may be composed of self-administered questionnaires, face-to-face as well as telephone surveys.

This design has been selected for two main reasons, which included its ability to provide answers to questions directly under investigation, and because of its prior use in an academic setting.

Strengths and Weaknesses

Strengths

Researchers have noted some strengths inherent in survey research methods. First, the use of standardized questionnaires can provide the researcher with a consistent measurement tool. In other words, the exact same inquiry can be addressed to each participant in exactly the same format, and under near identical conditions. In fact, surveys make possible the collection of large amounts of data with relatively little input from the researcher beyond the initial stages of distribution, and the treatment of data after collection.

Often, large amounts of data are often required for social science statistics, and can be necessary to maintain the validity of a study. The ability to both analyze and draw conclusions from the data requires the reduction of the material from unmanageable details to coherent summaries that the researcher as well as casual reader can understand. The researcher is able to then summarize based upon mean, median, or standard deviations to name a few.

Weaknesses

Some researchers have noted a number of weaknesses in applying survey research. The requirement for a

standardized questionnaire often presents challenges related to issues of instrument validity. In cases where a new study is proposed, this can present great challenges, particularly for the novice researcher.

Also, the survey questionnaire is inherently rigid in its application. Respondents are restricted in their ability to respond in ways that do not conform to the items generated by the survey. Also, the respondents may not have been given ample opportunity to fully consider their feelings, beliefs, or thoughts on matters contained within the questionnaire. And finally, some bias may be introduced into the findings simply because respondents that are interested in the topic surveyed may have a greater inclination to participate as a respondent than one who has no interest in the study at all.

Participants

After receiving permission in writing from the department of Instructional Technology at Middle Tennessee State University (Appendix B), twelve elementary schools were contacted within the Ontario-Montclair School District to solicit their participation in the study. After verbal permission was obtained from ten school sites, the researcher provided a copy of the disclaimer

stating the reason for the survey, as well as information about the researcher, in addition to instructions regarding the survey completion process and collection.

The teachers in Ontario-Montclair School District were chosen in large part due to the researcher's direct involvement with personnel within the district, as well as gaining insight into challenges confronting teachers when attempting to utilize instructional technology within the classroom. The descriptive survey was limited to teachers within the Ontario-Montclair School District.

Instrumentation

A discussion of the instrumentation used during the study is presented. The individual sections contained within the survey will be discussed that address the instrument used during Middle Tennessee State University's study (1998), Assessing the Impact of Technology on Teaching and Learning.

The survey instrument utilized by the researcher consisted of 46 items, and is based upon a Likert scale. The initial section of the survey deals with teachers' beliefs about computer technology, and how effectively it is both employed, and supported at the school and district

level. This component is key to the successful implementation of instructional technology in the schools.

The second section of the survey focuses on instructional technology use and its effects upon several areas of student performance as well as how teachers present the curriculum to their students. This inclusion is critical in that how technology is utilized within the instructional setting is equally as important as the technology itself.

The third section of the survey instrument addressed instructional technology, and teachers' projected use over the next 24 months in terms of how technology might be applied within their instructional setting. It is important to the effective use of technology that students have clearly articulated goals, as well as regular exposure to the use of instructional technology so that consistent learner outcomes can be assessed. And finally, the last section of the instrument focused on demographic data related to job position, years of experience, and tenure within the district. Most research states that training and staff development is critical in terms of teachers making decisions relative to the infusion of instructional technology into the curriculum.

Survey Reliability

The survey instrument used in the survey was used by the Instructional Technology Department at Middle Tennessee State University, and the questions contained in the instrument were adapted from the "Seven Principles of Good Practice in Undergraduate Education," (Chickering & Gamson 1987, as cited in http://www.mtsu.edu/~itsurvey/syldoc.html). These practices include student interaction with instructor, student collaboration, student participation and feedback, and high expectation of student performance. The questionnaire was first tested by a sample group of faculty at Middle Tennessee State University, and deemed a reliable test instrument (http://www.mtsu.edu/~itsurvey/syldoc.html).

Data Collection

Survey materials were distributed to the study participants by the researcher. The researcher collected the survey materials one or two days after completion. The letter of introduction and intent was reviewed by each site administrator (Appendix C), though in some cases not signed; though in every case verbal permission was granted. Data was collected from January 25, 2003 to March

10, 2003. All participants were asked to complete the questionnaire during their own time.

Treatment of the Data

A restatement of the purpose of the study and the research questions follow. The statistical procedures to analyze each research question are also presented.

Restatement of the Purpose and Research Questions

The purpose of this study was to determine teachers' perceptions of computer technology's impact upon student achievement. Specifically, answers to the following survey questions were particularly relevant to the study:

1. Do teachers believe that the use of computer technology in the classroom can enhance student learning?
2. Do teachers believe that the use of computer technology in the classroom can enhance student learning at their grade level or in their discipline?
3. Do teachers believe that they are adequately prepared to incorporate computer technology into their instruction?
4. Do teachers have access to adequate staff development opportunities, and an adequate

support structure at both the district and site level?

5. Do teachers perceive that student achievement actually increases when computer technology is infused into the classroom curriculum?

Data Analysis Procedures

Data was analyzed with the survey and statistical software programs, Wisco Survey Power and Microsoft Excel.

1. Descriptive statistics were used to describe the demographics characteristics of the study participants.
2. The mean and standard deviation were applied to specific variables related to teacher's belief in their ability and preparation to integrate technology into the curriculum.
3. Descriptive statistics were used to measure specific responses related to teachers' belief in their level of staff development training and school-site/district level support.
4. Descriptive statistics were applied to measure the responses teachers had regarding their belief that computer technology, when applied, has had a positive impact upon student achievement.

5. Cross tabulation was used to examine the relationship between demographic variables and technology proficiency, as well as technology proficiency and staff development, and finally, teachers' actual perception of computer technology's impact upon student achievement and technology use in the classroom.

Summary

This chapter reviewed the research methodology used for the study. The participants were described along with the rationale for their selection. And finally, discussion of the instrumentation and data analysis were presented.

CHAPTER FOUR

RESULTS OF THE STUDY

This chapter presents the results of the methodological procedures described in Chapter Three. The first section will present the survey response rates. The second section will present the demographic data provided by the participant. Finally, the results of analysis procedures to the research questions themselves will be presented.

Survey Response Rates

Data collection procedures were presented in Chapter Three. Only the researcher collected the survey data. Survey instruments were distributed to several different school sites following verbal and/or written permission from school site administration. A total 120 surveys were administered. Of those, 70 were completed. The 70 surveys provided the data used in the analysis of the study.

Demographic Data

Responses in the demographics section related to issues of teaching experience, subject area taught, rank (employment status), and grade level taught if applicable.

Experience

There were 68 responses to the item years in education. Appendix E provides a complete breakdown of the responses by number and percent. Years-of-experience is broken down into five-year increments starting with 0-5, and ending with 35-40. Two participants did not respond to this item.

Subject Area

There were 68 responses to the subject-area question. Subject-area or job classification was used to determine the specific job title. All 68 responses indicated self-contained classroom.

Rank

There were 68 responses to the rank question. Rank was used to determine the employment status or professional qualifications held by each teacher. This category was broken down into four categories, and is presented in Table 3.

Grade Level

There were 74 responses to the grade level question. Grade level was used to determine the grade level taught by each of the respondents. This category was broken down into 7 categories, and is presented in Table 3. Two participants did not respond to this item.

Data Analysis

In analyzing research data, four major factors were examined which comprised several survey items. First, analyze demographic information of the respondents. Second, determine teachers' self-assessments of their own computer technology proficiency. Third, determine the level of staff development provided to the classroom teacher. Fourth, determine what type of technology support is provided in the implementation and integration of computer technology. And finally, determine teachers' perceptions about computer technology use, and its impact upon student achievement. First, specific demographic information was sought. What was the demographic profile of the study participants? Descriptive statistics were used to describe the demographic data of the study participants. Results of this analysis are presented in the following narrative, and are also provided in Tables 1-3.

First, there were 64 responses to the years in education item. Table 1 provides a complete breakdown of the responses with those indicating 0-5 years teaching experience being 21.9% (n = 14), with those indicating 6-10 years of experience at 28.1% (n = 18). Those with 11-15 years of experience tallied 21.9% (n = 14), and

those indicating 16-20 years of experience was 7.8% (n = 5). Finally, those indicating over 20 years of teaching experience were 20.3% (n = 13).

The mean, or average years of experience being 16.48 years of experience, and the median being 15 years of experience. Secondly, there were 69 responses to the rank item. The level of rank included tenured, untenured, mentor/trainer, and other. Table 2 provides a breakdown by number and percent for each above-mentioned category. The largest category of respondents was tenured teachers with 68.1% (n = 47). The second largest category was untenured teachers at 26.1% (n = 18). The third largest category fell into the other designation with 5.8% (n = 4). And finally, 0% (n = 0) indicated a status of mentor/trainer.

Next, a further examination of specific survey items will be reviewed that fall into the following categories.

1). Teachers' self-assessment of their existing computer technology proficiency.

2). Staff development opportunities at the school site and district-level.

3). Technology support at the school site and district level.

4). Teachers' perceptions of computer technology's impact upon student achievement.

Each question of the Technology Survey was answered on a Likert scale as: 1) strongly agree, 2) agree, 3) neutral, 4) disagree, 5) strongly disagree.

In terms of self-assessed technology proficiency, a total of 56% strongly agreed or agreed that they possessed the skills and knowledge required to use computer applications for presenting lesson content and outlines. A total of 36% reported that they did not possess the necessary knowledge and skills. Secondly, 59% of teachers reported that they believed they had the necessary skills and knowledge to use computer applications to demonstrate specific concepts in class, though a total of 30% disagreed or strongly disagreed to this.

Results suggest that most teachers believe that they possess the skills and knowledge necessary to use computer technology applications to present lesson concepts and content in their classrooms. In addition, when cross-tabulations were performed (using item 2, and 82), there seemed to be a direct relationship between the teachers' grade level taught, and their belief that instructional technology could enhance student learning in their grade level or discipline, (this information is presented in Table 4). In other words, the higher the grade level taught, the greater the belief respondents had

in computer technology's ability to enhance student learning at their grade level.

Next, the issue of staff development will be examined. First, teachers were asked if they had adequate opportunities at their school site or district to develop the technical skills required for instructional technology use and development. A total of 35% disagreed or strongly disagreed to this question, with another 28% neither agreeing nor disagreeing, which may suggest that some teachers surveyed may lack knowledge of what is required to successfully integrate technology into their classrooms.

Secondly, teachers were asked whether or not they have adequate opportunities at their school site for release time for instructional technology development. A majority of teachers (62%) either disagreed or strongly disagreed with this statement. Thirdly, teachers were then asked whether or not they received sufficient time to develop and adapt course materials for the use of instructional technology. A total of 78% responded that they either disagreed or strongly disagreed to this survey item. Next, when teachers were surveyed concerning whether or not their school site or district promoted faculty development and use of instructional technology, a total

of 39% either agreed or strongly agreed with this item, with 39% taking a neutral position on the issue. Again, this may suggest that teachers surveyed are unclear as to how much staff development may be necessary to assist them in developing a comprehensive instructional technology component within their classrooms.

In addition, 83% of teachers disagreed or strongly disagreed when asked whether awards or incentives were offered to promote faculty use and development of instructional technology, with the remaining 7% taking a neutral position on this item. Finally, when teachers were surveyed as to whether special events were held either at the school site or district level to promote instructional technology use, a total of 62% either disagreed or strongly disagreed with this item. Another 30% were neutral on this item. When cross-tabulations were performed on items related to teachers' technology proficiency, and staff development opportunities, (item 7 and 10), there seemed to be no direct relationship between teachers having adequate release time, and teachers believing they have the skills and knowledge to use computer technology in the classroom. This information is found in Table 5. And finally, there did not appear to be any relationship between teachers' years of experience in

education, and their degree of self assessed computer technology proficiency.

The second major topic of examination focuses on the technology support available to teachers. First, a total of 51% either disagreed or strongly disagreed when asked whether or not their classroom computer was adequate for the development and use of instructional technology. A total of 23% were neutral on this issue. Second, when teachers were asked if they have access to instructional technology technical support, a total of 48% either agreed or strongly agreed. Further, when asked if their district's technology center had the necessary facilities for the development and use of instructional technology, a total of 42% either agreed or strongly agreed, with 47% being neutral.

Finally, teachers were asked if it was important to their school site to provide faculty with master classrooms to facilitate the use of instructional technology. A total of 47% either agreed or strongly agreed with this, with 28% being neutral on this item.

The last major area of analysis focuses specifically on teachers' perceptions of computer technology's impact upon student academic performance. First, when teachers were asked how their use of computer applications to

present lesson content affected student performance, 67% reported it had a positive affect, with 33% reporting it had no affect at all. Also, 69% of teachers reported it had a positive affect on student participation and feedback.

Second, when computer applications were used to demonstrate specific academic concepts, 69% reported it had a positive impact on student performance. Additionally, 71% of teachers reported it also had a positive affect upon student participation and feedback. Third, when teachers were asked how their students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based application affected student performance, 59% reported it had a positive affect, with 41% being neutral. Also, 62% reported it had a positive affect on student participation and feedback, with 38% being neutral.

Finally, teachers were asked how their students' use of computers to complete assignments, create presentations, or develop web pages affected student performance. A total of 68% reported that it had a positive affect on student performance, with 30% being neutral. In addition to this, 66% reported it had a

positive affect on student participation and feedback, with 31% reporting it had no affect at all. Further, when teachers were surveyed as to whether they believed that the use of technology in the classroom would enhance student learning at their grade level or discipline, 76% agreed or strongly agreed that it would, with 19% being neutral.

Lastly, when cross-tabulation was performed (on item 2 and item 20), there seemed to exist a direct relationship between teachers' belief that the use of computer technology in the classroom can enhance student learning in general, and in particular at their grade level, and how often teachers actually employ computer applications to present lesson material in class. Additionally, how often teachers use audio/visual equipment to display materials in class seemed to be directly related to their belief that the use of computer technology in the classroom can enhance student learning, (item 1 and item 35). This information is referenced in Table 6 and Table 7.

Summary

This chapter described the procedures and major findings of the study. The demographic data was presented,

followed by the data analysis, which provided the information to answer specific sections of the research instrument, as well as cross-tabulations of related survey items.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

This chapter is divided into five sections. The first section presents a review of the purpose of the study and the research methods employed in the study. The second section briefly reviews the finding. The third section presents the conclusions. The fourth section specifies recommendations for future studies.

Review of the Purpose and Research Methods

The purpose of this study was to determine teachers' perceptions of computer technology's impact upon student achievement. Specifically, answers to the following survey questions were particularly relevant to the study:

1). Do teachers believe that they are adequately prepared to incorporate computer technology into their instruction?

2). Do teachers have access to adequate staff development opportunities at both the district and site levels?

3). Do teachers have an adequate technical support structure at both the district and site level?

4). Do teachers believe that the use of computer technology in the classroom can enhance student learning?

The surveys were distributed to individual school sites within the Ontario-Montclair School District following verbal and/or written permission from site administrators. The researcher distributed the questionnaires to the site administrators. Included was a letter with background information concerning both the researcher, and the purpose of the study.

A total of 120 surveys were distributed amongst 10 school sites, with 70 surveys being returned complete. The surveys were distributed and subsequently collected between the dates of January 25, 2003 to March 10, 2003. First, a section on computer technology use at both the school and site level was included. Second, participants were asked questions regarding instructional technology use and effect. Third, participants were surveyed regarding demographics information, which included questions relating to personal information regarding level of teaching experience, employment status, rank, and job classification.

Review of the Findings

In analyzing research data, four major factors were examined which comprised several survey items. First, demographic information of the respondents was examined. Second, teachers' self-assessments of their computer technology proficiency were analyzed. Third, the level of staff development provided to the classroom teacher was noted. Fourth, determination was made as to what type of technology support was provided in the implementation and integration of computer technology. And finally, teachers' perceptions about computer technology use, and its impact upon student achievement was reviewed.

First, there were 64 responses to the years in education item. Those that indicated 1-5 years of experience were 42 % (n = 27). Those indicating 6-10 years of experience was 28.1% (n = 18). Those with 11-15 years of experience tallied 21.9% (n = 14), and those indicating 16-20 years of experience was 7.8% (n = 5). Finally, those that indicated over 20 years of teaching experience were 20.3% of the total number of teachers surveyed (n = 13). The mean, or average years of experience being 16.48 years, and the median being 15 years of experience.

Next, there were 69 responses to the rank item. The level of rank included tenured, untenured, and

mentor/trainer, and other. The largest category of respondents was tenured teachers with 68.1% (n = 47). The second largest category was untenured teachers at 26.1% (n = 18). The third largest category fell into the other designation with 5.8% (n = 4). And finally, 0% (n = 0) indicated a status of mentor/trainer.

Next, a further examination of specific survey items was reviewed that fall into the following categories:

1). Teachers' self-assessment of their existing computer technology proficiency.

2). Staff development opportunities at the school site and district-level.

3). Technology support at the school site and district level.

4). Teachers' perceptions of computer technology's impact upon student achievement.

Each question of the Technology Survey, excluding demographic information, was answered on a Likert scale as: 1) strongly agree, 2) agree, 3)neutral, 4)disagree, 5)strongly disagree.

In terms of self-assessed technology proficiency, a total of 56% strongly agreed or agreed that they possessed the skills and knowledge required to use computer applications for presenting lesson content and outlines. A

total of 36% reported that they did not possess the necessary knowledge and skills. Secondly, 59% of teachers reported that they believed they had the necessary skills and knowledge to use computer applications to demonstrate specific concepts in class, though a total of 30% disagreed or strongly disagreed to this.

Results suggest that most teachers believe that they possess the skills and knowledge necessary to use computer technology applications to present lesson concepts and content in their classrooms. In addition, when cross-tabulations were performed, there seemed to exist a direct relationship between the teachers' grade level taught, and their belief that instructional technology could enhance student learning in their grade level or discipline. The higher the grade level taught, the greater the likelihood that teachers believed in computer technology's benefits for their classrooms.

Next, the issue of staff development was examined. First, teachers were asked if they had adequate opportunities at their school site or district to develop the technical skills required for instructional technology use and development. A total of 35% disagreed or strongly disagreed to this question, with another 28% neither agreeing nor disagreeing, (which may suggest that some

teachers surveyed may be uncertain as to how much staff development might be necessary to successfully understand successful computer technology integration).

Secondly, teachers were asked whether or not they have adequate opportunities at their school site for release time for instructional technology development. A majority of teachers (62%), either disagreed or strongly disagreed with this statement. Thirdly, teachers were then asked whether or not they received sufficient time to develop and adapt course materials for the use of instructional technology. A total of 78% responded that they either disagreed or strongly disagreed to this survey item as well. According to these findings, clearly teachers believe that instructional technology integration time is seriously lacking.

Next, when teachers were surveyed concerning whether or not their school site or district actually promoted faculty development and use of instructional technology, a total of 39% either agreed or strongly agreed with this item, with 39% taking a neutral position on the issue.

In addition, 83% of teachers disagreed or strongly disagreed when asked whether awards or incentives were offered to promote faculty use and development of instructional technology, with the remaining 7% taking a

neutral position on this item. This is a clear indication that instructional technology has not been promoted at either the site or district level.

Also, when teachers were further surveyed as to whether special events were held either at the school site or district level to promote instructional technology use, a total of 62% either disagreed or strongly disagreed with this item. Another 30% were neutral on this item. When cross-tabulations were performed (on items related to teachers' technology proficiency, and staff development opportunities), there seemed to be a connection between teachers having adequate release time, and teachers believing they have the skills and knowledge to use computer technology in the classroom. At the same time however, there did not appear to be any relationship between teachers' years of experience in education, and their degree of self-assessed computer technology proficiency.

The second major topic of examination focused on the technology support available to teachers. First, a total of 51% either disagreed or strongly disagreed when asked whether or not their classroom computer was adequate for the development and use of instructional technology. A total of 23% were neutral on this issue.

Additionally, when teachers were asked if they have access to instructional technology technical support, a total of 48% either agreed or strongly agreed. Further, when asked if their district's technology center had the necessary facilities for the development and use of instructional technology, a total of 42% either agreed or strongly agreed, with 47% being neutral. This neutrality may be an indication of teachers' uncertainty as to how extensive technology facilities should be to adequately support the use and development of instructional technology.

Finally, teachers were asked if it was important to their school site to provide faculty with master classrooms to facilitate the use of instructional technology. A total of 47% either agreed or strongly agreed with this, with 28% being neutral on this item.

The last major area of analysis focused specifically on teachers' perceptions of computer technology's impact upon student academic performance. First, when teachers were asked how their use of computer applications to present lesson content affected student performance, 67% reported it had a positive affect, with 33% reporting it had no affect at all. Also, 69% of teachers reported it

had a positive affect on student participation and feedback.

Second, when computer applications were used to demonstrate specific academic concepts, 69% reported it had a positive impact on student performance. Additionally, 71% of teachers reported it also had a positive affect upon student participation and feedback.

Third, when teachers were asked how their students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based application affected student performance, 59% reported it had a positive affect, with 41% being neutral. Also, 62% reported it had a positive affect on student participation and feedback, with 38% being neutral.

Finally, teachers were asked how their students' use of computers to complete assignments, create presentations, or develop web pages affected student performance. A total of 68% reported that it had a positive affect on student performance, with 30% being neutral. In addition to this, 66% reported it had a positive affect on student participation and feedback, with 31% reporting it had no affect at all.

Further, when teachers were surveyed as to whether they believed that the use of technology in the classroom would enhance student learning at their grade level or discipline, 76% agreed or strongly agreed that it would, with 19% being neutral. Lastly, when cross-tabulations were performed, there seemed to be a direct relationship between teachers' belief that the use of computer technology in the classroom can enhance student learning at their grade level, and how often teachers actually use computer applications to present lesson material in class, as well as how often they use computer applications to demonstrate specific concepts in class.

Conclusions

The conclusions extracted from the study were as follows:

First, there were 64 responses to the years in education item. Those indicating 6-10 years of experience comprised the largest group of respondents at 28.1% (n = 18). Those indicating 0-5 years of experience, and 11-15 years of experience respectively, accounted for 21.9% of those surveyed. Finally, those indicating 16-20 years of experience accounted for the smallest percentage of respondents, at 7.8 % (n = 5).

The mean, or average years of experience of those surveyed was 16.48 years, and the median was 15 years of experience.

Next, there were 69 responses to the rank item. The level of rank included tenured, untenured, and mentor/trainer, and other. The largest category of respondents was tenured teachers with 68.1% (n = 47). The second largest category was untenured teachers at 26.1% (n = 18). The third largest category fell into the other designation with 5.8% (n = 4). And finally, 0% (n = 0) indicated a status of mentor/trainer.

In terms of teachers' self-assessment of their technology proficiency, 67% believe that they have the skills and knowledge to present lesson outlines using computer technology. Also, 59% of the teachers surveyed believe that they have the skills and knowledge necessary to demonstrate specific concepts using technology, and 67% of teachers surveyed believe that they have the skills necessary to communicate electronically with their students.

In regards to staff development, only 37% surveyed agreed that they had adequate opportunity to further develop their skills in instructional technology use and development. In addition, just 2% of teachers believed

that they had adequate release time for instructional technology development. And thirdly, only 1% agreed they had sufficient time to develop and adapt instructional technology materials for integration into the curriculum.

In examining the issue of instructional technology support, only 26% of teachers surveyed agreed that their staff, and administration adequately develop and support instructional technology. In addition, only 48% of respondents believe that they have access to instructional technology support at their site and district level.

Regarding student learning, 85% of teachers believed that the use of technology in the classroom could enhance student learning. And further, 76% of respondents believed that the use of technology in the classroom enhances student learning in their specific grade level.

Discussion

The findings in this study were organized around four key research questions. A general discussion will follow, which will include reference to related literature as well. First, one issue addressed in this study was the issue of teachers' technology proficiency. Though this was a self-assessed measure, according to the Department of Education (1993), as well as Clark (2000), a teachers'

confidence in their ability to use technology in large part determines the degree to which they will attempt to infuse technology in their own classrooms. Teacher attitude, according to Ravitz, Becker, and Wong (as cited by Clark, 2000), is directly linked to training and comfort level, and is a critical issue that needs to be addressed if successful computer technology integration is to be realized.

A second issue this study examined was staff development at both the site and district levels. In particular, the findings from this study suggest that teachers do not get adequate opportunity for staff development training. In fact, only 37% reported having adequate training opportunities at their school site or at the district level, with only another 3% reporting they were given adequate time to both develop and adapt course materials for computer technology integration. And yet, research by Hawkins & Honey (as cited by Wellburn, 1996) asserts that on-going staff development is critical for successful technology integration. And further, technology implementation into instruction will only increase with teacher training (Middleton, 1999). Findings from this study substantiate the connection that exists between staff development, and computer technology integration.

For example, only 26% of teachers reported frequently using computer technology to present lesson material, with only 32% reporting frequent use of computer applications to demonstrate specific concepts in class.

A third component addressed by this study was hardware and software support. Results from this study suggest that teachers do not receive adequate software and hardware support. For example, only 26% of respondents reported that their classroom computers were adequate for supporting development and use of instructional technology; yet research done by Becker, (as cited in Culp, Honey, & Spielvogel, 1999), states that computers belong in the classroom where teachers will find it easier to integrate computer activities with other instructional and learning activities. In addition, only 47% reported that they have access to instructional technology technical support at both the site and district levels.

In closing, results from this study suggest that because teachers did not have adequate staff development opportunities, nor receive adequate technical support, teachers were unable to consistently integrate computer technology into their curriculum. And further, findings from this study support the major research regarding the connection between staff development, software and

hardware support, and computer technology integration in the classroom.

Recommendations for Future Studies

The following recommendations resulting from the conclusion of this study are as follows.

1. A long-term (longitudinal) study would quite possibly assist in alleviating any possible inconsistencies resulting from tracking schedules within a year-round school district.
2. Selection and use of additional demographic data related to prior training and experience with instructional technology. This may assist in more accurately gauging self-assessed competencies in instructional technology.
3. A similar study, in a different location, or several locations to determine if findings are universally applicable, and consistent for different sample populations.
4. A more diverse sample population, including teachers from the junior high, and high school levels may serve to introduce variable factors not addressed in this study.

Summary

Chapter Five has served as a review of the purpose of the study, the research method and the findings of the study. Conclusions and a discussion of the conclusions were also presented. Lastly, the recommendations derived from the study were presented.

APPENDIX A

TECHNOLOGY SURVEY

TECHNOLOGY SURVEY

Instructional Technology at my School or District

1. I believe that the use of technology in the classroom can enhance student learning.
   Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

2. I believe that the use of technology in the classroom enhances student learning in my discipline or grade level.
   Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

3. I believe that email, listservs, and other forms of electronic communication are important tools in faculty/student communication.
   Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

4. I believe that web-based instructional materials enhance student learning
   Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

5. The school administration, staff, and support staff use and develop technology for instruction and support services.
   Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

6. I have the skills and knowledge required to use computer applications for presenting lesson (lecture) outlines.
   Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

7. I have the skills and knowledge required to use computer applications for demonstrating specific concepts in class.
   Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

8. I have the skills and knowledge required to communicate electronically with my students.
   Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

9. I have the skills and knowledge required to communicate electronically with my students.
   Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

10. I have adequate training opportunities at my school site (and/or district), to develop the technical skills required for instructional technology use and development.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

11. My classroom computer is adequate for supporting the development and use of instructional technology.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

12. I have access to instructional technology technical support at my school site and/or district.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

13. There are adequate opportunities at my school site for faculty release time for instructional technology development.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

14. I have sufficient time to develop and adapt course materials for the use of instructional technology.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

15. My district's technology center has the necessary facilities for the development and use of instructional technology.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

16. My school and/or district site promotes faculty development and use of instructional technology.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

17. Awards and/or incentives are offered to promote faculty use and development of instructional technology.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

18. It is important that my school site provides its faculty with master classrooms to facilitate the use of instructional technology.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology at my School or District

19. Special events held at my school site and/or within my school district enhance my knowledge and use of instructional technology.
    Scale 1 = Strongly Agree 2 = Agree 3 = Neutral 4 = Disagree 5 = Strongly Disagree

Instructional Technology Use And Effect

20. How often do you use computer applications to present lesson (lecture) material in class?
    A. Frequently
    B. Sometimes
    C. Rarely
    D. Never

Instructional Technology Use And Effect

21. How does your use of computer applications to present lesson content affect:

    Depth of content covered?
    A. Positively
    B. Not at all
    C. Negatively

Instructional Technology Use And Effect

22. How does your use of computer applications to present lesson content affect:

    Breadth of content covered?
    A. Positively
    B. Not at all
    C. Negatively

Instructional Technology Use And Effect

23. How does your use of computer applications to present lesson content affect:

    Your interaction with students?
    A. Positively
    B. Not at all
    C. Negatively

Instructional Technology Use And Effect

24. How does your use of computer applications to present lesson content affect:

    Student participation and feedback?
    A. Positively
    B. Not at all
    C. Negatively
    D. No response

Instructional Technology Use And Effect

25. How does your use of computer applications to present lesson content affect:

    Your expectation of student performance?
    A. Positively
    B. Not at all
    C. Negatively

Instructional Technology Use And Effect

26. How does your use of computer applications to present lesson content affect:

    Student performance?
    A. Positively
    B. Not at all
    C. Negatively

Instructional Technology Use And Effect

27. How often do you use computer applications to demonstrate specific concepts in class?
    A. Frequently
    B. Sometimes
    C. Rarely
    D. Never
28. How do you use of computer applications to demonstrate specific concepts affect:

    Depth of content covered?
    A. Positively
    B. Not at all
    C. Negatively

29. How does your use of computer applications to demonstrate specific concepts affect:

    Breadth of content covered?
    A. Positively
    B. Not at all
    C. Negatively
30. How does your use of computer applications to demonstrate specific concepts affect:

    Your interaction with students?
    A. Positively
    B. Not at all
    C. Negatively
31. How does your use of computer applications to demonstrate specific concepts affect:

    Student interaction with other students?
    A. Positively
    B. Not at all
    C. Negatively
32. How does your use of computer applications to demonstrate specific concepts affect:

    Student participation and feedback?
    A. Positively
    B. Not at all
    C. Negatively
33. How does your use of computer applications to demonstrate specific concepts affect:

    Your expectation of student performance?
    A. Positively
    B. Not at all
    C. Negatively
34. How does your use of computer applications to demonstrate specific concepts affect:

    Student performance?
    A. Positively
    B. Not at all
    C. Negatively
35. How often do you use audio/visual equipment (i.e., VCR's, laser disc players, slide projectors, and visual presenters) to display materials in class?
    A. Frequently
    B. Sometimes
    C. Rarely
    D. Never
36. How does your use of audio/visual equipment affect:

    Depth of content covered?
    A. Positively
    B. Not at all
    C. Negatively

37. How does your use of audio/visual equipment affect:

    Breadth of content covered?
    A. Positively
    B. Not at all
    C. Negatively
38. How does your use of audio/visual equipment affect:

    Your interaction with students?
    A. Positively
    B. Not at all
    C. Negatively
39. How does your use of audio/visual equipment affect:

    Student interaction with other students?
    A. Positively
    B. Not at all
    C. Negatively
40. How does your use of audio/visual equipment affect:

    Student participation and feedback?
    A. Positively
    B. Not at all
    C. Negatively
41. How does your use of audio/visual equipment affect:

    Your expectation of student performance?
    A. Positively
    B. Not at all
    C. Negatively
42. How does your use of audio/visual equipment affect:

    Student performance?
    A. Positively
    B. Not at all
    C. Negatively
43. How often do you encourage students to communicate electronically with you or others?
    A. Frequently
    B. Sometimes
    C. Rarely
    D. Never
44. How does your students' electronic communication with you or others affect:

    Depth of content covered?
    A. Positively
    B. Not at all
    C. Negatively
45. How does your students' electronic communication with you or others affect:

    Breadth of content covered?
    A. Positively
    B. Not at all
    C. Negatively

46. How does your students' electronic communication with you or others affect:

    Your interaction with students?
    A. Positively
    B. Not at all
    C. Negatively
47. How does your students' electronic communication with you or others affect:

    Student interaction with other students?
    A. Positively
    B. Not at all
    C. Negatively
48. How does your students' electronic communication with you or others affect:

    Student participation and feedback?
    A. Positively
    B. Not at all
    C. Negatively
49. How does your students' electronic communication with you or others affect:

    Your expectation of student performance?
    A. Positively
    B. Not at all
    C. Negatively
50. How does your students' electronic communication with you or others affect:

    Student performance?
    A. Positively
    B. Not at all
    C. Negatively
51. How often do you encourage students to use supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications outside of class?
    A. Frequently
    B. Sometimes
    C. Rarely
    D. Never
52. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect:

    Depth of content covered?
    A. Positively
    B. Not at all
    C. Negatively
53. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect:

    Breadth of content covered?
    A. Positively
    B. Not at all
    C. Negatively

54. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect:

    Your interaction with students?
    A. Positively
    B. Not at all
    C. Negatively
55. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect:

    Student interaction with other students?
    A. Positively
    B. Not at all
    C. Negatively
56. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect:

    Student participation and feedback?
    A. Positively
    B. Not at all
    C. Negatively
57. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect:

    Your expectation of student performance?
    A. Positively
    B. Not at all
    C. Negatively
58. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect:

    Student performance?
    A. Positively
    B. Not at all
    C. Negatively
59. How often do you encourage students to use a computer to complete assignments, create presentations, or develop web pages?
    A. Frequently
    B. Sometimes
    C. Rarely
    D. Never
60. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect:

    Depth of content covered?
    A. Positively
    B. Not at all
    C. Negatively

61. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect:

    Breadth of content covered?
    A. Positively
    B. Not at all
    C. Negatively
62. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect:

    Your interaction with students?
    A. Positively
    B. Not at all
    C. Negatively
63. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect:

    Student interaction with other students?
    A. Positively
    B. Not at all
    C. Negatively
64. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect:

    Student participation and feedback?
    A. Positively
    B. Not at all
    C. Negatively
65. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect:

    Your expectation of student performance?
    A. Positively
    B. Not at all
    C. Negatively
66. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect:

    Student performance?
    A. Positively
    B. Not at all
    C. Negatively
67. How does your use of instructional technology in general affect:

    Professional development?
    A. Positively
    B. Not at all
    C. Negatively

68. How does your use of instructional technology in general affect:

    Tenure and promotion?
    A. Positively
    B. Not at all
    C. Negatively
69. How does your use of instructional technology in general affect:

    Job satisfaction?
    A. Positively
    B. Not at all
    C. Negatively

Instructional Technology Projected Use

70. I will use computer applications to present lesson materials in class
    Scale 1 = Extremely Likely 2 = Likely 3 = Not Sure 4 = Unlikely 5 = Extremely Unlikely
71. I will use computer applications to demonstrate specific concepts in class
    Scale 1 = Extremely Likely 2 = Likely 3 = Not Sure 4 = Unlikely 5 = Extremely Unlikely
72. I will use audio/visual equipment such as VCRs, laser disc players, slide projectors, and visual presenters to display materials in class.
    Scale 1 = Extremely Likely 2 = Likely 3 = Not Sure 4 = Unlikely 5 = Extremely Unlikely
73. I will encourage students to communicate electronically with me, each other, or other people through electronic mail, web bulletin boards, listservs, discussion groups, or news groups.
    Scale 1 = Extremely Likely 2 = Likely 3 = Not Sure 4 = Unlikely 5 = Extremely Unlikely
74. I will encourage students to use supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications outside of class.
    Scale 1 = Extremely Likely 2 = Likely 3 = Not Sure 4 = Unlikely 5 = Extremely Unlikely
75. I will encourage students to use a computer to complete assignments, create presentations, or develop web pages.
    Scale 1 = Extremely Likely 2 = Likely 3 = Not Sure 4 = Unlikely 5 = Extremely Unlikely

Demographics and Comments

76. Enter your years in educations:
77. Enter your years at your present district:
78. Check your rank:
    A. Tenured teacher
    B. Untenured teacher
    C. Other
    D. Mentor/trainer
79. Have you received tenure at your present district?
    A. Yes
    B. No

80. Check your subject area:
    A. Language arts
    B. Math
    C. Social studies
    D. Science
    E. Computer lab
    F. Library/media center
    G. Support staff
    H. All subjects/self contained classroom
    I. No response
81. I believe that instructional technology is important:
    A. Yes
    B. No
82. Enter your grade level(s)
    A. K
    B. 1
    C. 2
    D. 3
    E. 4
    F. 5
    G. 6
    H. No response

APPENDIX B

PERMISSION TO USE TECHNOLOGY SURVEY

Date: Tue, 14 Jan 2003 17:02:45 -0600

From: "Barbara Draude" <bdraude@mtsu.edu>

To: "james lewis" <jgceclewis@yahoo.com>

Subject: Re: survey instruments

James:

You are more than welcome to use the tool. There are two "generations" of the tool described on the web site (http://www.mtsu.edu/~itsurvey).

The first one was done in 1998. With that tool, we piloted it first with a small group of faculty and students and did analysis to determine reliability and normality. Those statistics are in the slide show presented on the web site.

I would enjoy hearing how your project evolves.

Good luck.

Barbara

APPENDIX C

EXPLANATION SHEET

January 8, 2003

Dear: Principal/Vice Principal/Program Facilitator

I am requesting permission to conduct a (staff) survey at your school site for the purpose of gathering data in the area of instructional technology. I would like at least one teacher at each grade level (K-6) to participate in the survey. Please state the importance of each respondent answering all items as thoughtfully as possible. I will be using this information solely for the purpose of gathering data for a graduate project at California State University, San Bernardino. Personal identity of the respondents will remain confidential, and the data collected will be used solely for research purposes. Your assistance in this process is greatly appreciated. I will allow respondents approximately one week to complete the survey.

By signing this document, I give permission for the survey to be administered.

_____ _____

Name Position

APPENDIX D

SURVEY RESULTS

Technology Survey

Instructional Technology/School or District

1. I believe that the use of technology in the classroom can enhance student learning.

Rating	Value
Agree	1.7714

S. Agree	Agree	Neutral	Disagree	S. D.
27	32	11	0	0

Instructional Technology at xyz School or District

2. I believe that the use of technology in the classroom enhances student learning in my discipline or grade level.

Rating	Value
Agree	2.0000

S. Agree	Agree	Neutral	Disagree	S. D.
21	32	13	4	0

Instructional Technology at xyz School or District

3. I believe that email, listservs, and other forms of electronic communication are important tools in faculty/student communication.

Rating	Value
Agree	2.3824

S. Agree	Agree	Neutral	Disagree	S. D.
17	20	20	10	1

Instructional Technology at xyz School or District

4. I believe that web-based instructional materials enhance student learning

Rating	Value
Agree	2.3235

S. Agree	Agree	Neutral	Disagree	S. D.
11	28	25	4	0

Instructional Technology at xyz School or District

5. The school administration, staff, and support staff use and develop technology for instruction and support services.

Rating	Value
Neutral	3.2174

S. Agree	Agree	Neutral	Disagree	S. D.
1	17	23	22	6

Instructional Technology at xyz School or District

6. I have the skills and knowledge required to use computer applications for presenting lesson (lecture) outlines.

Rating	Value
Neutral	2.6912

S. Agree	Agree	Neutral	Disagree	S. D.
13	25	5	20	5

Instructional Technology at xyz School or District

7. I have the skills and knowledge required to use computer applications for demonstrating specific concepts in class.

Rating	Value
Neutral	2.6029

S. Agree	Agree	Neutral	Disagree	S. D.
11	29	8	16	4

Instructional Technology at xyz School or District

8. I have the skills and knowledge required to communicate electronically with my students.

Rating	Value
Agree	2.3043

S. Agree	Agree	Neutral	Disagree	S. D.
22	24	9	8	6

Instructional Technology at xyz School or District

9. I have the skills and knowledge required to communicate electronically with my students.

Rating	Value
Neutral	2.9559

S. Agree	Agree	Neutral	Disagree	S. D.
11	16	15	17	9

Instructional Technology at xyz School or District

10. I have adequate training opportunities at my school site (and/or district), to develop the technical skills required for instructional technology use and development.

Rating	Value
Neutral	3.0000

S. Agree	Agree	Neutral	Disagree	S. D.
5	21	19	17	7

Instructional Technology at xyz School or District

11. My classroom computer is adequate for supporting the development and use of instructional technology.

Rating	Value
Neutral	3.3478

S. Agree	Agree	Neutral	Disagree	S. D.
4	14	16	24	11

Instructional Technology at xyz School or District

12. I have access to instructional technology technical support at my school site and/or district.

Rating	Value
Neutral	2.7246

S. Agree	Agree	Neutral	Disagree	S. D.
9	24	19	11	6

Instructional Technology at xyz School or District

13. There are adequate opportunities at my school site for faculty release time for instructional technology development.

Rating	Value
Disagree	4.0735

S. Agree	Agree	Neutral	Disagree	S. D.
1	1	17	22	27

Instructional Technology at xyz School or District

14. I have sufficient time to develop and adapt course materials for the use of instructional technology.

Rating	Value
Disagree	4.2899

S. Agree	Agree	Neutral	Disagree	S. D.
0	1	11	24	33

Instructional Technology at xyz School or District

15. My district's technology center has the necessary facilities for the development and use of instructional technology.

Rating	Value
Neutral	2.6029

S. Agree	Agree	Neutral	Disagree	S. D.
7	22	32	5	2

Instructional Technology at xyz School or District

16. My school and/or district site promotes faculty development and use of instructional technology.

Rating	Value
Neutral	2.8857

S. Agree	Agree	Neutral	Disagree	S. D.
2	25	27	11	5

Instructional Technology at xyz School or District

17. Awards and/or incentives are offered to promote faculty use and development of instructional technology.

Rating	Value
Disagree	4.4286

S. Agree	Agree	Neutral	Disagree	S. D.
0	0	5	30	35

Instructional Technology at xyz School or District

18. It is important that my school site provides its faculty with master classrooms to facilitate the use of instructional technology.

Rating	Value
Neutral	2.6812

S. Agree	Agree	Neutral	Disagree	S. D.
12	21	19	11	6

Instructional Technology at xyz School or District

19. Special events held at my school site and/or within my school district enhance my knowledge and use of instructional technology.

Rating	Value
Disagree	3.7143

S. Agree	Agree	Neutral	Disagree	S. D.
3	3	21	27	16

Instructional Technology Use And Effect

20. How often do you use computer applications to present lesson (lecture) material in class?

	Count	Percentage
A. Frequently	4	6%
B. Sometimes	14	20%
C. Rarely	23	33%
D. Never	28	41%

Instructional Technology Use And Effect

21. How does your use of computer applications to present lesson content affect: depth of content covered

	Count	Percentage
A. Positively	31	79%
B. Not at all	7	18%
C. Negatively	1	3%

Instructional Technology Use And Effect

22. How does your use of computer applications to present lesson content affect: breadth of content covered

	Count	Percentage
A. Positively	29	74%
B. Not at all	9	23%
C. Negatively	1	3%

Instructional Technology Use And Effect

23. How does your use of computer applications to present lesson content affect: your interaction with students

	Count	Percentage
A. Positively	27	69%
B. Not at all	10	26%
C. Negatively	2	5%

Instructional Technology Use And Effect

24. How does your use of computer applications to present lesson content affect: student participation and feedback

	Count	Percentage
A. Positively	27	69%
B. Not at all	12	31%
C. Negatively	0	0%
D. No response	0	0%

Instructional Technology Use And Effect

25. How does your use of computer applications to present lesson content affect: your expectation of student performance

	Count	Percentage
A. Positively	26	67%
B. Not at all	13	33%
C. Negatively	0	0%

Instructional Technology Use And Effect

26. How does your use of computer applications to present lesson content affect: student performance

	Count	Percentage
A. Positively	26	67%
B. Not at all	13	33%
C. Negatively	0	0%

Instructional Technology Use And Effect

27. How often do you use computer applications to demonstrate specific concepts in class?

	Count	Percentage
A. Frequently	4	6%
B. Sometimes	18	26%
C. Rarely	17	25%
D. Never	30	43%

28. How do you use of computer applications to demonstrate specific concepts affect: depth of content covered?

	Count	Percentage
A. Positively	32	76%
B. Not at all	9	21%
C. Negatively	1	2%

29. How does your use of computer applications to demonstrate specific concepts affect: breadth of content covered?

	Count	Percentage
A. Positively	31	74%
B. Not at all	10	24%
C. Negatively	1	2%

30. How do you use of computer applications to demonstrate specific concepts affect: your interaction with students?

	Count	Percentage
A. Positively	30	71%
B. Not at all	11	26%
C. Negatively	1	2%

31. How do you use of computer applications to demonstrate specific concepts affect: student interaction with other students?

	Count	Percentage
A. Positively	29	69%
B. Not at all	13	31%
C. Negatively	0	0%

32. How does your use of computer applications to demonstrate specific concepts affect: student participation and feedback?

	Count	Percentage
A. Positively	30	71%
B. Not at all	12	29%
C. Negatively	0	0%

33. How do you use of computer applications to demonstrate specific concepts affect: your expectation of student performance?

	Count	Percentage
A. Positively	26	62%
B. Not at all	16	38%
C. Negatively	0	0%

34. How does your use of computer applications to demonstrate specific concepts affect: student performance?

	Count	Percentage
A. Positively	29	69%
B. Not at all	13	31%
C. Negatively	0	0%

35. How often do you use audio/visual equipment (i.e., VCR's, laser disc players, slide projectors, and visual presenters) to display materials in class?

	Count	Percentage
A. Frequently	26	37%
B. Sometimes	22	31%
C. Rarely	12	17%
D. Never	10	14%

36. How does your use of audio/visual equipment affect: depth of content covered?

	Count	Percentage
A. Positively	56	92%
B. Not at all	5	8%
C. Negatively	0	0%

37. How does your use of audio/visual equipment affect: breadth of content covered?

	Count	Percentage
A. Positively	53	87%
B. Not at all	7	11%
C. Negatively	1	2%

38. How does your use of audio/visual equipment affect: your interaction with students?

	Count	Percentage
A. Positively	51	84%
B. Not at all	10	16%
C. Negatively	0	0%

39. How does your use of audio/visual equipment affect: student interaction with other students?

	Count	Percentage
A. Positively	40	67%
B. Not at all	20	33%
C. Negatively	0	0%

40. How does your use of audio/visual equipment affect: student participation and feedback?

	Count	Percentage
A. Positively	53	87%
B. Not at all	8	13%
C. Negatively	0	0%

41. How does your use of audio/visual equipment affect: your expectation of student performance?

	Count	Percentage
A. Positively	50	82%
B. Not at all	11	18%
C. Negatively	0	0%

42. How does your use of audio/visual equipment affect: student performance?

	Count	Percentage
A. Positively	53	87%
B. Not at all	8	13%
C. Negatively	0	0%

43. How often do you encourage students to communicate electronically with you or others?

	Count	Percentage
A. Frequently	0	0%
B. Sometimes	3	4%
C. Rarely	2	3%
D. Never	65	93%

44. How does your students' electronic communication with you or others affect:

depth of content covered?

	Count	Percentage
A. Positively	1	7%
B. Not at all	12	86%
C. Negatively	1	7%

45. How does your students' electronic communication with you or others affect:

breadth of content covered?

	Count	Percentage
A. Positively	2	14%
B. Not at all	11	79%
C. Negatively	1	7%

46. How does your students' electronic communication with you or others affect:

your interaction with students?

	Count	Percentage
A. Positively	3	21%
B. Not at all	10	71%
C. Negatively	1	7%

47. How does your students' electronic communication with you or others affect:

student interaction with other students?

	Count	Percentage
A. Positively	4	29%
B. Not at all	9	64%
C. Negatively	1	7%

48. How does your students' electronic communication with you or others affect:

student participation and feedback?

	Count	Percentage
A. Positively	2	14%
B. Not at all	11	79%
C. Negatively	1	7%

49. How does your students' electronic communication with you or others affect:

your expectation of student performance?

	Count	Percentage
A. Positively	4	29%
B. Not at all	9	64%
C. Negatively	1	7%

50. How does your students' electronic communication with you or others affect:

student performance?

	Count	Percentage
A. Positively	3	21%
B. Not at all	10	71%
C. Negatively	1	7%

51. How often do you encourage students to use supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications outside of class?

	Count	Percentage
A. Frequently	5	7%
B. Sometimes	16	23%
C. Rarely	13	19%
D. Never	35	51%

52. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect: depth of content covered

	Count	Percentage
A. Positively	26	63%
B. Not at all	15	37%
C. Negatively	0	0%

53. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect: breadth of content covered

	Count	Percentage
A. Positively	25	61%
B. Not at all	16	39%
C. Negatively	0	0%

54. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect: your interaction with students

	Count	Percentage
A. Positively	22	54%
B. Not at all	19	46%
C. Negatively	0	0%

55. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect: student interaction with other students

	Count	Percentage
A. Positively	21	51%
B. Not at all	20	49%
C. Negatively	0	0%

56. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect: student participation and feedback

	Count	Percentage
A. Positively	24	62%
B. Not at all	15	38%
C. Negatively	0	0%

57. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect: your expectation of student performance

	Count	Percentage
A. Positively	21	54%
B. Not at all	18	46%
C. Negatively	0	0%

58. How does your students' use of supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications affect: student performance

	Count	Percentage
A. Positively	23	59%
B. Not at all	16	41%
C. Negatively	0	0%

59. How often do you encourage students to use a computer to complete assignments, create presentations, or develop web pages?

	Count	Percentage
A. Frequently	2	3%
B. Sometimes	18	26%
C. Rarely	13	19%
D. Never	37	53%

60. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect: depth of content covered?

	Count	Percentage
A. Positively	25	66%
B. Not at all	13	34%
C. Negatively	0	0%

61. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect: breadth of content covered?

	Count	Percentage
A. Positively	25	66%
B. Not at all	12	32%
C. Negatively	1	3%

62. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect: your interaction with students?

	Count	Percentage
A. Positively	19	50%
B. Not at all	19	50%
C. Negatively	0	0%

63. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect: student interaction with other students?

	Count	Percentage
A. Positively	22	59%
B. Not at all	15	41%
C. Negatively	0	0%

64. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect: student participation and feedback?

	Count	Percentage
A. Positively	23	66%
B. Not at all	11	31%
C. Negatively	1	3%

65. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect: your expectation of student performance?

	Count	Percentage
A. Positively	25	69%
B. Not at all	10	28%
C. Negatively	1	3%

66. How does your students' use of a computer to complete assignments, create presentations, or develop web pages affect: student performance?

	Count	Percentage
A. Positively	25	68%
B. Not at all	11	30%
C. Negatively	1	3%

67. How does your use of instructional technology in general affect: professional development?

	Count	Percentage
A. Positively	48	74%
B. Not at all	17	26%
C. Negatively	0	0%

68. How does your use of instructional technology in general affect: tenure and promotion?

	Count	Percentage
A. Positively	13	20%
B. Not at all	52	80%
C. Negatively	0	0%

69. How does your use of instructional technology in general affect: job satisfaction?

	Count	Percentage
A. Positively	31	58%
B. Not at all	22	42%
C. Negatively	0	0%

Instructional Technology Projected Use

70. I will use computer applications to present lesson materials in class

Rating	Value
Not Sure	2.8986

Ex.Li.	Likely	N. S.	Un.	Ex.Un.
13	17	16	10	13

71. I will use computer applications to demonstrate specific concepts in class

Rating	Value
Not Sure	2.8286

Ex.Li.	Likely	N. S.	Un.	Ex.Un.
11	24	13	10	12

72. I will use audio/visual equipment such as VCRs, laser disc players, slide projectors, and visual presenters to display materials in class.

Rating	Value
Likely	1.7857

Ex.Li.	Likely	N. S.	Un.	Ex.Un.
42	15	5	2	6

73. I will encourage students to communicate electronically with me, each other, or other people through electronic mail, web bulletin boards, listservs, discussion groups, or news groups.

Rating	Value
Unlikely	3.9286

Ex.Li.	Likely	N. S.	Un.	Ex.Un.
3	8	13	13	33

74. I will encourage students to use supplementary materials such as web pages, computer-assisted instruction modules, or other computer-based applications outside of class.

Rating	Value
Not Sure	3.0571

Ex.Li.	Likely	N. S.	Un.	Ex.Un.
9	22	12	10	17

75. I will encourage students to use a computer to complete assignments, create presentations, or develop web pages.

Rating	Value
Not Sure	2.9420

Ex.Li.	Likely	N. S.	Un.	Ex.Un.
9	25	12	7	16

Demographics and Comments

76. Enter your years in education:

Most Common Responses	Count	Percentage
10	6	9%
7	6	9%
5	5	7%
4	5	7%
3	5	7%
6	4	6%
12	4	6%
14	3	4%
15	3	4%
Other Responses	27	40%

77. Enter your years at your present district:

Most Common Responses	Count	Percentage
7	8	12%
1	8	12%
3	7	10%
2	6	9%
10	6	9%
6	4	6%
14	4	6%
4	4	6%
20	3	4%
Other Responses	19	28%

78. Check your rank:

	Count	Percentage
A. Tenured teacher	47	69%
B. Untenured teacher	18	26%
C. Other	3	4%
D. Mentor/trainer	0	0%

79. Have you received tenure at your present district?

	Count	Percentage
A. Yes	47	69%
B. No	21	31%

80. Check your subject area:

	Count	Count Percentage	Respondent Percentage
A. Language arts	0	0%	0%
B. Math	0	0%	0%
C. Social studies	0	0%	0%
D. Science	0	0%	0%
E. Computer lab	0	0%	0%
F. Library/media center	0	0%	0%
G. Support staff	0	0%	0%
H. All subjects/self contained classroom	68	100%	100%
I. No response	0	0%	0%

81. I believe that instructional technology is important:

	Count	Percentage
A. Yes	53	90%
B. No	6	10%

82. Enter your grade level(s)

	Count	Count Percentage	Respondent Percentage
A. K	1	1%	1%
B. 1	11	15%	16%
C. 2	11	15%	16%
D. 3	12	16%	18%
E. 4	12	16%	18%
F. 5	13	18%	19%
G. 6	12	16%	18%
H. No response	2	3%	3%

APPENDIX E

TABLE ONE

Table One

Experience Distribution

	n	%
0-5 Years	14	21.9
6-10 Years	18	28.1
11-15 Years	14	21.9
16-20 Years	5	7.8
21+ Years	13	20.3
Total	64	100.0

APPENDIX F

TABLE TWO

Table Two

Rank Distribution

	n	%
Tenured Teacher	47	68.1
Untenured Teacher	18	26.1
Mentor/Trainer	0	0.0
Other	4	5.8
Total	69	100.0

APPENDIX G

TABLE THREE

Table Three

Grade-level Distribution

	n	%
K	1	1.4
1	11	14.9
2	11	14.9
3	12	16.2
4	12	16.2
5	13	17.6
6	12	16.2
No Response	2	2.6
Total	74	100.0

APPENDIX H

TABLE FOUR

Table Four

Technology Survey
Crosstabulation

Cross-Tabulation of Question # 2 and Question # 82

2. I believe that the use of technology in the classroom enhances student learning in my discipline or grade level.

A. Strongly Agree
B. Agree
C. Neutral
D. Disagree
E. Strongly Disagree

82. Enter your grade level.

	Question # 2 Choices					
Question #82 Choices	A	B	C	D	E	Total
1. K	0%	0%	7.69%	0.000%	0.000%	1
2. 1	9.091%	5.714%	38.462%	50.000%	0.000%	11
3. 2	9.091%	17.143%	23.077%	0.000%	0.000%	11
4. 3	18.182%	11.429%	23.077%	25.000%	0.000%	12
5. 4	18.182%	22.857%	0.000%	0.000%	0.000%	12
6. 5	18.182%	22.857%	0.000%	25.000%	0.000%	13
7. 6	18.182%	20.000%	7.692%	0.000%	0.000%	12
8. No response	9.091%	0%	0.000%	0.000%	0.000%	2
Totals	22	35	13	4	0	74

APPENDIX I

TABLE FIVE

Table Five

Technology Survey
Crosstabulation

Cross-Tabulation of Question # 7 and Question # 10

Question # 7

I have the skills and knowledge required to use computer applications for demonstrating specific concepts in class.

.

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Question # 10

I have adequate training opportunities at my school site (and/or district), to develop the technical skills required for instructional technology use and development.

A. Strongly Agree
B. Agree
C. Neutral
D. Disagree
E. Strongly Disagree

	Question # 10 Choices					
Question #7 Choices	A	B	C	D	E	Total
Strongly Agree	20.000%	23.810%	15.789%	6.250%	14.286%	11
Agree	60.000%	33.333%	42.105%	43.750%	57.143%	29
Neutral	20.000%	14.286%	0.000%	18.750%	14.286%	8
Disagree	0.000%	14.286%	36.842%	31.250%	14.286%	16
Strongly Disagree	0.000%	14.286%	5.263%	0.000%	0.000%	4
Totals	5	21	19	16	7	68

APPENDIX J

TABLE SIX

Table Six

Technology Survey
Crosstabulation

Cross-Tabulation of Question # 2 and Question # 20

Question # 2

I believe that the use of technology in the classroom enhances student learning in my discipline or grade level.

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

.

Question # 20
How often do you use computer applications to present lesson (lecture) material in class?

A. Frequently
B. Sometimes
C. Rarely
D. Never

	Question # 20 Choices				
Question #2 Choices	A	B	C	D	Total
Strongly Agree	50.000%	42.857%	39.130%	14.286%	21
Agree	50.000%	57.143%	43.478%	39.286%	31
Neutral	0.000%	0.000%	13.043%	35.714%	13
Disagree	0.000%	0.000%	4.348%	10.714%	4
Strongly Disagree	0.000%	0.000%	0.000%	0.000%	0
Totals	4	14	23	28	69

APPENDIX K

TABLE SEVEN

Table Seven

Technology Survey
Crosstabulation

Cross-Tabulation for Question # 1 and Question # 35

Question # 1

I believe that the use of technology in the classroom can enhance student learning.

1. Strongly Agree
2. Agree
3. Neutral
4. Disagree
5. Strongly Disagree

Question # 35
How often do you use audio/visual equipment (i.e., VCR's, laser disc players, slide projectors, and visual presenters) to display materials in class?

A. Frequently
B. Sometimes
C. Rarely
D. Never
Totals

	Question # 35 Choices				
Question #1 Choices	A	B	C	D	Total
Strongly Agree	42.308%	40.909%	41.667%	20.000%	27
Agree	38.462%	45.455%	50.000%	60.000%	32
Neutral	19.231%	13.636%	8.333%	20.000%	11
Disagree	0.000%	0.000%	0.000%	0.000%	0
Strongly Disagree	0.000%	0.000%	0.000%	0.000%	0
Totals	26	22	12	10	70

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