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COMPUTER USE AND INTEGRATION OF

MIDDLE SCHOOL TEACHERS

by
Susan Panco Medio

A Thesis

Submitted in partial fulfillment of the requirements of the
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Professor

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ABSTRACT

Susan P. Medio
Computer Use and Integration of Middle School Teachers
2004/05
Dr. Louis Molinari, Advisor
Educational Technology

The problem in this study asks: Could it be that teachers who have high

integration of computer use have different identifiable characteristics than teachers that

have a low integration of computer use?

A data collection instrument was developed and distributed to 56 teachers

at Landis Intermediate School in Vineland, New Jersey. The 20 questions on the survey

that pertained to computer use and integration were assessed and a score was given to

each subject. These scores were used to run independent sample t tests.

As a result of this study it was found that teachers that have a high computer use

and integration score have the following characteristics: under 30 years of age, less than

10 years of teaching experience, and first used computers during elementary or high

school. Those teachers with high use and integration scores also believed that college

and or professional development had prepared them to use computers.

Since the null hypothesis stated that there would be no significant difference in

the characteristics of those teachers who have high integration scores with those who

have low integration scores, the null hypothesis was rejected.

Acknowledgments

I would like to thank my family and friends that have supported me in my efforts to reach my goals. Thank you to my children and my husband Eugene for editing my work. Thank you to my son Steven for his continual encouragement. This project has taken many years to reach fulfillment. Many hours of dedication and commitment have taken away from other activities. My family and my friends have been very patient.

To all of my fellow seminar friends I owe special thanks for all of their support along the way. Having them to share the trials and tribulations of writing this thesis made it possible. Finally, thank you to my advisor, Dr. Molinari for the many hours of consultation, the suggestions and encouragement.

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Chapter 1

Significance of the Study

Students must be technology literate by the end of the eighth grade according to the No Child Left Behind Act. The International Society for Technology in Education has developed National Educational Technology Standards which have been adopted, adapted, aligned with or referenced in 49 states. Both of these documents list requirements that both teachers and students must follow in regard to the use of technology, specifically computers in the classroom. This is proof that technology in Education is here to stay. It is now imperative that teachers be provided with proper training in order to carry out these requirements.

If we are going to prepare our teachers to implement these new requirements we must determine what methods are the most successful. There is a body of research available regarding the use of computers in classrooms. As noted by Cats and McNaull (1993) by observing schools, it is obvious that some teachers use computers with their students and others do not. It is now necessary to determine why this is true. Previous research has focused mainly on how teachers use computers. This is important as a base but it has become necessary to extend the research to find out which teachers are using computers and what prompts them to do so in order to direct future teacher training effectively. Marcinkiewics (as cited in Ertmer, Addison, Lane, Ross & Woods, 1999)

states that "to understand how to achieve integration we need to study teachers and what makes them use computers" (p.234)

In the early 1970's computers appeared in some classrooms (Wilson, as cited in Piotrowski, 1992). In the later part of the 1970's microcomputers were introduced and began to make significant contributions to the learning environment. According to Ordovensky (as cited in Liu & Reed, 1992), 91% of schools had computers in 1988. By 1992 teachers were still only using computers on a limited basis (Piotrowski). Since then computers have played an increasing role in education (Guha, 2000). This increase has made it necessary for teachers to become knowledgeable about technology in order to teach their students (Piotrowski). Effective teacher training will provide teachers with the ability to use technology themselves as well as to integrate technology into their classrooms.

When computers first appeared in schools most teachers did not have a specialized background. They had to discover on their own the best way to utilize the computer. With rather limited exposure teachers attempted to incorporate the computer into their classroom routine. At first teachers used the computer for record keeping and other organizational tasks.

Although many teachers found ways to use the computer to enhance their classroom organization very little was known about incorporating computers into the curriculum. If teachers did not choose to incorporate the computer into their daily routine no one complained and the teacher's effectiveness was not questioned. However the demands placed on computer use in classrooms increased and many teachers found

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themselves without the necessary training to implement the computer into the learning environment.

School districts responded in a variety of ways. They provided workshops and the like when the need arose. There were very few systematic approaches to helping teachers find the best way to integrate the computer into the curriculum. In fact many of the districts' budgets did not reflect the training aspect of teachers when considering their technology budget. Spending money on purchasing the equipment was the extent of their concern for technology. Teachers were left on their own to find effective ways to use computers in their classrooms.

As technology has come to the forefront in education through the requirements of the No Child Left Behind Act, school districts are being forced to include teacher training into their budgets. Research is showing that not only is it necessary to provide adequate training but it is also important to include continuing technology support. Since budgeting money for technology training and support can be very expensive it will be beneficial to first determine what types of training will be most efficient and therefore the most cost effective.

Due to the fact that computers have been in classrooms for well over 2 decades in one way or another, teachers have a very broad and varied base of knowledge about computer implementation. As more teachers enter the field of education with computer experience and degrees of knowledge it becomes more important than ever before to evaluate the technology needs not only of our students but of our teachers as well. The many levels of computer knowledge and experience makes it more difficult to plan and direct effective teacher training. We must find out what makes some teachers implement

technology and not others. School districts would be wise to determine what type of training or experiences show the best results.

Researchers support the continuing need to find the best ways of training teachers (Reed, 2002). It has been shown that teachers use computers more as their level of training increases, especially when the training is specific to their needs. We know that in the classroom one approach won't meet the needs of all, that students learn at different rates, and that abilities are likely to be all over the spectrum. Staff development is no different (Wolinsky, 1999). We've worked to adjust methods for our students and the way they acquire knowledge, we haven't done the same for educators, the very people who are responsible for teaching our students (Marsh, 2002). Teacher training must address the specific needs of the teachers. We must consider attitudes towards computers, experience with computers, types of training, length of teaching experience and educational background. The more effective programs survey teachers' needs and develop training sessions around these topics (Alden, 1989).

It is important that all teachers have the skills necessary to implement technology into their classrooms. If a teacher's experience with using computers is associated with their amount of classroom integration then we should attempt to provide similar experiences for all of our teachers. Today's younger teachers may have structures that have been developed due to early use of computers. For this reason it is likely that the training best suited to their needs will be very different from that of teachers that have not used computers at an early age and therefore do not have the same mental structures. At the same time their experience in using computers may have been limited to personal use and they may not have had any practice or training in integrating technology in a

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classroom. It is difficult for a new teacher to feel comfortable teaching with technology without first witnessing examples of its use (Honey & Moeller, 1997). This can present a serious challenge for new teachers who are hired with the expectation that they will know a fair amount about technology (Ponsessa, 1996). New teachers may enter the profession eager to utilize technology but without the knowledge of how to integrate technology into the curriculum in an effect manner. This is another reason that we must determine what makes some teachers implement computers in their classrooms. Schools may be taking for granted the fact that teachers know and understand computers and assume that this knowledge will automatically translate into classroom integration.

If a teacher's attitude toward computers contributes to the degree of classroom integration then we should attempt to determine a way to improve all teachers' attitudes. Many teachers that have been in education during the initial integration of computers may have developed negative attitudes towards the use of technology. Since there was very little direction during the initial years of computer integration and teachers were expected to find their own ways to use the computer they may have been very frustrated. It is possible that this frustration has led to a less then positive attitude toward computers. School districts that are aware of this may be able to offer these teachers the necessary support to foster a more positive attitude. Once again, it is important to determine if a teacher's attitude has any effect on the degree that they implement computers into the curriculum.

The type of training that a teacher has had may be another factor in the way in which computers are integrated in the classroom. If taking college courses offers what is needed for a higher degree of implementation then school districts should budget the

money necessary to finance this type of training. Research has shown that successful training offers more than a one time session. Taking college courses will offer an ongoing source of training over a longer period of time. District in-service training may be worthwhile if additional support is offered after the initial training. Finding out the types of training that teachers have had will help to establish connections between the training and the classroom integration.

With all of the available research it is apparent that there are still many questions regarding the appropriate way to train educators in the use of technology. It is evident that new teachers enter the field with varying degrees of computer knowledge and practice. It is also evident that teachers have had their own experiences with training and staff development. If we are to find the best way to meet the needs of each teacher and offer necessary training in order that students will meet the requirements of the No Child Left Behind Act as well as NETS we must first learn more about our teachers. We must find out what they already know and what they do not know. We must determine if they understand the use of computers to implement curriculum. If we are to offer training that will be useful we must first find out which teachers use computers in their classroom, how they use computers and why. It is necessary to find out what type of training they have had, what experiences they have had using computers, how much teaching experience they have had and what their general attitude is regarding the use of computers. We need to know if any one of these factors might affect the way in which they implement technology into the curriculum.

Summary of Chapter One

For over two decades computers have been used in schools. Technology is now permanently engrained within the educational process due to Federal and State regulations. No Child Left Behind has played a major role in continuing the need for technology in schools. It is necessary to provide all of our teachers with the proper training in order to ensure that our students will meet these mandates.

Training teachers to use computers was once a very simple process. Today's training is much more complex. We must take into account what types of training teachers have had as well as their attitudes about computers. We must consider their experience both with computers and in the teaching field. In order to make teacher training successful we must first determine the needs of our teachers.

Statement of the Problem

Could it be that teachers who have high integration of computer use have different identifiable characteristics than teachers that have a low integration of computer use?

Purpose of the Study

The purpose of the study was to determine what, if any, correlation exists between the characteristics of teachers that have a high integration of computer use and the teachers that have a low integration of computer use.

Hypothesis

There will be no significant difference in the characteristics of those teachers who have high integration of computers in their classrooms and those who have low integration as determined by the Medio Technology Survey prepared by the researcher specifically for this purpose.

Method of the Study

A survey questionnaire was developed and used as the data collection instrument. The survey included questions regarding the ways teachers were currently using computers in their classrooms as well as background information regarding teachers past experiences with computers and the types of training they have had. This survey was distributed to all of the teachers at Landis Intermediate School, completed individually and returned to the researcher. All surveys were anonymous. The data was then reviewed, analyzed, studied and interpreted.

Limits of the Study

This study was conducted at one middle school. For this reason it is possible that the attitudes of the administration have affected the participants. Since some teachers have been working under this administration for a longer period of time, they may have been affected differently. The principal has been in his position for the past 7 years and the vice principal has only been there for 5 months.

Another limitation of this study was access to computers. Although all classrooms have a minimum of 2 computers there are others that have 3 or more. Although many teachers make use of whatever they have available it may certainly be possible that teachers with a greater number of computers available will use their computers differently with their students than those that only have 2 computers available.

This study was limited to the use of computers in the classroom. Other types of technology were not included.

Definition of Terms

DOE – Department of Education

Integration – In reference to computers this means incorporating computers into the classroom in a meaningful way.

ISTE – International Society for Technology in Education is a not-for-profit organization dedicated to supporting the use of information technology to aid in learning, and teaching of K-12 students and teachers.

MAN – A metropolitan area network is a large computer network usually spanning a campus or a city.

National Educational Technology Plan – This is the United States vision of what is needed to prepare the nation's students for the effective use of technology in elementary and secondary education.

NCATE – National Council for the Accreditation of Teacher Education. This is the professional accrediting organization for schools, colleges, and departments of education in the United States.

NCLB – No Child Left Behind. This is the common term used to describe the revised Elementary and Secondary Education Act, which is a blend of requirements, incentives and resources for states in the United States.

NETS – National Education Technology Standards. Provides educators with criteria to use and factors to consider for better implementation of technology in public education in the United States.

New Jersey Technology Standards – These have been developed to assure that all students are computer literate.

TSSA – Technology Standards for School Administrators

Chapter 2

Review of the Literature

The No Child Left Behind Act, signed into law in January 2002 is the latest reauthorization of the 1985 Elementary and Secondary Education Act. The revised law includes the requirement that all students must be technology literate by the end of the eighth grade. In June of 1998 the National Education Technology Standards (NETS) for students were released. In June 2000 NETS for teachers were released followed by NETS for Administrators (TSSA) in November 2001. As of May 2004, 49 of the 51 states (including the District of Columbia) have adopted, adapted, aligned with, or otherwise referenced at least one set of these standards. In January of 2005 former Secretary of Education Rod Paige officially presented to Congress the new National Education Technology Plan. This plan establishes a national vision and strategy that supports effective use of technology. All of these initiatives point to the fact that the educational system is now required to implement technology. There is no longer an opportunity for schools to choose to use technology. These requirements are part of a national vision to improve student academic achievement and to prepare students for the 21st century.

With these new challenges now facing the educational system schools and teachers will be looking for ways to implement technology into the curriculum. One of the major focuses must be on training teachers so they will be able to meet these

requirements. Training opportunities enable teachers to build skills and confidence and learn strategies to integrate computers into their curriculum. It is necessary for teachers to become knowledgeable about technology in order to teach their students (Piotrowski, 1992).

A review of the literature indicates that there are many techniques that are available to train teachers in the use of technology. University coursework, in service training, workshops and self directed learning are some of the training that have been considered. Research supports the continuing need to find the best ways of training teachers (Reed, 2002). Early in-service focused on learning about computers as opposed to learning to use them as teaching tools (Hasselbring, as cited in Piotrowski, 1992). Guha (2000) indicates that there is a continuing need for teacher computer training. He noted that the emphasis of teacher training should be on using computers for student performance improvement. Although teachers know the importance of the Internet and other forms of information technology, many have yet to completely understand how it relates to the quality of teaching (Kotrlik, Harrison, & Redmann, 2000).

One type of training that has been looked at is University Coursework. One particular study focused on teachers who had received one course in technology education as undergraduates (Kirkwood, 2001). All of the subjects in the study were required to take a 2-credit course in their elementary education program and had since been teaching for 3 years. The purpose of the study was to identify any connection to implementation of technology in the classroom and having taken a college level technology course. A survey instrument was administered. Results indicated that 73% of the subjects felt that the course they had taken was the most influential factor in their

current use of technology. The researchers noted that considering such a high number of teachers found coursework to be a significant factor it was disappointing that very few colleges or universities require coursework for elementary education undergraduates.

A second study that supported university coursework as being a significant factor in teachers' utilization of computers was done in 1993 by Ward Cates and Patricia McNaull. This study looked at seventh and eighth grade teachers to find out what role coursework played in determining computer use in their classrooms. It was determined that those teachers who had completed more than three credit hours of university coursework were at a distinct advantage. Those respondents who had three or fewer credit hours appeared to have the greatest difficulty in seeing how to use the computer and did so less often. One significant finding in this study was that when teachers had a high level of both university coursework and in service training combined they had the highest use of computers in their classrooms. This led the researchers to conclude that coursework along with in service training appeared to be the best combination. They did however express the reservation that this generalization did not take into account the attitude of those teachers towards computers. They stated that this study could not determine if the teachers who had the highest level of both coursework and training did so because they also had the highest level of interest.

Teacher in service training and workshops were the focus of a 1999 study by Rosemary Reichstetter. The study compared the type of training received by Middle School teachers to classroom computer use. Eleven specific areas of computer training were studied, these were: word processing, desktop publishing, graphics, multimedia, spreadsheets, databases, telecommunications, Internet, web page design, programming

language and subject-specific software. At least four hours of formal instruction were considered one training session. The results of the study showed that the frequency of computer use was significantly related to the amount of training received. The most frequently used were word-processing and subject-specific software followed by Internet, multimedia and desktop publishing. The least used were Web Page design and programming language.

Delivery of training was also considered as a component of the study (Reichstetter, 2000). Included were: presentation of theory, demonstration and modeling of use, coaching and feedback on use, and practice. The results showed that both demonstration/modeling of uses by the trainer and practice showed the most significant correlation to high reported use. This finding clearly shows that how the training is presented is also an important factor in determining how successful the integration will be.

Research indicates that the two most significant components of in service training or workshops is the amount of time spent on the training and the amount of follow up support available. We can not send teachers to a one day workshop and expect them to return to the classroom and know all about computers (Piotrowski, 1992). Professional development is not a one-time event. Glen and Carrier (as cited in Cates & McNaull, 1993) found that school districts tend to offer one-time in-service approaches to cover the fundamentals of computer use but do not provide follow-up support. It is important that support be available. Teachers use of computers increased based upon the presence of an on-site technology coordinator (Reichstetter, 2000). It is also clear that workshops that meet for more than one session, such as those scheduled for several meetings over the

course of a month are more likely to produce positive results then workshops that meet for one 2 hour session. Completing two separate in-service training sessions on the same topic is significantly more effective in helping teachers use computers than completing a single service session (Driscoll, as cited in Cates & McNaull, 1993). It is not reasonable to send teachers to a one day workshop and expect them to return to their classrooms and function without any further support (Piotrowski). As the literature clearly shows, teacher training must include follow up sessions and/or on site support personnel to be the most effective.

Many teachers have learned to use computers through self directed learning. Reading manuals, using on-line tutorials and personal experience are ways that many educators have learned about technology. Although the research has shown that university coursework greatly improves teachers' computer use, less than one quarter of teachers studied indicated any university or college training (Kotrlik, Harrison & Redmann, 2000). Almost 60% of the respondents indicated that self-directed learning including information booklets and training manuals was their source for computer training. A majority of teachers are self-taught in the area of computer skills (Pomeroy as cited in Kotrlik, et al.). This provides further indication that there is a need to increase teacher training.

Research indicates that many barriers exist that keep teachers from implementing technology. These barriers make it difficult to research which methods of training are the most useful, why some teachers use computers, and why others do not. These barriers may be divided into two categories (Ertmer, et al.,1999). These authors suggest the concept of first-order barriers and second-order barriers. They define first-order barriers

as extrinsic and include lack of access to computers, lack of access to software, lack of planning time, and not enough technical and administrative support. According to these authors, second-order barriers are intrinsic and include beliefs about teaching, beliefs about computers, established classroom practices and not being willing to change. It is important that research consider these obstacles to be certain that they do not interfere with the results.

Appropriate training is one factor that appears to lead teachers to hold a more favorable attitude toward computer use (Feaster,1985; Hagey,1985; Sebastiani,1985). Many studies have found a correlation between teachers' attitudes about computers and their usage. In a study that looked at anxiety among computer users, it was found that the subjects with the least amount of computer experience had the highest levels of anxiety about their use (Liu & Reed, 1992). The study went on to suggest that to overcome these feelings, computer training should be divided into two categories: general information or fundamentals and applied uses. The authors determined that this would be the best way to approach those inexperienced users and dispel their fears. Once teachers have mastered the fundamentals, thus becoming less anxious about using computers, they should be prepared to move into the applied use training (Liu & Reed). Many researchers have found that teachers' anxiety levels increase due to their feelings of inadequacy and limited knowledge in computer usage in the classroom. Since teachers are the ones that interact with the students it is necessary for them to be comfortable with technology before they are able to use these tools with their students (Guha, 2000). Clearly teachers must feel comfortable using technology if they are going to use computers to integrate

curriculum. Continued practice and increased use appear to decrease teachers' level of anxiety.

The concept of having two levels of training is corroborated by Susan Piotrowski (1992) who also suggested two separate programs for teacher computer training. She states that teachers usually demonstrate anxiety and fear towards technology if they are unequipped or uninformed. A beginners' program should be offered for teachers to master basic competencies. Once teachers have mastered the basics an advanced program could allow teachers to develop classroom integration skills. In cases without adequate training or resources teachers expressed feelings of isolation, being overwhelmed and needing a resource person (Twery, 2003). Once again, research supports properly training teachers and offering continued support for the most effective integration of technology to occur.

In a discussion of teachers' attitudes about computer use it is necessary to look at the different categories of use. Some teachers may feel positively about using computers to complete everyday tasks such as doing attendance or sending e-mail but they may have a very different attitude about implementing computers into their teaching. Researchers have found that some teachers do not believe that computers will improve learning while other teachers feel that by using a computer they will be jeopardizing the importance of teachers. There are teachers who have positive attitudes towards computers but see them as "supplemental" or "rewards" as opposed to being a vehicle used to develop the concept of the lesson. Many teachers consider technology to be additional or supplementary to the existing curriculum (Ertmer et al.,1999). Even many teachers who support the use of technology and have a positive outlook towards computers are not

willing to embrace technology to change the way they teach. "Implementing computers in the classroom requires more than mechanical change by the teacher. There is the extremely important element of personal change." (Adams as cited in Guha, 2000, p.6). In order to incorporate technology into the classroom teachers must have a positive attitude about computers themselves as well as a positive attitude about how computers will benefit instruction. Many researchers have concluded that we must understand teachers' goals for technology and their beliefs about how technology should be utilized before we can initiate change.

Aside from teacher training there are other factors that have been found to affect teachers' attitudes toward computer use. Many studies show that teachers do not feel that they have adequate access to computers or software. Teachers' complaints include not having enough computers, not having enough funding to purchase equipment or update their equipment, and not being able to offer a variety of programs to their students. Since funding is considered a problem by many teachers it may be assumed that more affluent school districts would not encounter the same problems. A study by Betty Young (2000) noted that there was no advantage to being from an affluent school district and teachers from districts with more money showed the same complaints as those from districts with limited funds. Rosemary Reichstetter (2000) found teachers' perceptions of lack of funding and equipment did not agree with their actual use of computers. Many teachers who complained about lack of computers or money to purchase equipment were using computers at the same level as teachers who had no complaints regarding funding. This leaves many questions about teachers' perceptions about how funding or lack of funding may actually affect the use of computers.

Many teachers are forced to use software that has been selected by school district authorities, leaving them with no choices to select programs that would meet the needs of individual students (Frase, as cited in Guha, 2000). Teachers would like to select their own software to use with their students. When teachers are part of the software selection committees they are better able to include programs that will be beneficial to their classrooms. Since teachers are with their students on a regular basis they would be much better equipped to indicate the needs of their students. Teachers become frustrated when they are unable to voice their needs (Guha). School districts should include teachers in technology decisions. Just telling teachers how to do things is not effective, teachers need to experience techniques for themselves, it has to make sense to them (Bruder, 1992).

Another factor that affects the attitudes that teachers have about using technology is the lack of time. Research shows that teachers do not feel they have enough time for training, planning or actually implementing technology into their classrooms. Teachers as well as students do not have enough time to experiment or practice during the school day (Guha, 2000). Many teachers indicate that "time management" is a problem and are unable to fit computer time into their daily routine or to integrate computers into curriculum instruction. Teachers may show an interest in learning how to implement computers into their curriculum but cite a lack of release time for training as a major inhibitor. Teachers know that learning to use technology is a very time consuming venture. Working in groups with colleagues, team teaching and shared planning increased the positive attitude of teachers regarding technology (Honey & McMillan, 1996). With the increasing number of technology requirements it seems that school

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districts should consider ways to allow time for the development of teachers' technology skills and implementation.

Lack of support by Administrators is viewed by many teachers as a major problem. Included in these concerns are lack of inspiration from leadership contingents, lack of rewards or incentives and lack of commitment from supervisors (Ely, as cited in Guha, 2000). Not surprisingly, administrators lag behind teachers in acquisition of computer skills (Young, 2001). In this study there was a significantly higher number of teachers rated as having high level computer skills than there were administrators. Most administrators talk about technology and use buzz words but their ideas are very general. Given that lack of administrative support has been repeatedly sighted by teachers as a major problem research indicates the need to train administrators. Training would help them to support computer-enhanced instruction and in doing so may increase their effectiveness as an administrator (Young). Principals and Supervisors should do more than talk about the use of computers; they should be modeling technology for teachers. When administrators use technology they begin to identify with all of the challenges and frustrations that teachers face as they begin to use technology (Office of Technology Assessment, 1995). Administrators need to have a vision of how technology will support students' learning (Barnett, 2003). Research supports the fact that leadership is an important factor affecting the successful integration of technology in education. Consideration must be given to training administrators and encouraging their use of technology.

Other areas of research that focus on teachers' integration of technology revolve around differences in teachers' personal backgrounds. Things such as age and gender

differences, subject area and grade level being taught, and years of teaching experience have all been considered. Studies have examined the differences in computer use between experienced teachers versus beginning teachers. Other researchers have looked at how teacher training before entering the classroom may affect the integration of technology.

It was found that when gender was taken into consideration there were areas that differed. Males had lower anxiety levels than females about the use of computers even though they had less experience using them (Liu & Reed, 1992). The one area that females seemed to excel was in the use of word processing programs. This study indicated that perception about the use of computers may be the reason. Writing is perceived as a female-oriented skill and word processing is closely associated to writing (Daly & Wilson, as cited in Liu & Reed). They also indicated that computers may be considered as "male objects" much like automobiles and motorcycles thus leading to lower anxiety levels by males. The one area that both males and females appeared to have equal results was in the use of content-area software. Neither group had significant experience with implementing this type of software. Betty Young (2001) found that men generally had higher levels of computers skills than woman. This research shows that gender is an area to consider when determining teacher computer use.

Teachers use computers differently based on the subject area and grade level that they teach. Special education teachers reported the greatest amount of computer use. Teachers of Foreign Language, Language Arts and Vocational Education followed with similar levels of use and teachers of Health/Physical Education showed the least amount of computer use with their classes (Reichstetter, 2000). Math and Science are the content

areas that show the least amount of computer use (Liu & Reed, 1992). Teachers in upper elementary grades and high schools showed highest levels of computer skills (Young, 2001). Secondary schools are the highest users of computers (Becker, as cited in Guha, 2000). As these studies indicate there are differences in computer use based on subject area and grade level.

Teacher's age shows a relationship to the amount of classroom use of computers. Teachers from 21-30 years old reported the most frequent use. Those over 51 used computers slightly more than half the amount of the 21-30 year old group. The 41-50 year olds followed closely behind. The lowest use of computers for instructional purposes was the 31- 40 year old group (Reichstetter, 2000).

One final area that has been studied by researchers is how computers are used by teachers based on their years of teaching experience. Generally the least experienced teachers had significantly stronger computer skills than those with the most years of teaching experience (Young, 2001). This finding was true throughout much of the research. Reichstetter (2000) found that teachers with the least years of teaching experience (1 to 6 years) had the highest instructional use of computers and teachers with the most years of teaching experience (25+ years) reported using computers for instructional purposes barely half that of newer teachers. This study showed that computer use went down as years of teaching experience went up.

Although less experienced teachers were found to use computers they were not necessarily comfortable. According to the U.S. Department of Education's 1999-2000 Schools and Staffing Survey only 42% of new teachers said they felt "well prepared" to use computers for instruction in their first year of teaching. There was a strong

correlation between those first year teachers that had observed technology being used during their field experience and those that felt prepared to use technology themselves (Twery, 2003). Many new teachers find themselves with a false sense of comfort. They may have computer skills but without having the advantage of seeing someone model the appropriate integration they may not be prepared to use the technology with their students. They may be eager to attempt the integration but may not have positive results. Experienced teachers who knew why they were learning a skill were more motivated and focused because they knew what they would do to integrate it into their classroom. Inexperienced teachers were still unfamiliar with what to do with the skills (Twery). Training inexperienced teachers may include the need to teach basic elements of teaching along with computer skills.

A review of the literature has revealed that there are a variety of reasons why some teachers use computers and others do not. There are differences in amounts of computer integration related to age, gender and years of teaching experience. A major factor appears to be how much training, what type of training and how the training has been presented. Teachers' attitudes about computers as well as their beliefs about teaching also affect their computer integration. Barriers exist such as lack of equipment or software and lack of support that interfere with teachers' use of computers. The one area that appears to be agreed upon in most of the research is that there is a need to continue studying why some teachers use computers and others do not.

Chapter 3

Design of the Study

Setting

The data for this research was collected at Landis Intermediate School in Vineland, New Jersey. Vineland is an urban setting and is designated as an Abbott School District by the state of New Jersey. There are a total of 10,108 students and over 1,000 teachers in the district. Technology in the Vineland Public Schools is directed by the Supervisor of Technology. The District has its own intranet system which operates over a Metropolitan Area Network. The Vineland MAN supports data, voice, and video connectivity and is accessible by all students, staff and parents. The district provides e-mail to all staff members. The district has an internet filtering system in place as well as a firewall. All computers are equipped with McAfee 8.0 virus protection software. All 22 educational sites in the Vineland Public School District have a Site Based Technology Coordinator. Additionally there are 9 technicians that work throughout the district. The district uses a Windows XP platform on all of its computers. The district has a Technology Plan that includes a technology vision. This vision states in part "We view technology as a critical tool for carrying out work, enhancing the educational process, and engaging in lifelong learning for all students and staff. As such, it is a means to an end, not an end unto itself."

Landis Intermediate School is one of four Intermediate Schools in the District that house grades five through eight. The school building was constructed in 1927 and is registered on the National Register of Historic Places. Landis has 744 students, 62 teachers, 2 administrators and 45 other staff members. The school is set up using Teams and practices the concept of looping. There are a total of 242 computers in the building of which 212 are used for instructional purposes. All computers have internet connectivity and all staff members have e-mail accounts. The student computer ratio is 3.51 students to each computer. Landis Intermediate School offers the following programs for general use: MS Office 2003 Professional (Word, Excel, PowerPoint Access, Front Page, Outlook, and Publisher), EZ Grade Pro, Accelerated Math, Accelerated Reader, KidBiz 3000, Success Maker, Study Island, Decisions-Decisions thru Tom Snyder Productions, United Streaming and other subject specific software. All staff members are offered the opportunity to sign up for free ETTC (Educational Technology Training Center) workshops at their convenience. The list of available workshops is extensive and is offered throughout the entire school year.

The Principal has been in his current position for the past 7 years and was the Assistant Principal prior to that. The Assistant Principal joined the staff in April of 2004. Both administrators are males. Of the 62 teachers at the school, only 10 have been staff members at Landis for 2 years or less while 47 have been at Landis for 5 years or more. 47 teachers are female while 15 are male. The sample used for this study was the entire population of 62 teachers at Landis Intermediate School. Fifty-six were present at the time that the survey was distributed and completed.

At the onset of the research project an application was submitted to the Rowan University Institutional Review Board (IRB) for approval. Approval was received. The researcher also completed the requirements and received a "Completion Certificate for Human Participant Protections Education for Research Teams" from the National Institutes of Health. Lastly, a letter of approval for the research to be conducted at Landis Intermediate School was received from Dr. Thomas McCann, principal.

Description of the Instrument

The data collection instrument was a survey created specifically for the purpose of this study. There was a total of 47 questions. The entire survey was contained on one sheet of paper using both sides of the page. The survey included 16 questions relating to the demographics and background of the population, 20 questions relating to use and integration of computers in the classroom and 11 questions regarding possible barriers affecting computer use. The survey was entirely voluntary and completely anonymous.

The first section of the survey instrument consisted of the demographic and background questions. These questions included current grade level being taught, subject being taught, years as a full time teacher, years at current school, gender, age, highest level of education, description of current teaching position, when they first used a computer, how well prepared teachers felt they were in using computers for personal use, how well prepared teachers felt they were for using computers for classroom instruction and school use, what type of computer training they have had, how many hours of professional development in using computers they have had, and if they had ever had a

college or university course in the use of computers. The last question in the background section used a Lickert scale and asked teachers to rate to what extent they believed that the following had prepared them to use computers: College/graduate work, Professional development activities, Colleagues, Students and Independent Learning. The 5 categories for this question were; not at all, small extent, moderate extent, significant extent, and great extent.

The Lickert scale was used to assess the 20 computer use/integration questions. Each of these questions had a scale of 1 – 5, producing a possible total of 100. For each participant this number was used to determine their amount of computer use and integration. The first part of this section included 9 questions about instructional use of computers. The questions asked teachers to rate how often they used computers to create materials, gather information for lessons, create multimedia presentations, record student attendance, record grades, complete report cards, write lesson plans, communicate with colleagues and communicate with parents or students. The categories were never, rarely, sometimes, often and regularly. The remaining 11 questions asked teachers to rate how often they used computers with their students or assigned these activities to students. The activities were word processing, spreadsheets, desktop publishing, multimedia, graphics, communicating, internet, web quests, subject-specific software, scavenger hunts, and simulation games. The 5 categories were the same as those for the first 9 questions. All answers to these 20 questions were totaled and this number was assigned to each participant as their computer use and integration score.

The final section of the survey instrument consisted of 11 questions asking teachers to rate the extent that each of the topics listed had affected their use of

computers. These 11 topics were: not enough computers, lack of good instructional

software, outdated or unreliable computers, internet access not easily accessible,

inadequate training opportunities, lack of release time to learn computer skills, lack of

administrative support, lack of technical support or advice, lack of time in the schedule to

use computers with students during class, concerns about students access to inappropriate

materials and lack of funding. The 5 rating categories were: not a barrier, small barrier,

moderate barrier, significant barrier and major barrier.

As indicated in the literature review, barriers exist that keep teachers from

implementing technology. These barriers make it difficult to research which methods of

training are the most useful, why some teachers use computers, and why others do not.

For this reason it was decided that this third section that includes questions about

perceived barriers should be included on the survey. This may offer some insight into

teachers' views of why they do or do not use computers.

The survey instrument was assessed for face and content validity. Five people

were asked to give their opinions about the validity of the sections and the reliability of

the questions. The judges consisted of a district supervisor of technology, a principal, a

retired social studies teacher, and two computer teachers. Four of the judges have

master's degrees and all of them have taken courses in the use of computers. All of the

judges approved the instrument.

To enhance reliability standard conditions of data collection were employed. All

subjects were give the same instructions by the same researcher and had the same amount

of time to complete the survey. The survey instrument was distributed to the teachers and

later collected. Each survey had a cover page attached which gave instructions for

completion. Attached to each cover page was a small strip of paper with the teacher's name on it. This assured that the surveys were given only to teachers and not to other staff members. The instructions asked teachers to complete both sides of the survey and tear off the paper with their name on it, turn the survey in to the researcher and then drop their name into the "bag". Once all surveys were handed in four names were pulled from the bag and the winners were awarded cash prizes. First place was $20.00, 2nd place was $15.00, 3rd place was $10.00 and 4th place was $5.00. The cash prizes were an incentive for prompt completion of the survey. This incentive appeared to be affective since only 2 of the 56 teachers that were present chose not to complete the survey.

Relationship of the Instrument to the Null Hypothesis

The null hypothesis of the study states there will be no significant difference in the characteristics of those teachers who have a high integration of computer use in their classrooms and those who have a low integration as determined by the Medio Technology Survey prepared by the researcher specifically for this study. The survey was designed to specifically measure the integration of computer use in classrooms by teachers. The purpose of the study was to determine what, if any, correlation exists between the characteristics of teachers that have a high integration of computer use and the teachers that have a low integration of computer use. This was tested using t-tests to compare each characteristic to the scores received in the computer use and integration section of the survey. Each characteristic was considered separately.

Summary

A 47 question survey instrument was created for this research project. The purpose was to assess any correlation between teacher characteristics and their computer use and integration. The survey was distributed to 90% of the teachers at Landis Intermediate School and later collected. Fifty-four teachers completed the survey. A Lickert scale was used to assess the 20 computer use and integration questions and this score was assigned to each participant. A t-test was used to compare each of the 15 characteristics to this assigned score. Also included in the survey were 11 questions concerning barriers to computer use. These questions were also rated on a Lickert scale. These were then compared to the participant's computer use and integration score to determine if there was any correlation.

Chapter 4

Analysis of the Data

The purpose of this study was to assess correlations between teacher characteristics and their computer use and integration. The surveys were analyzed to determine if any such correlation existed. The sample used for this study was the entire population of 62 teachers at Landis Intermediate School. Fifty-six teachers were present at the time that the survey was distributed and completed.

There were a total of 54 surveys returned. Of those, 4 did not complete the entire survey and therefore were not evaluated. This left a total of 50 completed surveys that were used to determine the results of the study. This was almost 81% of the total population of teachers at Landis Intermediate School.

Of the 50 completed surveys 40 were completed by females and 10 were completed by males as shown in Table 1.

Table 1

Number of subjects by gender

male	10
female	40

Sixteen or 32% of the surveys were completed by teachers who have been full time teachers for less than 5 years. Sixteen or 32% were completed by teachers who have been teaching between 6 and 10 years. Six teachers which represent 12% have been teaching between 11 and 15 years. Four teachers or 8% have been teaching between 16 and 20 years and the remaining 5 teachers or 10% who completed the survey have been full time teachers for 28 years or more. These results show that 64% of those completing the survey have been teaching for 10 years or less as can be extrapolated from Figure 1.

Figure 1

Years of Teaching Experience
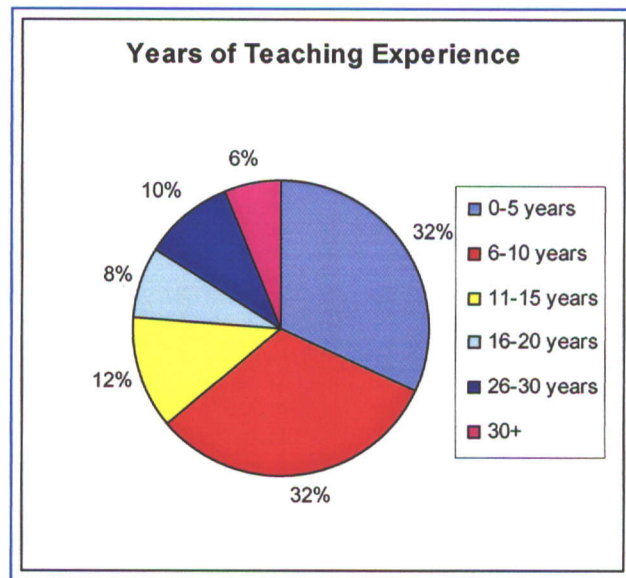
Among those surveyed there was a variety of subject areas taught. Nine teachers taught multiple subject areas. One teacher did not indicate the subject area that he or she

taught. Of the 40 remaining teachers they were divided among the following subject areas: 15 taught Mathematics, 7 taught Language Arts, 5 taught Social Studies, 4 taught Science, 3 taught Physical Education/Health, 3 taught English as a Second Language, 1 taught Music and 1 taught Cooking. This can be seen in Figure 2.

Figure 2

Subject Area Being Taught
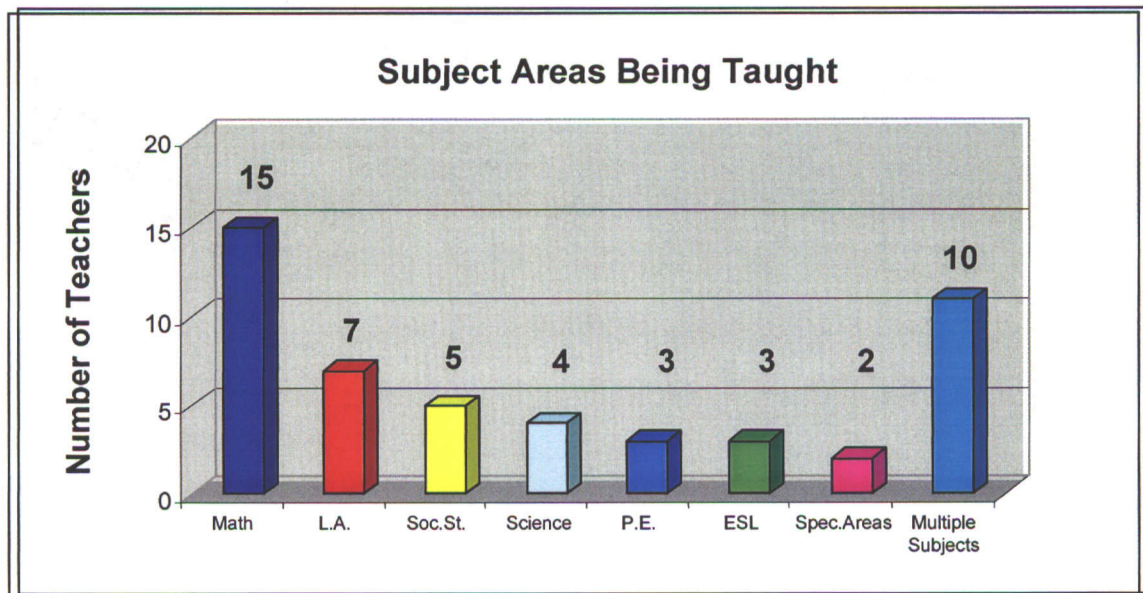
Of the 50 subjects who were studied 11 were under 30 years of age. Seventeen fell into the 31-40 year old category. Eight of the subjects were between 41 and 50 years old and the remaining 14 subjects were 50 years old or older. This can be seen in Figure 3.

Figure 3

Age of Subjects

Age of Subjects

■ under 30	
■ 31-40	
□ 41-50	
■ 50+	
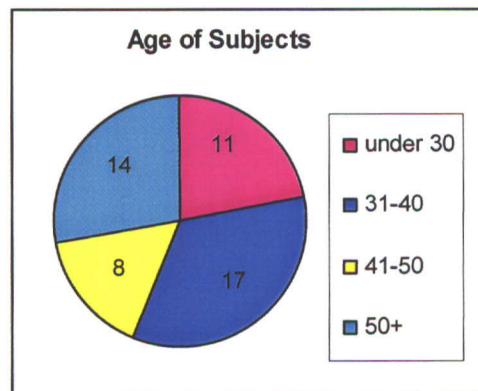
Thirty seven of the teachers taught in a regular classroom setting. Four teachers taught Bilingual Education, 5 taught Special Education and 4 were in-class support teachers as shown in Table 2.

Table 2

Type of Teaching Position

Regular Classroom	74 %
Bilingual Classroom	8 %
Special Education	10 %
In-class support	8 %

The break down of grade levels being taught was based on the fact that Landis Intermediate School practices looping and teachers change grade levels each year. Twenty-one teachers surveyed teach 7th and 8th grade, 20 teachers teach 5th and 6th grade and 9 teachers teach all grade levels each year. This can be seen in Table 3.

Table 3

Grade level being taught

5th and 6th grade	40 %
7th and 8th grade	42 %
5th, 6th 7th and 8th grade	18 %

The 20 questions in Section II and III of the survey that pertained to computer use and integration were assessed and a score was given to each subject based on the responses to the questions with a possible total of 100 points. The subjects scored as follows: 2 which was 4% received a score below 30; 6 which was 12% scored between 30 and 40; 9 which was 18% scored between 40 and 50; 11 which was 22% scored between 50 and 60; 12 which was 24% scored between 60 and 70; 7 which was 14% scored between 70 and 80; 2 which was 4% scored between 80 and 90 and the highest score of 92 was scored by 1 subject which was 2%. The results showed that 64% of those surveyed had a computer use and integration score of between 40 and 70. 16% scored below this number and 20% scored above. This can be extrapolated from Figure 4.

Figure 4

Computer Use and Integration Scores of Teachers
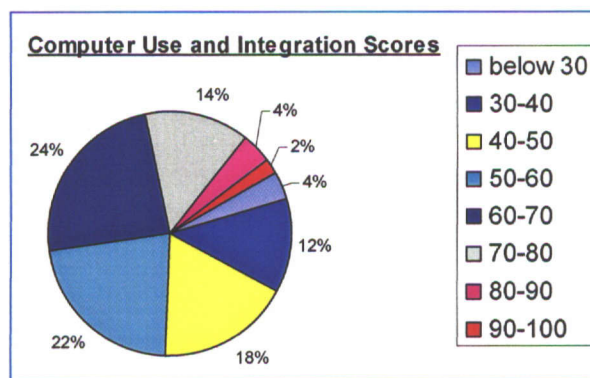
In order to determine if there was any correlation between teacher characteristics and their computer use and integration the above scores were used to run independent sample t tests. The first group of t-tests showed no significant difference in teachers' computer use and integration score based on the grade level that they taught as shown in Table 4. Also showing no significant difference were t-tests run comparing computer use and integration based on the type of teaching position held, such as regular classroom, bilingual, in-class support or special education as shown in Table 5. When computer use and integration comparisons were made using the teachers' highest level of education again, no significant differences were found.

Table 4

Computer use and integration scores of 5th & 6th grade teachers as compared with 7th & 8th grade teachers.

Independent Samples t-test Statistic	Value
Mean of group one	61.050000
Mean of group two	55.90476258.413043
t-Value	1.216340
Degrees of freedom (d/)	39

*p<.05.

Table 5

Computer use and integration scores of teachers with a Bachelors Degree as compared with teachers with graduate degrees.

Independent Samples t-test Statistic	Value
Mean of group one	56.04
Mean of group two	57.43
t-Value	-0.33
Degrees of freedom (d/)	48

*p<.05.

When a t-test compared computer use and integration scores of males and females there was no significant difference found between these two groups. Since the literature review pointed out that the one area that females seemed to excel in was the use of word processing programs (Daly & Wilson, as cited in Liu & Reed), this particular area was reviewed. It was found that 50% of the males reported never using word processing as compared to only 17% of the females who said they did not use word processing. Additionally only 20% of the males reported using word processing often or regularly as compared to 40% of the females who used word processing often or regularly. This supported previous research that females appear to excel in the use of word processing. This can be extrapolated from Figure 5.

Figure 5

The comparison of use of word processing between males and females.
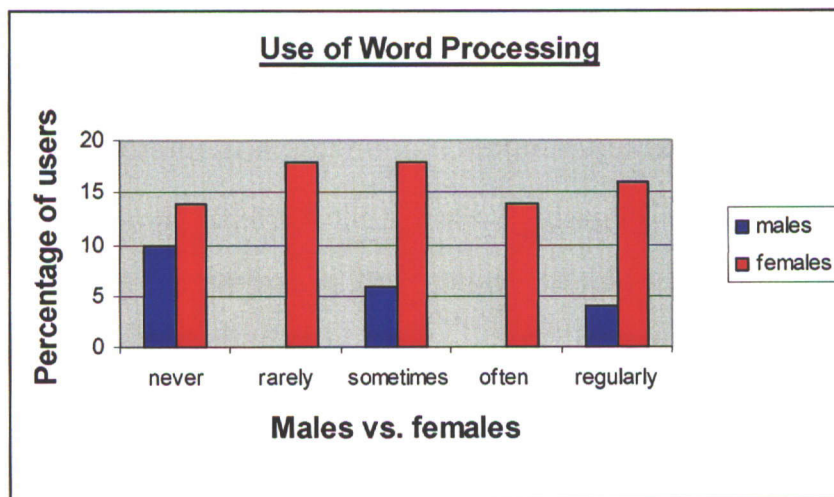
When independent sample t-tests were done comparing computer use and integration scores based on the subject area being taught, the only area that showed a significant difference at the .05 level was the comparison between Physical Education teachers and all other teachers that were surveyed. The t-test showed that there were 47 degrees of freedom and the t-value was -2.999134 with the distribution of t being 2.01365 as shown in Table 6. This finding, that Physical Education teachers had the lowest computer use and integration of computers agreed with the research discussed in the literature review. Teachers of Health/Physical Education showed the least amount of computer use with their classes (Reichstetter, 2000).

Table 6

Comparison of computer use and integration scores of Physical Education/Health teachers with teachers of all other subjects combined.

Independent Samples t-test	
Statistic	Value
Mean of group one	33.666667
Mean of group two	58.413043
t-Value	-2.999134
Degrees of freedom (*df*)	47

*p<.05.

Again, using independent sample t-tests, teachers' age was used to compare their computer use and integration scores. The subjects in the survey were divided into the following four age groups: under 30, 31-40, 41-50 and over 50. Each of these groups was compared independently to each of the other age groups and then each group was

compared to the remaining total of all other groups. The only two tests that resulted in a statistically significant difference at the .05 level were when the under 30 age group was compared to the over 50 age group and when the over 50 age group was compared to all of the other subjects combined. These results can be seen in Table 7 and Table 8. In both cases the 50 and over age group showed a much lower computer use and integration score. The mean of each group went down as the age level went up. The means were as follows: (under 30) – 63.09; (31-40) – 58.05; (41-50) – 56.50 and (over 50) – 50.07. These results differ from the results reported in the literature review in Chapter 2. Those results showed that although the teachers that were under 30 also reported more frequent use of computers, the over 50 age group was the second highest computer user group and the lowest age group in regard to computer use and integration was the 31 – 40 year old group (Reichstetter, 2000).

Table 7

Comparison of computer use and integration scores of teachers under 30 years of age with teachers over 50 years of age.

Independent Samples t-test	
Statistic	Value
Mean of group one	63.090909
Mean of group two	50.071429
t-Value	2.104625
Degrees of freedom (df)	23

*p<.05.

Table 8

Comparison of computer use and integration scores of teachers over 50 years of age with teachers 50 and under.

Independent Samples t-test	
Statistic	Value
Mean of group one	50.071429
Mean of group two	59.25000
t-Value	2.018581
Degrees of freedom (*df*)	48

*p<.05.

Another comparison that was made in evaluating the results of the survey was based on the number of years of teaching experience of the subjects. The subjects were divided into the following groups according to the number of years they had been teaching: 0-5; 6-10; 11-15; 16-20; 21-25; 26-30 and over 30. Initially, independent sample t-tests were performed that compared each group individually to each other group. There were no significant differences in any of these comparisons. When several groups were combined and t-tests performed the results differed. When groups were combined and the scores of the subjects with 0-10 years of teaching experience were compared to each other group there was a statistically significant difference when compared to the group with over 30 years of experience, as shown in Table 9. Also showing a statistically significant difference at the .05 level on an independent sample t-test were the results of a comparison between the computer use and integration scores of teachers having 0-5 years of experience and those with 11 or more years, as shown in Table 10. The findings in this section agreed with the previous research that was reported

in Chapter 2. The least experienced teachers had significantly stronger computer skills than those with the most years of teaching experience (Young, 2001).

Table 9

Comparison of computer use and integration scores of teachers with less than 10 years of teaching experience with teachers having 30 or more years of teaching experience.

Independent Samples t-test

Statistic	Value
Mean of group one	59.656250
Mean of group two	40.000000
t-Value	2.261950
Degrees of freedom (d*f*)	33

*p<.05

Table 10

Comparison of computer use and integration scores of teachers with 5 years or less of teaching experience with teachers having 11 or more years of teaching experience.

Independent Samples t-test

Statistic	Value
Mean of group one	62.500000
Mean of group two	51.388889
t-Value	2.174023
Degrees of freedom (d*f*)	32

*p<.05

The next area that was considered was the point at which the subjects first used computers. The subjects were grouped as follows: elementary school, high school, undergraduate study, after college or graduate study. The computer use and integration scores were compared between each of these groups. The only area that was found to have a statistically significant difference on an independent samples t-test was the group that first used computers during high school when compared to those that didn't use computers until after college. The high school group had a mean score of 63.00 and the after college group had a mean score of 50.30. There were 19 degrees of freedom with a t-value of 2.177295 and the distribution of t was 2.093. When a t-test was done on a combined group another significant difference was determined. Comparing the scores of the elementary and high school combination to the scores of all the other subjects the t-value was 2.120114 with 48 degrees of freedom and the distribution of t was 2.0105. The results of this test showed that those teachers who had used computers in elementary and or high school had a higher computer use and integration score than all other teachers.

Table 11

Comparison of computer use and integration scores of teachers that first used computers during high school with teachers that didn't use computers until after college.

Independent Samples t-test Statistic	Value
Mean of group one	63.00000
Mean of group two	50.300000
t-Value	2.177295
Degrees of freedom (d*f*)	19

*p<.05

Table 12

Comparison of computer use and integration scores of teachers that first used computers during elementary school or high school with teachers that didn't use computers until after college.

Independent Samples t-test	
Statistic	Value
Mean of group one	60.200000
Mean of group two	51.400000
t-Value	2.120114
Degrees of freedom (df)	48

$*p<.05$

One section of the survey asked subjects to what extent they felt they had been prepared to use computers by: college/graduate work, professional development activities, colleagues, students and independent learning. Subjects were asked to rate each of these areas as follows: none, small amount, moderate, significantly or greatly. An independent sample t test was done on each of these areas comparing the computer use and integration score of each subject based on the extent they felt this area had prepared them to use computers.

When asked if they felt students had helped prepare them to use computers nearly half of the subjects responded that they had done so moderately/significantly or greatly with just over half saying that students had not prepared them or had done so to only a small extent. The t-tests showed no significant difference in computer use and integration even though the subjects felt that students had helped to prepare them.

In response to what extent they felt that colleagues had helped to prepare them to use computers 34% felt that colleagues had not help to prepare them or had done so to only a small extent. Sixty-six percent felt that colleagues had helped prepare them to use

computers moderately, significantly or greatly. T-tests showed no significant difference between any of the groups.

When asked if college had helped to prepare them to use computers the subjects were split almost in half. Twenty-four felt that college had in no way or only a small way prepared them to use computers and the remaining 26 felt that college had prepared them moderately, significantly or greatly. Independent sample t-tests showed that the only comparison that was statistically significant was the group that felt college had not prepared them at all with the group that felt college had greatly prepared them. The results of this t-test showed a t-value of -2.38 with 16 degrees of freedom and the distribution of t was 2.120 as shown in Table 13.

In another question regarding how college had helped prepare for the use of computers, subjects were asked if they had specific college/university level computer courses. Twenty-nine did have computer courses, 20 did not and one teacher did not respond to this question. There was no significant difference in the computer use and integration scores of these two groups.

Table 13

Comparison of computer use and integration scores of teachers that felt that college had not prepared them to use computers with teachers that felt college had greatly prepared them to use computers.

| Independent Samples t-test | |
Statistic	Value
Mean of group one	49.86
Mean of group two	70.75
t-Value	-2.38
Degrees of freedom (d*f*)	16

*p<.05

44

In another question regarding how college had helped prepare teachers for the use of computers, subjects were asked if they had specific college/university level computer courses. Twenty-nine did have computer courses, 20 did not and one teacher did not respond to this question. There was no significant difference in the computer use and integration scores of these two groups.
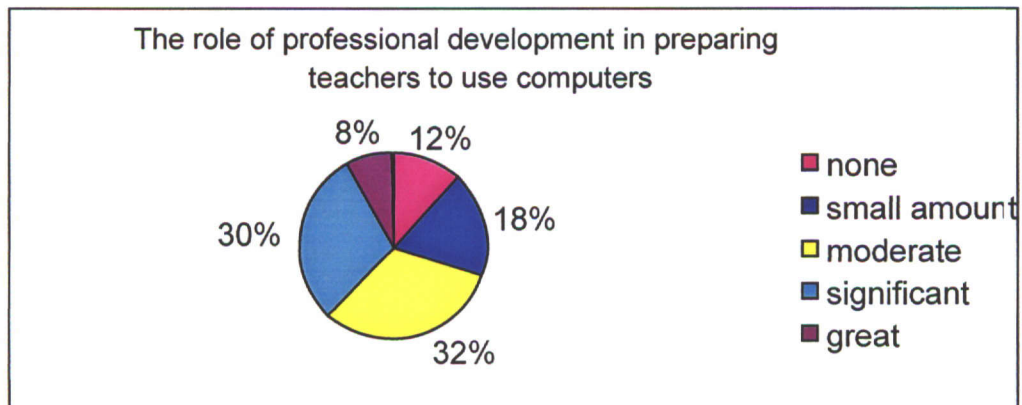
Overall, subjects felt that professional development had helped to prepare them to use computers. Only 30% of the respondents felt that professional development had not helped them or had done so to only a small degree. The remaining 70% of those surveyed felt that professional development had prepared them moderately, significantly or greatly to use computers as seen in Figure 6. When independent sample t-tests were completed there were several comparisons that showed significant differences. When the group that responded significantly was compared with the group that responded none, and then with the group that responded small amount, both showed significant differences. The greatest difference was found when comparing the 30% that responded none or small amount with the 70% that responded moderately, significantly or greatly. This t-test had a t-value of -3.14 with 32 degrees of freedom and a 2.036 distribution of t. This shows that the teachers that felt professional development helped to prepare them did in fact use computers more than those that felt professional development had not helped them.

Another question on the survey asked teachers how many hours of professional development in the use of computers did they have over the last 3 years. The results showed that 12% had none, 56% had between 1 and 10 hours, 18% had between 11 and

20 hours, 8% had between 21 and 30 hours and 6% reported having more than 31 hours

of professional development in the use of computers as shown in Figure 7.

Figure 6

How teachers believe that professional development helped to prepare them to use computers.

The role of professional development in preparing teachers to use computers

- none
- small amount
- moderate
- significant
- great

8% 12%
30% 18%
32%

Table 14

Comparison of computer use and integration scores of teachers that felt that professional development had not prepared them or only slightly prepared them to use computers with teachers that felt professional development had moderately, significantly or greatly prepared them to use computers.

Independent Samples t-test

Statistic	Value
Mean of group one	49.86
Mean of group two	70.75
t-Value	-2.38
Degrees of freedom (d*f*)	16

*p<.05

46

Figure 7

Number of hours of Professional Development in the use of computers that teachers have had during the past three years.

Hours of Professional Development in the past 3 years

- none
- 1-10 hours
- 11-2- hours
- 21-30 hours
- 31 or more

6%
8%
12%
18%
56%
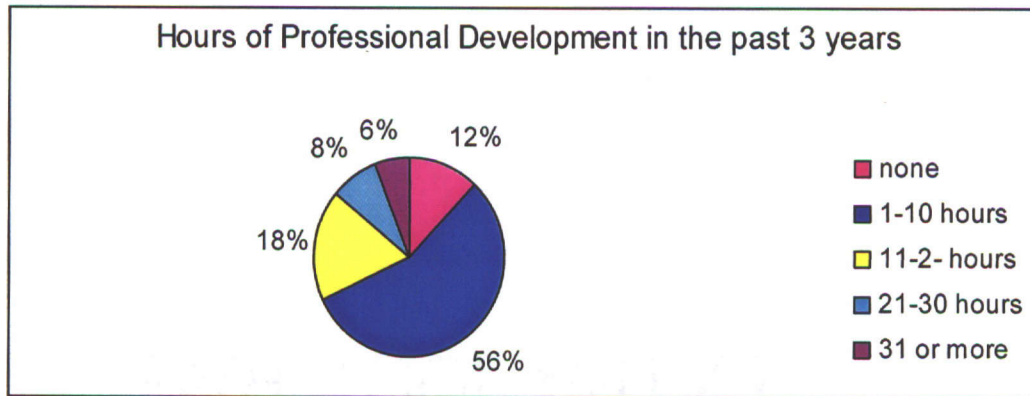
Respondents felt that independent learning was by far what helped to prepare them to use computers more than any of the other items surveyed. Only 10% of those surveyed felt that independent learning did not help them or did so to only a small degree. An overwhelming 90% of those surveyed felt that independent learning helped to prepare them either moderately, significantly or greatly. The results of the t-tests demonstrated that there were many areas of significance. The groups that responded moderately, significantly or greatly each showed a significant difference when compared to the group that responded none. The t test that showed the greatest significant difference was the comparison between the 10% group and the 90% group. The t-value was -2.90 with 48 degrees of freedom and a 2.01065 distribution of t as shown in Table 15. It is evident from these results that the teachers that felt that independent learning had played a significant role in preparing them to use computers did use computers more than those that did not feel that independent learning had helped them.

Table 15

Comparison of computer use and integration scores of teachers that felt that independent learning had not prepared them or only slightly prepared them to use computers with teachers that felt independent learning had moderately, significantly or greatly prepared them to use computers.

Independent Samples t-test

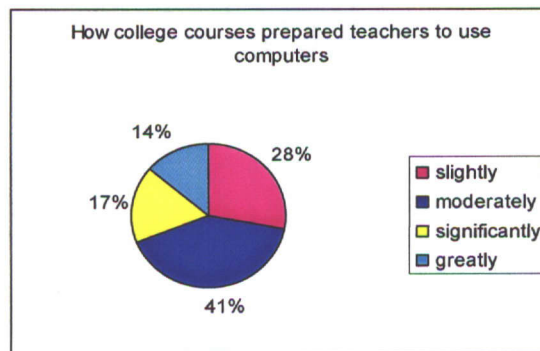| Statistic	Value
Mean of group one	39.60
Mean of group two	58.58
t-Value	-2.90
Degrees of freedom (df)	48

*p<.05

The results of this section, where comparisons were made based on what the subjects felt most prepared them to use computers, showed some similarities and some differences from the literature discussed in Chapter 2. A majority of teachers are self-taught in the area of computer skills (Pomeroy as cited in Kotrlik, et al.). This was supported in the current study by the fact that 90% of the subjects in this survey felt that independent learning had been an important factor in their use of computers. 73% of the subjects felt that the university course they had taken was the most influential factor in their current use of technology (Kirkwood, 2001). This was somewhat supported by the current research. Of the 29 subjects that did have college level computer courses 31% felt that the college course had greatly or significantly impacted their use of computers in the classroom, and there was another 38% that felt the college courses had moderately impacted them. This resulted in a total of 69% of the subjects that had taken college level computer course felt that the course had been influential this can be extrapolated from Figure 8. Finally, research supported the combination of college level courses and professional development. When teachers had both university coursework and in service

training combined they had the highest use of computers in their classrooms (Cates & McNaull, 1993). In the current study 26 teachers had a combination of both coursework and professional development. The mean computer use and integration score for those teachers that had both was 70.85 as compared to the mean score of 53.29 for those that did not have both coursework and professional development. This supports the previous research that there is a distinct advantage among those that have both types of training even though there was no statistically significant difference (as shown in Table 16).

Figure 8

To what extent teachers that have taken college level computer courses believe these courses helped to prepare them to use computers.

How college courses prepared teachers to use computers

- slightly
- moderately
- significantly
- greatly

14%
28%
17%
41%

Table 16

Comparison of computer use and integration scores of teachers that had both college level computer courses and professional development with the scores of teachers that had only one or neither.

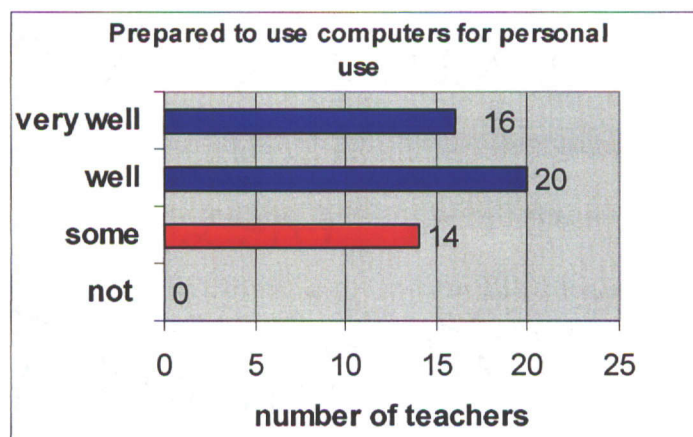| Independent Samples t-test	
Statistic	Value
Mean of group one	70.85
Mean of group two	53.29
t-Value	1.50
Degrees of freedom (df)	48

*$p<.05$

Many studies have found a correlation between teachers' attitudes about computers and their usage. In the current study teachers were asked 2 questions regarding how well prepared they felt they were to use computers. The first question asked how well prepared they felt they were to use computers for personal use. Seventy-two percent of the subjects felt they were well or very well prepared to use computers for personal use and only 28% felt they were somewhat prepared (as shown in Figure 9). No one responded that they were not prepared at all. When an independent sample t-test was used to compare those that answered somewhat with those that felt well prepared (as shown in Table 17) and then with those that felt very well prepared, both tests resulted in statistically significant differences. When a t-test compared those that felt only somewhat prepared with the 72% that felt well or very well prepared the result was a t-value of -3.279780 with 48 degrees of freedom and a 2.01065 distribution of t (as shown in Table 18).

Figure 9

To what extent teachers felt prepared to use computers for personal use.

Table 17

Comparison of computer use and integration scores of teachers that felt somewhat prepared to use computers for personal use with teachers that felt very well prepared.

Independent Samples t-test

Statistic	Value
No. of scores in group one	14
Mean of group one	46.571429
No. of scores in group two	36
Mean of group two	60.611111
t-Value	-3.279780
Degrees of freedom (d*f*)	48

*p<.05

Table 18

Comparison of computer use and integration scores of teachers that felt not prepared and somewhat prepared to use computers for personal use with teachers that felt well prepared and very well prepared.

Independent Samples t-test

| Statistic	Value
No. of scores in group one	14
Mean of group one	46.571429
No. of scores in group two	16
Mean of group two	58.550000
t-Value	-2.935325
Degrees of freedom (d*f*)	32

*p<.05

The second question asked how well prepared they felt they were to use computers for instructional use. This time 48% of the respondents felt they were only

51

somewhat or not at all prepared, 34% felt they were well prepared and only 18% felt very

well prepared to use computers for instructional use (as shown in Figure 10). When

independent samples t-tests were done comparing each of the 4 categories individually to

each other; not prepared, somewhat prepared, well prepared and very well prepared, there

were 4 that showed a statistically significant difference to .05. When a t-test was done

comparing the 48% that felt they were not prepared or somewhat prepared with the

combined groups of well and very well prepared the t-value was -3.352918 with 48

degrees of freedom and a 2.01065 distribution of t (as shown in Table 19) which showed

a statistically significant difference. The results of this testing supports the research that

says there is a correlation between teachers attitudes about computers and their usage. It

is evident that those teachers that feel they are prepared are using computers in their

classrooms.

Figure 10

To what extent teachers felt prepared to use computers for instructional use.
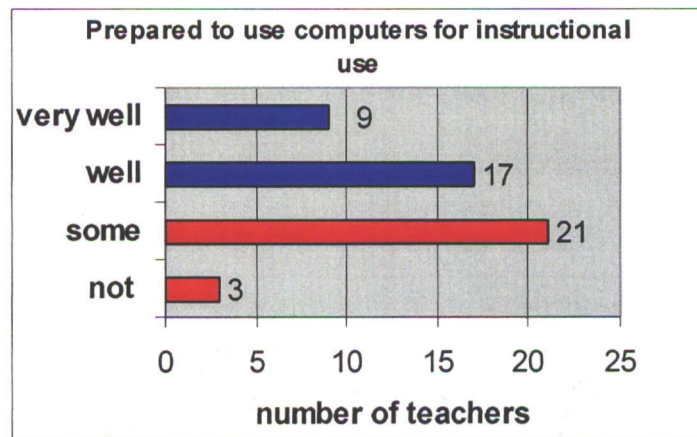
Table 19

Comparison of computer use and integration scores of teachers that felt not prepared and somewhat prepared to use computers for instructional use with teachers that felt well prepared and very well prepared.

Independent Samples t-test

| Statistic	Value
No. of scores in group one	24
Mean of group one	50.000000
No. of scores in group two	26
Mean of group two	62.846154
t-Value	-3.352918
Degrees of freedom (df)	48

*p<.05

As indicated in the literature review, research shows that many barriers exist that keep teachers from implementing technology. First-order barriers include lack of access to computers, lack of software, lack of planning time and not enough technical and administrative support (Ertmer, et al.,1999). The survey used in the current study asked subjects to indicate, using a Likert scale, to what extent they felt certain barriers affected their use of computers. There were 11 barriers included. The findings (as shown in Figure 11) showed that lack of technical support and lack of administrative support were only small barriers. Slightly above that were inadequate training, concerns about inappropriate materials, internet access not easily accessible and lack of funding. Just below the level of being a moderate barrier were: lack of release time, lack of instructional software and outdated computers. The only item determined to be a moderate barrier was lack of time during class to use computers. The item found to be

the greatest barrier was not having enough computers. This was determined to be a significant barrier.

Figure 11

To what extent teachers felt these were barriers that affected their computer use and integration.
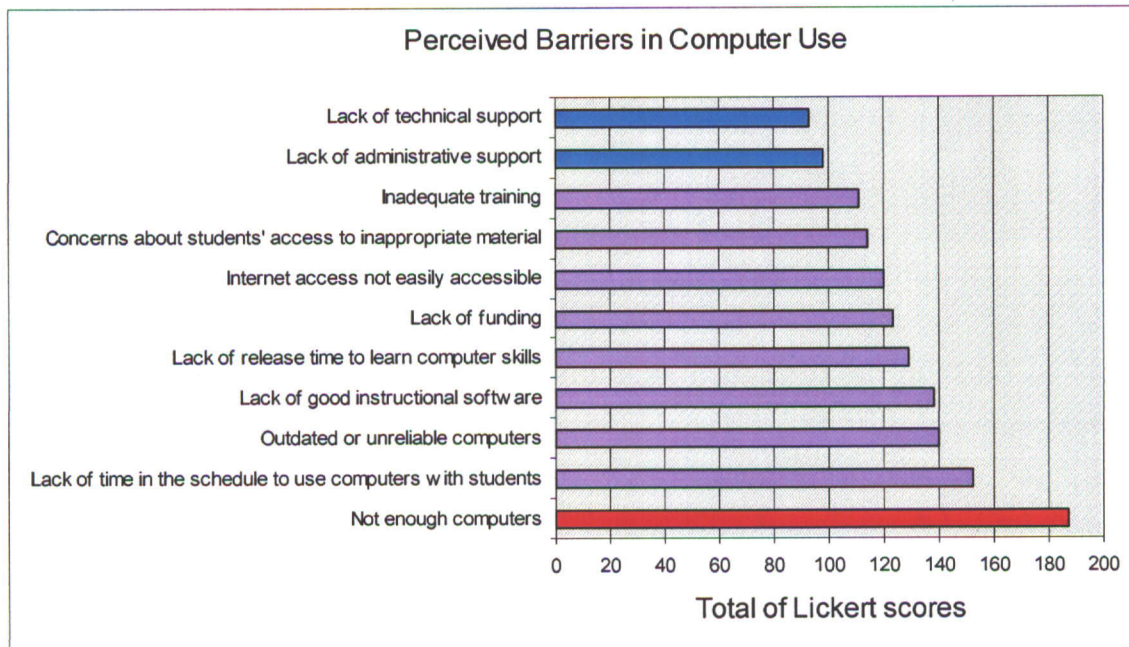
The final area of this study analyzed the areas of classroom integration that were used the most. According to a 1999 study by Rosemary Reichstetter, the areas most frequently used during classroom integration were word processing, subject specific software and the Internet. The current study found that the same top 3 areas were also implemented the most. Following those 3 areas in order from most used to least used were: e-mail, graphics, multi media, web quests, desktop publishing, spreadsheets, simulation games and scavenger hunts as shown in Figure 12.

Figure 12

To what extent teachers felt these were barriers that affected their computer use and integration.
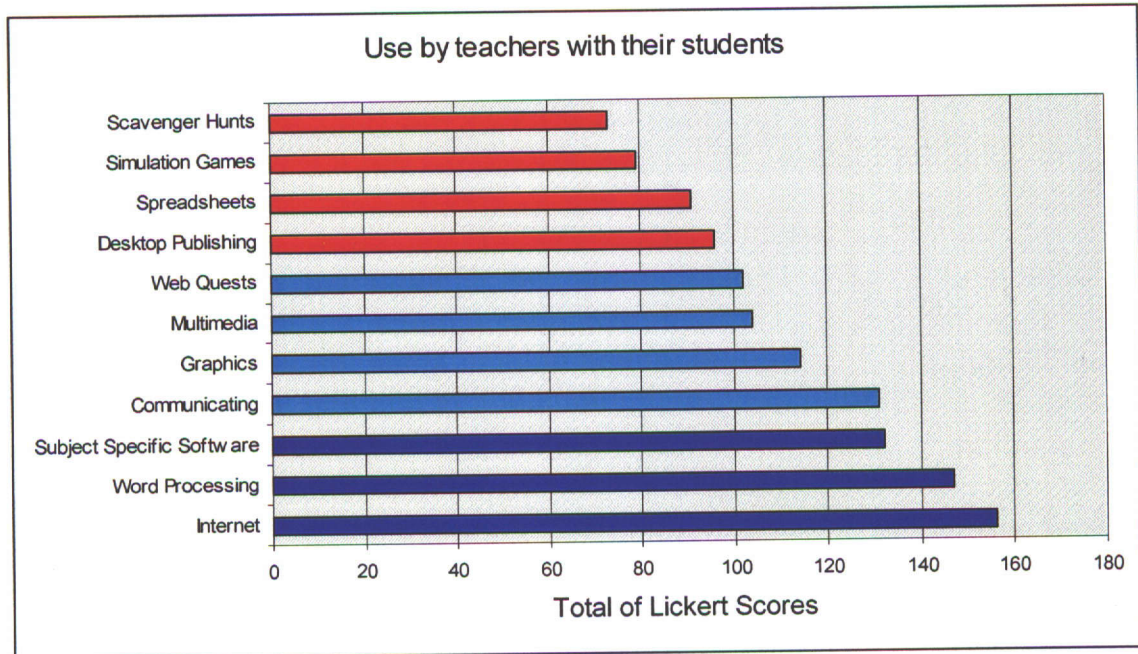
This chapter analyzed the data collected. The results, of the survey that was completed by the 50 subjects, were reviewed and presented in graphic form along with possible explanation. As a result of this analysis there were a number of areas that were found to have statistically significant differences as well as many areas that showed no significant differences.

Chapter 5

Conclusions and Recommendations

Summary of the Problem

Research has shown that some teachers integrate computers into their classrooms and others do not. The purpose of this study was to determine what, if any, correlation exists between the characteristics of teachers who have a high integration of computer use and the teachers who have a low integration of computer use.

Summary of the Procedures

A review of literature pertaining to the use of computers by teachers and their integration into the classroom was conducted. Following this review a problem was formulated. The problem that resulted was: Could it be that teachers who have high integration of computer use have different identifiable characteristics than teachers who have a low integration of computer use?

A data collection instrument was developed specifically for the purpose of this study. This instrument was a 47 question survey. This survey was distributed to the teachers at Landis Intermediate School. The surveys were collected and the results were analyzed. The results identified many areas that showed significant differences.

Conclusions and Implications

Using the data from Chapter 4 it was determined that there were many identifiable characteristics that showed significant differences between those teachers who have high integration of computer use in their classrooms and those who have low integration of computer use. The null hypothesis stated: There will be no significant difference in the characteristics of those teachers who have high integration of computer use in their classrooms and those who have low integration as determined by the Medio Technology Survey prepared by the researcher specifically for this purpose. Statistical analysis resulted in rejection of the null hypothesis due to some differences in the characteristics between the teachers with high integration of computer use and those with low integration of computer use. However, there were some areas that showed no difference. Those were: grade level being taught, type of teaching position, highest level of education, and gender. It should be noted that although gender did not show a significant difference in regard to overall use and integration, word processing was used twice as often by females as it was by males.

The areas that showed significant differences were: subject area, age, years of teaching experience and when the teacher first used a computer. Also showing significant differences were teachers' perceptions of how well prepared they felt they were to use computers both for personal use and for instructional use as well as what they believed was responsible for preparing them to use computers. Lastly, those teachers who believed that not having enough computers was a barrier that kept them from using computers in their classrooms proved to be significant.

In the category of subject area it was determined that Physical Education/Health teachers used computers significantly less than all other teachers. Since the purpose of Physical Education classes in schools usually encourages students to learn by physical activity it would be obvious that computers would not be a major component in meeting the goals of this subject area. This may possibly account for the lower use and integration scores by Physical Education Teachers.

A significant difference in computer integration was found when teacher age was considered. Those teachers who were under 30 years old used computers much more than those teachers who were 50 and older. Also, teachers who were over 50 used computers less than all other teachers who were surveyed. Similarly, it was discovered that teachers who first used computers during their own Elementary and or High School years as students, had a higher computer use and integration score than those teachers who had not used computers until after college and those teachers with less than 10 years of teaching experience also had a higher use and integration score. Considering that computers have been available for classroom and personal use for over 20 years it is possible that these results are due to familiarity with computers and this may account for an increase in computer use in classrooms over time.

Teachers were asked what they felt had prepared them to use computers. Those teachers who felt college had significantly prepared them had a higher use and integration score then teachers that did not feel college had prepared them. Of those teachers that had specific college courses in the use of computers there was no significant difference in their use and integration score from teachers that did not have computer courses in college. This might lead us to believe that integration of computers in college courses

and not independent computer courses provide teachers with a greater ability to integrate computers into their classrooms. Those teachers who felt professional development had prepared them "moderately", "significantly" or "greatly" also had a much higher use and integration score. When a combination of both college computer courses and professional development were considered there was also a significant difference in the classroom use and integration score. Since teachers were not asked to describe the type of professional development they had participated in it is difficult to evaluate why this combination is significant. If the training had provided the integration component that was missing in taking specific computer courses in college we might consider once again that learning computer skills through an integrated format would lead to a greater ability to integrate computers into their classrooms.

Lastly, 90% of the teachers surveyed felt that independent learning had prepared them "moderately", "significantly" or "greatly". The results proved that these teachers did have a higher computer use and integration score then the teachers that felt independent learning did not help to prepare them. It was surprising to note that independent learning had a 90% rating and professional development had only 70% but the results of the t tests showed a much greater significance of difference in the computer use and integration scores regarding professional development. It appears that teachers' perceptions do not necessarily agree with the actual use and integration scores. This was also true when teachers were asked if colleagues had helped prepare them to use computers. The perception by 66% of the teachers was that they had helped them "moderately", "significantly" or "greatly" but no statistically significant difference was found.

Teachers were asked to rate how well prepared they felt they were to use computers first for personal use and then for instructional use. In both cases when teachers felt they were "well prepared" or "very well" prepared their computer use and integration scores were higher then those that felt only somewhat prepared or not at all prepared. The results of the survey showed that 72% of teachers felt "well prepared" or "very well prepared" to use computers for personal use but this did not carry over to how well prepared they felt they were for instructional use. Just over 50% of the teachers felt "well prepared" or "very well prepared" to use computers for instructional use. It is reasonable to assume that just because teachers feel comfortable using a computer does not necessarily mean they feel comfortable using it for classroom instruction. As previous research as shown it is also possible that teachers may not believe that using computers as a teaching tool will benefit instruction.

A final topic that was considered in this study was what type of barriers teachers felt affected their use of computers. There were 11 barriers considered. Lack of technical support was the least significant with 76% of the teachers stating that this was "not a barrier" or only a "small barrier". It is possible that the teachers were influenced by the fact that the researcher was the person responsible for offering their technical support. It would not be unreasonable to believe that they did not want to offend their technical support person. Therefore the results regarding this barrier should be taken lightly.

The barrier that was second from the bottom was lack of administrative support. This was a very interesting finding. Only 27% of those surveyed felt that this was a "moderate", "significant" or "major" barrier. As indicated in the Literature Review,

previous research has shown that administrators need to use computers and not just talk about their importance in order to improve the classroom integration by their teachers. At Landis Intermediate School, the administration does not have a very extensive background in the use of computers. The Principal has been in that position for 7 years and has done an excellent job of verbally supporting and funding technology but his personal use is limited. The results of this survey show that this group of teachers does not consider lack of administrative support a barrier.

The item that was at the top of the list and considered a significant barrier was not enough computers. Currently the school has 242 computers with a total of 744 students. This includes 2 hardwired computer labs and one mobile lab. Since this barrier is perceived to be significant by the teachers it would be helpful to determine how many computers they feel would be enough. Prior to completing this study it was noted that some classrooms had a greater number of computers than others and this might have had an affect on the study.

Recommendations for Future Study

As with all research there were limitations to this study. Overall this was a small study. Replication at other middle schools would increase the available data. Also noted as limitations were the affect that administration may have on the staff and the overall availability of computers in individual classrooms.

Suggestions for further studies may include continuing to monitor computer use and integration as it relates to the age and years of experience of the teachers. As this study indicated younger teachers with less experience have a higher degree of computer

use and integration. It may be helpful to follow this for a long term study to determine if familiarity with computers may account for an increase in computer use in classrooms over time.

Additional questions could be asked regarding the types of professional development that teachers have had. This may be helpful in considering whether learning to use computers in an integrated format rather than in an independent computer class would increase computer use and integration scores of teachers.

Also, further questions regarding why teachers felt well prepared to use computers for personal use, but not for classroom integration may offer some insight into how we can adapt training that may help teachers to make the transfer from personal use to classroom integration. Understanding their beliefs about integrating computers may be beneficial.

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Appendix

The following survey is for the sole purpose of completion of a graduate thesis through Rowan University. The survey is entirely voluntary. All results will be completely anonymous.

Section I – Demographic and Background Information

1. What grade level/levels do you currently teach? _____

2. What subject/subjects do you currently teach? _____

3. How many years have you been a full time teacher? _____

4. How many years have you taught at your current school? _____

5. What is your gender?   Male _____   Female _____

6. When did you first use a computer? (give year or education level) _____

7. Which of the following describes your current teaching position for the majority of the school day?
   _____a. regular classroom teacher   _____b. in class support teacher
   _____c. bilingual classroom teacher   _____d. special education classroom teacher
   _____e. other (specify) _____

8. Which one of the following categories correlates with your age?
   _____a. under 30   _____b. 31-40   _____c. 41-50   _____d. 50+

9. Check ALL areas that apply: Did you ever use a computer in:
   _____elementary school (K-8)   _____high school   _____undergraduate study   _____graduate study

10. What is your highest level of education? (include +15 or +30) _____

11. In your opinion, how well prepared are you to use computers for your own **personal use**?
    _____a. not at all prepared   _____b. somewhat prepared   _____c. well prepared   _____d. very well prepared

12. In your opinion, how well prepared are **you to use computers for classroom instruction and school use**.
    _____a. not at all prepared   _____b. somewhat prepared   _____c. well prepared   _____d. very well prepared

13. Check ALL areas that apply: Where have you received computer?
    _____a. high school   _____b. college   _____c. professional development/workshops

14. In the last 3 years how many hours of professional development (not college) in the use of computers have you had?
    _____0   _____1-10 hours   _____11-20 hours   _____21-30 hours   _____more than 31

15. Have you ever taken a college/university course in the use of computers?   _____yes   _____no

    If yes, how many courses and what were they? _____

16. To what extent do you believe the following have prepared you to use computers?

	Not at all	Small Extent	Moderate Extent	Significant Extent	Great Extent
College/graduate work......................................	1	2	3	4	5
Professional development activities........................	1	2	3	4	5
Colleagues...	1	2	3	4	5
Students...	1	2	3	4	5
Independent learning.......................................	1	2	3	4	5

Section II – Instructional Use of Computers

For each objective listed below, please indicate how often **you** use computers to accomplish this goal.

	Never	Rarely	Sometimes	Often	Regularly
1. Create materials (tests, handouts etc.)..........	1	2	3	4	5
2. Gather information for planning lessons.......	1	2	3	4	5
3. Create multimedia presentations................	1	2	3	4	5
4. Record student attendance........................	1	2	3	4	5
5. Record grades (EZ Grade Pro etc.)............	1	2	3	4	5
6. Complete report cards/progress reports.........	1	2	3	4	5
7. Write lesson plans.................................	1	2	3	4	5
8. Communicate with colleagues/other professionals	1	2	3	4	5
9. Communicate with parents/students...........	1	2	3	4	5

Section III – Classroom Integration of Computers

For each activity or application listed below, please indicate how often you use computers with your students or assign to students **during class time.**

	Never	Rarely	Sometimes	Often	Regularly
1. Word Processing (Word etc.)....................	1	2	3	4	5
2. Spreadsheets (Excel etc.).........................	1	2	3	4	5
3. Desktop Publishing (Publisher etc.)............	1	2	3	4	5
4. Multimedia (PowerPoint, Hyper Studio etc.)...	1	2	3	4	5
5. Graphics (Paint, clipart etc.).....................	1	2	3	4	5
6. Communicating (e-mail, chat rooms, etc.).....	1	2	3	4	5
7. Internet...	1	2	3	4	5
8. Web Quests..	1	2	3	4	5
9. Subject-specific software programs............	1	2	3	4	5
10. Scavenger Hunts.................................	1	2	3	4	5
11. Simulation Games (SimCity, Operation frog etc.)	1	2	3	4	5

Section IV – Barriers Affecting Computer Use/Integration

For each statement listed below, please indicate to what extent that statement affects your use of computers.

	Not a Barrier	Small Barrier	Moderate Barrier	Significant Barrier	Major Barrier
1. Not enough computers...................................	1	2	3	4	5
2. Lack of good instructional software..................	1	2	3	4	5
3. Outdated or unreliable computers.....................	1	2	3	4	5
4. Internet access is not easily accessible..............	1	2	3	4	5
5. Inadequate training opportunities.....................	1	2	3	4	5
6. Lack of release time to learn computer skills........	1	2	3	4	5
7. Lack of administrative support........................	1	2	3	4	5
8. Lack of technical support or advice..................	1	2	3	4	5
9. Lack of time in the schedule to use computers with students during class..	1	2	3	4	5
10. Concerns about students access to inappropriate materials..	1	2	3	4	5
11. Lack of funding......................................	1	2	3	4	5