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# Computer self-efficacy beliefs of preservice teachers: Implementation of a concurrent mixed-model.

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COMPUTER SELF-EFFICACY BELIEFS OF PRESERVICE TEACHERS:
IMPLEMENTATION OF A CONCURRENT MIXED-MODEL

by

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ABSTRACT

This aim of this concurrent nested mixed-model study was to examine the computer self-efficacy beliefs of 210 preservice teachers. The quantitative component consisted of the Computer User Self-Efficacy (CUSE) scale that examined the relationship between computer self-efficacy and gender, age, ethnic origin, previous undergraduate degree, licensure area, software packages use, computer experience, training, ownership and socioeconomic status of preservice teachers. Students' previous undergraduate degree, licensure area, experience and familiarity with software packages were found to have a statistically significant effect on computer self-efficacy.

The qualitative data indicated that society and school were the most positive factors that influenced preservice teachers' attitudes towards computers, while the family had the highest percentage of negative influence. The findings revealed that although preservice teachers had completed only two months of the program, those with higher CUSE scores were more ready to integrate computers into their lessons than those with lower scores.

# DEDICATION

This research is dedicated to my loving family, friends and my husband Franco.

Your constant support and words of encouragement

have made my entire educational journey

a life-changing experience.

Thank you for making all my dreams come true.

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# CHAPTER I

# INTRODUCTION

Educational technology and computers play an important role in education. Since the use of technology is no longer confined to computer science majors, it is essential for all students and future teachers to use and understand computers and implement technology in order to be successful in their future careers (Rizza, 2000). Even though there is an increasing number of computer laboratories used in universities all across North America, many teachers do not feel comfortable using technology in the classroom.

The teachers' role has a huge impact on educational technology. The way teachers view technology, how they respond to it, how they present it, and how it helps to accomplish their vision of teaching and learning, will affect the future years of implementation of educational technology (Roblyer, 2003). Some teacher education programs remain problematic due to the amount of time spent on examining technological potential. Many inservice (currently teaching) and preservice (currently in training) teachers believe that they are not adequately trained and often are not given appropriate tools in order to implement educational technology in their classrooms (Hardy, 2003). An increased amount of positive exposure to technology in all areas of academia may generate more favourable attitudes toward computers and educational technology. Research done by Brosnan (1998) indicated that female undergraduate students tend to be more reluctant to use computers due to the higher anxiety when using them than do their male counterparts. Furthermore, it is much more likely for girls to be introduced to computers by their teachers, thus making the teacher's role in shaping girls' impression of technology crucially important. It is imperative that these teachers are adequately trained in order to reduce any anxiety they themselves may have. Rosen (1995) reported that although the computer experience is the most noticeable predictor of technophobia, other predictors such as age, gender, teaching experience, computer availability, ethnicity, and school socioeconomic status also play important roles in predicting technophobia in teachers.

The construct of self-efficacy has come into existence as part of a social cognitive theory. Self-efficacy can be defined as the beliefs a person has about his or her capability to successfully perform a particular behaviour or task (Cassidy and Eachus, 2002). Strong feelings of self-efficacy in students can help students to create a better academic or occupational environment. Preservice teachers with lower computer self-efficacy are more likely to have problems with technology integration and are likely to have problems integrating technology into they own classroom when they exit teacher education programs and start teaching in their own classrooms (Wall, 2004). Preservice teachers are expected to be knowledgeable about current technology and how it can be used to promote learning. Many school leaders and inservice teachers look to new teachers to fill the gap between the technology available in schools and its effective integration into the curriculum (Jacobsen, Clifford & Friesten, 2002). Preservice teachers' strengths and weaknesses as they affect technology integration should be evaluated in order to determine their potential for the effective use of computers. One possible way to examine effectiveness of future teachers' technology use in the classroom can be measured by evaluating their self-efficacy (Wall, 2004). The Computer Self-Efficacy Scale (CUSE) may be used to identify individuals, in particular students (and in this study preservice students), who will find it difficult to exploit a learning environment which relies heavily on computer technologies (Cassidy & Eachus, 2002).

Problem statement

Even though preservice teachers have formal training in instructional technology, most new teachers have limited knowledge about integrating computer technology in their professional practice and curriculum (Pallegrono & Altman, 1997; Bauer, 2000; Hardy, 2003).

Educational Relevance

The results of this computer self-efficacy study may be used to review the University of Windsor Faculty of Education technology instructions to better meet the needs of the preservice teachers. In addition, the results of study may serve as an informative guide for determining technologically problematic areas that preservice teachers encounter.

Purpose of the study

The purpose of this concurrent nested mixed-model study is to obtain statistical, quantitative results from preservice teachers at the University of Windsor and then follow up with a qualitative open-ended questionnaire. In the quantitative component, the Computer User Self-Efficacy (CUSE) scale will examine the relationship between self-efficacy and gender, age, ethnic origin, previous undergraduate degree, licensure area, computer experience, use of software packages, computer training, computer ownership and socioeconomic status of preservice teachers. In the qualitative component open-ended questions are used to explore computer self-efficacy results by examining preservice teachers' past technological interaction experiences and beliefs.

Rationale for the study

Computers and technology are becoming a necessity in all aspects of everyday life. The technology of the 21st century has had an impact on everybody: thus, teachers need to become more proficient end-users of various software applications. Since computer technology plays the important role of supporting learning in higher education, the students are expected to master new applications in order to keep up with technological progress. One of the main reasons for the efficient use of technologies is connected with the improvement of learning and future preparation of students for post-secondary education or the workforce. Research from the United States and other countries indicate that computer user differences are present in technology and also in preservice teachers. Unfortunately, there has been very little research done in Canada in regards to preservice teachers and technology.

Current literature in computer self-efficacy is lacking a combination of qualitative and quantitative studies. Although, the quantitative study on computer self-efficacy (Wall, 2004) recommended qualitative follow-up (such as interviews), so far there has not been enough research conducted combining the two methods. Some research conducted on preservice teachers (Bauer, 2000; Hardy, 2003) did have a combination of mixed-methodology studies, but there was no attempt to further validate the research questions.

The aim of this study is to encompass the advantage of both qualitative and quantitative research methods, where a researcher is able to gain perspectives from the different types of data and from different levels within the study.

Quantitative Research Questions:

1. Is there a significant difference in computer self-efficacy between male and female preservice teachers?

2. Is there a significant difference in computer self-efficacy between traditional (teacher education students under 24 years of age) and non-traditional students (teacher education students 24 years of age or older) (Parker, 1993)?

3. Is there a significant difference in computer self-efficacy of preservice teachers based on their ethnic origin?

4. Is there a significant difference in computer self-efficacy of preservice teachers based on their previous undergraduate degree?

5. Is there a significant difference in computer self-efficacy of preservice teachers based on their licensure area (Primary/Junior, Junior/Intermediate and Intermediate/Senior)?

6. Is there a significant difference in computer self-efficacy of preservice teachers based on their computer experience?

7. Is there a significant difference in computer self-efficacy of preservice teachers based on their familiarity with software packages?

8. Is there a significant difference in computer self-efficacy of preservice teachers based on their computer ownership?

9. Is there a significant difference in computer self-efficacy of preservice teachers based on their previous computer training course?

10. Is there a significant difference in computer self-efficacy of preservice teachers based on their socioeconomic status?

Qualitative Research Question:

*Central Question*

1. How do preservice teachers describe their previous computer experiences and beliefs based on the four sources of self-efficacy (performance accomplishments, vicarious experiences, verbal persuasion and emotional arousal)?

Definition of Terms

*Ethnic origin:* ethnic or cultural group(s) to which the respondent's ancestors belong (2001 Census Dictionary).

*Incompatibility theses:* impossible compatibility between quantitative and qualitative methods due to the incompatibility of the paradigms that underlie the qualitative and quantitative methods (Tashakkori & Teddlie, 2003).

*Inservice teachers:* teachers currently teaching.

*Licensure/Divisions of Preservice teachers:* (i) Primary/Junior (Junior Kindergarten to Grade 6), (ii) Junior/Intermediate (Grades 4 to 10) and (iii) Intermediate/Senior (Grade 7 to 12).

*Mixed-methods*: research focused on the collection and analysis of both qualitative and quantitative data in a single study (Creswell, 2003).

*Non-traditional students:* teacher education students 24 years of age or older (Parker, 1993).

*Quantitized data:* qualitative data type converted into numerical codes that can be statistically analyzed (Tashakkori & Teddlie, 2003).

*Preservice teachers:* full-time students (that possess an undergraduate degree) in the consecutive teacher education programme that are currently in training to become teachers.

*Self-efficacy:* the beliefs a person has about his or her capability to successfully perform a particular behaviour or task (Cassidy & Eachus, 2002).

*Teachable Subjects:* according to University of Windsor Undergraduate Calendar 2004/2006, Junior/Intermediate preservice teachers are required to select one teachable subject (excluding Individual and Society). Intermediate/Senior preservice teachers are required to select two teachable subjects from the following: Biology, Chemistry, Computer Science, Dramatic Arts, English, French, Geography, History, Mathematics, Music-Instrumental, Music-Vocal, Physical and Health Education, Physics, Religious Education in the Roman Catholic Schools, Science (General), Individual and Society, and Visual Arts.

*Traditional students:* teacher education students under 24 years of age (Parker, 1993).

## Summary of Chapter I

Cassidy and Eachus (2002) defined self-efficacy as the beliefs a person has about his or her capability to successfully perform a particular behaviour or task. Having strong feelings of self-efficacy in students can help them to create a better academic or occupational environment. Preservice teachers with lower computer self-efficacy are more likely to have problems with technology integration when they exit teacher education programs and start teaching in their own classrooms (Wall, 2004).

Current literature in computer self-efficacy is lacking a combination of qualitative and quantitative research methods. Although, some research conducted on preservice teachers (Bauer, 2000; Hardy, 2003) did have a combination of mixed methodology studies, there was no attempt to further validate the research questions.

The purpose of this study is to obtain statistical, quantitative CUSE results from preservice teachers at the University of Windsor and then follow up with a qualitative open-ended questionnaire in order to explore computer self-efficacy results by examining preservice teachers' past technological interaction experiences and beliefs.

# CHAPTER II

# REVIEW OF THE LITERATURE

## Social Cognitive Theory

In the formulation of a theoretical view for studying the computer self efficacy of preservice teachers, social cognitive theory provides a useful model. Bandura (1986), as a social cognitive theorist, postulated that behaviours were best understood in terms of "triadic reciprocal determinism", which was defined as a belief that cognition, behaviour and the environment operate interactively as determinants of one another (See Appendix A). This meant that individuals did not simply react to environmental events; the individuals were able to actively create their own environments and act to change them. Positive or negative feedback for behaviour, in turn, influenced people's thinking (cognitions) and the ways in which they acted to change the environment (Bandura, 1986, p.23-24).

Efficacy expectations are individual beliefs or convictions that one can produce certain behaviour. Ryckman (2000) in his book *Theories of Personality* (2002) cited Bandura who indicated that individuals who knew what to do in a situation and who had the skills required to do it would not necessarily perform well if they had serious self-doubts about their capabilities. Therefore, it was postulated that different individuals with the same skills, or the same individual on different occasions, may perform poorly, adequately, or extraordinarily. In addition, it was noted that competent functioning involved not only skills but also the judgments of self-efficacy to permit their effective use. Even when individuals possessed the necessary skills in combination with a strong sense of efficacy, they may not have chosen to perform the activities if they had no incentive to do so. For instance, Bandura pointed out that efficacy expectation influenced people's choices of activities and environmental settings. The amount of effort the individual expended on certain activities, how long he or she persisted in challenging tasks and in the face of disliked experiences depended on judgments of their self efficacy. Individuals with low efficacy expectations were prone to avoid threatening situations that they believed would exceed their coping skills. If these individuals had to perform in threatening situations, their low efficacy expectation would lead them to expend little effort and to give up after a short time. In contrast, individuals with high efficacy expectations, opted for challenging tasks in order to develop new skills. They were able to overcome their obstacles and engaged in activities that helped them to obtain their subgoals and eventually become closer to the achievement of their main goals. Thus, the construct of self-efficacy is situation specific due to the fact that self-efficacy is based on self-perceptions regarding particular behaviour.

As a social cognitive theorist, Bandura (1977, 1986) stated that the acquisition of different levels of self efficacy was determined by the following four major sources: (i) performance accomplishments (success or failures) – where efficacy expectations were ingrained in personal mastery experiences. Higher expectations were created by successful experience, whereas in contrast the low expectations were created by failure experiences. To change the low expectation one had to have a repeated and frequent success stimulated by individual determined effort, (ii) vicarious experiences (observing other people's successes and failures) – seeing or visualizing other people performing successfully could inspire high self-perceptions of efficacy in observers, (iii) verbal persuasion (from teachers, relatives, colleagues)- used as encouragement to let one know that he/she may have the necessary capabilities to accomplish the goal, and (iv) emotional arousal (affective state) –difficult situations caused a high state of arousal where one could use this arousal information to judge one's capabilities.

Computer Self-Efficacy

Since the introduction of Bandura's self-efficacy concept, research flourished in academic development and achievement, career choices, job performance and physical and mental health (Ryckman, 2000). Academic development and achievement research stated that the strongest source of efficacy information came from the actual levels of prior accomplishments and mastery of tasks. Established self-efficacy beliefs have influenced what students do by affecting the various types of strategies used to achieve success. For example, students with higher efficacy used more rehearsal, elaboration and organization strategies. Additionally, since students compared themselves to other students, outperforming other students was likely to increase self-efficacy levels. Self-efficacy beliefs affected the amount of effort people applied as well as the level of persistence they displayed when experiencing adversity and anxiety (Ryckman, 2000).

Research on college and non-college adults demonstrated that self-efficacy beliefs were linked positively to striving for achievement and accomplishments (Ryckman, 2000). This confirmed the suggestion made by Bandura (1986) regarding the perceptions of an individual's capabilities to perform a task leading to an increased likelihood that the task would be completed successfully.

A previous study done at the University of Windsor (Kellenberger, 1994) explored the relationship between preservice teachers' achievement and value-related motivational beliefs about computers and four groups of teaching-related perceptions: (i) perceived likelihood of using computers under differential access to computer resources (ii) perceived likelihood of using computers for different instructional uses (iii) perceived computer self-efficacy and (iv) perceived frequency of use and value of computers in different subject areas. Achievement-related motivational beliefs were examined within a motivational framework called "learning history". The framework was used to describe preservice teachers' perceived success of computer experience and former achievement together with the causal attributions used to explain this achievement. Value-related motivational beliefs for computers were constructed from the following six measurements: (i) own personal needs, (ii) future teaching career, (iii) spouse, (iv) children, (v) future students, and (vi) society in general. Data were collected twice using the questionnaire. The first time, data related to motivational beliefs were gathered at the beginning of the programme. Data related to both motivational beliefs and teaching-related perceptions were gathered at the end of the programme. It was found that preservice teachers' learning history and value of computers were only moderately more favorable when they left the programme compared to when they entered it. Perceived computer self-efficacy was the only dependent variable related to both independent variables (own value and learning history). “Own value” (variable consisting of the value of computers for preservice teachers’ own needs and their career) was the only effect found to be significantly related to each of the four teaching-related perceptions. The researcher concluded that University of Windsor preservice teachers with a higher perceived value of computers for themselves had more favourable teaching-related perceptions (See Appendix B).

Computer Self-Efficacy and Computer Experience, Use of Software Packages, Computer Training, Computer Ownership and Gender

Cassidy and Eachus (2002) examined self-efficacy beliefs in the context of computer use. In their study self-efficacy beliefs have been reported as a major factor in understanding the frequency and success within individual uses of computers. The past research confirmed that it was the quality -not the quantity- of computer experience which was a crucial factor in determining self-efficacy beliefs (Cassidy & Eachus, 2000; Ertmer, Evenbeck & Cennamo, 1994; Hill, Smith & Mann, 1987; Torkzadeh & Koufteros, 1994). This meant that it was the type of computer experience which was important rather than computer experience per se. Positive experience with computers would increase self-efficacy beliefs, while negative experiences would reduce self-efficacy beliefs. Cassidy and Eachus (2002) pointed out that the investigation of gender differences in computer self-efficacy (CSE) indicated that the differences may be related to the perceived masculinity of the task in question. Furthermore, it appeared that it was the complexity of the task which determined the gender difference in CSE. The more complex the task, the higher was the perceived masculinity factor; therefore, men showed higher self-efficacy for such tasks. Cassidy and Eachus (2002) used a 30-item Computer User Self-Efficacy (CUSE) scale in order to measure general computer efficacy in an adult student population. Part One of the instrument was used to examine the following factors: (i) *computer experience*: measured on a 5-point Likert scale (from 1 = none to 5 = extensive) (ii) *familiarity* with software packages: respondents picked from a list of nine software packages and with the option to specify additional packages (iii) *computer training*: choice from yes or no (iv) *computer ownership*: choices from yes or no. The original phase of the research consisted of a 47-item CUSE using a 6-point Likert scale and was unidimensional; therefore it was refined to 30-items in Part Two of an instrument. The modified version (Part Two) of the instrument contained more acceptable numbers that did not affect the psychometric properties of the instruments. This scale investigated the relationship between self-efficacy, computer experience, use of software packages, computer training, computer ownership and gender. The total number of female participants was 113 and male participants was 94. The participants consisted of the following five groups (i) first year physiotherapy students with minimal computer experience (ii) software engineering students with extensive computer experience (iii) radiographers who regularly used electronic equipment (iv) post-registration nurses who rarely used computers and (v) Internet users who had at least moderate experience with computers. The main reason for the inclusion of discrete groups within the sample was to generate validity data for the instrument. Three groups were retested a month later, with the exception of the software engineers and the Internet users. As predicted, the software engineers scored significantly higher than all other groups; the internet users had the second highest score. Although the radiographers scored higher than nurses, there were no differences between nurses and physiotherapists. Males had higher self-efficacy scores, were more experienced, and more familiar with a greater number of packages than females. Training did not affect the gender differences, although males did show higher self-efficacy scores in trained and untrained groups. The participants who owned computers had higher self-efficacy, more experience and greater familiarity with packages. The results indicated that experience with computers and familiarity with software packages were important factors when explaining the effect of gender, training, and computer ownership on CSE. The CUSE scale yielded beneficial results since it could be used to identify the participants who found it difficult to learn when having to rely heavily on computer technologies.

Computer Experience and Implementation of Mixed-Methodology

Past research provided some important facts about preservice teachers' attitudes toward technology. Results from a study by Compeau and Higgins (1995) indicated that individuals with high self-efficacy used and enjoyed using computers more, while experiencing less computer-related anxiety.

A study that employed both quantitative and qualitative data analysis techniques was conducted by Rizza (2000). This study evaluated the influence of the use of technology in an undergraduate education psychology course. The sample consisted of 54 undergraduate education majors. The course employed technology within the content through the use of a course Web page and PowerPoint lectures. In addition to the course requirements, the students were exposed to several Web-based activities. The Web-based activities included evaluating education-related Web sites and participation in the class Web bulletin board questions. The course Website contained lecture information and links related to material covered in class and additional extra-credit opportunities not discussed in class. In addition, the preservice students were required to research a topic of interest and present their information in the form of a Web page. They were provided additional training in Webpage design as well as additional outside class assistance. The students were asked at the beginning and end of the semester to rate their attitudes toward computers and their use of computers. In a pre-course survey, the students were asked to evaluate the *comfort* (referred to as the students' feeling of ease with computers), *knowledge* (defined as the students' overall understanding of the computer and the application they used) and *competence* (referred to in terms of the students' self-esteem towards computers). The rating scale used was from 1 = low to 5 = high. In a post-course survey the preservice teachers were asked to re-evaluate their attitudes about computers after the course work was completed. Additionally, they discussed how the activities in the course influenced their attitude toward computers and their changes in computer use as a result of the course. It was found that the attitudes of students that were exposed to instructional technology did change in the two areas of *comfort* and *competence*. According to the work of Bandura (1986) how comfortable and competent an individual felt about the task at hand would have a direct impact on one's self-efficacy and subsequent engagement in the task. Thus, the participants responded that their comfort level using computers increased as a result of a course participation infused by technology. Furthermore, the participants anticipated further growth in use of technology as their comfort increased; therefore, indicating a more active role in project design and implementation of future classes as teachers. Interestingly, the participants in the study indicated that there was no difference in their perceptions of the amount of knowledge of computer technology acquired. The qualitative data revealed that the participants did perceive an increase in their knowledge of specific computer skills while quantitative data produced nonsignificant results. One possible explanation for the difference among quantitative and qualitative data was that quantitative data may be a result of the questions asked than the data itself. The preservice teachers did indicate that increased exposure to technology made them more aware that there was a lot more to learn; therefore, the educators who instructed using technology needed to implement directly the reinforcement of skills that would help students to become more self-efficacious. This study had a restricted sample and sample size, thus the generalizability of the results to groups other than undergraduate education majors was not established (Rizza, 2000).

A paper presented by Hardy (2003) highlighted the results of an investigation of preservice elementary teachers' perceptions of their ability and preparation to teach using technology. Preservice teachers voiced a great deal of criticism because it was felt that they were only being taught the fundamentals of operating computer software such as how to create a spreadsheet, how to use grading programs and how to implement a multimedia presentation. A review of the literature done by Dusick (1998) reported that although these are valuable skills, often they were not sufficient to adequately prepare the teacher to teach with technology. Hardy (2003) collected data from 43 preservice elementary teachers by using a 5-point Likert scale and open-response items. Data indicated that preservice teachers perceived themselves as capable, although they had difficulty identifying specific technological resources that could be used as instruction tools. They felt that there was a need for more instruction on methods of teaching with technology. The results of open-ended questions indicated that the university in this study (located in the United States) had failed to prepare participants well to teach with technology. The data indicated that 83.7% of preservice teachers did not receive enough instruction regarding methods of using technological resources to teach a concept or process. This indicated that teacher educators in the future may need to possibly revise teacher preparation programs to better incorporate instructional technology in order to provide preservice teachers with more experience with technological resources both as learners and instructors. Although Hardy's (2003) survey appeared to be reasonably valid, based on the observed compatibility between the survey questions and the participants' responses, no data were available concerning the validity or reliability of the questionnaire.

Gender Differences, Gender Perceptions and Computer Influences from Society, School, Family, Employer:

Bauer's study (2000) examined female preservice teachers' perception of gender differences in learning and the use of computer technology. Data were analyzed using the quantitative and qualitative methods in a mixed-methodology design. The purpose of the study was to triangulate findings in order to demonstrate convergent results (Creswell, 1994). The quantitative data were provided by a survey/questionnaire while open-ended questions and a focused interview were the sources of qualitative data. The survey/questionnaire was completed by 45 preservice participants. The questionnaire contained 35 items and many were based on the Likert-type item scale from 1 = low to 5 = high, while other questions consisted of "yes" or "no" responses. Bauer (2000) found that the following four overlapping themes emerged from the survey/questionnaire: (i) female gender bias such as the opinion that men knew more about computer technology (ii) low self-esteem and evidence of frustration with technology (iii) medium enthusiasm and competency levels in various educational technology programs and (iv) weakness in the technology training received from teacher education classes. This meant that future female teachers would be reluctant to encourage computer technology in the classroom because teacher education programs did not do enough to encourage computer literacy among female students. The open-ended question at the end of the survey (questionnaire) asked participants to recount their worst problem with computers and how it was solved.

The purpose of this question was to measure frustration and reaction levels. All the answers had one common indicator, namely that all preservice teachers did ask for help in solving a computer problem. Although it appeared they were using good judgement, data indicated that many of the students had problems that could have been solved by themselves in far less time (e.g. rebooting the system after a crash or saving material to a disk after the work). This finding meant that many preservice teachers did not have adequate technology skills for computer problem solving. Having step-by-step solutions training in their initial course work could have helped to eliminate the frustration of the preservice teachers who may have been unnerved by difficult experiences. This program could also have trained them to troubleshoot situations in future classrooms. The qualitative data from one interview supported the findings from the quantitative data. The interviewee felt that technology education in her Methods class (focussed on learning how to develop a classroom computer lesson) did not have much impact, while 38% of preservice education teachers felt that Teacher Education did not prepare them well enough to teach computer lessons. Another important point was that many preservice teachers felt most comfortable with teaching lessons in word processing and the least comfortable teaching functions of databases and spreadsheets in math lessons. These data implied that there may be fewer math lessons taught by future female teachers using these important technology tools. It was noted that 60% of participants could create a PowerPoint presentation and 36% used a HyperStudio stack that could be effective as a vehicle of technology when presenting to a large group. Apart from the fact that this research study included data from only one school, from one part of the country at a specific time of the year, a qualitative portion of an interview conducted with only one participant was an additional limitation of this mixed-methodology design study.

Roberta Furger (1998) in her book *Does Jane Compute? Preserving Our Daughters' Place in the Cyber Revolution* demonstrated the impact teachers can have on getting girls involved with technology once they are aware of the gender gap. Furger (1998) pointed out that many programs were not designed to train teachers on gender and technology issues. She stated the following: "There is very little in the way of equity training in preservice teacher education, where it has the potential to affect every new teacher entering our classroom" (p.93). A study done by Gilley (2002) investigated the gender issue of technology awareness. The researcher tested the allegation that many programs were not designed to train teachers on gender and technology issues by surveying twenty teacher education programs in order to see if four years after Furger's book, gender and technology awareness training were being included in required courses to prepare future teachers who might encounter gender inequity in fluency with information technology. It was stated that the intervention in teacher education programs may be particularly critical since the majority of preservice teachers are female. This meant that female students themselves were more likely to carry negative attitudes about technology, thereby the idea of incorporating technology was discouraging. Gilley's (2002) review of the literature suggested that the following three major options be used to ensure that preservice teachers were technologically literate in the United States: (i) preservice teachers should be required to take an instructional technology course (ii) instructional technology would be integrated into a Methods course instead of standing as its own course and (iii) by passing a test of some kind to show basic computer proficiency among preservice teachers. The researcher chose the top twenty schools of education as rated in the April 15, 2002 issues of *U.S. News & World Report*. This way, a broad cross-section of public and private schools across 14 different States was represented in this research. The researcher visited each school's Web site in order to find out if their teacher education program had a required technology course. If the school offered the course, the researcher emailed the instructor to check if gender issues were covered in the course at all. The research showed that only 15% of the schools in the study required that every single preservice teacher learn about issues relating to the gender gap in technology. This meant that only 15% of future teachers of these top twenty schools surveyed were equipped with the skills to recognize and change this issue when they enter the classroom.

Todman and Dick (1993) conducted a study in Scotland that investigated the relationship between pupil and teacher attitudes toward computers in primary schools. They reported that the only sex difference in attitudes toward computers resided in how much "fun" computers were perceived to be. The study reported by Cassell (1998) stated that girls tended to view the computer as a tool. Often, they used computers for word processing or other clerical duties in which girls outnumbered boys. On the other hand, the boys used computers more for fun, such as playing video games. Research done in 1997 by the Gallup poll cosponsored by CNN, *USA Today* and the National Science Foundation, and research done by Subrahmanyam, Kraut, Greenfield and Gross, (2000) claimed that there was not a major gender gap in teens' relation to technology. It was found that teenage boys and girls reported an equal level of computer usage and reported a similar degree of confidence in their computer skills. Furthermore, they reported two major differences between genders: (i) boys played video games more than girls and (ii) boys spent significantly more time online than girls. Again, in the 1999 survey done by Gallup Poll and cosponsors, similar results were found in that computer games and Web surfing were far more common for boys. Subrahmanyam et al. (2000) indicated that cognitive research suggested that playing computer games in moderation could be an important building block to computer literacy because it enhanced children's ability to read and visualize images in three-dimensional space and track multiple images simultaneously. This brought to light the issue of bias in software design and whether or not educational software were tailored to appeal to boys. Huff and Cooper (1987) stated in their research that there was a bias even in educational software, thus making them more suitable to boys. The research consisted of 43 educators with programming experience in design of software for either boys or girls or a group of students consisting of both boys and girls. The results showed that programs for girls were classifiable as learning tools whereas programs for boys and a group of students were most like games. Surprisingly, it was concluded that it was not the computer or software that was at the root of the sex bias, but the expectation and stereotypes of the designers of the software.

The study conducted by Upitis (2001) investigated project-based learning involving technology. Project-based learning was a useful activity that involved a large degree of social interaction and a natural integration of subject areas. Papert (1993) indicated that interaction in cognitive development plays an important role due to the fact that student construct knowledge by interacting with teachers and peers, engaging in ideas, confronting problems, and reviewing materials. The literature review in the Upitis' (2001) study pointed out that the use of computers as tools in the context of project-based learning had been heralded along with the necessary teacher support and knowledge in order to create exciting and inclusive classrooms where computers would be integrated in an authentic fashion. The research conducted by Upitis (2001) examined how 29 (12 females and 17 males) Canadian junior high school (grades 7 and 8) students aged 11 to 14 used technology to design and produce toys. The researcher and her helpers observed, solicited and documented students' behaviours by using extensive field notes, conducting informal interviews, analysing artifacts, participating in class discussions and attending a Toy Fair. The students were expected to create a toy, using a wide variety of materials and human resources. They had to produce a number of additional products such as design plans, logos, advertisements and business cards. It was mandatory that at least two of these products be developed with a computer. Another requirement was fulfilled in the computer lab at the school that involved learning to use a spreadsheet to create a "pretend toy order" within a specified budget. During the five-week unit, the teachers monitored the students' progress through the daily work journals and small-group discussions. The final result of the unit was that the students would display, demonstrate and describe their toys to the other members of the school and the neighbourhood community in a Toy Fair. Upitis (2001) found that many of the girls made stuffed animals while many of the boys constructed their toys from wood, demonstrating traditional gender choices. The researcher purposely selected the following four students that represent the full range of technology use: (i) Desiree - "The Titanic": designed a Titanic computer game that was entirely text-based. She wanted players to concentrate on the story. She spent most of her effort on creating the game itself (there was no classroom instruction on the use of HyperCard but she received the help of her peers). She completed the rest of the units, such as advertising by hand (ii) Derek - "The Dino-Bank": created a dinosaur with a slit in its back for saving coins. He wanted to find a fun way for kids to save money. Additionally, he used Lex-an, a material made of "unbreakable plexi-glass" in his construction so the children would be able to see how much they were saving since the materials was transparent. He spent as much time on advertising his toy as on the design and manufacturing aspect by creating interactive computer programs. Interestingly, he found journal keeping tedious and "kind of boring" (iii) Jane – "Cuddles": created a stuffed animal called Cuddles. She was not enthusiastic about her toy. She spent little time designing the toy since she did not like sewing. She only used the computer when required. She created a business card and a flyer on the computer with her father's help. Interestingly, Jane handed-in a computer printout of her daily journal since she preferred it to the hand-written notes and (iv) Matt – "Puzzle Castle": created a computer game with math problems and riddles. The story was about a knight who had to save a princess. He got the idea from non-violent games. He was asked if it was possible for a woman to be a hero. He admitted he never thought of that since he had never seen a game like that. He wanted to modify the game to allow players to select the gender they wished to play. He also noted that the game would sell better with the gender option. Matt indicated that he disliked daily journals and the unit of advertising. This research was very useful since it demonstrated that the project-based curriculum unit allowed students to use a wide array of abilities and to incorporate a broad range of interests. The potential of project-based units was that it was possible for the girls and the boys to shift their views of themselves as they made use of computer technology. The variety of computer uses appeared to disrupt some of the typical gender-technology patterns. Desiree used the computer in a way that made her an expert, while Matt realized that his project could be integrated across genders. Ultimately, it was crucial for teachers to link computer use with girls' interests as there was a lack of appropriate conditions for girls to thrive in a computer-rich environment.

A recent study done in Britain by Colley and Comber (2003) examined possible changes in the computer experience and attitudes of 11-12-year-old and 15-16-years old students. Recently introduced applications such as e-mail, accessing the Internet and using CD-ROMs showed no overall gender difference in their frequency of use. Additionally, the data indicated that some gender differences remained, particularly in attitudes. It was pointed out that boys: (i) liked computers more (ii) were more self-confident in their use and (iii) used computers more frequently out of school, especially for playing games. It was found that older girls held the least positive attitudes, and this suggested that their approach to computers may be influenced by the cultural pressures of gender stereotyping. It was concluded that even though the evidence showed that some changes occurred since the early 1990s, increased exposure to computers had not closed the gender gap.

Butler (2000) explored the literature and research of the last fifteen years on gender and computer technology. Her focus was on young adolescents. She noted that past research indicated that middle school played an important role in making a difference in computer attitude and use, as girls need more exposure to technology, particularly during the critical middle school years. It was suggested that more computer training should be provided to women teachers who could then serve as positive role models. The researcher further suggested that educators continue to pay attention to the impact that school, class, parental attitudes and student learning styles play in girls' computer technology attitudes and uses. It was noted that careful attention needed to be paid to the issues of girls and boys and computer technology.

Vicarious Learning Experiences and Self-Efficacy

Wang, Ermert, and Newby (2004) explored how vicarious learning experiences and goal setting influenced preservice teachers' self-efficacy for integrating technology into the classroom. The total number of participants in the study was 280 and they were enrolled in an introductory educational technology course. Research design consisted of a two way Analysis of Variance (Vicarious experiences X Goal Setting) mixed factorial research design. The participants were divided into 18 lab sections, such that the sections belonged to one of four conditions (three experimental and one control). The four conditions were: (a) NVE/NGS: no vicarious experiences and no goal setting (also defined as the control group), (b) NVE/GS: no vicarious experiences but with goal setting, (c) VE/NGS: vicarious experiences with no goal setting, and (d) VE/GS: vicarious learning experiences with goal setting. The purpose of this design was to examine how vicarious experience and goal setting affect preservice teachers' judgment of self-efficacy for technology integration. The vicarious experiences for technology integration in this study were presented to the students using VisionQuest, which was an instructional CD-ROM that featured the technology practices and beliefs of six K-12 teachers. This program provided vicarious learning experiences for the users through the use of video segments augmented by electronic artifacts (for example, lesson plans, student products) for teachers' classrooms. This CD-ROM illustrated various cases in which technology integration could be achieved in a variety of situations, in spite of differences in settings, resources or various student backgrounds. Users could explore teachers' classrooms either (i) one at a time (case by case) or (ii) thematically (comparing components of technology integration across cases). Users could examine the examples of teachers' planning for integration, their current implementation of technology within the classroom and their assessment of the impact of their efforts. The VE/GS and VE/NGS groups were exposed to vicarious experience; thus, they explored the VisionQuest CD-ROM and observed the technology uses and classroom management strategies of teachers. The VE/GS and NVE/GS groups were assigned specific goals. The participants were, therefore, given a number of specific goals which were completed through the WebQuest Website. For NVE/GS and NVE/NGS groups that were not exposed to vicarious learning experiences, the users explored a Web site that contained links to various WebQuests selected for the study. The WebQuest contained the content of technology in teaching, but it was missing the characteristics of vicarious learning. The groups (VE/NGS and NVE/NGS) that were not assigned any goals received only instruction on how to navigate the WebQuest Website or VisionQuest software. There was no required knowledge the participants were expected to gain from the software or the site. Most of the participants spent at least one hour viewing either the VisionQuest or the WebQuest Web site to which they were assigned. The participants completed a pre (consisting of 21 item Likert-style from 1 = strongly disagree to 5 = strongly agree) and post survey (consisting of 16 item Likert-style from 1=strongly disagree to 5=strongly agree) in order to examine their self-efficacy beliefs for technology integration. It was found that when vicarious learning experiences and goal setting were both present, a significantly powerful effect was produced. The final results indicated that preservice teachers who were exposed to vicarious experiences connected to successful technology integration (with and without goal settings) *did* experience significantly greater increases in judgments of self-efficacy for technology integration than those who were not exposed to these vicarious experiences. It was concluded that use of vicarious learning experiences and incorporation of specific goals may help preservice teachers to develop the confidence they need to become effective technology users within their own classroom.

Traditional versus Nontraditional students

Spitzer (2000) examined traditional (age 23 and under) and nontraditional (age 25 and over) full-time undergraduate students on their predictors of college success. The predictors included: five personal dimensions (academic self-efficacy, global self-worth, social acceptance, career decision making self-efficacy, and social support) and two learning dimensions (intrinsic motivation and self-regulation). The Grade Point Average (GPA) was used to assess the relationship between academic performance, career developments and career decidedness. The researcher concluded that nontraditional students and females had higher GPAs and greater decidedness. Academic efficacy, self-regulation and social support were positive predictors of GPA.

Parker (1993) investigated technological fluency of nontraditional students versus traditional students. The researcher found out that a high percentage of both traditional students (age 23 and under) and nontraditional students (age 24 and older) felt inadequate with regard to computers while maintaining a positive attitude toward computers in the school setting.

Ethnic Origin, Computer Access & Ownership and Income

According to the 2001 Census Dictionary on Statistics Canada's Website, ethnic origin referred to the ethnic or cultural group(s) to which the respondent's ancestors belong. Even though most people in Canada viewed themselves as Canadians, information on their ancestral origins has been collected since the 1901 Census to portray the changing composition of Canada's diverse population. In the 2001 Census, 39% of the total population reported Canadian as their ethnic origin either alone or in combination with other origins. Twenty-three percent of the total population stated Canadian as their only ethnic origin. In 2001, Canada was a nation of 30 million people, where the most frequent ethnic origins, after Canadian (11.7 million), were English (6 million) and French (4.7 million), Scottish (4.2 million) and Irish (3.8 million). Based on the *Canada e-Book* (2003) more than 200 different ethnic origins were reported in the 2001 Census question on ethnic ancestry. This changing source of immigrants to Canada has resulted in emerging new ethnic origins from Eastern Europe, Central Asia, the Middle East, Africa and Central and South America. Since 18.4% of the population was born outside Canada, the proportion of visible minorities has increased steadily over the past 20 years. Visible minorities were defined by the *Equity Act* as "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour." Although the distribution of visible minorities was varied across Canada, in Ontario 19% of the population were visible minorities.

Most of the literature from the United States referred to "ethnicity" while the literature from Canada used "ethnic origin". Wall's (2004) research indicated that ethnicity had a statistically significant effect on the computer self-efficacy of preservice teachers. A total of 121 participants were identified by one of the following three major groups of ethnicity: Caucasian, African American and Other. The African American preservice students had a significantly higher level of computer self-efficacy than the Caucasian preservice students. In addition, it should be noted that a large majority of preservice teachers in the study had access to a computer outside of the university setting.

Chisholm, Carey and Hernandez (2002) conducted a study on computer access and usage of university students of many different ethnicities. The study, which used a sample of 316 participants revealed that compared to a majority of students, minority students were less likely to own computers, were apt to have had their first experience with computers later in their lives and to have less confidence in their knowledge of computers. The researchers found that members of non-Euro-American ethnic groups did not own computers in the same quantities as the Euro-American group. If, in turn computer-based self-efficacy was predicted by computer ownership, it may affect computer-related performance. A model of computer-related performance in the study was partly confirmed. Data established a link between income and ethnicity that predicted computer ownership and that indicated that computer education and ownership predicted computer-based self-efficacy. The remainder of the model from the study needed to be confirmed through additional data.

Licensure Area/Division and Previous Undergraduate Degree

In her study, Wall (2004) found that the licensure area did not have a statistically significant effect on the computer self-efficacy of preservice teachers. Preservice teachers were identified by the following licensure areas: K-8, 7-12 and K-12. They were found to have relatively equal levels of computer self-efficacy.

Cassidy and Eachus' (2002) study on computer self-efficacy included participants with various undergraduate degrees. The highest self-efficacy was among software engineers while the lower levels of self-efficacy were exhibited by nurses and physiotherapists. The results indicated that experience with computers and familiarity with software packages had an effect on computer self-efficacy. Past literature lacks information pertaining to preservice teachers and their previous undergraduate degree.

Evolution of Mixed-Methods and Educational Research

In their book *Handbook of Mixed Methods in Social and Behavioral Research* Tashakkori and Teddlie (2003) stated that current researchers in the social and behavioral sciences could be categorized into three groups: (a) quantitatively oriented researchers (QUANs) working with the postpositivist tradition where focus of research is on numerical analyses, (b) qualitatively oriented researchers (QUALs) working with the constructivist tradition where focus of interest is on an analysis of narrative data, and (c) mixed methodologists working with various paradigms where the focus of research is on both qualitative and quantitative types of data. Tashakkori and Teddlie (2003) indicated the main idea behind pragmatism was centered on "what works" as the truth regarding the research questions under investigation. Pragmatists rejected choices associated with the paradigm wars, or more specifically the "either/or" component of incompatibility theses. They strongly supported the use of mixed methods in research and recognized the value of the researcher as the interpreter of results. The benefit of mixed methods research was not only that it could provide research questions that other methodologies could not, but that also it could provide the opportunity for presenting a greater diversity of various views in addition to stronger inferences. The researchers stated: "A major advantage of this research is that it enables the researcher to simultaneously answer confirmatory and exploratory questions, and therefore verify and generate theory in the same study" (Tashakkori & Teddlie, 2003, p.15).

In addition, the researchers defined multiple designs as research in which more than one method or more than one worldview were used. They defined the following categories of multiple designs: (i) multimethod research where research questions were answered by using two data collection procedures or two research methods, but within qualitative or quantitative traditions and (ii) mixed methods research describing designs consisting of mixed methods and mixed model research. Mixed methods research used qualitative and quantitative data collection and analysis techniques in either parallel or sequential phases. One of the characteristics of this design is that the mixing occurred in the methods section of a study. Tashakkori and Teddlie (1998; 2003) developed a grouping of the following five mixed methods designs: (a) sequential (b) parallel/simultaneous, (c) equivalent status, (d) dominant-less dominant and (e) multilevel use of approaches (Appendix C). In comparison, mixed model research (Tashakkori & Teddlie,1998) was mixed in many or all stages of the study. For example, mixing could occur at any of the following stages: questions, research methods, data collection and analysis, and the inferences process. This design had to meet a much more rigorous set of assumptions because of multiple research questions, but one of the advantages of such a research possibility is that two worldviews or paradigms were being mixed through a single research project. Furthermore, Tashakkori and Teddlie (2003) classified three stages of the research process: (a) exploratory versus confirmatory nature of the investigation, (b) quantitative and qualitative data/operations, and (c) statistical analysis/inferences and qualitative analysis/inferences. The authors pointed out that mixed methods only related to the data collection/operations stage, while the mixed model method related to three stages. They stated that:

> "A shortcoming of this classification is that it does not clearly differentiate between the data analysis stage and the nature of the final inferences that are made on the basis of the data analysis results. The main reason for lack of differentiation in the typology of design is that we, like many other writers, believe that all inferences in social/behavioral research have some degree of subjectivity…" (p. 29).

In extension of their earlier work, monostrand and multistrand mixed model studies were added. A monostrand mixed model design or single phase designs was quantitatively and qualitatively mixed so that one stage of the research process was different from the other two stages in order to answer either qualitative or quantitative research questions. The data could be transformed between both methods and analyzed to reach either qualitative or quantitative inferences. Therefore, the monostrand mixed model produces eight possible types of study: pure quantitative, pure qualitative, and six mixed model designs in which the alternate methods are selected for one of the three stages of research. This model has not been well-articulated in mixed methods research; thus, there is lack of systematic typology to integrate at this time. The multistrand design encompassed both qualitative and quantitative methods concurrently with respect to the research questions, data, data analysis and inferences. Multistrand mixed model studies were described as parallel mixed model designs and sequential mixed model designs consisting of multiple types of questions (both qualitative and quantitative) and both types of data and data analysis techniques.

Creswell (2003) identified the following two general designs: (i) sequential design consisting of explanatory, exploratory and transformative strategy and (ii) concurrent design consisting of triangulation, nested and transformative strategies (Appendix D). The sequential explanatory and exploratory designs are similar in the sense that both consist of two phases of research, but are different in such a way that the first design includes the collection and analysis of quantitative data followed by the collection and analysis of qualitative data; the second design consists of the collection and analysis of qualitative data followed by the collection and analysis of quantitative data. The findings from both phases are integrated in the interpretation stage of the study. In sequential explanatory design, the focus of qualitative data is to provide an explanation of quantitative findings while the sequential exploratory design emphasizes qualitative methods for depth and additional exploration of the research questions. The sequential explanatory and exploratory designs are similar to Tashakkori and Teddlie's (2003) sequential design. Both the sequential transformative and concurrent transformative designs are comparable in that they are guided by a theory; however they differ in their stage of data collection. Sequential transformative design is formed of a two-phase process that implements either quantitative or qualitative data collection first while the results are incorporated in the interpretation stage. In the concurrent transformative strategy, data collections occur simultaneously. Creswell's (2003) concurrent triangulation and concurrent nested designs are similar to Tashakkori and Teddlie's

(1998; 2003) equivalent status design. An advantage of concurrent triangulation design is the use of concurrent quantitative and qualitative approaches in order to balance the weakness of each and to confirm, cross-validate, or corroborate findings with a single study (Creswell, 2003). In concurrent nested strategies design, both quantitative and qualitative data are collected simultaneously, but equal importance is not assigned to qualitative or quantitative as in the concurrent triangulation design. The concurrent nested strategy consists of a predominant method that guides the project. The method with less priority would be embedded or nested with the predominant methods. The main purpose of nesting is that the embedded method addresses a different question from the dominant method or searches for the information from different levels (Creswell, 2003).

Since mixed methodology design is the most recent method introduced in the field of research, it is still in its adolescence. Therefore, there is a lack of research on the method in the current literature. Horvath (2005) examined perceived values and problems associated with field trips at middle school utilizing Creswell's (2003) concurrent triangulation mixed methods design. The quantitative data from the study were obtained from surveys, and students' grades. The qualitative data from the study consisted of open-ended questions and focus groups. Data were analyzed by applying Tashakkori and Teddlie's (1998) concurrent parallel mixed analysis. Horvath (2005) pointed out that her participants (parents and staff) expressed that in order to have a more useful survey, open-ended questions in future research should be placed before close-ended questions. The quantitative part of the study allowed for statistical comparison between groups. The results indicated that students had more favourable impressions of field trips. The qualitative part of the study confirmed existing categories and also provided new categories regarding field trips. Thus, Horvath's (2005) study provides new direction for future research by applying mixed methods.

Summary of Chapter II

A social cognitive theory provides a useful model in the formulation of a theoretical view for studying the computer self-efficacy of preservice teachers. Bandura (1977, 1986) a social cognitive theorist, stated that the acquisition of different levels of self-efficacy was determined by the following four major sources: (i) performance accomplishments (ii) vicarious experiences (iii) verbal persuasion and (iv) emotional arousal.

Research has indicated that the students with higher efficacy used more rehearsal, elaboration and organization strategies. Self-efficacy beliefs affected the amount of effort people applied as well as the level of persistence they displayed when experiencing adversity and anxiety (Ryckman, 2000). Research literature has also indicated that various Teacher Education Programs remain problematic due to the fact that many preservice teachers do not feel adequately prepared to use technological resources to teach a concept or process (Hardy, 2003). This means that future female teachers would be reluctant to use computer technology in the classroom because teacher education programs did not do enough to encourage computer literacy among female students (Bauer, 2000). Cassidy and Eachus' (2002) study on computer self-efficacy consisted of participants with various undergraduate degrees. The highest self-efficacy was among software engineers while the lower levels of self-efficacy were exhibited by nurses and physiotherapists. This study will address the lack of adequate information in the literature pertaining to preservice teachers and their previous undergraduate degree.

Even though the field of mixed-methodology is still in a formative stage, the aim of this study is to encompass both Creswell's (2003) concurrent nested strategy and Tashakkori and Teddlie's (2003) multistrand concurrent mixed model design. Being able to include both quantitative and qualitative methodologies would enrich this research by including perspectives from the different types of data and from different levels within the study.

# CHAPTER III

# METHODOLOGY

Focus Group:

The participants for this study consisted of 210 students recruited from the Faculty of Education of the University of Windsor. Participants were full-time undergraduate preservice students in the consecutive teacher education program. All preservice students had already obtained an undergraduate degree. The one-year education program at the faculty prepares students to be teachers and upon completion of the program, the candidates will receive a Bachelor of Education degree. The participants were grouped into Primary/Junior (P/J), Junior/Intermediate (J/I) and Intermediate/Senior (I/S) divisions. The J/I division was required to have one teachable subject where as the I/S division required two teachable subjects. During their consecutive teacher education program, preservice teachers were required to take a general computer methodology course. The computer methodology course focused on providing preservice teachers with necessary computer skills such as hands-on computer experience in order to be able to integrate technology with education.

Procedures

After receiving approval from the Research Ethics Board and the Dean of the Faculty of Education, data were collected at the beginning of the Fall 2005 semester after the preservice teachers had their first practice teaching placement. Upon obtaining permission from professors, the investigator visited preservice classes one week before the actual date of data collection (completion of the questionnaire) to conduct a brief presentation on the research (see Appendix F). The investigator explained the purpose of the study, procedures, potential risks and benefits, remuneration for participation, confidentially, participation and withdrawal rights, feedback on the results of the study, and the rights of the research subjects. After the presentation, a letter of "Invitation to Participate in a Research Study" (Appendix G) was distributed to all the preservice teachers. They kept the letter for a week during which time they would decide whether/or not to participate in the study. Participation in this study was voluntary.

The following week, the investigator having consulted with the professor, arrived at the beginning of the class to conduct the study. During this time, those who had agreed to take part in the study were given the consent form (Appendix H) to sign and the questionnaire (Appendix I) to complete. This procedure lasted on average 15-20 minutes, after which the investigator collected both the consent form and the questionnaire from the participants. The consent form was collected separately for purposes of anonymity. The data were kept in a locked holder that was only accessible to the researcher.

Methodology

The purpose of this concurrent nested mixed model study was to analyze and evaluate the computer self-efficacy of preservice teachers at University of Windsor in relationship to the following variables: gender, age, ethnic origin, previous undergraduate degree, licensure area (division), access to computers, computer ownership, computer training, socioeconomic status and previous technological interaction experiences. The quantitative component of the CUSE scale examined the relationship between self-efficacy and age, gender, ethnic origin, previous undergraduate degree, licensure area, access to computers, computer ownership, computer training and socioeconomic status. In the qualitative component, a survey consisting of open-ended questions was used to explore computer self-efficacy results by examining preservice teachers' past technological interaction experiences and beliefs.

The study utilized the concurrent nested method design by following the designs of Creswell's (2003) concurrent nested strategy and Tashakkori and Teddlie's (2003) multistrand concurrent mixed model design. Creswell's (2003) design used criteria of classification that included the sequence in which data were collected, the purpose of the study, and theoretical perspective (transformation or not). Tashakkori and Teddlie (1998) developed a typology of mixed method and mixed model designs based on "procedure" of the method of study (Tashakkori & Teddlie, 2003). The concurrent mixed model design consisted of two strands of research with both types of questions, both types of data and analyses, and both types of inferences pulling together at the end to reach a meta-inference (Tashakkori & Teddlie, 2003). A nested approach contained the predominant method that guided the project (Creswell, 2003). The method with less priority (in this study, qualitative) was embedded or nested within the predominant method (in this case, the quantitative). This nesting meant that the nested method searched for information from different levels. The strength of this mixed model was that the researcher was able to collect two types of data simultaneously, during a single data collection phase (see Appendix J). Besides providing a study with advantages of both qualitative and quantitative research methods, the researcher was able to gain perspectives from the different types of data and from different levels within the study (Creswell, 2003).

Quantitative Instrumentation:

CUSE scale (Cassidy & Eachus, 2002) was used to determine the preservice teachers' computer self-efficacy. The original CUSE scale examined the relationship between self-efficacy, computer experience, use of software packages (i.e., familiarity), computer training, computer ownership and gender. The 6-point Likert-type survey required that preservice teachers rate each statement from "strongly disagree" to "strongly agree". In the original research (Cassidy & Eachus, 2002) this 30-item scale had a high internal consistency (Cronbach's Alpha *alpha* = 0.97, N = 184) and high and significant test-retest reliability over a one-month period (r = 0.86, N =74, p<0.0005). This scale was used to identify particular students who would find it difficult to take advantage of a teaching and learning environment which integrated computer technologies.

Qualitative Instrumentation:

The qualitative open-ended questions were used to explore computer self-efficacy results by examining preservice teachers' past technological interaction experiences and beliefs. Two previous studies that used CUSE scale (Cassidy & Eachus, 2002, Wall, 2004) did not explore students' past experiences from qualitative perspective. Although Wall (2004) recommended that further follow-up qualitative data (such as interviews) be conducted, literature to date has been lacking such information. Cassidy and Eachus (2002) stated that it was the quality, not the quantity of experience, which was a critical factor in determining self-efficacy beliefs. Thus, it was the type of computer experience which was important rather than computer experience per se. Positive experience with computers would increase self-efficacy belief views while negative computer experience would reduce self-efficacy beliefs. The one way to explore the computer experiences of preservice teachers was to ask them open-ended questions.

As previously mentioned, Bandura (1977, 1986) indicated that the acquisition of different levels of self efficacy was determined by the following four major sources: (i) performance accomplishments (success or failures) (ii) vicarious experiences (observing others' successes and failures) (iii) verbal persuasion (from teachers, relatives, colleagues), and (iv) emotional arousal (affective state). Thus, the open-ended questions survey was used to explore computer self-efficacy results by examining preservice teachers' past technological interaction experiences and beliefs based on the four sources of self-efficacy.

Formation of Questionnaire (See Appendix I):

The purpose of the CUSE scale was to examine attitudes toward the use of computers. The questionnaire was divided into three parts:

1. In Part 1, the participants were asked to provide some basic background information about themselves and their experience with computers, if any. Question #3 (ethnic origin), 4 (previous undergraduate degree), 5 (division), 10 (income level) were added to the original CUSE scale (Cassidy & Eachus, 2002) in order to achieve a clearer comparison between the three divisions (primary/junior, junior/intermediate, intermediate/senior) of preservice teachers.

2. In Part 2, participants were asked to describe their computer experiences.

Part 2 was the qualitative component of the questionnaire. The open-ended questionnaire survey was used to explore computer self-efficacy results by examining preservice teachers' technological interaction experiences and beliefs based on four sources of self-efficacy: (i) performance accomplishments, (ii) vicarious experiences, (iii) verbal persuasion, and (iv) emotional arousal. The survey was divided according to four sources of self-efficacy and all questions were formed from various parts of the research literature review. For example the first question:

*i) a) What was the worst problem you had with computers?*

*b) How was this problem solved?*

The notation i) symbolized the first source of self-efficacy called "performance accomplishments". The questions were based on the kinds of questions posed in the literature review. For instance, Bauer's (2003) study on perceived skill and frustration levels among female preservice teachers contained the following qualitative question: "Briefly describe your worst experience with a computer, your reaction to it, and what you did about it (i.e., whom [sic] you asked for help)" (p. 7-8). The goal of Bauer's (2003) question was to measure frustration and reaction levels among the participants. The intention of this qualitative question in the current study was to measure performance accomplishments (success or failure) of preservice teachers. The researcher explored the notion of whether efficacy expectations were embedded in personal mastery experiences. Since participants from Horvath's (2005) study indicated that in order to have a more useful survey, open-ended questions in future research should be placed before close-ended questions; the researcher in this study placed the qualitative part of the questionnaire with open-ended questions before the CUSE scale.

3. Part 3 aimed to elicit more detailed information by asking participants to indicate the extent to which they agree or disagree with a number of statements provided. Part 3 was

the original part of Computer User Self-Efficacy Scale (CUSE) (Cassidy & Eachus, 2002).

Research Design and Analysis

Statistical analyses were preformed using SPSS 14.0. The qualitative responses of the survey were first typed in Word document. The coding of qualitative date was concluded after the researcher read through the documents and assigned descriptive codes to participants' words. The researcher often used participants' own words. For instance, when a participant was asked to respond what was the worst problem they had with computers and they answered "virus infection" then that answer would receive the code "virus". After the codes were assigned to each question, each code was identified by a number and entered into SPSS 14.0 program. The goal was to quantitize the qualitative data. Therefore, the research explored the old and new themes that emerged from research by nesting the method.

The quantitative responses to the CUSE scale were analyzed using SPSS 14.0. One-way analysis of variance (ANOVA) was preformed to test the hypotheses for statistical significance at the .05 confidence level. If the null hypothesis was rejected and the independent variable consisted of more than two levels, Tukey HSD (honestly significant difference) test for post-hoc comparisons was performed.

Quantitative Hypotheses

Quantitative Null Hypotheses:

1. There is no significant difference in computer self-efficacy between male and female preservice teachers.

2. There is no significant difference in computer self-efficacy between traditional (teacher education students under 24 years of age) and non-traditional students (teacher education students 24 years of age or older) (Parker, 1993).
3. There is no significant difference in computer self-efficacy of preservice teachers based on their ethnic origin.
4. There is no significant difference in computer self-efficacy of preservice teachers based on their previous undergraduate degree.
5. There is no significant difference in computer self-efficacy of preservice teachers based on their licensure area (Primary/Junior, Junior/Intermediate and Intermediate/Senior).
6. There is no significant difference in computer self-efficacy of preservice teachers based on their computer experience.
7. There is no significant difference in computer self-efficacy of preservice teachers based on their familiarity with software packages.
8. There is no significant difference in computer self-efficacy of preservice teachers based on their computer ownership.
9. There is no significant difference in computer self-efficacy of preservice teachers based on their previous computer training course.
10. There is no significant difference in computer self-efficacy of preservice teachers based on their socioeconomic status.

Central Question: Qualitative Research Question

1. How do preservice teachers describe their previous computer experiences and beliefs based on the four sources of self-efficacy (performance accomplishments, vicarious experiences, verbal persuasion and emotional arousal)?

Summary of Chapter III

This study involved 210 preservice students recruited from the Faculty of Education of the University of Windsor. The data were collected at the beginning of the Fall 2005 semester after the preservice teachers had their first practice teaching placement.

The purpose of this concurrent nested mixed model study was to analyze and evaluate the computer self-efficacy of preservice teachers at University of Windsor. The quantitative component of the CUSE scale examined the relationship between self-efficacy and age, gender, ethnic origin, previous undergraduate degree, licensure area, access to computers, computer ownership, computer training and socioeconomic status. The CUSE scale was used to determine the preservice teachers' computer self-efficacy, especially to identify particular preservice teachers who would find it difficult to take advantage of a teaching and learning environment which integrated computer technologies. In the qualitative component, a survey consisting of open-ended questions was used to explore computer self-efficacy results by examining preservice teachers' past technological interaction experiences and beliefs based on the four sources of self-efficacy.

The study implemented the concurrent nested method design by following the designs of Creswell's (2003) concurrent nested strategy and Tashakkori and Teddlie's

(2003) multistrand concurrent mixed model design. The concurrent mixed model design in this study consisted of two strands of research with both types of questions, both types of data and analyses, and both types of inferences pulling together at the end to reach a meta-inference (Tashakkori & Teddlie, 2003). A nested approach which contained the method with less priority (in this study, qualitative) was embedded or nested within the predominant method (in this case, the quantitative). This nesting meant that the nested method searched for information from different levels. The benefit of this mixed model was that the researcher was able to collect two types of data simultaneously during a single data collection phase. In addition, the researcher was able to gain perspectives from the different types of data and from different levels within the study (Creswell, 2003).

# CHAPTER IV

# FINDINGS

The study examined CUSE results in order to determine the difference between the preservice teachers' self-efficacy toward their abilities to use computers in the classroom and the following variables: gender, age, ethnic origin, previous undergraduate degree, licensure area, access to computers, computer ownership, computer training, socioeconomic status and previous technological interaction experiences. The participants answered ten questions about their demographic information, 12 questions on past technological experiences and 30 questions about their computer self-efficacy. Since qualitative data were missing from 31 surveys collected, those surveys were eliminated from the study. Thus, a total of 210 participants' responses to the survey were analyzed in this study.

SPSS 14.0 statistical software was used to analyze the data. The quantitative data contained information about the following ten variables:

1. Gender: preservice teachers were identified by gender based on demographic data.

2. Age: preservice teachers were identified as traditional students (under 24 years of age) and non-traditional students (24 years and older).

3. Ethnic origin: preservice teachers were identified by ethnic origin. Furthermore, due to a large number of various ethnic origins, the researcher classified ethnic origins into the following groups: Canadian, European and Other. For instance, participants identified themselves as Italian, Polish, Croatian, Irish, Dutch,

German, British, English, Irish, Lithuanian, Bosnian, Macedonian, Italian-English, English-Irish-French, and Polish-Scottish-English-Irish: therefore, the researcher grouped them together as European. The Other group consisted of participants of East Asian, South Asian, South/Latin American, African, Arabic, USA and various other ethnic backgrounds.

4. Previous undergraduate degree: preservice teachers were identified by their previous undergraduate degree.

5. Division or Licensure Area: preservice teachers were identified by their division - Primary/Junior (Junior Kindergarten to Grade 6), Junior/Intermediate (Grades 4 to 10) and Intermediate/Senior (Grades 7 to 12).

6. Experience: preservice teachers were scored using a standard Likert format where "none" was scored as 1 and "extensive" was scored as 5. Furthermore, experience was categorized as follows: (i) *inexperienced* - participants with "none" (no experience at all), and "very limited" experience, (ii) *some experience* – those that have some degree of experience and (iii) *experienced* – those with "quite a lot" or "extensive" experience.

7. Computer software packages: preservice teachers specified the number of various computer packages they had used such as word processing, spreadsheets, databases, presentation, statistics packages, desktop publishing, multimedia and other. The participants were scored one (1) for each package used and these scores made up a total package score. The minimum score of 0 (none) meant the participant did not use any packages that were listed and the maximum score of

eight indicated that the participant used all 8 packages. Due to the small number of participants in certain categories, the nine categories were further scaled down to seven categories, consisting of the following: (i) 0 or 1, (ii) 2, (iii) 3, (iv) 4, (v) 5, (vi) 6 and (vii) 7 or 8 package categories.

8. Computer ownership: preservice teachers were identified by whether they owned a computer or not.

9. Computer training course: preservice teachers were identified by whether they had received computer training or not.

10. Socioeconomic status: preservice teachers were identified by their household income level. The income contained nine different categories and ranged from under $30,000 to over $100,000.Due to the small number of participants in certain categories, the nine categories were further reduced to the following four categories: (i) under $30 000, (ii) $30 000-$59 999, (iii) $60 000-$99 999 and (iv) over $100 000.

The score for computer self-efficacy was determined by totalling all 30 items for each participant. A high total score on the scale indicated more positive computer self-efficacy beliefs.

Section 1: Quantitative Research

Table 1 provides a demographic overview of the participants. The total number of participants was 210. A frequency distribution indicated that the sample consisted of 62 (29.5%) male preservice teachers and 148 (70.5%) females. There were 49

(23.3%) traditional and 161 nontraditional (76.7%) students. Furthermore, 85 Primary/Junior (40.5%) and 85 Junior/Intermediate (40.5%) and 40 Intermediate/Senior (19%) students were assigned in the following nine different ethnic groups: (i) 126 (60%) Canadian, (ii) 54 (25.7%) European, (iii) 7 (3.3%) East Asian, (iv) 5 (2.4%) South Asian, (v) 5 (2.4%) South/Latin American, (vi) 2 (1%) African, (vii) 6 (2.9%) Arabic, (viii) 3 (1.4%) United States of America (USA) and (ix) 2 (1%) Other. Eighty-two participants (39.9%) completed an Art degree followed by 60 (28.6%) Social Science, 40 (19%) Science, 20 (9.5%) Other degrees and 8 Combination of Degrees (3.8%). Ninety-eight students (46.7%) reported that they had quite a lot of experience with computers while 81 (38.6%) indicated that they had some experience. Although only 7 students (3.3%) did not own a computer, 97 (46.2%) attended a computer training course. Two-hundred and eight (99%) had used only word processing packages out of the eight choices which included word processing, spreadsheets, databases, presentation, statistics, desktop, multimedia and other packages; the computer software package reported as the least used was statistics (40%).

Table 1: Preservice Teacher Demographics

| Variable | Group | n | Percent % |
|---|---|---|---|
| Gender: | Male | 62 | 29.5% |
| | Female | 148 | 70.5% |
| Age | Traditional | 49 | 23.3% |
| | Non-traditional | 161 | 76.7% |
| Ethnic Origin: | Canadian | 126 | 60% |
| | European | 54 | 25.7% |
| | East Asian | 7 | 3.3% |
| | South Asian | 5 | 2.4% |
| | South/Latin American | 5 | 2.4% |
| | African | 2 | 1% |
| | Arabic | 6 | 2.9% |
| | USA | 3 | 1.4% |
| | Other | 2 | 1% |
| Previous Degree | Art | 82 | 39.9% |
| | Social Science | 60 | 28.6% |
| | Science | 40 | 19.0% |
| | Other | 20 | 9.5% |
| | Combination | 8 | 3.8% |
| Division: | Primary/Junior | 85 | 40.5% |
| | Junior/Intermediate | 85 | 40.5% |
| | Intermediate/Senior | 40 | 19% |
| Experience: | 1 = none | 1 | 0.5% |
| | 2 = very limited | 7 | 3.3% |
| | 3 = some experience | 81 | 38.6% |
| | 4 = quite a lot | 98 | 46.7% |
| | 5 = extensive | 23 | 11.0% |

Table 1 (continued): Preservice Teacher Demographics

| Variable | Group | n | Percent % |
|---|---|---|---|
| Computer Software Packages: | Word Processing | | |
| | Yes | 208 | 99% |
| | No | 2 | 1% |
| | Spreadsheets | | |
| | Yes | 177 | 84.3% |
| | No | 33 | 15.7% |
| | Databases | | |
| | Yes | 129 | 61.4% |
| | No | 81 | 38.6% |
| | Presentation | | |
| | Yes | 131 | 62.4% |
| | No | 79 | 37.6% |
| | Statistics | | |
| | Yes | 84 | 40% |
| | No | 126 | 60% |
| | Desktop Publishing | | |
| | Yes | 146 | 69.5% |
| | No | 64 | 30.5% |
| | Multimedia | | |
| | Yes | 124 | 59% |
| | No | 86 | 41% |
| | Other (specify) | | |
| | Yes | 10 | 4.8% |
| | N/A | 200 | 95.2% |
| Computer Ownership: | Yes | 203 | 96.7% |
| | No | 7 | 3.3% |
| Computer Training: | Yes | 97 | 46.2% |
| | No | 113 | 53.8% |

Table 1 (continued): Preservice Teacher Demographics

| Variable: Income level (household): | Group | n | Percent % |
|---|---|---|---|
| | Under $30,000 | 101 | 48.1% |
| | $30,000-$39,999 | 8 | 3.8% |
| | $40,000-$49,999 | 13 | 6.2% |
| | $50,000-$59,999 | 20 | 9.5% |
| | $60,000-$69,999 | 14 | 6.7% |
| | $70,000-$79,999 | 14 | 6.7% |
| | $80,000-$89,999 | 5 | 2.4% |
| | $90,000-$99,999 | 2 | 1.0% |
| | Over $100,000 | 33 | 15.7% |
| **Total number of participants:** | | 210 | 100% |

Table 1b and Table 1c provide a detailed description of Other Degree and Combination degree frequencies. It should be noted that 6 students possessed a Science Degree in Combination with other degrees.

Table 1b: Other Degree Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Other Degree Frequencies** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Business | 6 | 1 | 1 | 8 |
| Human Kinetics | 0 | 7 | 1 | 8 |
| Disabilities studies | 1 | 0 | 0 | 1 |
| Health Sciences | 0 | 1 | 0 | 1 |
| Engineering | 0 | 0 | 1 | 1 |
| Not Specified by Participant | 1 | 0 | 0 | 1 |
| **Total** | 8 | 9 | 3 | 20 |

Table 1c: Combination Degree Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Combination Degree Frequencies** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Art & Social Science | 2 | 1 | 0 | 2 |
| Art & Science | 1 | 0 | 0 | 3 |
| Science & Business | 0 | 1 | 0 | 1 |
| Social Science & Science | 0 | 1 | 2 | 2 |
| Total | 3 | 3 | 2 | 8 |

Table 2 indicates the descriptive statistics of CUSE scale for 210 participants. The CUSE scores indicated that the lowest score was 51 and the highest score was 176 out of a possible 180. Mean and median (M=130.60 and Mdn=133.0) are approximately close to each other (Figure 1) while the SD=26.639. A fairly normal distribution was indicated by a negative skewness of -.431 and slightly platykurtic distribution, as indicated by a Kurtosis value of -0.442.

Table 2: CUSE descriptive statistics

| N: # of Participants | 210 |
|---|---|
| Mean | 130.60 |
| Median | 133.00 |
| Mode | 112(a) |
| Std. Deviation | 26.639 |
| Skewness | -.431 |
| Std. Error of Skewness | .168 |
| Kurtosis | -.442 |
| Std. Error of Kurtosis | .334 |
| Minimum | 51 |
| Maximum | 176 |

Multiple modes exist. The smallest value is shown

A total of 13 (4 traditional and 9 non-traditional) preservice students indicated that they did not know the meaning of DOS-based computer packages and they wrote question marks next to word DOS indicating uncertainty about its meaning. Therefore, the answer to question # 8 (scale from 1 to 6 - "DOS-based computer packages don't cause many problems for me") of CUSE scale was problematic for them.

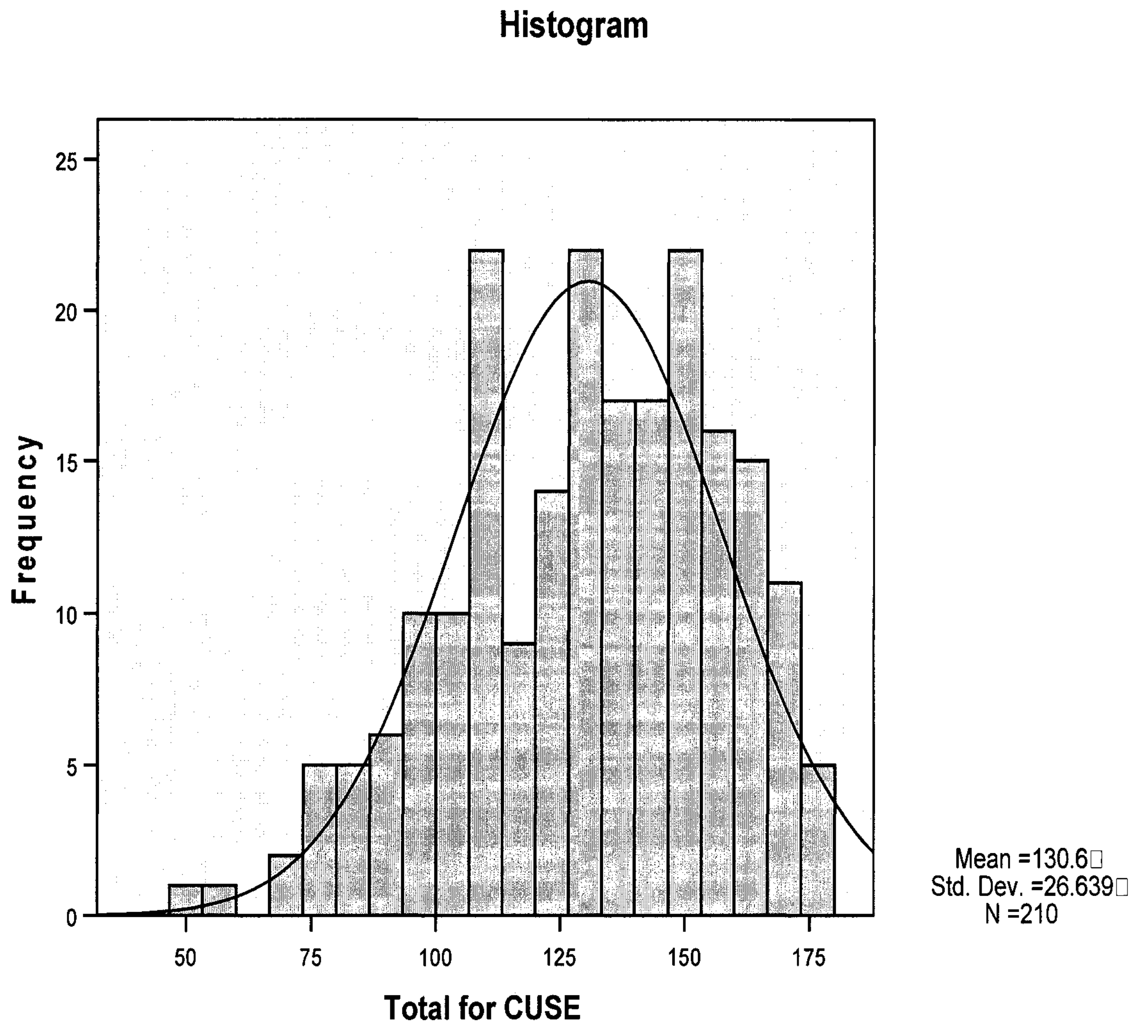



Figure 1: The CUSE Histogram

*Null Hypothesis 1:* There is no significant difference in computer self-efficacy between male and female preservice teachers.

The data in Table 3a indicated a relative closeness between the mean values of CUSE scale for male (M = 130.27, SD = 26.272) and female (M = 130.74, SD=26.879) participants. After performing a one-factor between-subjects analysis of variance (one-way ANOVA) test F (1,208) = .013, p =. 909 on this hypothesis, it was found that there was no significant difference between groups based on gender. The null hypothesis was retained (see Table 3b).

Table 3a: One-way ANOVA for Gender

| Gender | n | Mean: | Std. Deviation |
|---|---|---|---|
| Male | 62 | 130.27 | 26.272 |
| Female | 148 | 130.74 | 26.879 |

Table 3b: One-way ANOVA for Gender

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 9.338 | 1 | 9.338 | .013 | .909 |
| Within Groups | 148303.062 | 208 | 712.995 | | |
| Total | 148312.400 | 209 | | | |

p>.05.

*Null Hypothesis 2:* There is no significant difference in computer self-efficacy between traditional (teacher education students under 24 years of age) and non-traditional students (teacher education students 24 years of age or older) (Parker, 1993).

The age of participants (M = 27.39) ranged from 21 to 52 years (Table 4a). The data in Table 4b illustrated that traditional students scored slightly higher than non-traditional students. The one-factor between-subjects analysis of variance test $F(1,208) = .449$, $p=.503$ indicated that there was no significant difference between students grouped by age. The null hypothesis was retained (see Table 4c).

Table 4a: Age Descriptive Information

| Mean | Std. Deviation | Range | Minimum Age | Maximum Age |
|---|---|---|---|---|
| 27.39 | 6.034 | 31 | 21 | 52 |

Table 4b: Age

| Age: | n: | Mean: | Std. Deviation |
|---|---|---|---|
| Traditional | 49 | 132.84 | 28.943 |
| Nontraditional | 161 | 129.92 | 25.955 |

Table 4c: One-way ANOVA for Age

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 319.756 | 1 | 319.756 | .449 | .503 |
| Within Groups | 147992.6 | 208 | 711.503 | | |
| Total | 148312.4 | 209 | | | |

$p>.05$.

*Null hypothesis 3*: There is no significant difference in computer self-efficacy of preservice teachers based on their ethnic origin.

The data in Table 5a gave different CUSE means for three ethnic groups. The Other group consisted of participants from East Asian, Indian-South Asian, South/Latin American, African, Arabic, USA and various other ethnic backgrounds. A one-way

ANOVA test F (2,207) = .310, p = .734 indicated no significant overall difference between ethnic groups (Table 5b). Thus, the null hypothesis was retained.

Table 5a: Ethnic Grouping

| Ethnic groups | Mean | N | Std. Deviation |
|---|---|---|---|
| Canadian | 131.75 | 126 | 27.710 |
| European | 129.26 | 54 | 26.846 |
| Other | 128.17 | 30 | 21.727 |

Table 5b: One-way ANOVA for Ethnic Origin Group

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 442.490 | 2 | 221.245 | .310 | .734 |
| Within Groups | 147869.910 | 207 | 714.347 | | |
| Total | 148312.400 | 209 | | | |

p>.05.

*Null hypothesis 4:* There is no significant difference in computer self-efficacy of preservice teachers based on their previous undergraduate degree.

The descriptive data in Table 6a split by previous undergraduate degrees indicates different CUSE means with Science (M=142.48, SD=20.838) degree students obtaining the highest score and showing the least variability as indicated by a standard deviation of 20.838. This is shown graphically in the Figure 1a. With an alpha level of .05, one-factor between-subjects analysis of variance indicated a significant effect for the previous undergraduate degrees: F (4,205) = 3.39, MSE = 678.631, p < .05. Post-hoc comparisons using the Tukey HSD test indicated a significant overall difference between Science and Art degrees and between Science and Social Science degrees, but no significant difference between any other variations of degrees (Table 6 c). Eta squared for the scores was .062 (Table 6d).

Table 6a: Degree

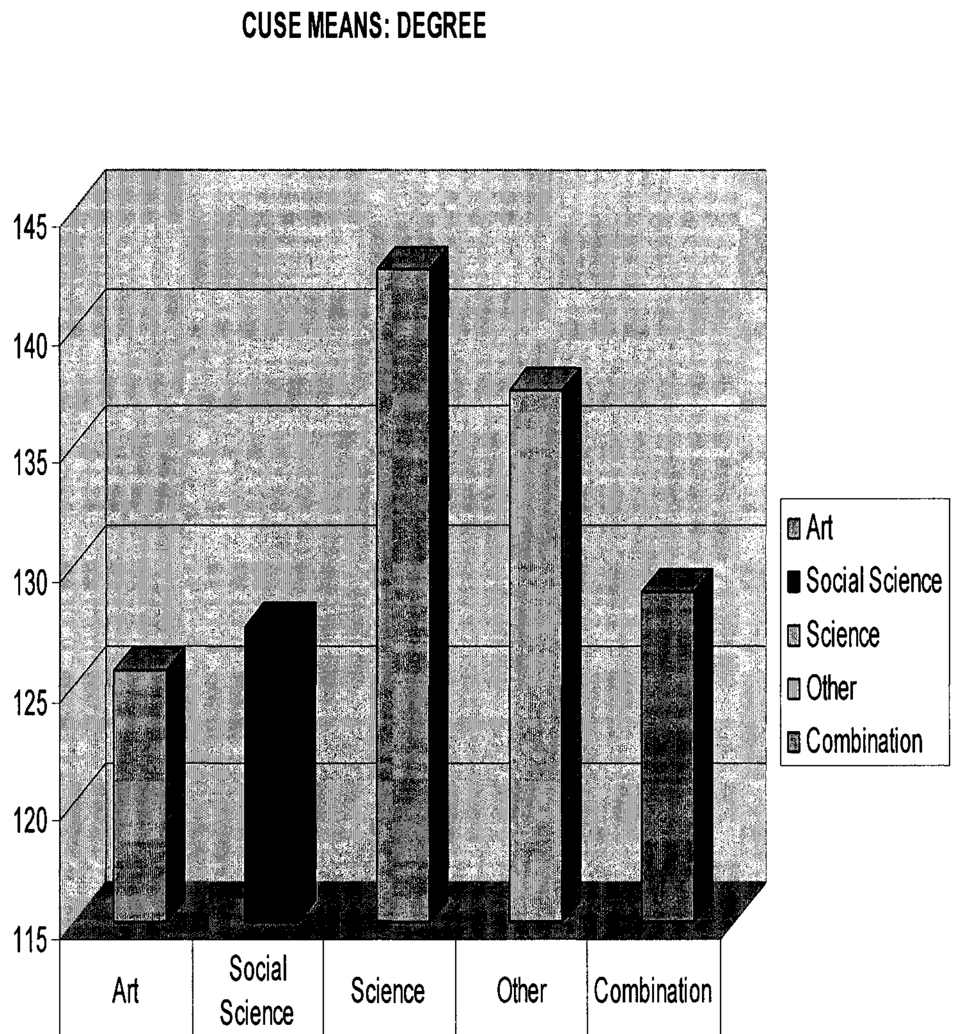
| Previous Undergraduate Degree: | n | Mean | Std. Deviation |
|---|---|---|---|
| Art | 82 | 125.63 | 27.090 |
| Social Science | 60 | 127.45 | 27.692 |
| Science | 40 | 142.48 | 20.838 |
| Other | 20 | 137.35 | 25.446 |
| Combination | 8 | 128.88 | 27.237 |

Table 6b: One-way ANOVA for Previous Undergraduate Degree

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 9193.126 | 4 | 2298.281 | 3.387 | .010* |
| Within Groups | 139119.274 | 205 | 678.631 | | |
| Total | 148312.400 | 209 | | | |

*p<.05.

Figure 1a: The CUSE Means: DEGREE




| | Art | Social Science | Science | Other | Combination |
|---|---|---|---|---|---|
| CUSE MEANS: DEGREE | 125.63 | 127.45 | 142.48 | 137.35 | 128.88 |

Table 6c: Tukey HSD - Multiple Comparisons (Degree)
Dependent Variable: Total for CUSE

| (I) Previous degree | (J) Previous degree | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|
| Art | Social Science | -1.816 | 4.426 | .994 | -14.00 | 10.36 |
| | Science | -16.841(*) | 5.024 | .008 | -30.67 | -3.01 |
| | Other | -11.716 | 6.497 | .374 | -29.60 | 6.16 |
| | Combination | -3.241 | 9.649 | .997 | -29.80 | 23.32 |
| Social Science | Art | 1.816 | 4.426 | .994 | -10.36 | 14.00 |
| Science | -15.025(*) | 5.318 | .041 | -29.66 | -.39 | |
| Other | -9.900 | 6.726 | .582 | -28.41 | 8.61 | |
| Combination | -1.425 | 9.805 | 1.000 | -28.41 | 25.56 | |
| Science | Art | 16.841(*) | 5.024 | .008 | 3.01 | 30.67 |
| | Social Science | 15.025(*) | 5.318 | .041 | .39 | 29.66 |
| | Other | 5.125 | 7.134 | .952 | -14.51 | 24.76 |
| | Combination | 13.600 | 10.089 | .662 | -14.17 | 41.37 |
| Other | Art | 11.716 | 6.497 | .374 | -6.16 | 29.60 |
| | Social Science | 9.900 | 6.726 | .582 | -8.61 | 28.41 |
| | Science | -5.125 | 7.134 | .952 | -24.76 | 14.51 |
| | Combination | 8.475 | 10.898 | .937 | -21.52 | 38.47 |
| Combination | Art | 3.241 | 9.649 | .997 | -23.32 | 29.80 |
| | Social Science | 1.425 | 9.805 | 1.000 | -25.56 | 28.41 |
| | Science | -13.600 | 10.089 | .662 | -41.37 | 14.17 |
| | Other | -8.475 | 10.898 | .937 | -38.47 | 21.52 |

* The mean difference is significant at the .05 level.

Table 6d: Eta Squared (Degree)

| Measures of Association: | Eta | Eta Squared |
|---|---|---|
| Total for CUSE * previous degree | .249 | .062 |

*Null hypothesis 5:* There is no significant difference in computer self-efficacy of preservice teachers based on their licensure area (primary/junior, junior/intermediate and intermediate/senior).

The descriptive data in Table 7a give different CUSE means with the Primary/Junior Division scoring the lowest (M=124.13). The Junior/Intermediate and Intermediate/Senior had relatively close means. With an alpha level of .05, one-factor between-subjects analysis of variance indicated a significant effect for the division/licensure area: $F(2,207) = 4.359$, $MSE = 687.531$, $p < .05$. Table 7c contains post-hoc comparisons using the Tukey HSD test. Tukey HSD indicated a significant overall difference between Primary/Junior and Junior/Intermediate groups, but no significant difference between any other variations of division. Eta squared for the scores was .040.

Table 7a: Division/Licensure Area

| Division | Mean | N | Std. Deviation |
|---|---|---|---|
| Primary/Junior | 124.13 | 85 | 28.259 |
| Junior/Intermediate | 134.76 | 85 | 25.054 |
| Intermediate/Senior | 135.50 | 40 | 24.026 |

Figure 1b: The CUSE Means: Division

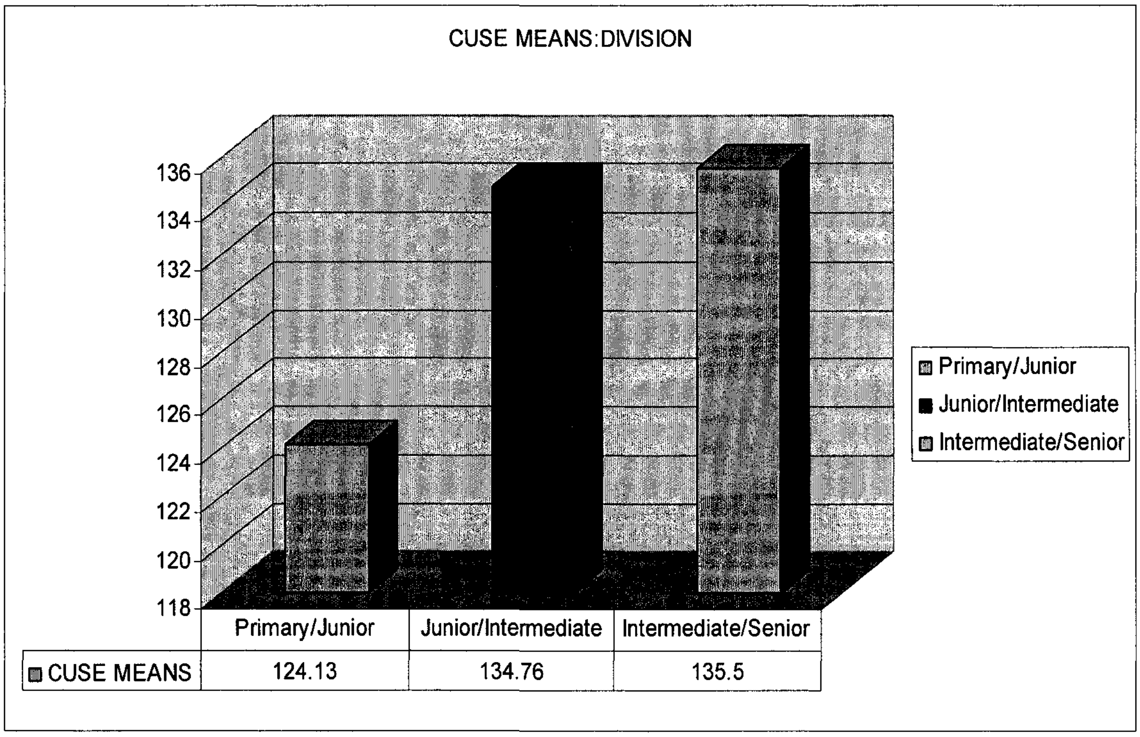



Table 7b: One-way ANOVA for Division/Licensure Area

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 5993.529 | 2 | 2996.765 | 4.359 | .014* |
| Within Groups | 142318.871 | 207 | 687.531 | | |
| Total | 148312.400 | 209 | | | |

*p<.05.

Table 7c: Tukey HSD - Multiple Comparisons (Division)
Dependent Variable: Total for CUSE
Tukey HSD

| | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| (I) Division | (J) Division | Mean Difference (I-J) | Std. Error | Sig. | Lower Bound | Upper Bound |
| Primary/ Junior | Junior/ Intermediate | -10.635(*) | 4.022 | .024 | -20.13 | -1.14 |
| | Intermediate/ Senior | -11.371 | 5.028 | .064 | -23.24 | .50 |
| Junior/ Intermediate | Primary /Junior | 10.635(*) | 4.022 | .024 | 1.14 | 20.13 |
| | Intermediate/ Senior | -.735 | 5.028 | .988 | -12.60 | 11.13 |
| Intermediate/ Senior | Primary/ Junior | 11.371 | 5.028 | .064 | -.50 | 23.24 |
| | Junior/ Intermediate | .735 | 5.028 | .988 | -11.13 | 12.60 |

* The mean difference is significant at the .05 level.

Table 7d: Eta Squared (Division)

| | Eta | Eta Squared |
|---|---|---|
| Total for CUSE * division | .201 | .040 |

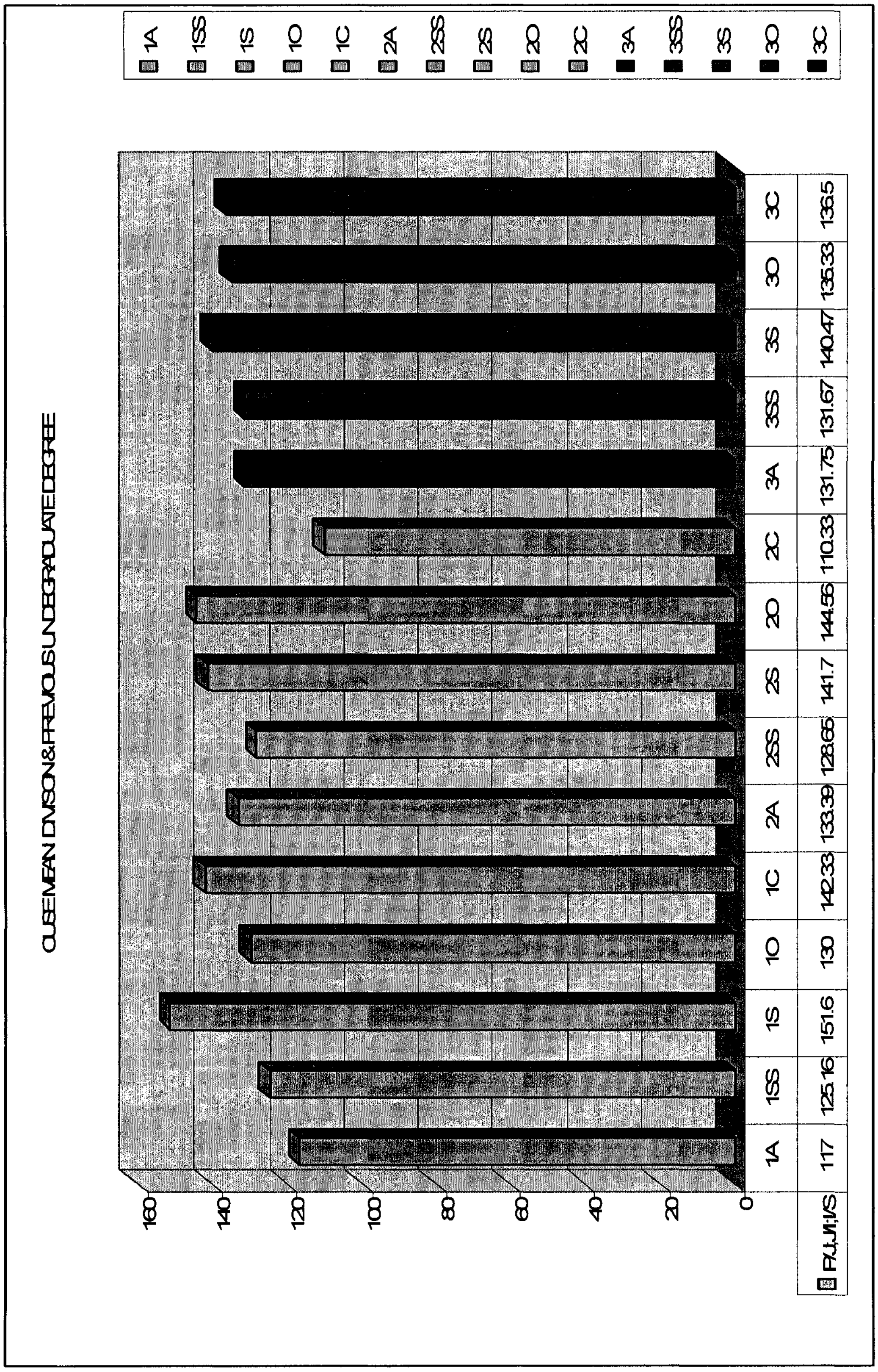
The descriptive data in Table 7e and Figure 1c noted different CUSE means for the Division and Previous Undergraduate Degree. The highest CUSE means were noted for the following: (i) Junior/Primary Division obtained by Science Degree (M=151.60) students, (ii) in the Junior/Intermediate Division the highest mean was recorded by Other Degree (M=144.56) students followed by Science Degree (M=141.70), and (iii) in the Intermediate/Senior Division the highest mean was obtained by Science Degree (M=140.47) students.

Table 7e: Overview of CUSE scores by Division and Previous Undergraduate Degree

| Division | Previous Undergraduate Degree | Mean | N | Std. Deviation |
|---|---|---|---|---|
| **Primary/Junior** | Art | 117.00 | 38 | 26.482 |
| | Social Science | 125.16 | 31 | 30.296 |
| | Science | 151.60 | 5 | 4.450 |
| | Other | 130.00 | 8 | 27.610 |
| | Combination | 142.33 | 3 | 24.214 |
| | **Total** | **124.13** | **85** | **28.259** |
| **Junior/Intermediate** | Art | 133.39 | 36 | 25.365 |
| | Social Science | 128.65 | 17 | 25.426 |
| | Science | 141.70 | 20 | 22.337 |
| | Other | 144.56 | 9 | 24.136 |
| | Combination | 110.33 | 3 | 26.502 |
| | **Total** | **134.76** | **85** | **25.054** |
| **Intermediate/Senior** | Art | 131.75 | 8 | 28.489 |
| | Social Science | 131.67 | 12 | 25.163 |
| | Science | 140.47 | 15 | 22.177 |
| | Other | 135.33 | 3 | 26.407 |
| | Combination | 136.50 | 2 | 30.406 |
| | **Total** | **135.50** | **40** | **24.026** |
| **Total** | Art | 125.63 | 82 | 27.090 |
| | Social Science | 127.45 | 60 | 27.692 |
| | Science | 142.48 | 40 | 20.838 |
| | Other | 137.35 | 20 | 25.446 |
| | Combination | 128.88 | 8 | 27.237 |
| | **Total CUSE** | **130.60** | **210** | **26.639** |

Figure 1c: Overview of CUSE scores by Division and Previous Undergraduate Degree

| **Code:** | | Primary/ Junior | **Code:** | | Junior/ Intermediate | **Code:** | | Intermediate/ Senior |
|---|---|---|---|---|---|---|---|---|
| 1A | = | Art | 2A | = | Art | 3A | = | Art |
| 1SS | = | Social Science | 2SS | = | Social Science | 3SS | = | Social Science |
| 1S | = | Science | 2S | = | Science | 3S | = | Science |
| 1O | = | Other | 2O | = | Other | 3O | = | Other |
| 1C | = | Combination | 2C | = | Combination | 3C | = | Combination |


CUSE MEAN DIVISION & PREVIOUS UNDEGRADUATE DEGREE
160
140
120
100
80
60
40
20
0
1A 1SS 1S 1O 1C 2A 2SS 2S 2O 2C 3A 3SS 3S 3O 3C
117 125.16 151.6 130 142.33 133.39 128.65 141.7 144.56 110.33 131.75 131.67 140.47 135.33 136.5

*Null hypothesis 6:* There is no significant difference in computer self-efficacy of preservice teachers based on their computer experience.

Table 8a and Figure 1d show different CUSE means in regards to preservice students' experience with computers. The experienced group had the highest mean (M= 143.36) while the inexperienced group had the lowest mean (M=87.50). With an alpha level of .05, one-factor between-subjects analysis of variance indicated a significant effect for experience: $F(2,207) = 56.352$, $MSE = 463.906$, $p < .01$. Table 8c contains post-hoc comparisons using the Tukey HSD test. Tukey HSD indicated a significant overall difference between all three groups. Eta squared for the scores was .353.

Table 8a: Experience

| Experience | Mean | N | Std. Deviation |
|---|---|---|---|
| inexperienced | 87.50 | 8 | 25.506 |
| some experience | 115.80 | 81 | 21.108 |
| experienced | 143.36 | 121 | 21.570 |

Figure 1d: The CUSE Means: Experience

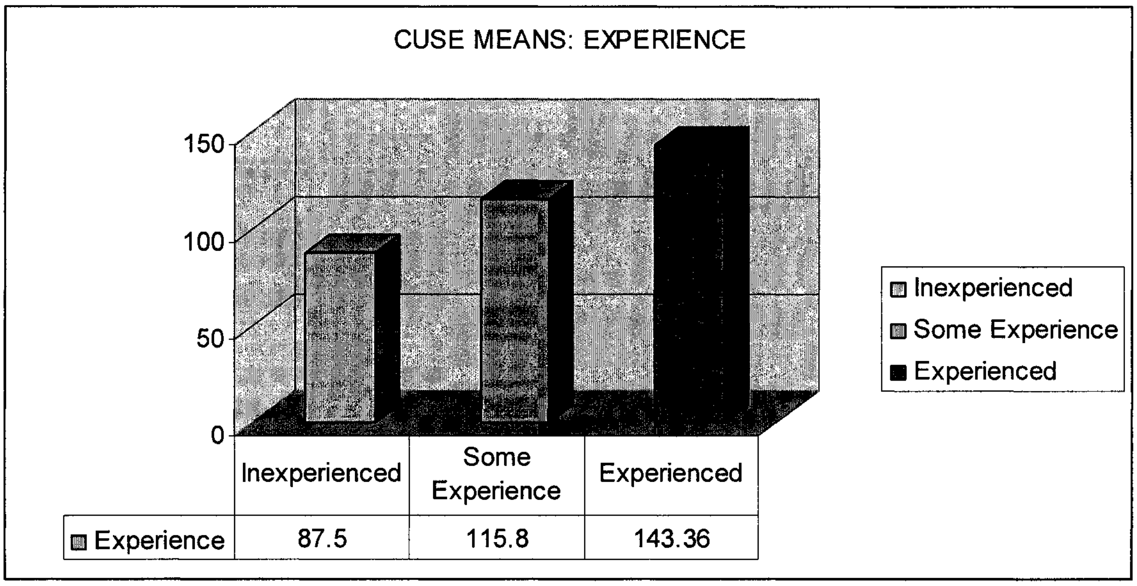


Table 8b: One-way ANOVA for Experience

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 52283.841 | 2 | 26141.921 | 56.352 | .000* |
| Within Groups | 96028.559 | 207 | 463.906 | | |
| Total | 148312.400 | 209 | | | |

*p<.01.

Table 8c: Tukey HSD - Multiple Comparisons (Experience)
Dependent Variable: Total for CUSE

| | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| (I) Experience | (J) Experience | Mean Difference (I-J) | Std. Error | Sig. | Lower Bound | Upper Bound |
| inexperienced | some experience | -28.302(*) | 7.982 | .001 | -47.15 | -9.46 |
| | experienced | -55.855(*) | 7.863 | .000 | -74.42 | -37.29 |
| some experience | inexperienced | 28.302(*) | 7.982 | .001 | 9.46 | 47.15 |
| | experienced | -27.553(*) | 3.092 | .000 | -34.85 | -20.25 |
| experienced | inexperienced | 55.855(*) | 7.863 | .000 | 37.29 | 74.42 |
| | some experience | 27.553(*) | 3.092 | .000 | 20.25 | 34.85 |

* The mean difference is significant at the .05 level.

Table 8d: Eta Squared (Experience)

| | Eta | Eta Squared |
|---|---|---|
| Total for CUSE * Experience | .594 | .353 |

*Null hypothesis 7:* There is no significant difference in computer self-efficacy of preservice teachers based on their familiarity with software packages.

Table 9a and Figure 1e show different CUSE means in regards to preservice students' use of software packages. The package categories 0 and 1 were grouped into one category. Similarly, categories 7 and 8 were also grouped into a single category. With an alpha level of .05, one-factor between-subjects analysis of variance indicated a significant effect for score on use of software packages: $F(6,203) = 17.515$, $MSE = 481.394$, $p < .01$. Hence, the null hypothesis was rejected. Table 9c contains Eta squared of .341.

Table 9a: Software Packages

| Packages | Mean | N | Std. Deviation |
|---|---|---|---|
| 0 or 1 | 98.82 | 11 | 27.860 |
| 2 | 99.61 | 18 | 20.595 |
| 3 | 116.86 | 21 | 25.176 |
| 4 | 124.00 | 28 | 17.737 |
| 5 | 136.47 | 49 | 22.500 |
| 6 | 140.71 | 45 | 20.984 |
| 7 or 8 | 147.39 | 38 | 21.998 |
| Total | 130.60 | 210 | 26.639 |

Figure 1e: The CUSE Means: Familiarity with Software Packages

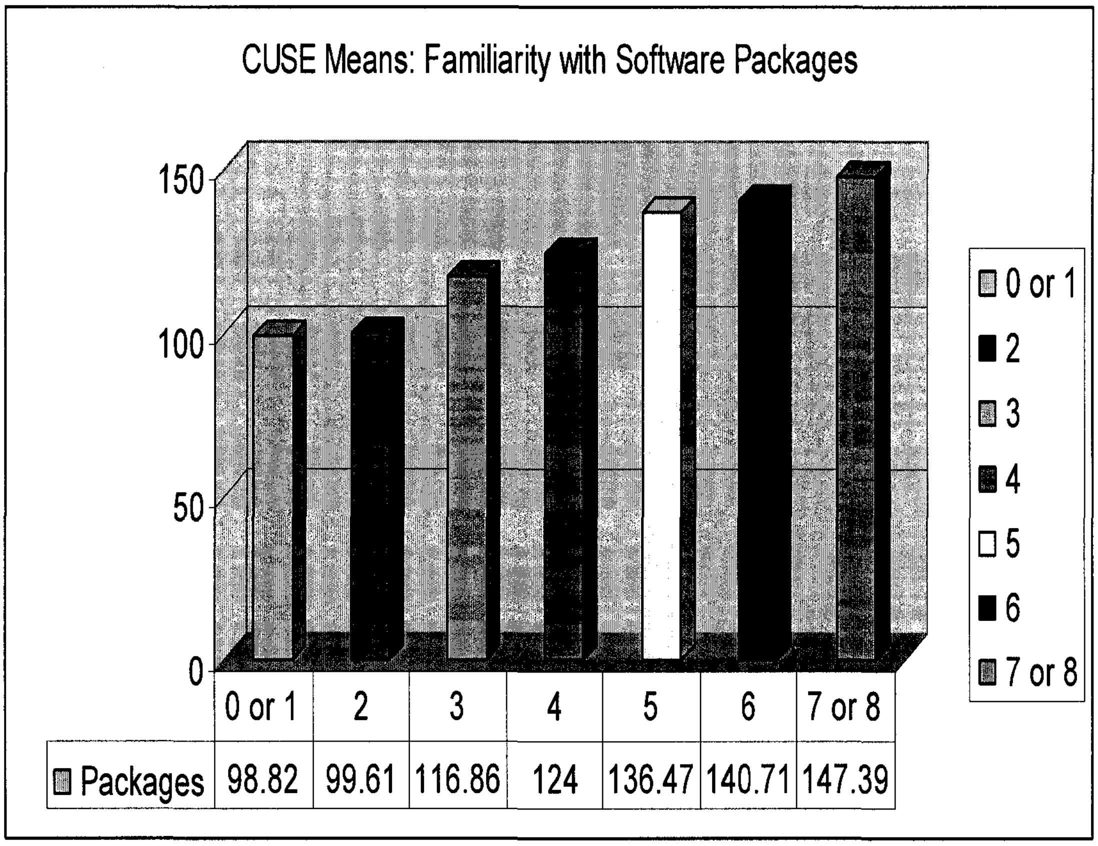



Table 9b:

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 50589.387 | 6 | 8431.564 | 17.515 | .000* |
| Within Groups | 97723.013 | 203 | 481.394 | | |
| Total | 148312.400 | 209 | | | |

*p<.01.

Table 9c: Eta Squared (Packages)

| | Eta | Eta Squared |
|---|---|---|
| Total for CUSE * Packages | .584 | .341 |

*Null hypothesis 8*: There is no significant difference in computer self-efficacy of preservice teachers based on their computer ownership.

The data in Table 10a give different CUSE means for each computer ownership group. The total number of students that owned a computer was 203 (96%). With an alpha level of .05, one-factor between-subjects analysis of variance indicated no significant effect for computer ownership: $F(1,208) = .018$, $MSE = 712.980$, $p > .05$. The null hypothesis was retained.

Table 10a: Computer Ownership

| Computer ownership | Mean | n | Std. Deviation |
|---|---|---|---|
| No | 129.29 | 7 | 21.838 |
| Yes | 130.65 | 203 | 26.833 |

Table 10b: One-way ANOVA for Computer Ownership

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 12.508 | 1 | 12.508 | .018 | .895 |
| Within Groups | 148299.892 | 208 | 712.980 | | |
| Total | 148312.400 | 209 | | | |

p>.05.

*Null hypothesis 9:* There is no significant difference in computer self-efficacy of preservice teachers based on their previous computer training course.

The descriptive data in Table 11a illustrates a relatively close CUSE means for a group that received training (M = 133.88) and a group that did not receive training (M = 127.79). With an alpha level of .05, one-factor between-subject analysis of variance indicated no significant effect for computer ownership: F (1,208) = .2.750, MSE = 703.738, p > .05. The null hypothesis was retained.

Table 11a: Previous Computer Training Course

| Previous training | Mean | n | Std. Deviation |
|---|---|---|---|
| NO | 127.79 | 113 | 28.027 |
| YES | 133.88 | 97 | 24.665 |
| Total | 130.60 | 210 | 26.639 |

Table 11b: One-way ANOVA for Computer Training Course

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 1934.982 | 1 | 1934.982 | 2.750 | .099 |
| Within Groups | 146377.418 | 208 | 703.738 | | |
| Total | 148312.400 | 209 | | | |

p>.05.

*Null hypothesis 10:* There is no significant difference in computer self-efficacy of preservice teachers based on their socioeconomic status.

Table 12a illustrates a CUSE means for income level. With an alpha level of .05, one-factor between-subjects analysis of variance indicated no significant effect for computer ownership: F (3,206) = .030, MSE = 719.645, p > .05. The null hypothesis was retained.

Table 12a: Income Level

| Income | Mean | N | Std. Deviation |
|---|---|---|---|
| under $30 000 | 130.14 | 101 | 26.356 |
| $30 000-$59 999 | 131.63 | 41 | 27.589 |
| $60 000-$99 999 | 130.66 | 35 | 26.857 |
| over $100 000 | 130.67 | 33 | 27.279 |
| Total | 130.60 | 210 | 26.639 |

Table 12b: One-way ANOVA for Income Level

| | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Between Groups | 65.609 | 3 | 21.870 | .030 | .993 |
| Within Groups | 148246.791 | 206 | 719.645 | | |
| Total | 148312.400 | 209 | | | |

p>.05.

*Stepwise Regression*

A stepwise regression computation was calculated in SPSS 14.0 in order to exclude the independent variables that were not significant in predicting computer self-efficacy. All the variables entered in the stepwise regression were used in previous null hypothesis testing in order to compute the one-way ANOVA. For the purpose of a stepwise regression, one level of the independent variable was coded as the dummy variable while other levels of the independent variable were used as comparison groups. Table 12c contains detailed description of variables that fulfilled the stepwise criteria of Probability-of-F-to-enter $\leq .150$ and Probability-of-F-to-remove $\geq .300$. Table 12d indicates $R^2 = .466$ for all seven variables. Table 12e gives a statistically significant result for the final model is $F(7, 202) = 25.202$, $p < .001$. The Experience-3 group ($\beta = .620$) and Degree-Science group ($\beta = .129$) indicate the highest positive beta values while PACK01 had the highest negative beta value ($\beta = -.210$). All the variables had a variance inflation factor (VIF) <10.0. The Experience-2 groups yielded a nonsignificant result ($t = 1.562$, $p > .05$). The following stepwise regression equation is based on Table 12f:

Y (Total Predicted CUSE) = 111.073 + 33.349 (Experience-3) - 25.100 (PACK01) - 25.104 (PACK2) -12.866 (PACK3) -10.466 (PACK4) + 8.736 (Degree-Science)

Table 12g indicated condition index < 15.0. The standardized residuals (zresid) histogram, normal probability plot (zresid normal p-p plot) and scatterplot of standardized residuals vs. standardized predicted values are illustrated in Figure 1f to 1h.

Table 12c: Description of Variables

| Variables Entered | Refers to: |
|---|---|
| Experience-3 | Experienced Group |
| PACK2 | Use of 2 Packages |
| PACK01 | Use of 0 or 1 Package |
| Degree-Science | Science Degree Participants |
| PACK3 | Use of 3 Packages |
| PACK4 | Use of 4 Packages |
| Experience-2 | Some Experience Group |

Table 12d: Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .560(a) | .313 | .310 | 22.130 |
| 2 | .602(b) | .363 | .356 | 21.370 |
| 3 | .637(c) | .406 | .398 | 20.675 |
| 4 | .656(d) | .431 | .420 | 20.292 |
| 5 | .666(e) | .444 | .430 | 20.105 |
| 6 | .678(f) | .460 | .444 | 19.867 |
| 7 | .683(g) | .466 | .448 | 19.797 |

a Predictors: (Constant), Experience-3
b Predictors: (Constant), Experience-3, PACK2
c Predictors: (Constant), Experience-3, PACK2, PACK01
d Predictors: (Constant), Experience-3, PACK2, PACK01, Degree-Science
e Predictors: (Constant), Experience-3, PACK2, PACK01, Degree-Science, PACK3
f Predictors: (Constant), Experience-3, PACK2, PACK01, Degree-Science, PACK3, PACK4
g Predictors: (Constant), Experience-3, PACK2, PACK01, Degree-Science, PACK3, PACK4, Experience-2

Table 12e: ANOVA

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 69142.753 | 7 | 9877.536 | 25.202 | .000* (a) |
| | Residual | 79169.647 | 202 | 391.929 | | |
| | Total | 148312.400 | 209 | | | |

*p<.01.

a Predictors: (Constant), Experience-2, Degree-Science, PACK4, PACK01, PACK2, PACK3, Experience-3
b Dependent Variable: Total for CUSE

Table 12f: Final model for equation

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Tolerance | VIF |
| 1 | (Constant) | 111.073 | 8.294 | | 13.393 | .000 | | |
| | Experience-3 | 33.349 | 8.265 | .620 | 4.035 | .000 | .112 | 8.938 |
| | PACK01 | -25.100 | 6.819 | -.210 | -3.681 | .000 | .809 | 1.237 |
| | PACK2 | -25.104 | 5.569 | -.264 | -4.508 | .000 | .768 | 1.302 |
| | PACK3 | -12.866 | 4.904 | -.145 | -2.624 | .009 | .862 | 1.160 |
| | PACK4 | -10.466 | 4.228 | -.134 | -2.475 | .014 | .904 | 1.107 |
| | Degree-Science | 8.736 | 3.573 | .129 | 2.445 | .015 | .948 | 1.055 |
| | Experience-2 | 12.434 | 7.960 | .228 | 1.562 | .120 | .124 | 8.045 |

a Dependent Variable: Total for CUSE

Table 12g: Collinearity Diagnostics (a)

| Model | Dimension | Eigen value | Condition Index | Variance Proportions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (Constant) | Experience-3 | PACK 01 | PACK 2 | PACK 3 | PACK 4 | Degree-Science | Experience-2 |
| 1 | 1 | 2.683 | 1.000 | .00 | .00 | .01 | .01 | .02 | .02 | .03 | .01 |
| | 2 | 1.200 | 1.495 | .00 | .01 | .05 | .09 | .06 | .01 | .06 | .02 |
| | 3 | 1.005 | 1.634 | .00 | .00 | .54 | .01 | .20 | .01 | .01 | .00 |
| | 4 | 1.000 | 1.638 | .00 | .00 | .07 | .38 | .28 | .01 | .00 | .00 |
| | 5 | .951 | 1.680 | .00 | .00 | .03 | .07 | .01 | .57 | .02 | .00 |
| | 6 | .789 | 1.844 | .00 | .01 | .00 | .03 | .06 | .03 | .62 | .01 |
| | 7 | .358 | 2.738 | .01 | .00 | .16 | .25 | .35 | .34 | .26 | .06 |
| | 8 | .014 | 13.637 | .99 | .97 | .15 | .17 | .03 | .01 | .00 | .91 |

a Dependent Variable: Total for CUSE

Table 12h: Residuals Statistics (a)

| | Minimum | Maximum | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| Predicted Value | 85.97 | 153.16 | 130.60 | 18.189 | 210 |
| Residual | -54.42 | 46.36 | .00 | 19.463 | 210 |
| Std. Predicted Value | -2.454 | 1.240 | .000 | 1.000 | 210 |
| Std. Residual | -2.749 | 2.342 | .000 | .983 | 210 |

a Dependent Variable: Total for CUSE

Figure 1f: Zresid Histogram

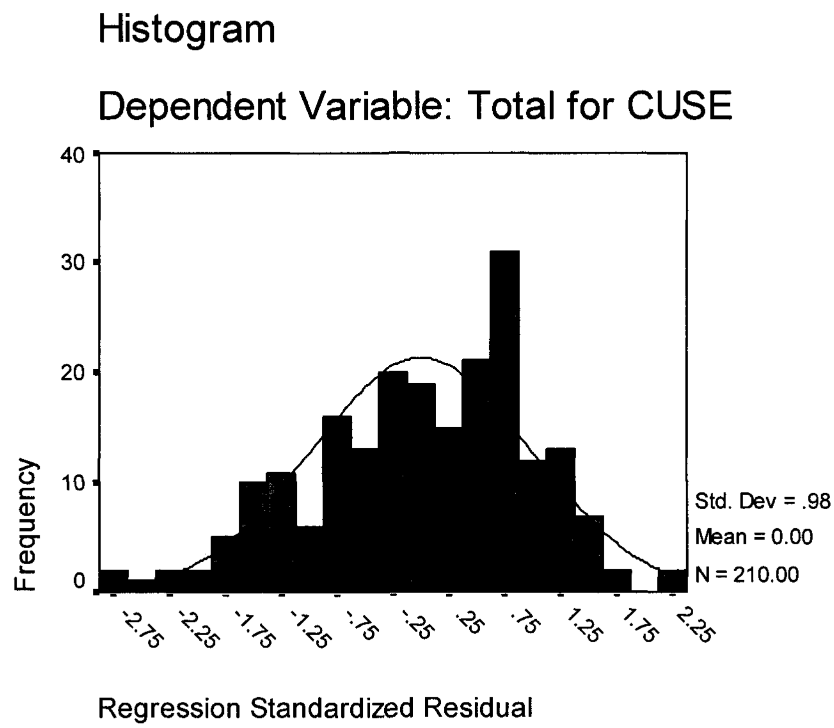


Figure 1g: Zresid Normal p-p plot

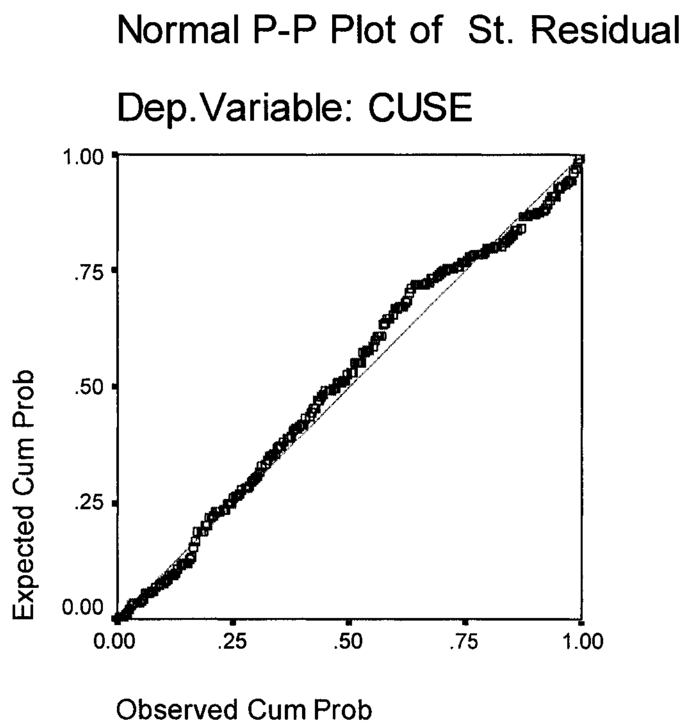
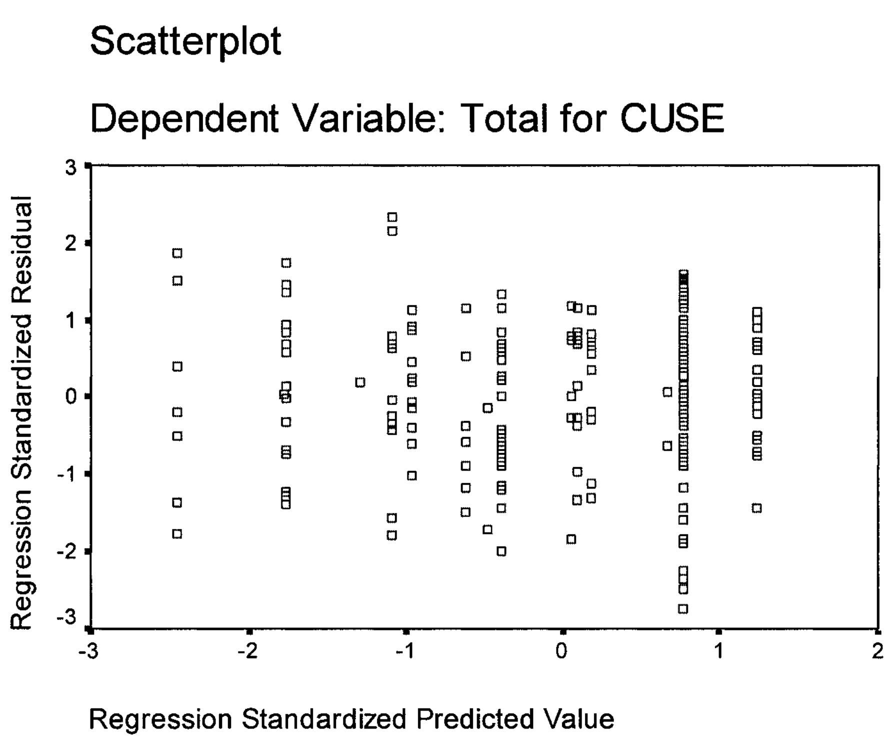



Figure 1h: Scatterplot of standardized residuals vs. standardized predicted values



*Section 2: Qualitative Research*

How do preservice teachers describe their previous computer experiences and beliefs based on four sources of self-efficacy?

***(i) Performance Accomplishments:***

*a) What was the worst problem you had with computers?*

The following four main categories in regard to worst computer problem emerged as common across all groups: (a) *virus* problem (interfering with their computer performance and students were unaware of how to make their system virus free), (b) computer that *did not work* (due to hardware/software), (c) *general problem* (losing data, computer freezing or crashing and difficulty of learning new software programs) and (d) *no problem* (Table 13a and Figure 2). Fifty-eight Junior/Intermediate (68.24%) students and 13 Other Degree (65%) students from a total of 121 preservice teachers (57.6%) viewed a general computer problem as the worst problem (Table 13b to Table 13d). The students indicated that they were frustrated with loss of homework or information due to program failures. The computer virus problem (27%) was most predominant among Primary/Junior (34.12%) students. Twenty-nine (13.8%) students had a computer that did not work due to hardware/software problems; therefore, they required outside help in order to obtain the hardware parts or software programs.

Table 13a: Worst Computer Problem Frequencies & Percentages

| **Worst Computer Problem:** | Frequency | **Percent** | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Virus | 57 | 27.1 | 27.1 | 27.1 |
| Did not work | 29 | 13.8 | 13.8 | 41.0 |
| General problem | 121 | 57.6 | 57.6 | 98.6 |
| No problems | 3 | 1.4 | 1.4 | 100.0 |
| **Total** | 210 | 100.0 | 100.0 | |

Figure 2: Worst Computer Problem Percentages

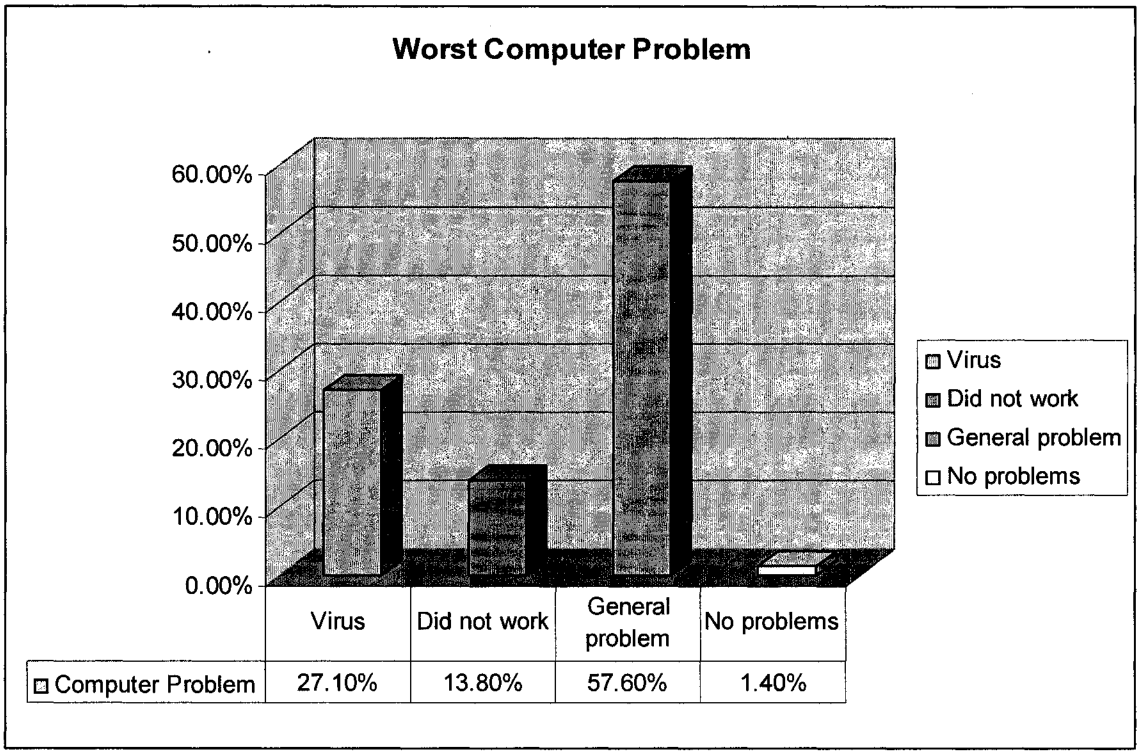



Table 13b: Worst computer problem & Division Frequencies

| **Worst Computer Problem** | **Division** Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
|---|---|---|---|---|
| Virus | 29 | 16 | 12 | 57 |
| Did not work | 11 | 9 | 9 | 29 |
| General problem | 45 | 58 | 18 | 121 |
| No problems | 0 | 2 | 1 | 3 |
| **Total** | 85 | 85 | 40 | 210 |

Table 13c: Worst computer problem & Division Percentages

| Worst Computer Problem | Division<br>Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
|---|---|---|---|
| Virus | 34.12% | 18.82% | 30.00% |
| Did not work | 12.94% | 10.59% | 22.50% |
| General problem | 52.94% | 68.24% | 45.00% |
| No problems | 0.00% | 2.35% | 2.50% |
| **Total** | 100.00% | 100.00% | 100.00% |

Table 13d: Worst computer problem & Previous Undergraduate Degree Frequencies

| Worst Computer Problem | Previous Undergraduate Degree<br>Art | Social Science | Science | Other | Combination | Total |
|---|---|---|---|---|---|---|
| Virus | 22 | 16 | 9 | 7 | 3 | 57 |
| Did not work | 12 | 9 | 7 | 0 | 1 | 29 |
| General problem | 48 | 35 | 22 | 13 | 3 | 121 |
| No problems | 0 | 0 | 2 | 0 | 1 | 3 |
| **Total** | 82 | 60 | 40 | 20 | 8 | 210 |

Table 13e: Worst computer problem & Previous Undergraduate Degree Percentage

| Worst Computer Problem | Previous Undergraduate Degree<br>Art | Social Science | Science | Other | Combination |
|---|---|---|---|---|---|
| Virus | 26.8% | 26.7% | 22.5% | 35.0% | 37.5% |
| Did not work | 14.6% | 15.0% | 17.5% | 0.0% | 12.5% |
| General problem | 58.5% | 58.3% | 55.0% | 65.0% | 37.5% |
| No problems | 0.0% | 0.0% | 5.0% | 0.0% | 12.5% |
| **Total** | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

*(ii) How was this problem solved?*

The following four main categories in terms of computer solutions emerged: (a) *New System/Part* (b) *Outside Help* (c) *Fixed by Participant* (d) *Not Fixed* (Table 14a & 14b; Figure 3). Although 82 (39%) students fixed the problem themselves, 66 (31.9%)

students obtained outside help. Thirty-nine Primary/Junior students (45.9%) obtained outside help (Table 14c) while 39 (47%) Junior/Intermediate, 17 (43.6%) Intermediate/Senior, and 19 (50%) Science and 12 (60%) Other degree students fixed the worst computer problem themselves. Furthermore, 7 Science (18.4%) students required at least some outside help while 32 (39%) Art and 20 (33.3%) Social Science students needed outside assistance to repair their computer problems.

Table 14a: Computer Solutions Frequencies

| | Solution | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | New System/Part | 26 | 12.4 | 12.6 | 12.6 |
| | Outside Help | 66 | 31.4 | 31.9 | 44.4 |
| | Fixed by Participant | 82 | 39.0 | 39.6 | 84.1 |
| | Not Fixed | 33 | 15.7 | 15.9 | 100.0 |
| | **Total** | 207 | 98.6 | 100.0 | |
| N/A | | 3 | 1.4 | | |
| Total | | 210 | 100.0 | | |

Figure 3: Computer Solution Percentages

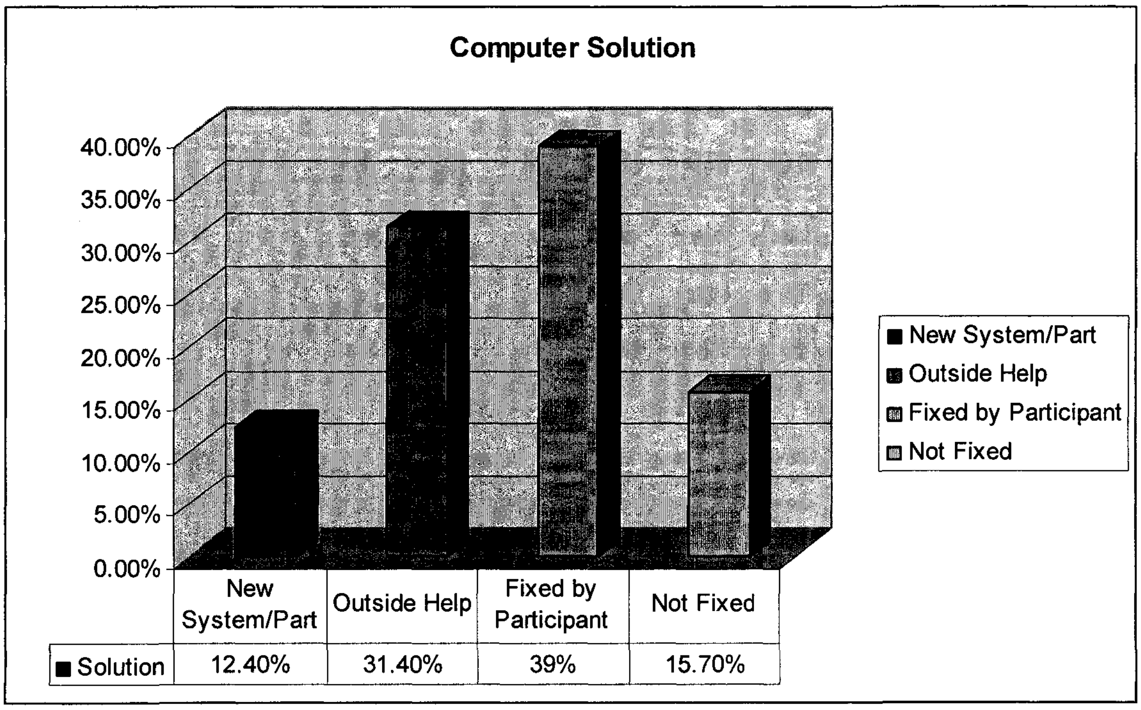


Table 14b: Computer Solutions & Division Frequencies

| Solution | Division<br>Primary/<br>Junior | Junior/<br>Intermediate | Intermediate/<br>Senior | Total |
|---|---|---|---|---|
| New System/Part | 11 | 10 | 5 | 26 |
| Outside Help | 39 | 19 | 8 | 66 |
| Fixed by Participant | 26 | 39 | 17 | 82 |
| Not Fixed | 9 | 15 | 9 | 33 |
| **Total** | 85 | 83 | 39 | 207 |

Table 14c: Computer Solutions & Division Percentages

| Solution | Division<br>Primary/<br>Junior | Junior/<br>Intermediate | Intermediate/<br>Senior |
|---|---|---|---|
| New System/Part | 12.9% | 12.0% | 12.8% |
| Outside Help | 45.9% | 22.9% | 20.5% |
| Fixed by Participant | 30.6% | 47.0% | 43.6% |
| Not Fixed | 10.6% | 18.1% | 23.1% |
| **Total** | 100.0% | 100.0% | 100.0% |

Table 14d: Computer Solutions & Previous Undergraduate Degree Frequencies

| Solution | Previous Undergraduate Degree<br>Art | Social Science | Science | Other | Combination | Total |
|---|---|---|---|---|---|---|
| New System/Part | 10 | 6 | 7 | 1 | 2 | 26 |
| Outside Help | 32 | 20 | 7 | 4 | 3 | 66 |
| Fixed by Participant | 29 | 21 | 19 | 12 | 1 | 82 |
| Not Fixed | 11 | 13 | 5 | 3 | 1 | 33 |
| **Total** | 82 | 60 | 38 | 20 | 7 | 207 |

Table 14e: Computer Solutions & Previous Undergraduate Degree Percentages

| Solution | Previous Undergraduate Degree<br>Art | Social Science | Science | Other | Combination |
|---|---|---|---|---|---|
| New System/Part | 12.2% | 10.0% | 18.4% | 5.0% | 28.6% |
| Outside Help | 39.0% | 33.3% | 18.4% | 20.0% | 42.9% |
| Fixed by Participant | 35.4% | 35.0% | 50.0% | 60.0% | 14.3% |
| Not Fixed | 13.4% | 21.7% | 13.2% | 15.0% | 14.3% |
| **Total** | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

***(ii) Vicarious Experiences:***

*ii) Do you think that computer programs are geared more towards males, females, or both equally? Why do you think so?*

The preservice teachers' responses based on vicarious experiences were explored through male, female, and no option/unsure categories (Table 15a to Table 15e; Figure 4). Samples of participants' responses by category, and the reasoning behind these responses include: (a) *male* category consisted of responses such as: males spend more time on computers; technology had always drawn in more males; therefore, more males were in this field; males were more technically oriented since most programmers were males who designed and manufactured software; marketing was male oriented (such as the Dell commercial" dude, you're getting a Dell"), (b) *no biased program* category consisted of responses such as: computers were geared toward the technologically advanced and computer-literate people; males and females used the same programs and were equally proficient; computer programs had to do less with gender and more with amount of exposure to computers and skill; a computer was seen as a universal appliance not specific to either gender, (c) *biased* program category encompassed responses such as: video games were oriented toward males and some computer programs were geared towards females; in addition, computer stores were not viewed as being female-friendly due to the fact that the majority of the staff were male and that interior decoration did not appeal to a female audience (d) *female* categories included responses stating that most programs were well organized with many options that were more appealing to females due to the fact that men do not like to ask for help or direction. While most preservice teachers believed that computer programs were geared toward both genders, 18 (21.18%) Primary/Junior preservice teachers indicated program orientation was geared toward males. A hundred twenty-three (58.6%) participants responded that there were no biased programs. It should be noted 11 (16.42%) Art and 10 Social Science (18.52%) students gave reasons for computer program orientation toward males compared to one (2.86%) Science preservice teacher (see Table 15f to Table 15j).

Table 15a: Computer Program Orientation Frequencies and Percentages

| **Program Orientation** | Frequency | **Percent** | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Male | 36 | 17.1 | 17.1 | 17.1 |
| Female | 4 | 1.9 | 1.9 | 19.0 |
| Both | 155 | 73.8 | 73.8 | 92.9 |
| No Opinion/Unsure | 15 | 7.1 | 7.1 | 100.0 |
| **Total** | 210 | 100.0 | 100.0 | |

Figure 4: Computer Program Orientation Percentages

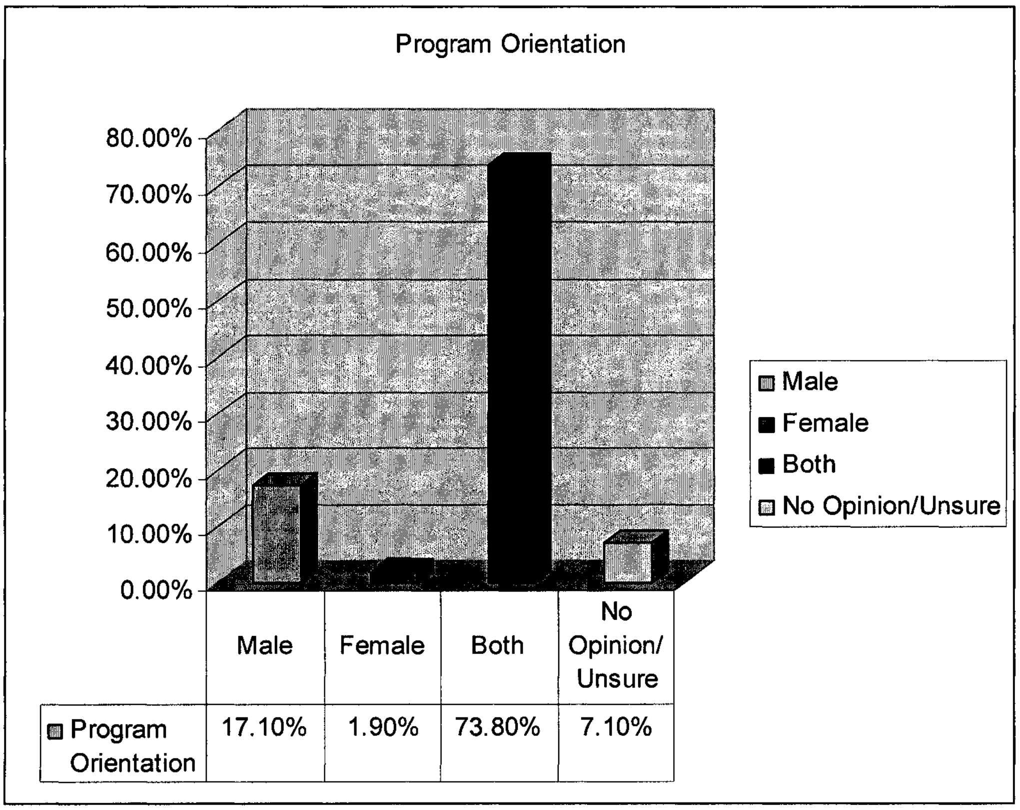


Table 15b: Computer Program Orientation & Division Frequencies

| Program Orientation | Division<br>Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
|---|---|---|---|---|
| Male | 18 | 12 | 6 | 36 |
| Female | 0 | 4 | 0 | 4 |
| Both | 61 | 62 | 32 | 155 |
| No Opinion/Unsure | 6 | 7 | 2 | 15 |
| **Total** | 85 | 85 | 40 | 210 |

Table 15c: Computer Program Orientation & Division Percentages

| **Program Orientation** | | **Division** | |
|---|---|---|---|
| Program Orientation | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Male | 21.18% | 14.12% | 15.00% |
| Female | 0.00% | 4.71% | 0.00% |
| Both | 71.76% | 72.94% | 80.00% |
| No Opinion/Unsure | 7.06% | 8.24% | 5.00% |
| **Total** | 100.00% | 100.00% | 100.00% |

Table 15d: Computer Program Orientation & Undergraduate Degree Frequencies

| **Program Orientation** | **Previous Undergraduate Degree** | | | | | Total |
|---|---|---|---|---|---|---|
| | Art | Social Science | Science | Other | Combination | |
| Male | 16 | 10 | 5 | 1 | 4 | 36 |
| Female | 0 | 1 | 3 | 0 | 0 | 4 |
| Both | 56 | 48 | 30 | 18 | 3 | 155 |
| No Opinion/Unsure | 10 | 1 | 2 | 1 | 1 | 15 |
| **Total** | 82 | 60 | 40 | 20 | 8 | 210 |

Table 15e: Computer Program Orientation & Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Program Orientation** | Art | Social Science | Science | Other | Combination |
| Male | 19.51% | 16.67% | 12.50% | 5.00% | 50.00% |
| Female | 0.00% | 1.67% | 7.50% | 0.00% | 0.00% |
| Both | 68.29% | 80.00% | 75.00% | 90.00% | 37.50% |
| No Opinion/Unsure | 12.20% | 1.67% | 5.00% | 5.00% | 12.50% |
| **Total** | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Table 15f: Reasoning behind Computer Program Orientation

| | **Reason** | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Male | 27 | 12.9 | 15.2 | 15.2 |
| | No biased program | 123 | 58.6 | 69.1 | 84.3 |
| | Biased programs | 26 | 12.4 | 14.6 | 98.9 |
| | Female-options | 2 | 1.0 | 1.1 | 100.0 |
| | **Total** | 178 | 84.8 | 100.0 | |
| No Explanation | | 32 | 15.2 | | |
| Total | | 210 | 100.0 | | |

Table 15g: Reasoning behind Computer Program Orientation & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Reason** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Male | 19 | 4 | 4 | 27 |
| No biased program | 44 | 49 | 30 | 123 |
| Biased programs | 9 | 12 | 5 | 26 |
| Female-options | 0 | 2 | 0 | 2 |
| **Total** | 72 | 67 | 39 | 178 |

Table 15h: Reasoning behind Computer Program Orientation & Division Percentages

| | Division | | |
|---|---|---|---|
| Reason | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Male | 26.39% | 5.97% | 10.26% |
| No biased program | 61.11% | 73.13% | 76.92% |
| Biased programs | 12.50% | 17.91% | 12.82% |
| Female-options | 0.00% | 2.99% | 0.00% |
| **Total** | 100.00% | 100.00% | 100.00% |

Table 15i: Reasoning behind Computer Program Orientation & Previous Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| Reason | Art | Social Science | Science | Other | Combination | Total |
| Male | 11 | 10 | 1 | 3 | 2 | 27 |
| No biased program | 42 | 38 | 28 | 12 | 3 | 123 |
| Biased programs | 14 | 6 | 4 | 0 | 2 | 26 |
| Female-options | 0 | 0 | 2 | 0 | 0 | 2 |
| **Total** | 67 | 54 | 35 | 15 | 7 | 178 |

Table 15j: Reasoning behind Computer Program Orientation & Previous Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| Reason | Art | Social Science | Science | Other | Combination |
| Male | 16.42% | 18.52% | 2.86% | 20.00% | 28.57% |
| No biased program | 62.69% | 70.37% | 80.00% | 80.00% | 42.86% |
| Biased programs | 20.90% | 11.11% | 11.43% | 0.00% | 28.57% |
| Female-options | 0.00% | 0.00% | 5.71% | 0.00% | 0.00% |
| **Total** | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

***(iii) Verbal Persuasion:***

*Which of the following factor(s) (society, school, family, employer and other) have been the most influential in forming your attitude toward computers? Please indicate by ✓ (check mark) in the Experience column whether this was a positive (+) or a negative (-) experience and explain why.* (See Appendix J for complete question.)

Society Factor

The society experience factor had a positive influence on 160 (76.2%) students (Table 16a). Seventy-two (92.31%) of Primary/Junior and 65 (89.04%) Art degree preservice teachers viewed society experience as a positive factor compared to only 26 (76.47%) of Intermediate/Senior preservice teachers and 26 (76.47%) Science Degree students (Table 16 b to Table 16d). However, 146 (69.5%) participants explained in detail the influence of the society factor (Table 16e to Table 16i; Figure 5). The participants' explanations of these categories were: (a) *negative* explanations were indicated in a way that participants felt they were being forced to be computer literate; they were worried of identity theft and felt that they were over dependent on computers (b) *positive* explanations consisted of responses such as: because we live in a computer-based society, computer access is being encouraged in many places (e.g. library) and it is a necessary survival skill; computers and technology have improved our standard of living and ways of communicating and keeping in touch with friends; many students felt that they had grown up with technology and therefore saw it as part of their everyday life (c) *no influence* factor included responses such as participant never felt that he/she should use computers and society had no influence (d) *both* positive and negative influences included responses such as information could be easily accessed and displayed.

Table 16a: Society Experience Frequencies and Percentages

| **Society Experience** | | Frequency | **Percent** | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Negative | 22 | 10.5 | 11.7 | 11.7 |
| | Positive | 160 | 76.2 | 85.1 | 96.8 |
| | No influence | 2 | 1.0 | 1.1 | 97.9 |
| | Both | 4 | 1.9 | 2.1 | 100.0 |
| | **Total** | 188 | 89.5 | 100.0 | |
| No response | | 22 | 10.5 | | |
| Total | | 210 | 100.0 | | |

Figure 5: Society Experience Percentages

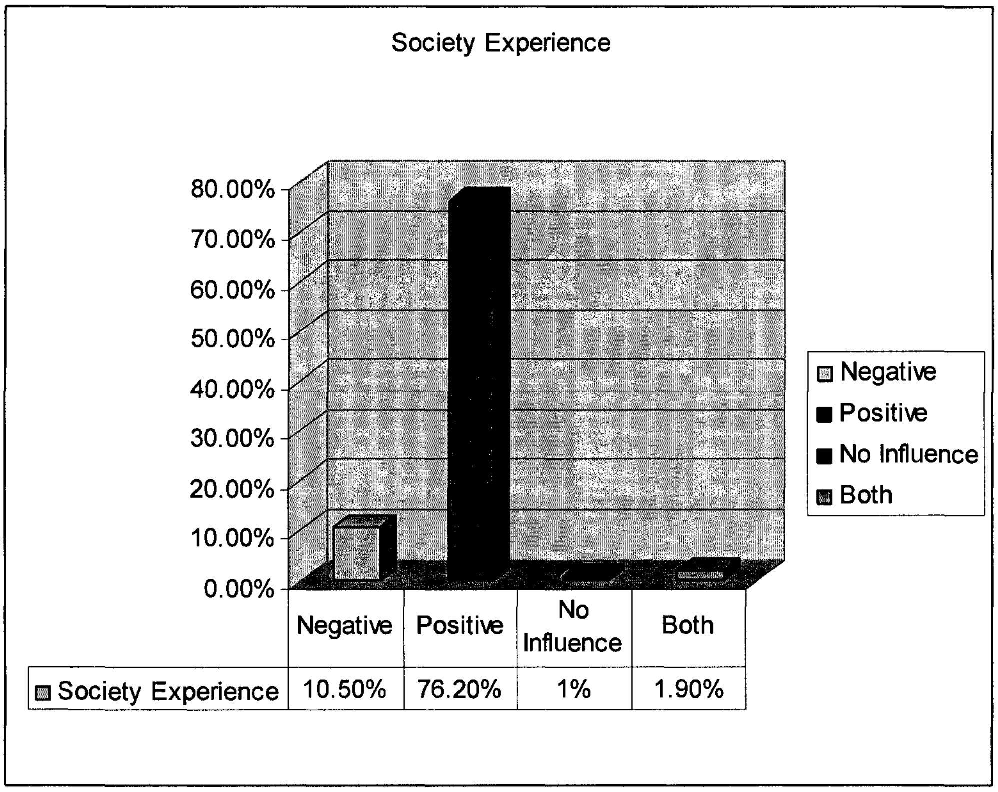



Table 16b: Society Experience & Division Frequencies

| **Society Experience** | Primary/ Junior | **Division** Junior/ Intermediate | Intermediate/ Senior | Total |
|---|---|---|---|---|
| Negative | 5 | 11 | 6 | 22 |
| Positive | 72 | 62 | 26 | 160 |
| No influence | 1 | 0 | 1 | 2 |
| Both | 0 | 3 | 1 | 4 |
| Total | 78 | 76 | 34 | 188 |

Table 16c: Society Experience & Division Percentages

| Society Experience | Division Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
|---|---|---|---|
| Negative | 6.41% | 14.47% | 17.65% |
| Positive | 92.31% | 81.58% | 76.47% |
| No influence | 1.28% | 0.00% | 2.94% |
| Both | 0.00% | 3.95% | 2.94% |
| **Total** | 100.00% | 100.00% | 100.00% |

Table 16d: Society Experience & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Society Experience** | Art | Social Science | Science | Other | Combination | Total |
| Negative | 6 | 7 | 6 | 1 | 2 | 22 |
| Positive | 65 | 47 | 26 | 17 | 5 | 160 |
| No influence | 0 | 1 | 0 | 0 | 1 | 2 |
| Both | 2 | 0 | 2 | 0 | 0 | 4 |
| Total | 73 | 55 | 34 | 18 | 8 | 188 |

Table 16e: Society Experience & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Society Experience** | Art | Social Science | Science | Other | Combination |
| Negative | 8.22% | 12.73% | 17.65% | 5.56% | 25.00% |
| Positive | 89.04% | 85.45% | 76.47% | 94.44% | 62.50% |
| No influence | 0.00% | 1.82% | 0.00% | 0.00% | 12.50% |
| Both | 2.74% | 0.00% | 5.88% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Table 16f: Society Influence Explanation Frequencies

| **Society Explanation** | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Positive Explanation | 125 | 59.5 | 85.6 | 85.6 |
| | Negative Explanation | 15 | 7.1 | 10.3 | 95.9 |
| | No influence | 3 | 1.4 | 2.1 | 97.9 |
| | Both | 3 | 1.4 | 2.1 | 100.0 |
| | Total | 146 | 69.5 | 100.0 | |
| N/A | | 64 | 30.5 | | |
| Total | | 210 | 100.0 | | |

Table 16g: Society Influence Explanation & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Society Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Positive Explanation | 58 | 42 | 25 | 125 |
| Negative Explanation | 5 | 6 | 4 | 15 |
| No influence | 2 | 1 | 0 | 3 |
| Both | 0 | 2 | 1 | 3 |
| Total | 65 | 51 | 30 | 146 |

Table 16h: Society Influence Explanation & Division Percentages

| | Division | | |
|---|---|---|---|
| **Society Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Positive Explanation | 89.23% | 82.35% | 83.33% |
| Negative Explanation | 7.69% | 11.76% | 13.33% |
| No influence | 3.08% | 1.96% | 0.00% |
| Both | 0.00% | 3.92% | 3.33% |
| Total | 100.00% | 100.00% | 100.00% |

Table 16i: Society Influence Explanation & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Society Explanation** | Art | Social Science | Science | Other | Combination | Total |
| Positive Explanation | 54 | 36 | 21 | 11 | 3 | 125 |
| Negative Explanation | 4 | 6 | 4 | 0 | 1 | 15 |
| No influence | 1 | 1 | 0 | 0 | 1 | 3 |
| Both | 1 | 0 | 2 | 0 | 0 | 3 |
| Total | 60 | 43 | 27 | 11 | 5 | 146 |

Table 16j: Society Influence Explanation & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Society Explanation** | Art | Social Science | Science | Other | Combination |
| Positive Explanation | 90.00% | 83.72% | 77.78% | 100.00% | 60.00% |
| Negative Explanation | 6.67% | 13.95% | 14.81% | 0.00% | 20.00% |
| No influence | 1.67% | 2.33% | 0.00% | 0.00% | 20.00% |
| Both | 1.67% | 0.00% | 7.41% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

School Factor:

A total of 201 (95.7%) students responded to the school influence section (Table 17a and Figure 6). The school factor had the highest percentage of positive influence on 73 (90.12%) Junior/Intermediate and 51 (89.47%) Social Science students (Tables 17b to 17e). A total of 167 (79.5%) students explained why the school factor had an influence in forming their attitudes toward computers (Table 17f). Twelve (16.9%) Primary/Junior and 9 (13.43%) Art preservice students gave the most negative explanation (Tables 17g to 17i). The school influence explanations were divided into the following categories: (a) *negative explanations* consisting of responses such as: lack of training and instruction obtained from teachers (b) *positive explanations* included responses that good teachers taught them programs; school offered courses to learn useful computer skills; computer was utilized in order to complete homework and research; university computer courses were more influential than high school coursework because the university focused on computer usage and computers were more accessible (c) *both* positive and negative explanations such as people spend too much time on computers; being aware of many programs that were not utilized since most assignments needed to be typed out; therefore only word processing software was being frequently used.

Table 17a: School Experience Frequencies and Percentages

| School Experience | Frequency | **Percent** | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Negative | 20 | 9.5 | 10.0 | 10.0 |
| Positive | 174 | 82.9 | 86.6 | 96.5 |
| Both | 7 | 3.3 | 3.5 | 100.0 |
| **Total** | 201 | 95.7 | 100.0 | |
| N/A | 9 | 4.3 | | |
| Total | 210 | 100.0 | | |

Figure 6: School Experience Percentages

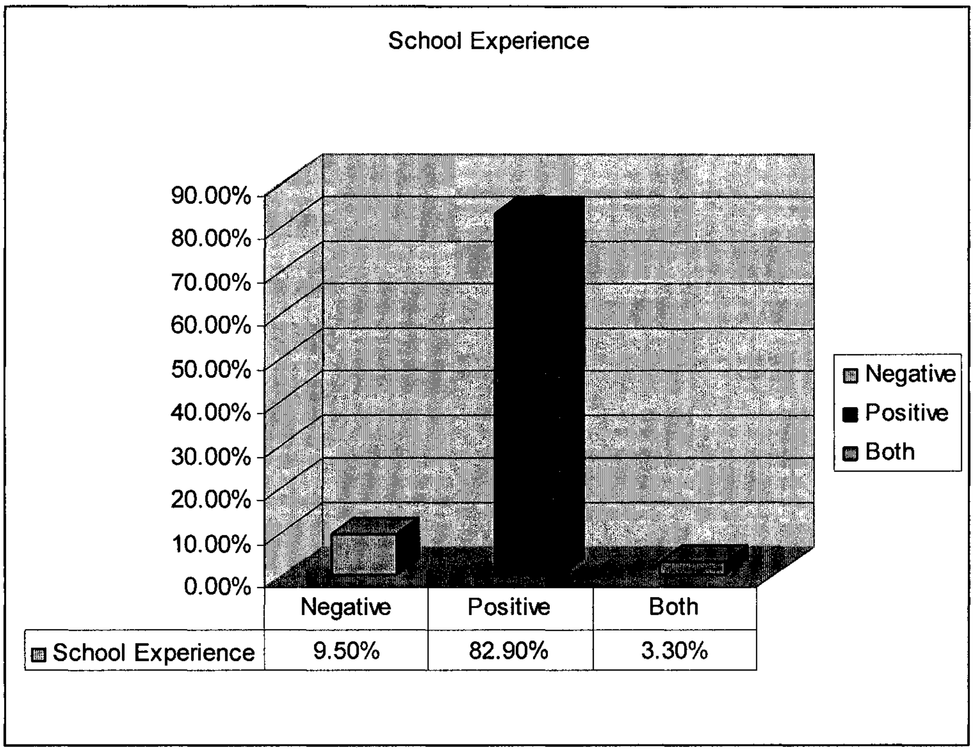



Table 17b: School Experience & Division Frequencies

| School Experience | Division Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
|---|---|---|---|---|
| Negative | 13 | 4 | 3 | 20 |
| Positive | 69 | 73 | 32 | 174 |
| Both | 0 | 4 | 3 | 7 |
| Total | 82 | 81 | 38 | 201 |

Table 17c: School Experience & Division Percentages

| | Division | | |
|---|---|---|---|
| **School Experience** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Negative | 15.85% | 4.94% | 7.89% |
| Positive | 84.15% | 90.12% | 84.21% |
| Both | 0.00% | 4.94% | 7.89% |
| Total | 100.00% | 100.00% | 100.00% |

Table 17d: School Experience & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **School Experience** | Art | Social Science | Science | Other | Combination | Total |
| Negative | 9 | 5 | 3 | 1 | 2 | 20 |
| Positive | 67 | 51 | 31 | 19 | 6 | 174 |
| Both | 1 | 1 | 5 | 0 | 0 | 7 |
| Total | 77 | 57 | 39 | 20 | 8 | 201 |

Table 17e: School Experience & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **School Experience** | Art | Social Science | Science | Other | Combination |
| Negative | 11.69% | 8.77% | 7.69% | 5.00% | 25.00% |
| Positive | 87.01% | 89.47% | 79.49% | 95.00% | 75.00% |
| Both | 1.30% | 1.75% | 12.82% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Table 17f: School Influence Explanation Frequencies

| **School Explanation** | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Negative Explanation | 21 | 10.0 | 12.6 | 12.6 |
| | Positive Explanation | 141 | 67.1 | 84.4 | 97.0 |
| | Both + - | 5 | 2.4 | 3.0 | 100.0 |
| | **Total** | 167 | 79.5 | 100.0 | |
| N/A | | 43 | 20.5 | | |
| Total | | 210 | 100.0 | | |

Table 17g: School Influence Explanation & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **School Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Negative Explanation | 12 | 6 | 3 | 21 |
| Positive Explanation | 59 | 52 | 30 | 141 |
| Both + - | 0 | 2 | 3 | 5 |
| Total | 71 | 60 | 36 | 167 |

Table 17h: School Influence Explanation & Division Percentages

| | Division | | |
|---|---|---|---|
| **School Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Negative Explanation | 16.90% | 10.00% | 8.33% |
| Positive Explanation | 83.10% | 86.67% | 83.33% |
| Both + - | 0.00% | 3.33% | 8.33% |
| Total | 100.00% | 100.00% | 100.00% |

Table 17i: School Influence Explanation & Previous Undergraduate Degree Frequencies

| **School Explanation** | **Previous Undergraduate Degree** | | | | | Total |
|---|---|---|---|---|---|---|
| | Art | Social Science | Science | Other | Combination | |
| Negative Explanation | 9 | 6 | 3 | 1 | 2 | 21 |
| Positive Explanation | 57 | 43 | 26 | 12 | 3 | 141 |
| Both + - | 1 | 0 | 4 | 0 | 0 | 5 |
| Total | 67 | 49 | 33 | 13 | 5 | 167 |

Table 17j: School Influence Explanation & Previous Undergraduate Degree Percentages

| **School Explanation** | **Previous Undergraduate Degree** | | | | |
|---|---|---|---|---|---|
| | Art | Social Science | Science | Other | Combination |
| Negative Explanation | 13.43% | 12.24% | 9.09% | 7.69% | 40.00% |
| Positive Explanation | 85.07% | 87.76% | 78.79% | 92.31% | 60.00% |
| Both + - | 1.49% | 0.00% | 12.12% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

<u>Family Factor:</u>

The family experience factor had a positive influence on 130 (61.9%) students (Table 18a and Figure 7). Fifty-five (76.39%) Junior/Intermediate and 31 (91.18%) Science students had a positive family experience in forming their attitudes about computers. Twenty-four (33.33%) Art and 23 (29.87%) Primary/Junior students had a negative experience (Table 18b to 18e). A hundred thirty-seven (65.2%) participants explained the influence of family experiences on computer attitudes (Table 18f). The highest percentage of negative family influence explanations in forming attitudes about computers was reported by 20 (31.5%) Primary/Junior and 20 (34.48%) Art and 13 (34.21%) Social Science students (Tables 18f to 18i). The participants' explanations were categorized as: (a) *positive explanations* included experiences such as: family being supportive in providing computer and necessary support; siblings were helping each other in trying to solve computer problems and improve each other's skills; family communication overseas had improved through e-mail and instant messaging (b) *negative explanations* included the following responses: family would feud to get access to the computer; family computer did not work due to viruses; older parents were not supportive of computer technology and computer usage due to unfamiliarity; family was not able to provide access to computer and (c) *both* positive and negative explanations encompassed responses that included statements such as: family did not know much about computers and therefore they were not encouraging each other to use the computer.

Table 18a: Family Experience Frequencies and Percentages

| Family Experience | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Negative | 45 | 21.4 | 24.7 | 24.7 |
| | Positive | 130 | 61.9 | 71.4 | 96.2 |
| | No Influence | 3 | 1.4 | 1.6 | 97.8 |
| | Both +- | 4 | 1.9 | 2.2 | 100.0 |
| | **Total** | 182 | 86.7 | 100.0 | |
| N/A | | 28 | 13.3 | | |
| Total | | 210 | 100.0 | | |

Figure 7: School Experience Percentages

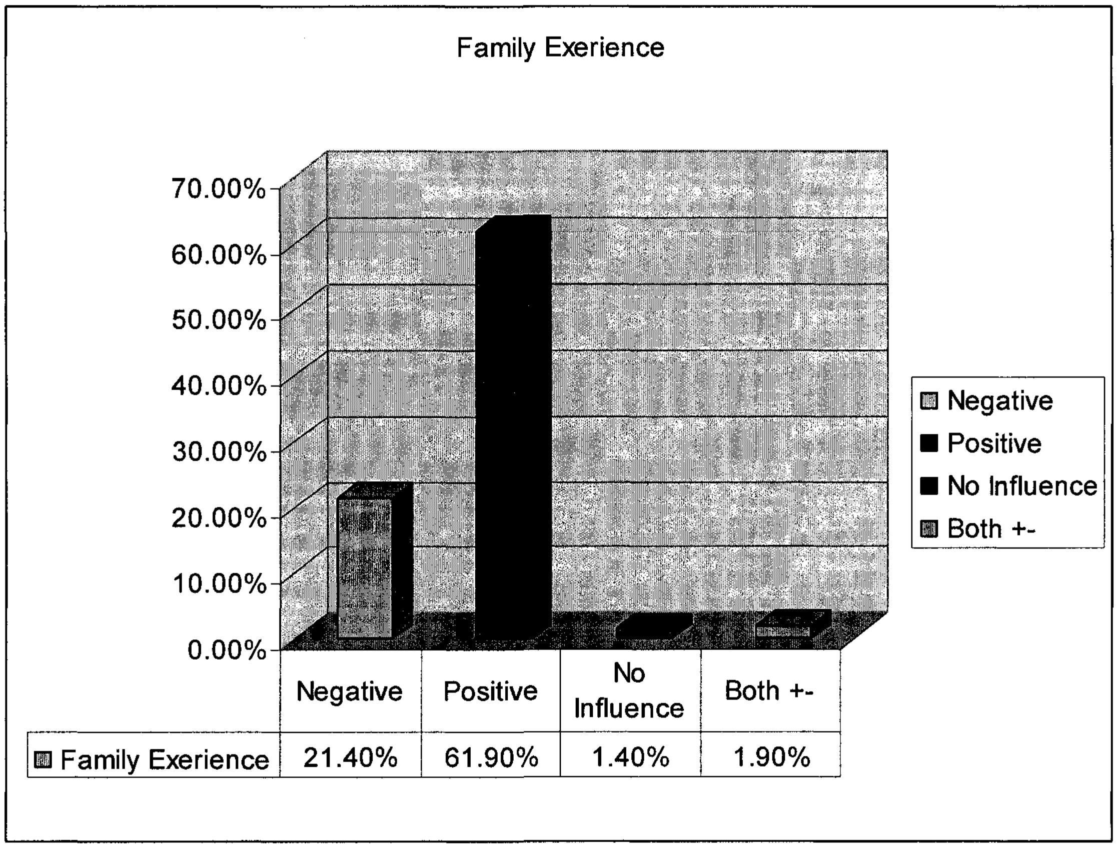


Table 18b: Family Experience & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Family Experience** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Negative | 23 | 14 | 8 | 45 |
| Positive | 52 | 55 | 23 | 130 |
| No Influence | 1 | 1 | 1 | 3 |
| Both +- | 1 | 2 | 1 | 4 |
| Total | 77 | 72 | 33 | 182 |

Table 18c: Family Experience & Division Percentages

| | Division | | |
|---|---|---|---|
| **Family Experience** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Negative | 29.87% | 19.44% | 24.24% |
| Positive | 67.53% | 76.39% | 69.70% |
| No Influence | 1.30% | 1.39% | 3.03% |
| Both +- | 1.30% | 2.78% | 3.03% |
| Total | 100.00% | 100.00% | 100.00% |

Table 18d: Family Experience & Previous Undergraduate Degree Frequencies

| | **Previous Undergraduate Degree** | | | | | |
|---|---|---|---|---|---|---|
| **Family Experience** | Art | Social Science | Science | Other | Combination | Total |
| Negative | 24 | 13 | 2 | 5 | 1 | 45 |
| Positive | 46 | 35 | 31 | 12 | 6 | 130 |
| No Influence | 0 | 1 | 0 | 1 | 1 | 3 |
| Both +- | 2 | 1 | 1 | 0 | 0 | 4 |
| Total | 72 | 50 | 34 | 18 | 8 | 182 |

Table 18e: Family Experience & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Family Experience** | Art | Social Science | Science | Other | Combination |
| Negative | 33.33% | 26.00% | 5.88% | 27.78% | 12.50% |
| Positive | 63.89% | 70.00% | 91.18% | 66.67% | 75.00% |
| No Influence | 0.00% | 2.00% | 0.00% | 5.56% | 12.50% |
| Both +- | 2.78% | 2.00% | 2.94% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Table 18f: Family Influence Explanation Frequencies

| **Family Explanation** | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Positive Explanation | 93 | 44.3 | 67.9 | 67.9 |
| Negative Explanation | 37 | 17.6 | 27.0 | 94.9 |
| No Use/Influence | 6 | 2.9 | 4.4 | 99.3 |
| Both +- Explanations | 1 | .5 | .7 | 100.0 |
| **Total** | 137 | 65.2 | 100.0 | |
| N/A | 73 | 34.8 | | |
| Total | 210 | 100.0 | | |

Table 18g: Family Influence Explanation & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Family Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Positive Explanation | 38 | 34 | 21 | 93 |
| Negative Explanation | 20 | 11 | 6 | 37 |
| No Use/Influence | 6 | 0 | 0 | 6 |
| Both +- Explanations | 0 | 0 | 1 | 1 |
| Total | 64 | 45 | 28 | 137 |

Table 18h: Family Influence Explanation & Division Percentages

| Family Explanation | Division<br>Primary/<br>Junior | Junior/<br>Intermediate | Intermediate/<br>Senior |
|---|---|---|---|
| Positive Explanation | 59.38% | 75.56% | 75.00% |
| Negative Explanation | 31.25% | 24.44% | 21.43% |
| No Use/Influence | 9.38% | 0.00% | 0.00% |
| Both +- Explanations | 0.00% | 0.00% | 3.57% |
| Total | 100.00% | 100.00% | 100.00% |

Table 18i: Family Influence Explanation & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Family Explanation** | Art | Social Science | Science | Other | Combination | Total |
| Positive Explanation | 35 | 24 | 23 | 8 | 3 | 93 |
| Negative Explanation | 20 | 13 | 2 | 1 | 1 | 37 |
| No Use/Influence | 3 | 1 | 0 | 1 | 1 | 6 |
| Both +- Explanations | 0 | 0 | 1 | 0 | 0 | 1 |
| Total | 58 | 38 | 26 | 10 | 5 | 137 |

Table 18j: Family Influence Explanation & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Family Explanation** | Art | Social Science | Science | Other | Combination |
| Positive Explanation | 60.34% | 63.16% | 88.46% | 80.00% | 60.00% |
| Negative Explanation | 34.48% | 34.21% | 7.69% | 10.00% | 20.00% |
| No Use/Influence | 5.17% | 2.63% | 0.00% | 10.00% | 20.00% |
| Both +- Explanations | 0.00% | 0.00% | 3.85% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Employer Factor:

A total of 165 (78.6%) participants responded to this questions (Table 19a and Figure 8). Nine (30%) Intermediate/Senior and 17 (25.37%) Art students had the highest percentage of negative computer experience from employer (Tables 19b to 19e). A total of 133 (63.3%) participants had written an explanation for employer influence (Table 19f). Nineteen (79.17%) Intermediate/Senior students, 23 (88.46%) Science, and 9 (100%) "Other" indicated that they had a positive influence from an employer (Tables 19g to 19j). The following four categories emerged from explanation responses: (a) *negative explanations* included answers such as: the job did not require computer work and the job was very manual; computers were not accessible or available; computers made extra work (b) *positive explanations* included the following responses: participants as employees were able to gain knowledge by attending workshops and were paid to do so; the workplace enabled them to learn about various programs by providing different training, therefore making the job easier; being computer literate was seen as a benefit that enabled participants to get better jobs and (c) *both* negative and positive influences occurred when the computers could handle large amounts of data, however, this would mean that more would be expected of the employee due to advanced capabilities of the computers.

Table 19a: Employer Experience Frequencies & Percentages

| **Employer Experience** | | Frequency | **Percent** | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Negative | 32 | 15.2 | 19.4 | 19.4 |
| | Positive | 128 | 61.0 | 77.6 | 97.0 |
| | No Influence | 3 | 1.4 | 1.8 | 98.8 |
| | Both | 2 | 1.0 | 1.2 | 100.0 |
| | **Total** | 165 | 78.6 | 100.0 | |
| N/A | | 45 | 21.4 | | |
| Total | | 210 | 100.0 | | |

Figure 8: Employer Experience Percentages

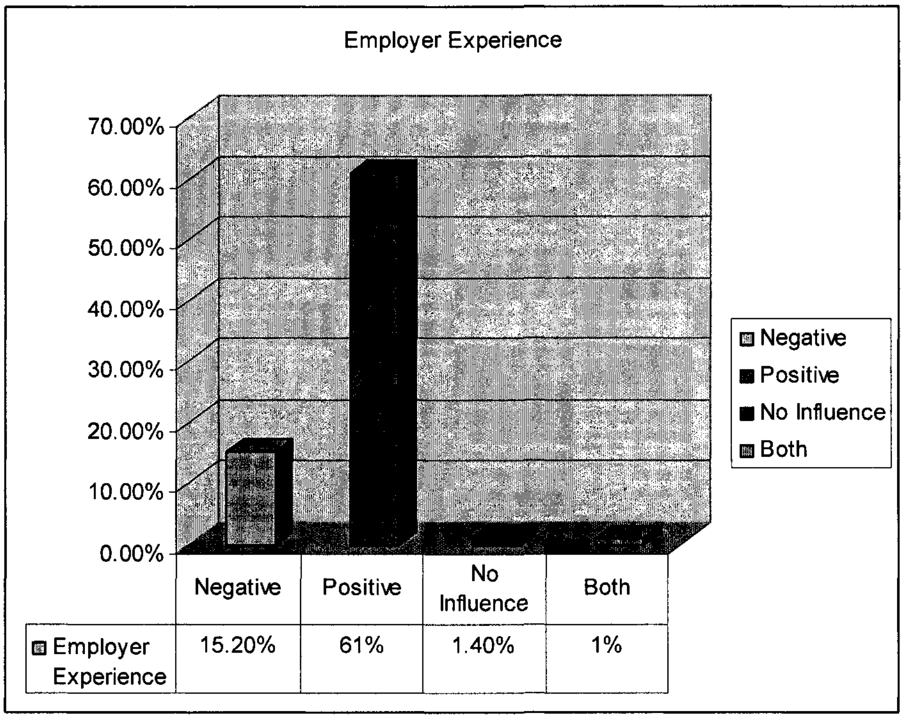



Table 19b: Employer Experience & Division Percentages

| | Division | | | |
|---|---|---|---|---|
| **Employer Experience** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Negative | 12 | 11 | 9 | 32 |
| Positive | 54 | 54 | 20 | 128 |
| No Influence | 2 | 1 | 0 | 3 |
| Both | 0 | 1 | 1 | 2 |
| Total | 68 | 67 | 30 | 165 |

Table 19c: Employer Experience & Division Percentages

| | Division | | |
|---|---|---|---|
| **Employer Experience** | Primary/Junior | Junior/Intermediate | Intermediate/Senior |
| Negative | 17.65% | 16.42% | 30.00% |
| Positive | 79.41% | 80.60% | 66.67% |
| No Influence | 2.94% | 1.49% | 0.00% |
| Both | 0.00% | 1.49% | 3.33% |
| Total | 0.00% | 100.00% | 100.00% |

Table 19d: Employer Experience & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Employer Experience** | Art | Social Science | Science | Other | Combination | Total |
| Negative | 17 | 8 | 4 | 2 | 1 | 32 |
| Positive | 50 | 32 | 27 | 15 | 4 | 128 |
| No Influence | 0 | 1 | 1 | 0 | 1 | 3 |
| Both | 0 | 1 | 1 | 0 | 0 | 2 |
| Total | 67 | 42 | 33 | 17 | 6 | 165 |

Table 19e: Employer Experience & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Employer Experience** | Art | Social Science | Science | Other | Combination |
| Negative | 25.37% | 19.05% | 12.12% | 11.76% | 16.67% |
| Positive | 74.63% | 76.19% | 81.82% | 88.24% | 66.67% |
| No Influence | 0.00% | 2.38% | 3.03% | 0.00% | 16.67% |
| Both | 0.00% | 2.38% | 3.03% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Table 19f: Employer Influence Explanation Frequencies and Percentages

| **Employer Explanation** | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| Negative Explanation | 14 | 6.7 | 10.5 | 10.5 |
| Positive Explanation | 100 | 47.6 | 75.2 | 85.7 |
| No Influence | 19 | 9.0 | 14.3 | 100.0 |
| **Total** | 133 | 63.3 | 100.0 | |
| N/A | 77 | 36.7 | | |
| Total | 210 | 100.0 | | |

Table 19g: Employer Influence Explanation & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Employer Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Negative Explanation | 4 | 7 | 3 | 14 |
| Positive Explanation | 46 | 35 | 19 | 100 |
| No Influence | 10 | 7 | 2 | 19 |
| Total | 60 | 49 | 24 | 133 |

Table 19h: Employer Influence Explanation & Division Percentages

| | Division | | |
|---|---|---|---|
| **Employer Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Negative Explanation | 6.67% | 14.29% | 12.50% |
| Positive Explanation | 76.67% | 71.43% | 79.17% |
| No Influence | 16.67% | 14.29% | 8.33% |
| Total | 100.00% | 100.00% | 100.00% |

Table 19i: Employer Influence Explanation & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Employer Explanation** | Art | Social Science | Science | Other | Combination | Total |
| Negative Explanation | 10 | 3 | 1 | 0 | 0 | 14 |
| Positive Explanation | 41 | 25 | 23 | 9 | 2 | 100 |
| No Influence | 10 | 6 | 2 | 0 | 1 | 19 |
| Total | 61 | 34 | 26 | 9 | 3 | 133 |

Table 19j: Employer Influence Explanation & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Employer Explanation** | Art | Social Science | Science | Other | Combination |
| Negative Explanation | 16.39% | 8.82% | 3.85% | 0.00% | 0.00% |
| Positive Explanation | 67.21% | 73.53% | 88.46% | 100.00% | 66.67% |
| No Influence | 16.39% | 17.65% | 7.69% | 0.00% | 33.33% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

<u>Other Factor:</u>

A total of 21 (10%) participants responded to this question (Table 20a and Figure 9). Eight (88.89%) Junior/Intermediate and 6 (85.71%) Social Science students had the highest percentage of *other* positive influence in forming their attitude towards computers (Tables 20b to 20e). A total of 15 (7.1%) had written an explanation for *other* influences (Table 20f). The following four categories resulted from participants' explanations: (a) *negative explanations* included responses from two participants; one participant felt that we spend too much time playing on the computer and the other felt that he might be too old to be sufficiently taught anything related to computers in the field of art, and (b) *positive explanations* included responses such as: computers were used for personal tasks such as banking, at the library and Internet searching; media through various advertisements had promoted the use of technology; computers were a widely used form of communication especially instant messaging.

Table 20a: Other Experience Frequencies & Percentages

| **Other Experiences** | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Negative | 4 | 1.9 | 19.0 | 19.0 |
| | Positive | 16 | 7.6 | 76.2 | 95.2 |
| | Both | 1 | .5 | 4.8 | 100.0 |
| | **Total** | 21 | 10.0 | 100.0 | |
| N/A | | 189 | 90.0 | | |
| Total | | 210 | 100.0 | | |

Figure 9: Other Experience Percentages

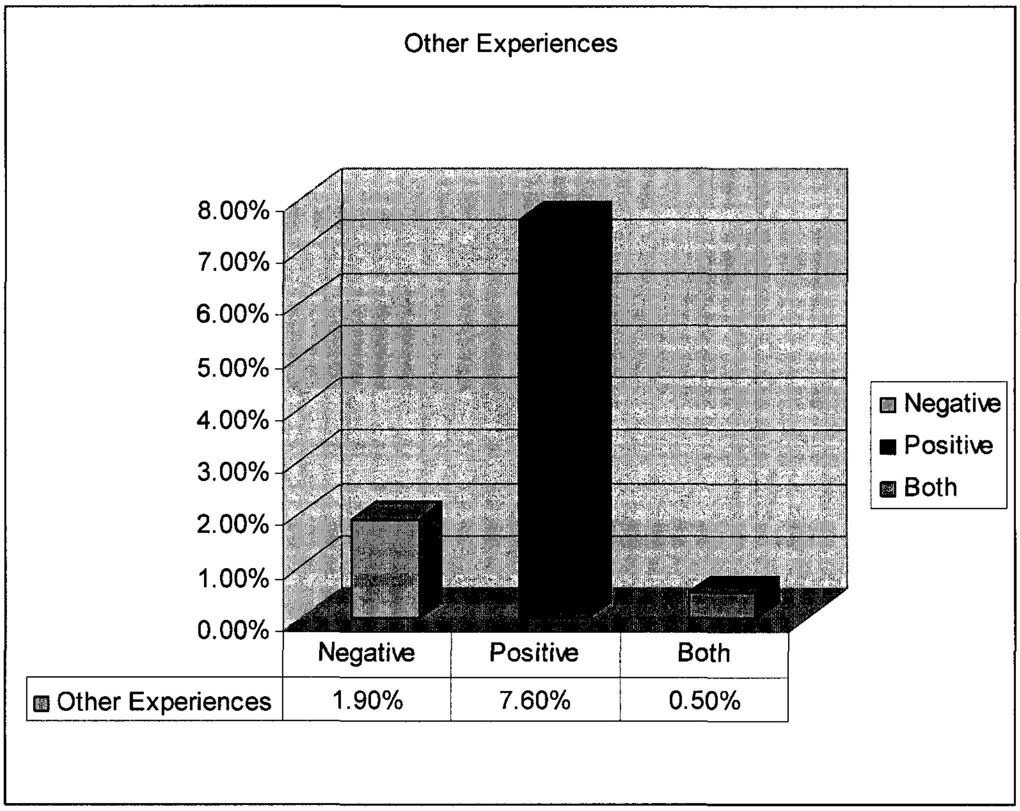



Table 20b: Other Experience & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Other Experiences** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Negative | 1 | 1 | 2 | 4 |
| Positive | 6 | 8 | 2 | 16 |
| Both | 1 | 0 | 0 | 1 |
| Total | 8 | 9 | 4 | 21 |

Table 20c: Other Experience & Division Percentages

| | Division | | |
|---|---|---|---|
| **Other Experiences** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Negative | 12.50% | 11.11% | 50.00% |
| Positive | 75.00% | 88.89% | 50.00% |
| Both | 12.50% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% |

Table 20d: Other Experience & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Other Experiences** | Art | Social Science | Science | Other | Combination | Total |
| Negative | 1 | 1 | 2 | 0 | 0 | 4 |
| Positive | 3 | 6 | 3 | 3 | 1 | 16 |
| Both | 1 | 0 | 0 | 0 | 0 | 1 |
| Total | 5 | 7 | 5 | 3 | 1 | 21 |

Table 20e: Other Experience & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Other Experiences** | Art | Social Science | Science | Other | Combination |
| Negative | 20.00% | 14.29% | 40.00% | 0.00% | 0.00% |
| Positive | 60.00% | 85.71% | 60.00% | 100.00% | 100.00% |
| Both | 20.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Table 20f: Other Influence Explanation Frequencies & Percentages

| **Other Explanation** | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Negative Explanation | 2 | 1.0 | 13.3 | 13.3 |
| | Positive Explanation | 13 | 6.2 | 86.7 | 100.0 |
| | **Total** | 15 | 7.1 | 100.0 | |
| N/A | | 195 | 92.9 | | |
| Total | | 210 | 100.0 | | |

Table 20g: Other Influence Explanation & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Other Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Negative Explanation | 1 | 1 | 0 | 2 |
| Positive Explanation | 5 | 5 | 3 | 13 |
| Total | 6 | 6 | 3 | 15 |

Table 20h: Other Influence Explanation & Division Percentages

| | Division | | | |
|---|---|---|---|---|
| **Other Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Negative Explanation | 16.67% | 16.67% | 0.00% | 2 |
| Positive Explanation | 83.33% | 83.33% | 100.00% | 13 |
| Total | 100.00% | 100.00% | 100.00% | 15 |

Table 20i: Other Influence Explanation & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Other Explanation** | Art | Social Science | Science | Other | Total |
| Negative Explanation | 1 | 1 | 0 | 0 | 2 |
| Positive Explanation | 3 | 5 | 3 | 2 | 13 |
| Total | 4 | 6 | 3 | 2 | 15 |

Table 20j: Other Influence Explanation & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | |
|---|---|---|---|---|
| **Other Explanation** | Art | Social Science | Science | Other |
| Negative Explanation | 25.00% | 16.67% | 0.00% | 0.00% |
| Positive Explanation | 75.00% | 83.33% | 100.00% | 100.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% |

***iv) Emotional Arousal:***

*Have you integrated computers into any of your lessons during your practicum placement? Please explain.*

A total of 208 (99%) students answered this question and 2 (1%) participants indicated that this question was not applicable to them (Table 21a and Figure 10). Twenty-two (56.41%) Intermediate/Senior and 23 (58.97%) Science students had the highest percentage of technology integration during their practicum placement (Tables 21b to 21e). The following four categories emerged from participants' explanations: (a) *not directly* implied that participants used technology in creating their lesson plans, but they were not implementing it because the lesson did not require it, (b) *no* due to *limitations* included responses that the school had limited access and shortage of computers; associate teacher did not require them to implement technology during their placement and (c) *yes* implied that students had a full technology-integrated lesson during their practicum placement. Twenty (55.56%) Intermediate/Senior, 19 (55.88%) Science and 9 (56.26%) "Other" students explained how they integrated computers into their lessons during their placement (Tables 21f to 21j).

Table 21a: Computer Integration Frequencies & Percentages

| **Computer Integration** | | Frequency | **Percent** | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | No | 133 | 63.3 | 63.9 | 63.9 |
| | Yes | 75 | 35.7 | 36.1 | 100.0 |
| | Total | 208 | 99.0 | 100.0 | |
| N/A | | 2 | 1.0 | | |
| Total | | 210 | 100.0 | | |

Figure 10: Computer Integration Percentages

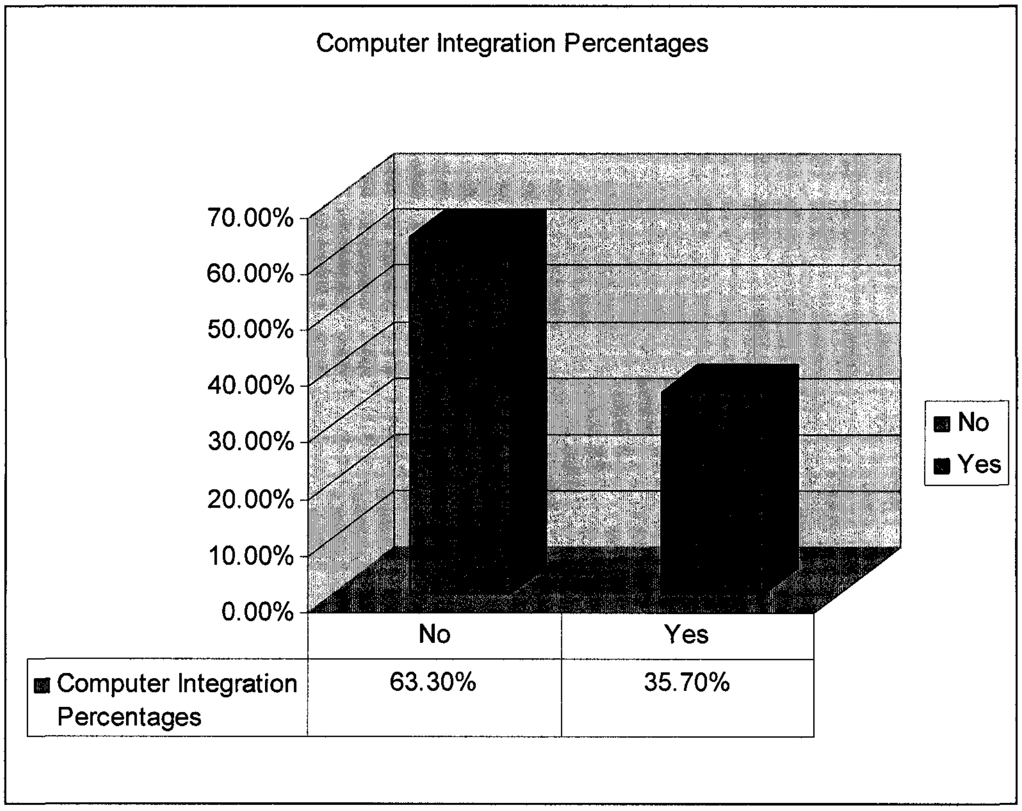



Table 21b: Computer Integration & Division Frequencies

| Computer Integration | Division Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
|---|---|---|---|---|
| No | 67 | 49 | 17 | 133 |
| Yes | 18 | 35 | 22 | 75 |
| Total | 85 | 84 | 39 | 208 |

Table 21c: Computer Integration & Division Percentages

| Computer Integration | Division Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
|---|---|---|---|
| No | 78.82% | 58.33% | 43.59% |
| Yes | 21.18% | 41.67% | 56.41% |
| Total | 100.00% | 100.00% | 100.00% |

Table 21d: Computer Integration & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| Computer Integration | Art | Social Science | Science | Other | Combination | Total |
| No | 65 | 37 | 16 | 12 | 3 | 133 |
| Yes | 17 | 22 | 23 | 8 | 5 | 75 |
| Total | 82 | 59 | 39 | 20 | 8 | 208 |

Table 21e: Computer Integration & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| Computer Integration | Art | Social Science | Science | Other | Combination |
| No | 79.27% | 62.71% | 41.03% | 60.00% | 7.50% |
| Yes | 20.73% | 37.29% | 58.97% | 40.00% | 5.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 12.50% |

Table 21f: Computer Integration Explanation Frequencies & Percentages

| Computer Integration Explanation | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Not directly | 70 | 33.3 | 43.5 | 43.5 |
| | No- limitation | 25 | 11.9 | 15.5 | 59.0 |
| | Yes | 66 | 31.4 | 41.0 | 100.0 |
| | Total | 161 | 76.7 | 100.0 | |
| No Response | | 49 | 23.3 | | |
| Total | | 210 | 100.0 | | |

Table 21g: Computer Integration Explanation & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| Computer Integration Explanation | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Not directly | 29 | 32 | 9 | 70 |
| No- limitation | 15 | 3 | 7 | 25 |
| Yes | 14 | 32 | 20 | 66 |
| **Total** | 58 | 67 | 36 | 161 |

Table 21h: Computer Integration Explanation & Division Percentages

| **Computer Integration Explanation** | **Division** Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
|---|---|---|---|
| Not directly | 50.00% | 47.76% | 25.00% |
| No- limitation | 25.86% | 4.48% | 19.44% |
| Yes | 24.14% | 47.76% | 55.56% |
| **Total** | 100.00% | 100.00% | 100.00% |

Table 21i: Computer Integration Explanation & Previous Undergraduate Degree Frequencies

| **Computer Integration Explanation** | **Previous Undergraduate Degree** Art | Social Science | Science | Other | Combination | Total |
|---|---|---|---|---|---|---|
| Not directly | 27 | 22 | 13 | 5 | 3 | 70 |
| No: limitation | 12 | 8 | 2 | 2 | 1 | 25 |
| Yes | 16 | 19 | 19 | 9 | 3 | 66 |
| Total | 55 | 49 | 34 | 16 | 7 | 161 |

Table 21j: Computer Integration Explanation & Previous Undergraduate Degree Percentages

| **Computer Integration Explanation** | **Previous Undergraduate Degree** Art | Social Science | Science | Other | Combination |
|---|---|---|---|---|---|
| Not directly | 49.09% | 44.90% | 38.24% | 31.25% | 42.86% |
| No: limitation | 21.82% | 16.33% | 5.88% | 12.50% | 14.29% |
| Yes | 29.09% | 38.78% | 55.88% | 56.25% | 42.86% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

*a) Did you find computer technology accessible in the schools during your practicum placement?*

A hundred-fifty five (73.8%) students found computer technology accessible while 3 (1.4%) students responded that they were *unsure* since they did not have a chance to look for it (Table 22a). Sixty-nine (81.18%) Primary/Junior and 49 (81.67%) Social Science students indicated that they had access to computer technology (Table 22b to Table 22c).

Table 22a: Computer Accessibility Frequencies and Percentages

| **Computer Accessibility** | Frequency | **Percent** | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| No | 52 | 24.8 | 24.8 | 24.8 |
| Yes | 155 | 73.8 | 73.8 | 98.6 |
| Unsure | 3 | 1.4 | 1.4 | 100.0 |
| **Total** | 210 | 100.0 | 100.0 | |

Figure 11: Computer Accessibility Percentages

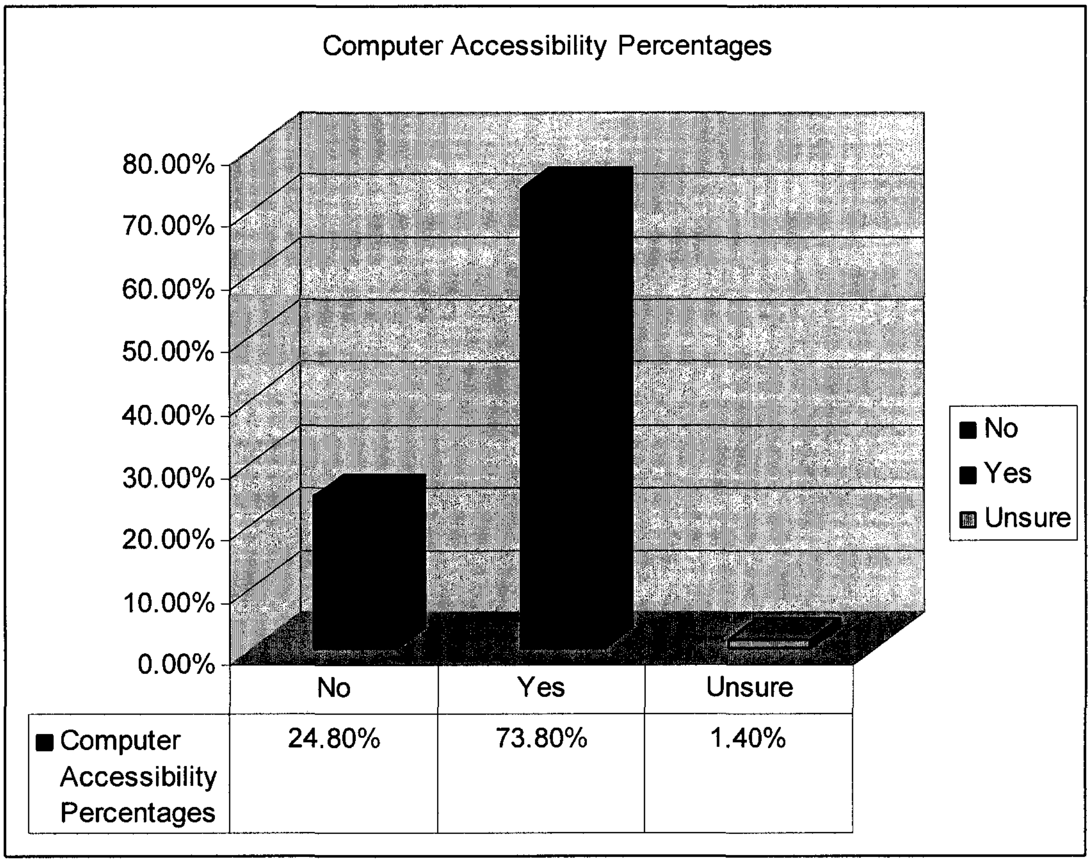


Table 22b: Computer Accessibility & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Computer Accessibility** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| No | 15 | 21 | 16 | 52 |
| Yes | 69 | 64 | 22 | 155 |
| Unsure | 1 | 0 | 2 | 3 |
| **Total** | 85 | 85 | 40 | 210 |

Table 22c: Computer Accessibility & Division Percentages

| | Division | | |
|---|---|---|---|
| **Computer Accessibility** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| No | 17.65% | 24.71% | 40.00% |
| Yes | 81.18% | 75.29% | 55.00% |
| Unsure | 1.18% | 0.00% | 5.00% |
| **Total** | 100.00% | 100.00% | 100.00% |

Table 22d: Computer Accessibility & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Computer Accessibility** | Art | Social Science | Science | Other | Combination | Total |
| No | 21 | 9 | 13 | 6 | 3 | 52 |
| Yes | 60 | 49 | 27 | 14 | 5 | 155 |
| Unsure | 1 | 2 | 0 | 0 | 0 | 3 |
| Total | 82 | 60 | 40 | 20 | 8 | 210 |

Table 22e: Computer Accessibility & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Computer Accessibility** | Art | Social Science | Science | Other | Combination |
| No | 25.61% | 15.00% | 32.50% | 30.00% | 37.50% |
| Yes | 73.17% | 81.67% | 67.50% | 70.00% | 62.50% |
| Unsure | 1.22% | 3.33% | 0.00% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

*b) What computer software are you reluctant to use? Why?*

A hundred and seven (51%) students were reluctant to use software (Table 23a). Forty-eight (66.67%) Junior/Intermediate and 43(68.25%) Art students had the highest number of participants that were reluctant to use certain software (Tables 23b to 23e). Thirty-four (16.2%) students indicated that they did not like using *complicated software* that had a lack of instruction or unfamiliar technology. Students preferred to use Microsoft Office Suite products since they were most familiar with them (Table 23f). This category encompassed 15 (32.61%) Primary/Junior, 13 (26.53%) Junior/Intermediate and 16 (35.56%) Art degree preservice teachers (Table 23g to Table 23j).

Table 23a: Computer Software Reluctance Frequencies and Percentages

| **Computer Software Reluctance** | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | No | 69 | 32.9 | 39.2 | 39.2 |
| | Yes | 107 | 51.0 | 60.8 | 100.0 |
| | **Total** | 176 | 83.8 | 100.0 | |
| No response | | 34 | 16.2 | | |
| Total | | 210 | 100.0 | | |

Figure 12: Computer Software Reluctance Percentages

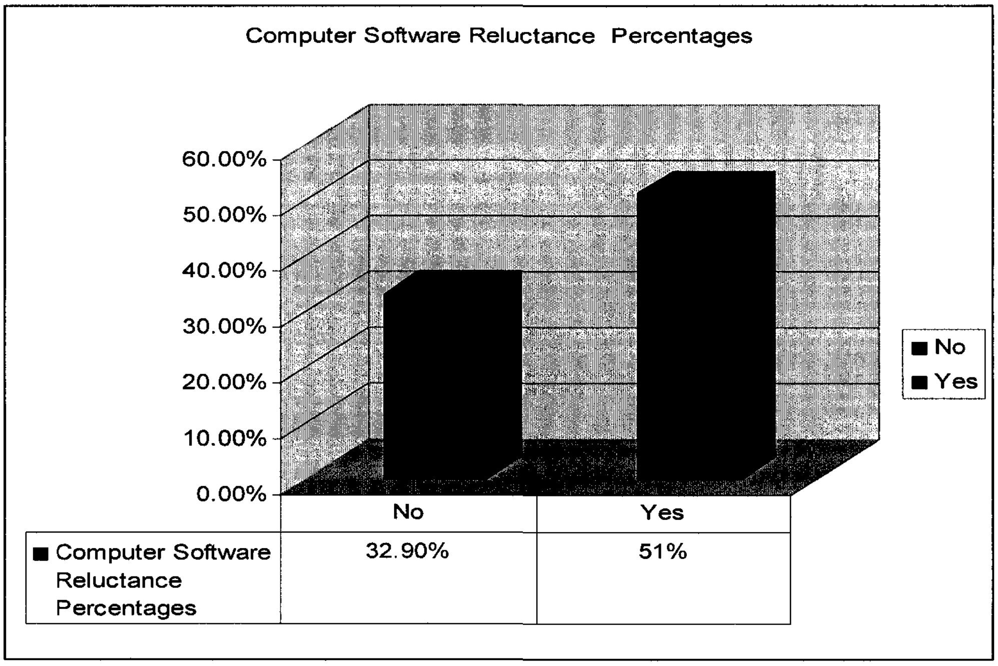



Table 23b: Computer Software Reluctance & Division Frequencies

| **Computer Software Reluctance** | Division Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
|---|---|---|---|---|
| No | 27 | 24 | 18 | 69 |
| Yes | 44 | 48 | 15 | 107 |
| Total | 71 | 72 | 33 | 176 |

Table 23c: Computer Software Reluctance & Division Percentages

| **Computer Software Reluctance** | Division Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
|---|---|---|---|
| No | 38.03% | 33.33% | 54.55% |
| Yes | 61.97% | 66.67% | 45.45% |
| Total | 100.00% | 100.00% | 100.00% |

Table 23d: Computer Software Reluctance & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Computer Software Reluctance** | Art | Social Science | Science | Other | Combination | Total |
| No | 20 | 17 | 16 | 12 | 4 | 69 |
| Yes | 43 | 36 | 18 | 6 | 4 | 107 |
| Total | 63 | 53 | 34 | 18 | 8 | 176 |

Table 23e: Computer Software Reluctance & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Computer Software Reluctance** | Art | Social Science | Science | Other | Combination |
| No | 31.75% | 32.08% | 47.06% | 66.67% | 50.00% |
| Yes | 68.25% | 67.92% | 52.94% | 33.33% | 50.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Table 23f: Computer Software Reluctance Details: Frequencies & Percentages

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Graphics | 7 | 3.3 | 6.3 | 6.3 |
| | Presentation software | 9 | 4.3 | 8.1 | 14.4 |
| | Databases | 5 | 2.4 | 4.5 | 18.9 |
| | Complicated (preference MS office) | 34 | 16.2 | 30.6 | 49.5 |
| | Different components of OS | 11 | 5.2 | 9.9 | 59.5 |
| | SPSS | 7 | 3.3 | 6.3 | 65.8 |
| | Spreadsheets | 11 | 5.2 | 9.9 | 75.7 |
| | Utilities | 1 | .5 | .9 | 76.6 |
| | Downloads/P2P | 2 | 1.0 | 1.8 | 78.4 |
| | Combination: MS office | 3 | 1.4 | 2.7 | 81.1 |
| | PDF | 2 | 1.0 | 1.8 | 82.9 |
| | Website Design | 5 | 2.4 | 4.5 | 87.4 |
| | Report Card Software | 1 | .5 | .9 | 88.3 |
| | Math Circus | 2 | 1.0 | 1.8 | 90.1 |
| | Online games | 5 | 2.4 | 4.5 | 94.6 |
| | Storybook & Weaver | 3 | 1.4 | 2.7 | 97.3 |
| | Corel suite | 2 | 1.0 | 1.8 | 99.1 |
| | Smart ideas | 1 | .5 | .9 | 100.0 |
| | Total | 111 | 52.9 | 100.0 | |
| Missing | No response | 34 | 16.2 | | |
| | N/A | 65 | 31.0 | | |
| | Total | 99 | 47.1 | | |
| Total | | 210 | 100.0 | | |

Table 23g: Computer Software Reluctance Details & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Reluctance Specification** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Graphics | 3 | 3 | 1 | 7 |
| Presentation software | 4 | 3 | 2 | 9 |
| Databases | 2 | 3 | 0 | 5 |
| Complicated (preference MS office) | 15 | 13 | 6 | 34 |
| Different components of OS | 5 | 6 | 0 | 11 |
| SPSS | 1 | 5 | 1 | 7 |
| Spreadsheets | 6 | 4 | 1 | 11 |
| Utilities | 1 | 0 | 0 | 1 |
| Downloads/P2P | 2 | 0 | 0 | 2 |
| Combination: MS office | 3 | 0 | 0 | 3 |
| PDF | 2 | 0 | 0 | 2 |
| Website Design | 1 | 4 | 0 | 5 |
| Report Card Software | 1 | 0 | 0 | 1 |
| Math Circus | 0 | 2 | 0 | 2 |
| Online games | 0 | 3 | 2 | 5 |
| Storybook & Weaver | 0 | 3 | 0 | 3 |
| Corel suite | 0 | 0 | 2 | 2 |
| Smart ideas | 0 | 0 | 1 | 1 |
| Total | 46 | 49 | 16 | 111 |

Table 23h: Computer Software Reluctance Details & Division Percentages

| | Division | | |
|---|---|---|---|
| **Reluctance Specification** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Graphics | 6.52% | 6.12% | 6.25% |
| Presentation software | 8.70% | 6.12% | 12.50% |
| Databases | 4.35% | 6.12% | 0.00% |
| Complicated (preference MS office) | 32.61% | 26.53% | 37.50% |
| Different components of OS | 10.87% | 12.24% | 0.00% |
| SPSS | 2.17% | 10.20% | 6.25% |
| Spreadsheets | 13.04% | 8.16% | 6.25% |
| Utilities | 2.17% | 0.00% | 0.00% |
| Downloads/P2P | 4.35% | 0.00% | 0.00% |
| Combination: MS office | 6.52% | 0.00% | 0.00% |
| PDF | 4.35% | 0.00% | 0.00% |
| Website Design | 2.17% | 8.16% | 0.00% |
| Report Card Software | 2.17% | 0.00% | 0.00% |
| Math Circus | 0.00% | 4.08% | 0.00% |
| Online games | 0.00% | 6.12% | 12.50% |
| Storybook Weaver | 0.00% | 6.12% | 0.00% |
| Corel Suite | 0.00% | 0.00% | 12.50% |
| Smart Ideas | 0.00% | 0.00% | 6.25% |
| Total | 100.00% | 100.00% | 100.00% |

Table 23i: Computer Software Reluctance Details & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Reluctance Specification** | Art | Social Science | Science | Other | Combination | Total |
| Graphics | 3 | 4 | 0 | 0 | 0 | 7 |
| Presentation software | 1 | 4 | 3 | 0 | 1 | 9 |
| Databases | 2 | 0 | 2 | 1 | 0 | 5 |
| Complicated (preference MS office) | 16 | 12 | 2 | 3 | 1 | 34 |
| Different components of OS | 3 | 6 | 2 | 0 | 0 | 11 |
| SPSS | 4 | 1 | 1 | 1 | 0 | 7 |
| Spreadsheets | 7 | 1 | 3 | 0 | 0 | 11 |
| Utilities | 0 | 0 | 0 | 1 | 0 | 1 |
| Downloads/P2P | 1 | 0 | 1 | 0 | 0 | 2 |
| Combination: MS office | 1 | 2 | 0 | 0 | 0 | 3 |
| PDF | 2 | 0 | 0 | 0 | 0 | 2 |
| Website Design | 0 | 4 | 1 | 0 | 0 | 5 |
| Report Card Software | 0 | 1 | 0 | 0 | 0 | 1 |
| Math Circus | 1 | 1 | 0 | 0 | 0 | 2 |
| Online games | 2 | 0 | 1 | 0 | 2 | 5 |
| Storybook & Weaver | 2 | 0 | 0 | 1 | 0 | 3 |
| Corel suite | 0 | 0 | 2 | 0 | 0 | 2 |
| Smart ideas | 0 | 1 | 0 | 0 | 0 | 1 |
| Total | 45 | 37 | 18 | 7 | 4 | 111 |

Table 23j: Computer Software Reluctance Details & Previous Undergraduate Degree Percentages

| | **Previous Undergraduate Degree** | | | | |
|---|---|---|---|---|---|
| **Reluctance Specification** | Art | Social Science | Science | Other | Combination |
| Graphics | 6.67% | 10.81% | 0.00% | 0.00% | 0.00% |
| Presentation software | 2.22% | 10.81% | 16.67% | 0.00% | 25.00% |
| Databases | 4.44% | 0.00% | 11.11% | 14.29% | 0.00% |
| Complicated (preference MS office) | 35.56% | 32.43% | 11.11% | 42.86% | 25.00% |
| Different components of OS | 6.67% | 16.22% | 11.11% | 0.00% | 0.00% |
| SPSS | 8.89% | 2.70% | 5.56% | 14.29% | 0.00% |
| Spreadsheets | 15.56% | 2.70% | 16.67% | 0.00% | 0.00% |
| Utilities | 0.00% | 0.00% | 0.00% | 14.29% | 0.00% |
| Downloads/P2P | 2.22% | 0.00% | 5.56% | 0.00% | 0.00% |
| Combination: MS office | 2.22% | 5.41% | 0.00% | 0.00% | 0.00% |
| PDF | 4.44% | 0.00% | 0.00% | 0.00% | 0.00% |
| Website Design | 0.00% | 10.81% | 5.56% | 0.00% | 0.00% |
| Report Card Software | 0.00% | 2.70% | 0.00% | 0.00% | 0.00% |
| Educational | 2.22% | 2.70% | 0.00% | 0.00% | 0.00% |
| Online games | 4.44% | 0.00% | 5.56% | 0.00% | 50.00% |
| Storybook & Weaver | 4.44% | 0.00% | 0.00% | 14.29% | 0.00% |
| Corel suite | 0.00% | 0.00% | 11.11% | 0.00% | 0.00% |
| Smart ideas | 0.00% | 2.70% | 0.00% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

*c) Are you comfortable using various spreadsheets or databases (for example: Microsoft Excel, QuatroPro, Microsoft Access or others) to teach mathematical subjects or to deliver a technological lesson?*

There were 109 (51.9%) students who indicated that they were comfortable using spreadsheets or databases to teach mathematical subjects in comparison to 77 (36.7%) students who were not comfortable. Seventeen (8.1%) students responded that they were not sure if they could deliver a technological lesson because they would need some additional practice (Table 24a). The most comfortable groups using spreadsheets or databases were 30 (75%) Intermediate/Senior and 29 (74.36%) Science preservice teachers. The least comfortable groups were 39 (47.56%) Primary/Junior and 40 (50.63%) Art students.

Table 24a: Computer Comfort (Spreadsheets & Databases) Frequencies and Percentages

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| **Comfort: Spreadsheets & Database** | No | 77 | 36.7 | 37.9 | 37.9 |
| | Yes | 109 | 51.9 | 53.7 | 91.6 |
| | Not Sure | 17 | 8.1 | 8.4 | 100.0 |
| | **Total** | 203 | 96.7 | 100.0 | |
| No response (N/A) | | 7 | 3.3 | | |
| Total | | 210 | 100.0 | | |

Figure 13: Computer Comfort (Spreadsheets & Databases) Percentages

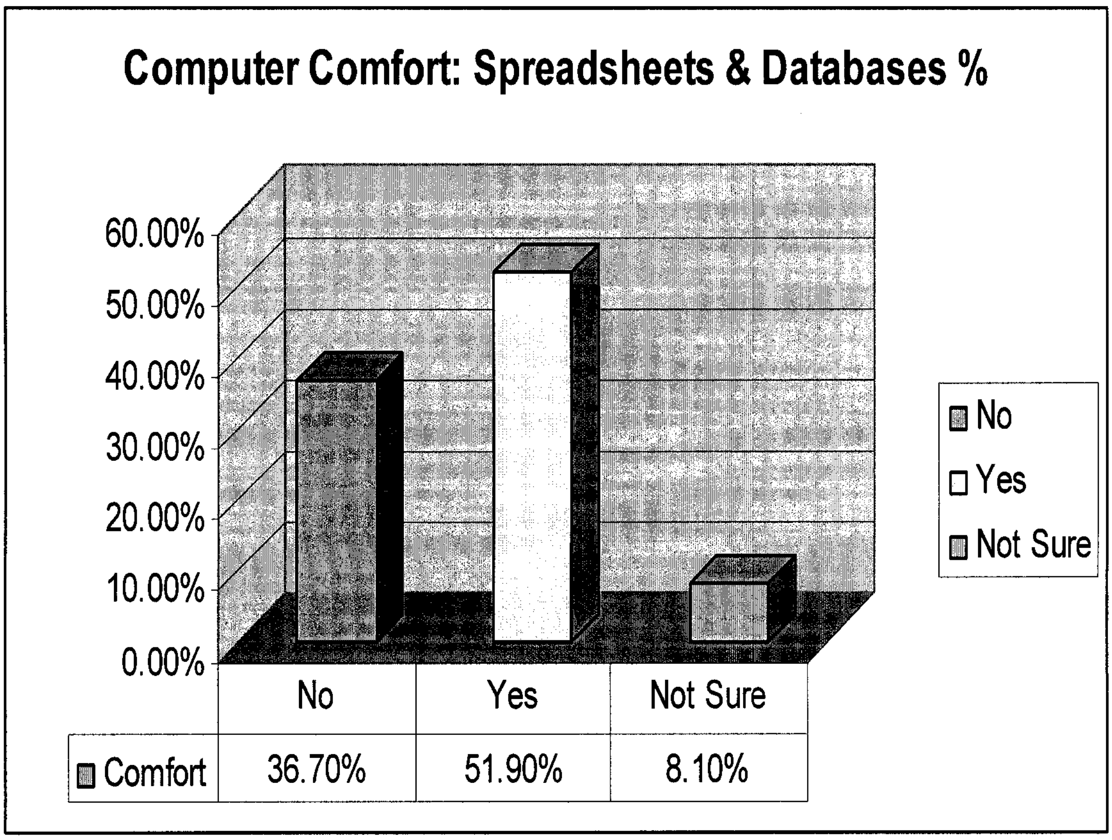


Table 24b: Computer Comfort (Spreadsheets & Databases) & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Comfort: Spreadsheets & Database** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| No | 39 | 32 | 6 | 77 |
| Yes | 36 | 43 | 30 | 109 |
| Not Sure | 7 | 6 | 4 | 17 |
| Total | 82 | 81 | 40 | 203 |

Table 24c: Computer Comfort (Spreadsheets & Databases) & Division Percentages

| | Division | | |
|---|---|---|---|
| **Comfort: Spreadsheets & Database** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| No | 47.56% | 39.51% | 15.00% |
| Yes | 43.90% | 53.09% | 75.00% |
| Not Sure | 8.54% | 7.41% | 10.00% |
| Total | 100.00% | 100.00% | 100.00% |

Table 24d: Computer Comfort (Spreadsheets & Databases) & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Comfort: Spreadsheets & Database** | Art | Social Science | Science | Other | Combination | Total |
| No | 40 | 23 | 7 | 5 | 2 | 77 |
| Yes | 30 | 33 | 29 | 14 | 3 | 109 |
| Not Sure | 9 | 3 | 3 | 0 | 2 | 17 |
| Total | 79 | 59 | 39 | 19 | 7 | 203 |

Table 24e: Computer Comfort (Spreadsheets & Databases) & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Comfort: Spreadsheets & Database** | Art | Social Science | Science | Other | Combination |
| No | 50.63% | 38.98% | 17.95% | 26.32% | 28.57% |
| Yes | 37.97% | 55.93% | 74.36% | 73.68% | 42.86% |
| Not Sure | 11.39% | 5.08% | 7.69% | 0.00% | 28.57% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

*d) What computer software do you enjoy using the most?*

Word processing was labelled as the most enjoyable computer software by 49 (23%) preservice students (Table 25a). Twenty-seven (34.62%) Primary/Junior and 18 (31.58%) Social Science students preferred word processing software the most (Table 25b to Table 25e). The second most enjoyable software was a combination of entertainment and communication media. Preservice students preferred to use a combination of instant messaging (MSN), computer games, i-tunes, Microsoft Office products and various computer graphics programs (such as Corel graphics or Kodak).

Table 25a: Enjoyable Computer Software Frequencies and Percentages

| **Enjoyable Software** | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Mac | 1 | .5 | .5 | .5 |
| | Microsoft Office Suite | 28 | 13.3 | 14.5 | 15.0 |
| | Entertainment | 20 | 9.5 | 10.4 | 25.4 |
| | Search Engines /Browsers/ Goggle Earth | 10 | 4.8 | 5.2 | 30.6 |
| | Combination: Entertainment & Communication Media | 43 | 20.5 | 22.3 | 52.8 |
| | Word processing | 49 | 23.3 | 25.4 | 78.2 |
| | Spreadsheets | 6 | 2.9 | 3.1 | 81.3 |
| | Graphics | 23 | 11.0 | 11.9 | 93.3 |
| | Presentation Software | 6 | 2.9 | 3.1 | 96.4 |
| | Database | 2 | 1.0 | 1.0 | 97.4 |
| | Statistics | 1 | .5 | .5 | 97.9 |
| | No preference | 1 | .5 | .5 | 98.4 |
| | Programming (Visual Studio) | 1 | .5 | .5 | 99.0 |
| | Educational: Kid Pix V.4/Smart ideas | 2 | 1.0 | 1.0 | 100.0 |
| | Total | 193 | 91.9 | 100.0 | |
| No Response | | 17 | 8.1 | | |
| **Total** | | 210 | 100.0 | | |

Table 25b: Enjoyable Computer Software & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Enjoyable Software** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Mac | 1 | 0 | 0 | 1 |
| Microsoft Office Suite | 13 | 7 | 8 | 28 |
| Entertainment | 5 | 10 | 5 | 20 |
| Search Engines/Browsers/Utilities/ Goggle Earth | 4 | 4 | 2 | 10 |
| Combination: Entertainment & Communication Media | 15 | 23 | 5 | 43 |
| Word processing | 27 | 14 | 8 | 49 |
| Spreadsheets | 4 | 0 | 2 | 6 |
| Graphics | 2 | 17 | 4 | 23 |
| Presentation Software | 3 | 2 | 1 | 6 |
| Database | 2 | 0 | 0 | 2 |
| Statistics | 1 | 0 | 0 | 1 |
| No preference | 1 | 0 | 0 | 1 |
| Programming (Visual Studio) | 0 | 1 | 0 | 1 |
| Educational: Kid Pix V.4/Smart ideas | 0 | 1 | 1 | 2 |
| **Total** | 78 | 79 | 36 | 193 |

Table 25c: Enjoyable Computer Software & Division Percentages

| | Division | | |
|---|---|---|---|
| **Enjoyable Software** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Mac | 1.28% | 0.00% | 0.00% |
| Microsoft Office Suite | 16.67% | 8.86% | 22.22% |
| Entertainment | 6.41% | 12.66% | 13.89% |
| Search Engines/Browsers/Utilities/ Goggle Earth | 5.13% | 5.06% | 5.56% |
| Combination: Entertainment & Communication Media | 19.23% | 29.11% | 13.89% |
| Word processing | 34.62% | 17.72% | 22.22% |
| Spreadsheets | 5.13% | 0.00% | 5.56% |
| Graphics | 2.56% | 21.52% | 11.11% |
| Presentation Software | 3.85% | 2.53% | 2.78% |
| Database | 2.56% | 0.00% | 0.00% |
| Statistics | 1.28% | 0.00% | 0.00% |
| No preference | 1.28% | 0.00% | 0.00% |
| Programming (Visual Studio) | 0.00% | 1.27% | 0.00% |
| Educational: Kid Pix V.4/Smart ideas | 0.00% | 1.27% | 2.78% |
| **Total** | 100.00% | 100.00% | 100.00% |

Table 25d: Enjoyable Computer Software & Previous Undergraduate Degree Frequencies

| | **Previous Undergraduate Degree** | | | | | |
|---|---|---|---|---|---|---|
| **Enjoyable Software** | Art | Social Science | Science | Other | Combination | Total |
| Mac | 1 | 0 | 0 | 0 | 0 | 1 |
| Microsoft Office Suite | 8 | 8 | 10 | 1 | 1 | 28 |
| Entertainment | 10 | 5 | 2 | 2 | 1 | 20 |
| Search Engines /Browsers/ Goggle Earth | 2 | 5 | 2 | 1 | 0 | 10 |
| Combination: Entertainment & Communication Media | 20 | 10 | 9 | 3 | 1 | 43 |
| Word processing | 17 | 18 | 6 | 6 | 2 | 49 |
| Spreadsheets | 2 | 0 | 2 | 2 | 0 | 6 |
| Graphics | 12 | 4 | 4 | 2 | 1 | 23 |
| Presentation Software | 1 | 3 | 0 | 2 | 0 | 6 |
| Database | 1 | 1 | 0 | 0 | 0 | 2 |
| Statistics | 0 | 1 | 0 | 0 | 0 | 1 |
| No preference | 0 | 1 | 0 | 0 | 0 | 1 |
| Programming (Visual Studio) | 0 | 0 | 1 | 0 | 0 | 1 |
| Educational: Kid Pix V.4/Smart ideas | 1 | 1 | 0 | 0 | 0 | 2 |
| **Total** | 75 | 57 | 36 | 19 | 6 | 193 |

Table 25e: Enjoyable Computer Software & Previous Undergraduate Degree Percentages

| | **Previous Undergraduate Degree** | | | | |
|---|---|---|---|---|---|
| **Enjoyable Software** | Art | Social Science | Science | Other | Combination |
| Mac | 1.33% | 0.00% | 0.00% | 0.00% | 0.00% |
| Microsoft Office Suite | 10.67% | 14.04% | 27.78% | 5.26% | 16.67% |
| Entertainment | 13.33% | 8.77% | 5.56% | 10.53% | 16.67% |
| Search Engines /Browsers/ Goggle Earth | 2.67% | 8.77% | 5.56% | 5.26% | 0.00% |
| Combination: Entertainment & Communication Media | 26.67% | 17.54% | 25.00% | 15.79% | 16.67% |
| Word processing | 22.67% | 31.58% | 16.67% | 31.58% | 33.33% |
| Spreadsheets | 2.67% | 0.00% | 5.56% | 10.53% | 0.00% |
| Graphics | 16.00% | 7.02% | 11.11% | 10.53% | 16.67% |
| Presentation Software | 1.33% | 5.26% | 0.00% | 10.53% | 0.00% |
| Database | 1.33% | 1.75% | 0.00% | 0.00% | 0.00% |
| Statistics | 0.00% | 1.75% | 0.00% | 0.00% | 0.00% |
| No preference | 0.00% | 1.75% | 0.00% | 0.00% | 0.00% |
| Programming (Visual Studio) | 0.00% | 0.00% | 2.78% | 0.00% | 0.00% |
| Educational: Kid Pix V.4/Smart ideas | 1.33% | 1.75% | 0.00% | 0.00% | 0.00% |
| **Total** | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

*e) Do you play video games? YES NO*

A hundred twenty-seven (60.5%) students did not play video games (Table 26a and Figure 14). The highest percentage of video game players were 37 (43.54%) Junior/Intermediate, 35 (42.68%) Art and 16 (40%) Science preservice students (Table 26b to Table 26e).

Table 26a: Computer Video Games Use: Frequencies and Percentages

| **Video Games Use** | Frequency | **Percent** | Valid Percent | Cumulative Percent |
|---|---|---|---|---|
| No | 127 | 60.5 | 60.5 | 60.5 |
| Yes | 83 | 39.5 | 39.5 | 100.0 |
| Total | 210 | 100.0 | 100.0 | |

Figure 14: Computer Game Use Percentages

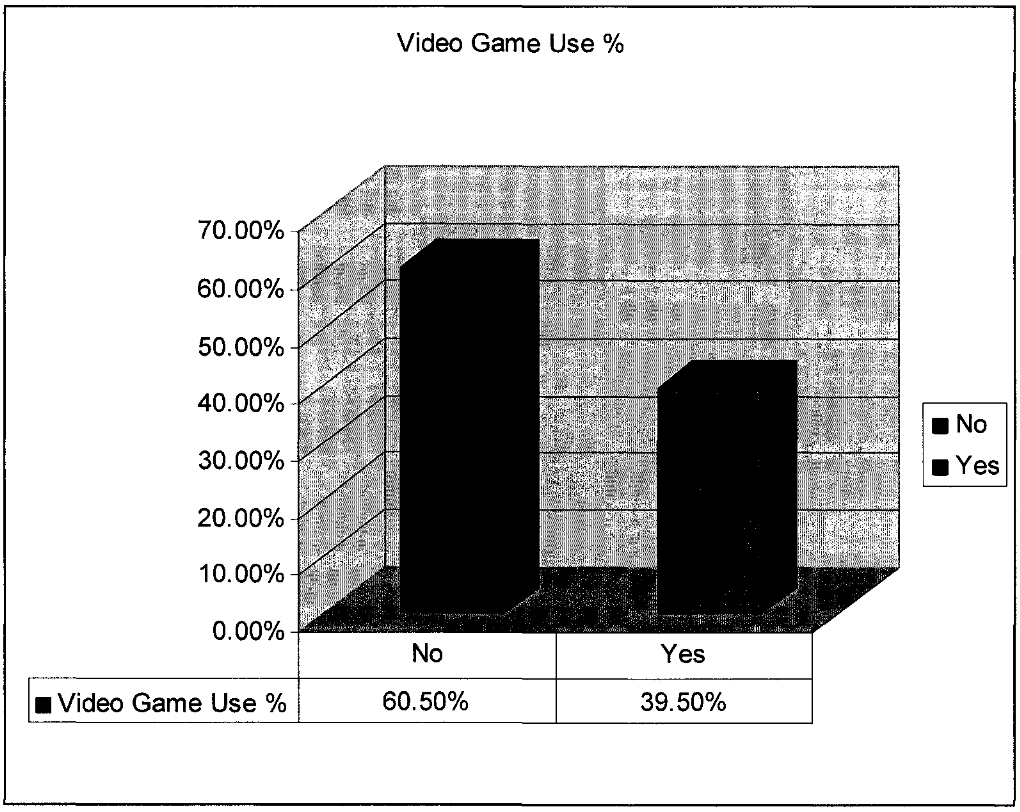



Table 26b: Computer Video Games Use & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Video Games Use** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| No | 54 | 48 | 25 | 127 |
| Yes | 31 | 37 | 15 | 83 |
| Total | 85 | 85 | 40 | 210 |

Table 26c: Computer Video Games Use & Division Percentages

| | Division | | |
|---|---|---|---|
| **Video Games Use** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| No | 63.53% | 56.47% | 62.50% |
| YES | 36.47% | 43.53% | 37.50% |
| Total | 100.00% | 100.00% | 100.00% |

Table 26d: Computer Video Games Use & Previous Undergraduate Degree Frequencies

| Video Games Use | Art | Social Science | Science | Other | Combination | Total |
|---|---|---|---|---|---|---|
| | **Previous Undergraduate Degree** | | | | | |
| No | 47 | 37 | 24 | 13 | 6 | 127 |
| Yes | 35 | 23 | 16 | 7 | 2 | 83 |
| Total | 82 | 60 | 40 | 20 | 8 | 210 |

Table 26e: Computer Video Games Use & Previous Undergraduate Degree Percentages

| Video Games Use | Art | Social Science | Science | Other | Combination |
|---|---|---|---|---|---|
| | **Previous Undergraduate Degree** | | | | |
| No | 57.32% | 61.67% | 60.00% | 65.00% | 75.00% |
| Yes | 42.68% | 38.33% | 40.00% | 35.00% | 25.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

*f) Do you think that video games have a beneficial or detrimental effect on students?*

The following five categories resulted from participants' explanations: (a) *detrimental* effect included negative responses such as: losing social skills; the influence of violence; lack of educational benefit; in addition video games were viewed as brainless activities that waste time and distract from learning, (b) *beneficial* effect encompassed participants' responses such as video games would improve motor skills, imagination, hand-eye coordination, problem-solving skills, memory and concentration, (c) *depending* effect included both positive and negative responses such as: depending on content of video game (violent video games versus educational video games); amount of time spent playing video games ( too much video game playing would impede student's homework); lack of physical activity, (d) *unsure* explanation encompasses responses of students who did not have any opinion or enough information to a make decision and (e) *neither* effect included responses that video games had no effect. A hundred and twelve (53.3%) preservice students responded that video games had both a positive and negative effect (Table 27a and Figure 15). In addition 52 (61.90%) Primary/Junior and 29 (78.38%) Science students viewed video game playing as having both a positive and negative effects (Tables 27b to 27e).

Table 27a: Computer Video Games Explanation Frequencies and Percentages

| **Video Games Explanation** | | Frequency | **Percent** | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Detrimental | 42 | 20.0 | 21.1 | 21.1 |
| | Beneficial | 32 | 15.2 | 16.1 | 37.2 |
| | Depends (both) | 112 | 53.3 | 56.3 | 93.5 |
| | Unsure | 8 | 3.8 | 4.0 | 97.5 |
| | Neither | 5 | 2.4 | 2.5 | 100.0 |
| | Total | 199 | 94.8 | 100.0 | |
| No explanation | | 11 | 5.2 | | |
| Total | | 210 | 100.0 | | |

Figure 15: Video Game Explanation Percentages

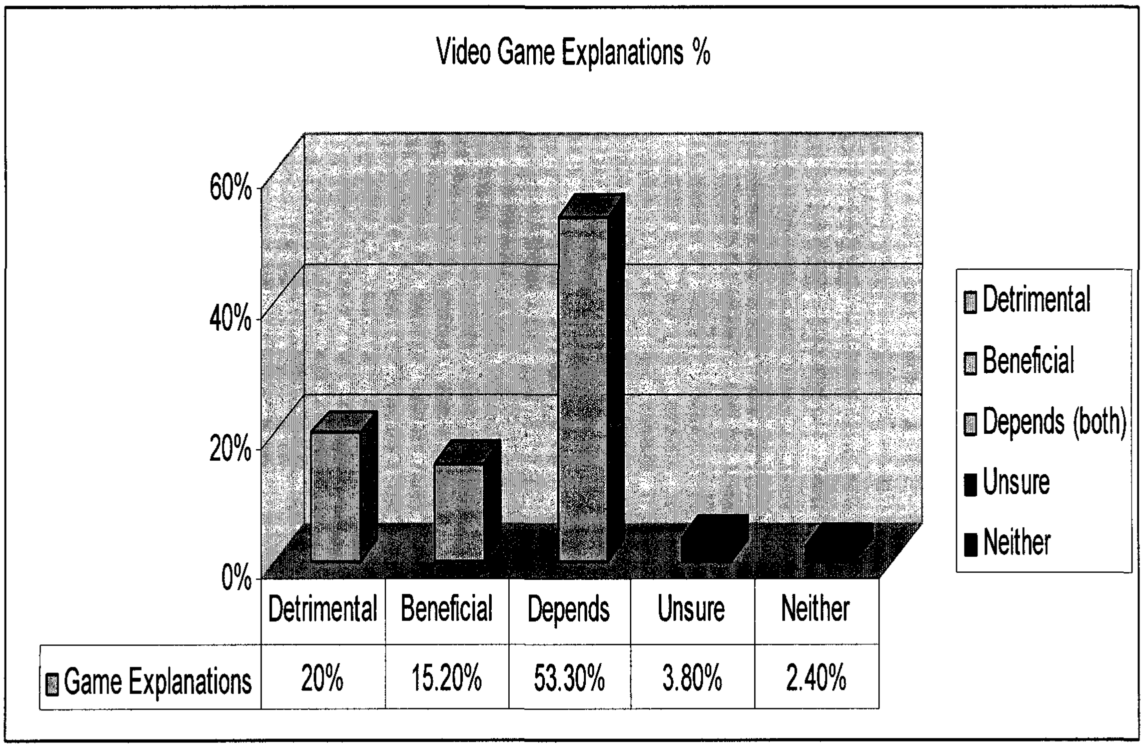


Table 27b: Computer Video Games Explanation & Division Frequencies

| | Division | | | |
|---|---|---|---|---|
| **Video Games Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior | Total |
| Detrimental | 18 | 15 | 9 | 42 |
| Beneficial | 12 | 14 | 6 | 32 |
| Depends (both) | 52 | 39 | 21 | 112 |
| Unsure | 2 | 6 | 0 | 8 |
| Neither | 0 | 3 | 2 | 5 |
| Total | 84 | 77 | 38 | 199 |

Table 27c: Computer Video Games Explanation & Division Percentages

| | Division | | |
|---|---|---|---|
| **Video Games Explanation** | Primary/ Junior | Junior/ Intermediate | Intermediate/ Senior |
| Detrimental | 21.43% | 19.48% | 23.68% |
| Beneficial | 14.29% | 18.18% | 15.79% |
| Depends (both) | 61.90% | 50.65% | 55.26% |
| Unsure | 2.38% | 7.79% | 0.00% |
| Neither | 0.00% | 3.90% | 5.26% |
| Total | 100.00% | 100.00% | 100.00% |

Table 27d: Computer Video Games Explanation & Previous Undergraduate Degree Frequencies

| | Previous Undergraduate Degree | | | | | |
|---|---|---|---|---|---|---|
| **Video Games Explanation** | Art | Social Science | Science | Other | Combination | Total |
| Detrimental | 17 | 12 | 6 | 6 | 1 | 42 |
| Beneficial | 10 | 15 | 1 | 6 | 0 | 32 |
| Depends (both) | 43 | 28 | 29 | 7 | 5 | 112 |
| Unsure | 5 | 3 | 0 | 0 | 0 | 8 |
| Neither | 2 | 2 | 1 | 0 | 0 | 5 |
| Total | 77 | 60 | 37 | 19 | 6 | 199 |

Table 27e: Computer Video Games Explanation & Previous Undergraduate Degree Percentages

| | Previous Undergraduate Degree | | | | |
|---|---|---|---|---|---|
| **Video Games Explanation** | Art | Social Science | Science | Other | Combination |
| Detrimental | 22.08% | 20.00% | 16.22% | 31.58% | 16.67% |
| Beneficial | 12.99% | 25.00% | 2.70% | 31.58% | 0.00% |
| Depends (both) | 55.84% | 46.67% | 78.38% | 36.84% | 83.33% |
| Unsure | 6.49% | 5.00% | 0.00% | 0.00% | 0.00% |
| Neither | 2.60% | 3.33% | 2.70% | 0.00% | 0.00% |
| Total | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% |

Summary of Chapter IV: Section 1

The following quantitative null hypotheses were rejected:

# 4. There is no significant difference in computer self-efficacy of preservice teachers based on their previous undergraduate degree.

# 5. There is no significant difference in computer self-efficacy of preservice teachers based on their licensure area (Primary/Junior, Junior/Intermediate and Intermediate/Senior).

# 6. There is no significant difference in computer self-efficacy of preservice teachers based on their computer experience.

# 7. There is no significant difference in computer self-efficacy of preservice teachers based on their familiarity with software packages.

In addition, we failed to reject the following quantitative null hypotheses:

# 1. There is no significant difference in computer self-efficacy between male and female preservice teachers.

# 2. There is no significant difference in computer self-efficacy between traditional (teacher education students under 24 years of age) and non-traditional students (teacher education students 24 years of age or older) (Parker, 1993).

#3. There is no significant difference in computer self-efficacy of preservice teachers based on their ethnic origin.

#8. There is no significant difference in computer self-efficacy of preservice teachers based on their computer ownership.

#9. There is no significant difference in computer self-efficacy of preservice teachers based on their previous computer training course.

#10. There is no significant difference in computer self-efficacy of preservice teachers based on their socioeconomic status.

The stepwise regression yielded the following equation:

Y (Total Predicted CUSE) = 111.073 + 33.349 (Experience-3) - 25.100 (PACK01) - 25.104 (PACK2) -12.866 (PACK3) -10.466 (PACK4) + 8.736 (Degree-Science)

Summary of Chapter IV: Section 2

The preservice teachers described their previous computer experiences and beliefs based on the following four sources of self-efficacy:

(i) Performance Accomplishments: a total of 121 preservice teachers (57.6%) viewed a general computer problem (losing data, computer freezing or crashing and difficulty of learning new software programs) as the worst computer problem. In addition, 39 (47%) Junior/Intermediate, 17 (43.6%) Intermediate/Senior, and 19 (50%) Science and 12 (60%) Other degree students fixed the worst computer problem themselves.

(ii) Vicarious Experiences: a total of 155 preservice teachers (73.8%) responded to *no biased program* category consisting of explanations such as: computers were geared toward the technologically advanced and computer-literate people; males and females used the same programs and were equally proficient; computer programs had to do less with gender and more with amount of exposure to computers and skill; a computer was seen as a universal appliance not specific to either gender.

(iii) Verbal Persuasions: (a) society factor: although the society experience factor had a positive influence on 160 (76.2%) students, 72 (92.31%) of Primary/Junior and 65 (89.04%) Art degree preservice teachers viewed society experience as a positive factor compared to only 26 (76.47%) of Intermediate/Senior preservice teachers and 26 (76.47%) Science Degree students, (b) school factor: this had the highest percentage of positive influence on 73 (90.12%) Junior/Intermediate and 51 (89.47%) Social Science students (c) family factor: the family experience factor had a positive influence on 130 (61.9%) students. More specifically, 55 (76.39%) Junior/Intermediate and 31 (91.18%) Science students had a positive family experience in forming their attitudes about computers. It should be noted that 24 (33.33%) Art and 23 (29.87%) Primary/Junior students had a negative experience (d) employer factor: a total of 9 (30%) Intermediate/Senior and 17 (25.37%) Art students had the highest percentage of negative computer experience from employer and (e) other: a total of 21 (10%) participants responded to this question. The highest percentage of *other* positive influence in forming their attitude towards computers was indicated by 8 (88.89%) Junior/Intermediate and 6 (85.71%) Social Science students.

(iv) Emotional Arousal: the highest percentage of technology integration during their practicum placement was noted by 22 (56.41%) Intermediate/Senior and 23 (58.97%) Science students. A hundred fifty-five (73.8%) preservice students found computer technology accessible during their practicum placement while 3 (1.4%) students responded that they were *unsure* since they did not have a chance to look for it. Sixty-nine (81.18%) Primary/Junior and 49 (81.67%) Social Science preservice students indicated that they had access to computer technology during their practicum placement. Students preferred to use Microsoft Office Suite products since they were most familiar with them. Word processing was labelled as the most enjoyable computer software by 49 (23%) preservice students. In addition, 109 (51.9%) students indicated that they were comfortable using spreadsheets or databases to teach mathematical subjects in comparison to 77 (36.7%) students who were not comfortable. The highest percentage of video game players were 37 (43.54%) Junior/Intermediate, 35 (42.68%) Art and 16 (40%) Science preservice students; however, 112 (53.3%) preservice students responded that video games had both a positive and negative effect.

# CHAPTER V

## DISCUSSION AND CONCLUSION

This concurrent nested mixed-model study examined the computer self-efficacy of preservice teachers in relationship to gender, age, ethnic origin, previous undergraduate degree, licensure area, computer experience, use of software packages, computer training, computer ownership and socioeconomic status. Furthermore, open-ended questions were used to explore computer self-efficacy results by examining preservice teachers' past technological interaction experiences and beliefs.

The total number of participants was 210 preservice teacher students. Sixty-two participants (29.5%) were male and 148 (70.5%) were female. A total of 161 (76.6%) were non-traditional students above 24 years of age which implied that the remaining 49 (23.3%) were under 24. The majority of preservice students identified themselves as having a Canadian ethnic origin, while the second largest ethnic group was of European origin. This sample included Art, Social Science, Science, Other and Combination degree students. The licensure area of preservice teachers encompassed 85 Primary/Junior, 85 Junior/Intermediate and 40 Intermediate/Senior preservice teachers. Twenty-three (11.0%) students had extensive computer experience in comparison to 98 (46.7%) students who had quite a lot of computer experience and 81 (38.6%) who had some experience. Only 7 (3.3%) students had a very limited computer experience while one (0.5%) student had none. Students reported a preference for computer software word processing and spreadsheets. A hundred-forty-six (69.5%) students used desktop publishing, 131 (62.4%) used presentation software, 129 (61.4%) used databases and 124 (59%) used multimedia software. A total of 126 (60%) students did not use statistics software. A large majority of preservice teachers surveyed owned a computer. Only 97 attended and received computer training in comparison to 113 who did not receive training. One hundred and one students reported a family income level that was under $30,000 compared to 33 who indicated a yearly income over $100,000. Seventy-six students fell within the household income range of $30,000-$99,999.

The CUSE scale was used to determine the students' levels of computer self-efficacy. The quantitative survey consisted of 30 items and asked preservice teachers to rank their perceived self-efficacy toward computers using a 6-point Likert-type scale ranging from strongly disagree (1) to strongly agree (6). The lowest possible score that could be obtained was 30 in comparison to the highest possible score of 180. A low CUSE score of 51 and high score of 176 was obtained in this study. The mean CUSE score for 210 participants was 130.60. A fairly normal distribution was indicated by a majority of preservice teachers who had a moderately high degree of computer self-efficacy.

One-factor between–subjects analysis of variance test was performed in order to analyze multilevel designs. The study tested ten null hypotheses at the .05 level of significance. Furthermore, if significant results were obtained, the Tukey HSD test was used in order to specify differences between two treatment means that are significant at the .05 level. The quantitative data were analyzed using the SPSS 14.0.

<u>Quantitative Dominant Part:</u>

*Null Hypothesis 1:* There is no significant difference in computer self-efficacy between male and female preservice teachers.

This hypothesis compared preservice teachers' computer self-efficacy and their gender. After a one-way ANOVA test was performed, the null hypothesis was retained, which implied there was no significant difference in the computer self-efficacy between male and female preservice teachers.

*Null Hypothesis 2:* There is no significant difference in computer self-efficacy between traditional (teacher education students under 24 years of age) and non-traditional students (teacher education students 24 years of age or older)

This hypothesis compared preservice teachers' computer self-efficacy and age category. The students were identified as traditional students (under 24 years of age) and non-traditional (24 years and older). The one-way ANOVA test showed that there was not a significant difference in computer self-efficacy between traditional and non-traditional preservice teachers. The null hypothesis was retained.

*Null Hypothesis 3:* There is no significant difference in computer self-efficacy of preservice teachers based on their ethnic origin.

This hypothesis compared preservice teachers' computer self-efficacy and their ethnic origin. The participants were classified into the following three groups: (i) Canadian, (ii) European and (iii) Other. After the one-way ANOVA test was performed, the null hypothesis was retained. There was no significant difference in the computer self-efficacy among preservice teachers from different ethnic groups..

*Null Hypothesis 4:* There is no significant difference in computer self-efficacy of preservice teachers based on their previous undergraduate degree.

This hypothesis compared preservice teachers' computer self-efficacy and their previous undergraduate degree. The students were grouped as having completed Art, Social Science, Science, Other or Combination degrees. The one-way ANOVA test indicated that there is a significant difference in computer self-efficacy of preservice teachers based on their previous undergraduate degree. The null hypothesis was rejected. The Tukey HSD test indicated a significant difference in computer self-efficacy of preservice teachers between Science and Art Degree students and Science and Social Science Degree students, but not a significant difference between any other categories of previous undergraduate degree. The Science degree students had the highest CUSE mean scores compared to Art and Social Science degree students.

*Null Hypothesis 5:* There is no significant difference in computer self-efficacy of preservice teachers based on their licensure area (Primary/Junior, Junior/Intermediate and Intermediate/Senior).

This hypothesis compared preservice teachers' computer self-efficacy and their division (licensure area). The preservice teachers were divided into three divisions: (i) Primary/Junior licensure area (Junior Kindergarten to Grade 6), (ii) Junior/Intermediate licensure area (Grades 4 to 10) and (iii) Intermediate/Senior licensure area (Grades 7 to 12). After the one-way ANOVA test was performed, the null hypothesis was rejected. There is a significant difference in computer self-efficacy of preservice teachers based on their licensure area. The Tukey HSD test indicated a significant difference in computer self-efficacy of preservice teachers between the Primary/Junior and Junior/Intermediate licensure area, but not between the Primary/Junior and Intermediate/Senior licensure area or Intermediate/Senior and Junior/Intermediate licensure area. The Primary/Junior division had the lowest CUSE mean scores and the lowest number of Science degree students. The Intermediate/Senior division had the highest mean of CUSE scores and the highest percentage of Science degree students. The Junior/Intermediate had a more balanced number of students for Art, Social Science and Science degrees, but this group did contain the largest number of Science students that had high self-efficacy scores.

*Null Hypothesis 6:* There is no significant difference in computer self-efficacy of preservice teachers based on their computer experience.

This hypothesis compared preservice teachers' computer self-efficacy and their computer experience. Experience consisted of the following five options: (i) none, (ii) very limited, (ii) some experience, (iv) quite a lot, and (v) extensive. Experience was grouped according to an *inexperienced* group consisting of "none" and "very limited", a *some experience* group with "some experience", and an *experienced* group consisting of, "quite a lot" and "extensive". One-way ANOVA indicated that there is a significant difference in computer self-efficacy of preservice teachers based on their computer experience. Thus, the null hypothesis was rejected. The Tukey HSD test indicated a significant difference in computer self-efficacy between all groups.

*Null Hypothesis 7:* There is no significant difference in computer self-efficacy of preservice teachers based on their familiarity with software packages.

This hypothesis compared preservice teachers' computer self-efficacy and their familiarity with software packages. The participants' familiarity with software packages was based on the following choices: word processing, spreadsheets, databases, presentation, statistics packages, desktop publishing, multimedia and other. After the one-way ANOVA test was performed, the null hypothesis was rejected. It was concluded that there is a significant difference in computer self-efficacy of preservice teachers based on their familiarity with software packages. Those who scored higher on familiarity with software packages also obtained a higher computer self-efficacy scores.

*Null Hypothesis 8:* There is no significant difference in computer self-efficacy of preservice teachers based on their computer ownership.

This hypothesis compared preservice teachers' computer self-efficacy and computer ownership. After analyzing the results of the one-way ANOVA, the null hypothesis was retained. It was concluded that there is no significant difference in computer self-efficacy of preservice teachers based on their computer ownership. A large majority of students did own computers.

*Null Hypothesis 9:* There is no significant difference in computer self-efficacy of preservice teachers based on their previous computer training course.

This hypothesis compared preservice teachers' computer self-efficacy and their attendance at computer training courses. A hundred and thirteen (53.8%) participants did not attend a computer training course. The one-way ANOVA results retained the null hypothesis; therefore, there is no significant difference in computer self-efficacy of preservice teachers based on their attendance at a previous computer training course.

*Null Hypothesis 10:* There is no significant difference in computer self-efficacy of preservice teachers based on their socioeconomic status.

This hypothesis compared preservice teachers' computer self-efficacy and their socioeconomic status. The participants were classified into the following categories: (a) under $30 000, (b) $30 000-$59 999, (c) $60 000-$99 999 and (d) over $100 000. A hundred and one (48.1%) preservice teachers' household income level was under

$30,000. The one-way ANOVA test indicated that there was no significant difference in computer self-efficacy for preservice teachers based on their socioeconomic status.

*Stepwise regression*

A stepwise regression computation was used in order to examine the relationship between independent variables that were significant in predicting computer self-efficacy. Forty-seven percent of the variation in the computer self-efficacy can be predicted from the use of 0 or 1, 2, 3 and 4 packages, science degree, some experience and experienced groups. A positive relationship was indicated between computer self-efficacy and the *experienced* (Experience-3) group ($\beta$=.620) and the science (Degree-Science) group ($\beta$=.129). The results show participants with "quite a lot" and "extensive" experience and a science degree tend to have higher self-efficacy.

The Experience-3 group ($\beta$=.620) and the Degree-Science group ($\beta$=.129) indicate the highest positive beta values while PACK01 had the highest negative beta value ($\beta$=-.210). A negative relationship was indicated between computer self-efficacy and use of packages with PACK01 ($\beta$=-.210), PACK2 ($\beta$=-.264), PACK3 ($\beta$=-.145) and PACK4 ($\beta$=-.134). The results show that preservice teachers who had used 0 or 1, 2, 3 and 4 packages tended to have lower computer-self efficacy. The preservice teachers with knowledge of 0 or 1 and 2 packages were the most negatively related to computer self-efficacy.

Qualitative Less Dominant Part:

The qualitative portion of this study consisted of an open-ended survey. The survey explored computer self-efficacy results by examining preservice teachers' technological interaction experiences and beliefs based on the following four sources of self-efficacy: (i) performance accomplishments, (ii) vicarious experiences, (iii) verbal persuasion, and (iv) emotional arousal. The participants' responses to the survey were typed in Word document and assigned descriptive codes. The qualitative data were quantitized and entered into SPSS 14.0 by assigning each code a number.

*(i) Performance Accomplishments*

Bauer's (2000) data indicated that many students had problems that they could have solved by themselves in little time had they not sought outside assistance (e.g. rebooting the system after a crash or saving material to a disk after the work was completed). Bauer (2000) stated that all the answers given by participants had one common indicator, namely, that all preservice teachers did ask for help in solving a computer problem.

The most common computer problems identified in the present study by preservice teachers were general problems such as losing data, computer freezing or crashing and difficulty learning new software programs. The second most frequent problem experienced by participants was a virus. Students felt that viruses interfered with their computer performance and they were not sure of how to make their system virus-free. It should be noted that viruses could slow down a computer and cause system crashing; therefore some participants experienced computer freezing or crashing possibly due to unidentified viruses. Students did not specify what kind of virus they were dealing with. The emerging theme of computer virus problems should be further examined since the current literature has scanty information on it.

Sixty-six (31.4%) students obtained outside help for their worst computer problems. The groups with the largest number of participants who needed the most outside help were Primary/Junior and Art degree students. The groups that had the largest percentage of students that fixed problems by themselves were Junior/Intermediate, Science and "Other" degree preservice teachers.

*(ii) Vicarious experiences:*

A majority of the students surveyed believed that computer programs were geared equally toward both females and males. Sixteen Art students indicated that they believed that computer programs were oriented toward males. Although 27 students gave explanations such as males being more technically oriented due to spending more time on computers, the highest number of participant responses for male reasoning were given by Primary/Junior and Art and Social Science students.

A past study by Bauer (2000) examined female preservice teachers' perception of gender differences in learning and the use of computer technology. One of the themes in Bauer's (2000) study that emerged from the survey was female gender bias. Females in the study were of the opinion that men knew more about computer technology. A majority of participants in the current study did not hold the same view as Bauer's (2000) participants.

*(iii) Verbal Persuasions:*

The participants specified which of the following factors were most influential in forming their attitudes toward computers: (a) society, (b) school, (c) family, (d) employer and (e) Other. In addition to this, participants indicated whether this was a positive or a negative experience (Figure 16 & 17). The factor with the highest percentage of negative experience and lowest percentage of positive experiences was the family factor. A great number of Primary/Junior and Art degree students had revealed that they had viewed family as a negative influence in forming their attitudes toward computers. A negative explanation encompassed the participants' responses that family was not able to provide access to computers or that their family was not supportive of computer technology and usage due to unfamiliarity. These participants often associated computer use with a time when family feuds were more likely to occur. In contrast, those participants who gave positive explanations viewed the computer as providing fun family time where siblings were helping each other in trying to solve computer problems and improving each other's skills.

Figure 16: Positive Verbal Persuasions Factors Percentages

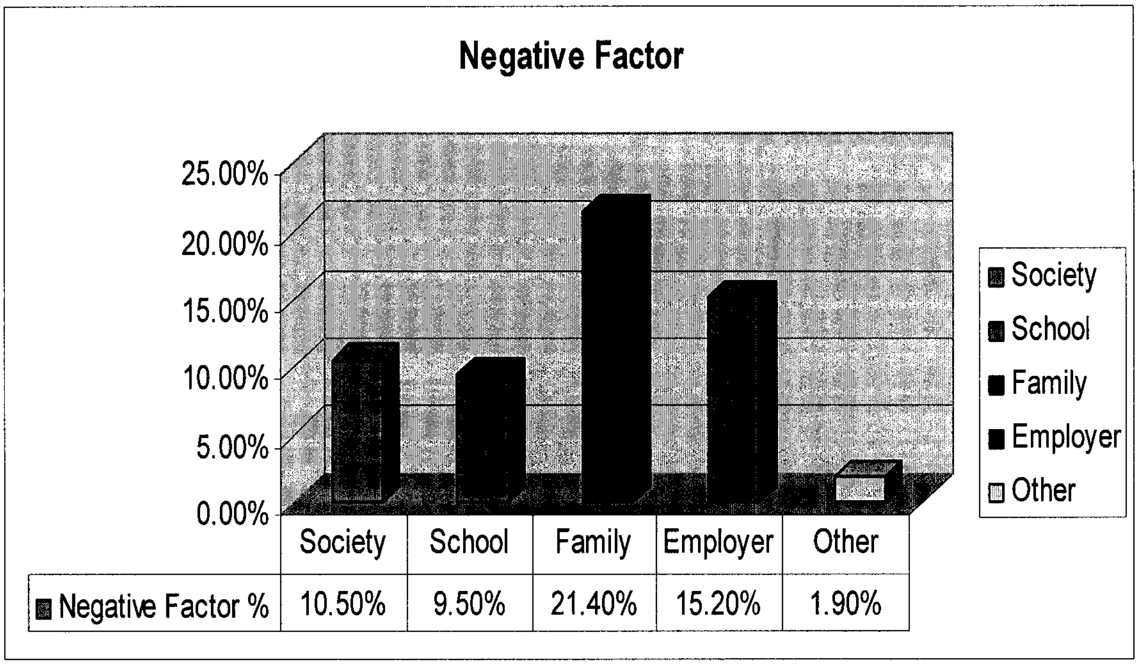
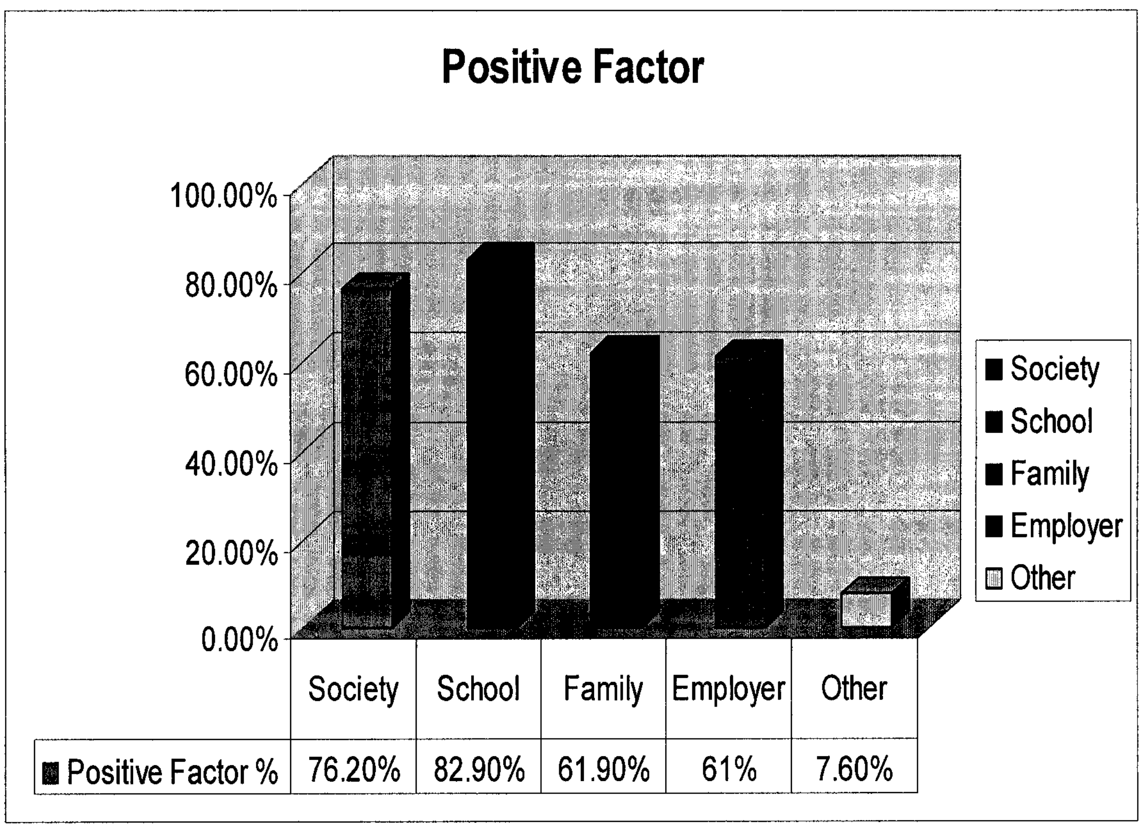



Figure 17: Negative Verbal Persuasions Factors Percentages



Two-hundred and one (95.7%) students viewed school as one of the most influential factors in forming their attitudes towards computers. A high proportion of the participants indicated that they had positive school experiences such as good teachers and a good education that enhanced their computer skills. Additionally, participants viewed university computer courses as beneficial due to the extra computer resources and materials being taught. Over half of the students viewed their employment as a positive influence in forming their attitudes toward computers. The positive explanations included responses such as: the additional monetary value of having a job, employers would provide training that would enhance their knowledge and enable participants to get better jobs. The society factor also had a positive influence on many of the participants. The participants viewed computer access as being encouraged in many places, and they believed that computer technology improved our standard of living. The "other" category factor only included 21 of participants and included responses that computer were used for personal reasons such as banking or communication or media.

*(iv) Emotional Arousal:*

Out of 210 students, 75 integrated computers into their lessons during their practicum placement. The highest percentage of technology integration during their practicum placement was demonstrated by students belonging to the Intermediate/Senior division and Science students.

Approximately three quarters of the students explained how they integrated computers during their placement. Seventy preservice teachers used computers and technology in creating their lesson plans, but did not integrate computers into any of their lessons during practicum since the lessons did not require it. Twenty-five participants noted that they did not integrate computers into any of lessons due to limitations such as: schools having limited access and lack of computers; and not being required to do so by associate teachers. Sixty-six students had fully integrated technology into at least one lesson during their practicum.

A hundred fifty-five students found computer technology accessible in the schools during their practicum placement. The highest percentage of computer accessibility during practicum placement was reported by Primary/Junior division and Social Science students. A little over half of the students were reluctant to use software. Students were most familiar with Microsoft office products and therefore preferred to use them. Furthermore, over one third of the students were not comfortable using spreadsheets or databases to teach mathematical subjects while word processing was labelled as the most enjoyable computer software by 49 preservice students.
Bauer's (2000) study indicated that many preservice teachers felt more comfortable with teaching lessons in word processing and less comfortable teaching functions of databases and spreadsheets in math lessons. These data implied that there may be fewer math lessons taught by future teachers using these important technology tools.

Eighty-three students did play video games, and the highest percentages of video game players were Junior/Intermediate preservice students. As previously mentioned, Subrahmanyam et al. (2000) indicated that cognitive research suggested that playing computer games in moderation could be an important building block to computer literacy because it enhanced the children's ability to read and visualize images in three-dimensional space and track multiple images simultaneously. In this study, a hundred-twelve (53.3%) students believed that video games had both a positive and negative effect (content of video games, amount of time spent playing video games, etc).

Conclusion:

The purpose of this concurrent mixed-model study was to determine if independent variables (gender, age, ethnic origin, previous undergraduate degree, licensure area, computer experience, use of software packages, computer training, computer ownership and socioeconomic status) had a statistically significant impact on the dependent variable (computer self-efficacy of preservice teachers from the University of Windsor). In addition, open-ended questions were used to explore preservice teachers' computer self-efficacy results by examining their past technological interaction experiences and beliefs. The participants were surveyed at the beginning of the Fall 2005 semester after they had experienced their first practice teaching placement. The data from this study led to the following conclusions:

1. Gender did not make a statistically significant difference on the computer self-efficacy of preservice teachers. Male and female participants had relatively equal levels of computer self-efficacy.
2. Age did not make a statistically significant difference on the computer self-efficacy of preservice teachers. Traditional and non-traditional participants had relatively equal levels of computer self-efficacy.
3. Ethnic origin did not make a statistically significant difference on the computer self-efficacy of preservice teachers. Nine ethnic groups had relatively equal levels of computer self-efficacy.

4. Previous Undergraduate degrees had a statistically significant effect on the computer self-efficacy of preservice teachers between Science and Art Degree students on the one hand, and Science and Social Science Degree students on the other. However, it did not have any significant effect on any other categories of previous undergraduate degree. The highest CUSE mean was obtained by Science (M=142.48) students in comparison to lower CUSE means obtained by Art (M=125.63) and Social Science (M=127.45) students.
5. Division (Licensure Area) had a statistically significant effect on computer self-efficacy of preservice teachers between the Primary/Junior and Junior/Intermediate licensure area, but not between the Primary/Junior and Intermediate/Senior licensure area or Intermediate/Senior and Junior/Intermediate licensure area.
6. Experience had a significant effect on computer self-efficacy of preservice teachers. The group with extensive computer experience achieved the highest CUSE mean (M=152.35). The Experienced group was positively related to computer self-efficacy and 31% of the variation in computer self-efficacy can be predicted from the experienced group.
7. Familiarity with software packages had a significant effect on computer self-efficacy of preservice teachers. The group that was most knowledgeable (total score of 7 or 8) did receive the highest CUSE mean (M=147.39). The least knowledgeable groups (0 or 1, 2, 3, and 4) were negatively related to computer self-efficacy. A large majority of participants do own a computer.

8. Previous computer training did not make a statistically significant difference on the computer self-efficacy of preservice teachers. A majority of students did not attend any training course, but the qualitative data indicated that preserivce teachers did receive training from siblings, family members and friends.
9. Socioeconomic status did not make a significant difference on computer self-efficacy of preservice teachers. A hundred and one (48.1%) preservice teachers' household income level was under $30,000 possibly due to the fact that they were full time students. A majority of students did own a computer and therefore had access to a computer.
10. Performance accomplishments results indicated that 82 (39.6%) students did fix their most frequent computer problem themselves. This revealed that a large number of the students will try to fix problems without anyone's help.
11. Vicarious experiences results indicated that 155 (73.8%) preservice teachers believed that computer programs are geared towards both females and males equally.
12. Verbal persuasions results indicated that the most positive factors in forming their attitude towards computers were school and society factors. The family factor had the highest percentage of negative influence.
13. Emotional arousal results indicated that 75 (35.7%) students integrated computers into their lessons during their first practicum placement. Seventy (33.3%) out of 161 (76.7% - total was 210 students) explained that they did not integrate computers into their lessons during their practicum since lessons did not require it. This implied that even though preservice teachers had done only two months of

their program, they were ready to integrate computers into their lesson. Technology was accessible to a majority of the students during their practicum placements. The most enjoyable computer software was word processing, while 77 (36.7%) were not comfortable using spreadsheets or databases to teach mathematical subjects. A majority of the students did not play video games, although many of the participants did indicate that playing video games had both a positive and negative effect.

Recommendations:

The following recommendations are proposed based on the results of this study:

1. Follow-up interviews with preservice teachers would assist in obtaining more detailed data on the qualitative portion of a study of this nature.
2. When constructing a mixed-methodology questionnaire, the researchers should specify the questions in great detail. For example, with reference to the qualitative question #9 (part of the original questionnaire), *"Have you ever attended a computer training course?"* the researcher should specify an example of a computer training course. The participants had an option of either a choice of yes or no. Qualitative data indicated that although some participants never attended any computer training, their siblings or family or friends were able to help and train them.
3. The questionnaire, should ask the participants to identify their teachable subjects. The purpose of this question would be to give a complete picture of Junior/Intermediate and Intermediate/Senior divisions, and teachable subjects as some of these individuals intend to teach computer science classes.

4. Teacher education programs should encourage more Science Degree students to apply for Primary/Junior licensure area, as this would strengthen computer usage in this important area that serves as the foundation years for young students.
5. Teacher education programs should encourage all students, especially Arts and Social Science students to take spreadsheets or database courses offered at university.
6. Teacher education programs should encourage all students to try out a variety of computer software programs.
7. Teacher education programs should be given projects that require the use of different computer programs, thereby increasing exposure to a variety of programs and possibly enhancing their computer experiences.
8. Students of Canadian ethnic origin represented the majority group in the study. A more ethnically diverse population should be examined.
9. As Wall's (2004) study suggested, teacher education programs should continue to improve the computer self-efficacy of preservice teachers by providing technology teaching and learning experiences that include the four sources of self-efficacy.
10. Future research needs to investigate the computer self-efficacy beliefs of preservice teachers at the end of their teacher education programs, thereby further exploring an issue that the present study investigated at the beginning of the preservice program.

11. A concurrent or sequential mixed-model or method with equal dominance of qualitative and quantitative data would enrich the future research on computer self-efficacy for preservice teachers.

Summary of Chapter V

The preservice teachers were surveyed at the beginning of the Fall 2005 semester after they had completed their first practice teaching placement. The quantitative conclusion of this concurrent mixed-model study determined that previous undergraduate degree, licensure area, computer experience and use of software packages had a statistically significant impact on the computer self-efficacy beliefs of preservice teachers. A stepwise regression indicated that 47% of the variation in the computer self-efficacy can be predicted from the use of 0 or 1, 2, 3 and 4 packages, science degree, some experience and experienced groups. A positive relationship was indicated between computer self-efficacy and the *experienced* (Experience-3) group and the science (Degree-Science) group. The results show participants with "quite a lot" and "extensive" experience and a science degree tend to have higher self-efficacy. A negative relationship was indicated between computer self-efficacy and the preservice teachers who had used 0 or 1, 2, 3 and 4 packages. Those preservice teachers tended to have lower computer-self efficacy. The preservice teachers with knowledge of 0 or 1 and 2 packages were the most negatively related to computer self-efficacy.

The open-ended questions were used to explore preservice teachers' computer self-efficacy results by examining their past technological interaction experiences and beliefs. The following was indicated by the four sources of self-efficacy: (i) performance accomplishments: results indicated that a large number of the students will try to fix problems without anyone's help (ii) vicarious experiences: results indicated that majority of preservice teachers believed that computer programs are geared towards both females and males equally (iii) verbal persuasions: results indicated that the most positive factors in forming their attitude towards computers were school and society factors. The family factor had the highest percentage of negative influence and (iv) emotional arousal: results showed that 75 (35.7%) students integrated computers into their lessons during their first practicum placement and technology was accessible to a majority of the students during their practicum placements. The most enjoyable computer software was Word processing, while 77 (36.7%) were not comfortable using Spreadsheets or Databases to teach mathematical subjects. In addition, a majority of the students did not play video games, although many of the participants did indicate that playing video games had both a positive and negative effect.

In conclusion, teacher education programs should encourage more Science Degree students to apply for Primary/Junior licensure area. Additionally, teacher education programs should encourage all students, especially Arts and Social Science students to take spreadsheet or database courses offered at university and encourage all students to try out a variety of computer software programs.

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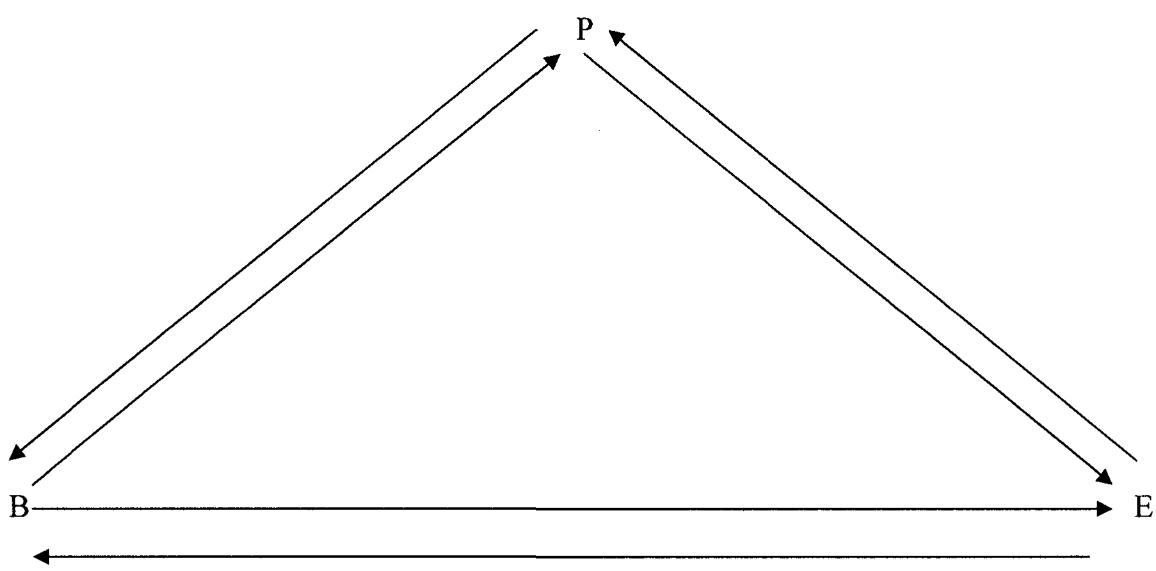
APPENDIX A: Triadic Reciprocal Determinism

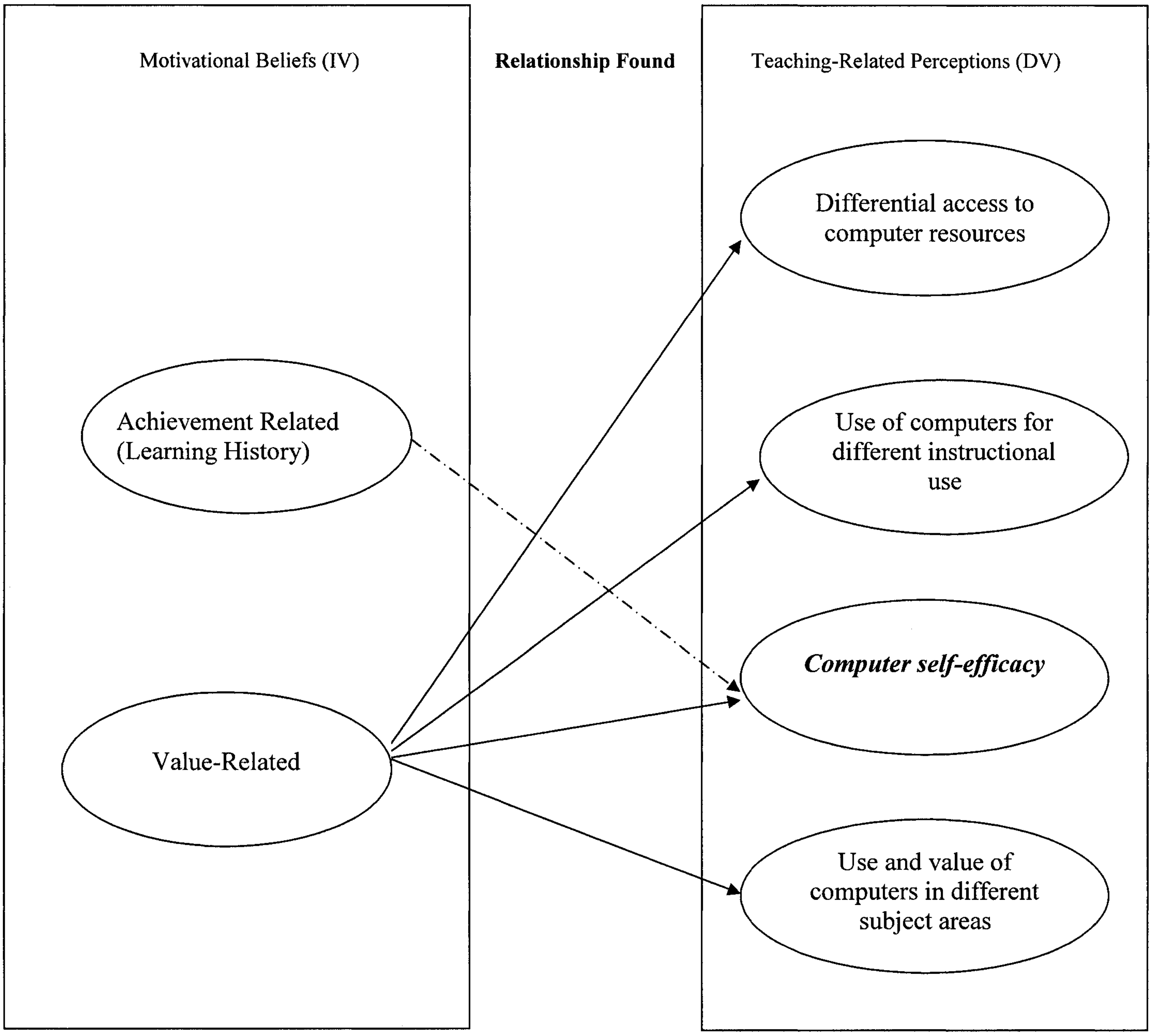



The relationship between the three major classes of determinants in triadic reciprocal causation:

- B represents behavior;
- P the internal personal factors in the form of cognitive, affective, and biological events; and
- E the external environment (Bandura, 1986).

APPENDIX B: Resultant Model: Kellenberger (1994):University of Windsor

Preservice teacher beliefs related to educational computer use




- Line thickness denotes relationship strength

# APPENDIX C:

Tashakkori and Teddlie's (2003) Mixed Methods Designs

| Design: | Main characteristic: |
|---|---|
| Sequential | Consecutive use of qualitative and quantitative methods |
| Parallel | Simultaneous use of quantitative and qualitative methods |
| Equivalent Status | Equal priority on both quantitative and qualitative methods |
| Dominant-Less Dominant | Dominant method that encompasses a smaller less dominant method |
| Multilevel | Quantitative and qualitative methods used at different levels of data |

# APPENDIX D:

Mixed Methods Strategies: Creswell (2003)

| Design: | Feature: | Advantage: | Disadvantage: |
|---|---|---|---|
| (i) Sequential: | Chronological mixing of qualitative and quantitative methodology | | |
| Explanatory: | Quantitative data collection occurs before qualitative data | Straightforward nature of this design allows for easy implementation and easy description and report | Time consuming |
| Exploratory: | Qualitative data collection occurs before quantitative data | Straightforward nature and implementation allows for easy implementation of new instrument | Time consuming and difficult to build from the qualitative analysis to subsequent quantitative data collection |
| Transformative: | Guided by a theoretical framework, specific ideology or advocacy | Transformative perspective appeals to researchers using transformative framework within one distinct methodology | Literature lacks guidance on use of transformative strategy |

Sequential Explanatory Design: Creswell (2003)

| | | |
|---|---|---|
| QUAN | → | qual |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| QUAN Data Collection | → | QUAN Data Analysis | → | qual Data Collection | → | qual Data Analysis | → | Interpretation of Entire Analysis |

Sequential Exploratory Design: Creswell (2003)

| | | |
|---|---|---|
| QUAL | → | quan |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| QUAL Data Collection | → | QUAL Data Analysis | → | quan Data Collection | → | quan Data Analysis | → | Interpretation of Entire Analysis |

Sequential Transformative Design: Creswell (2003)

QUAL → quan

Vision, Advocacy, Ideology, Framework

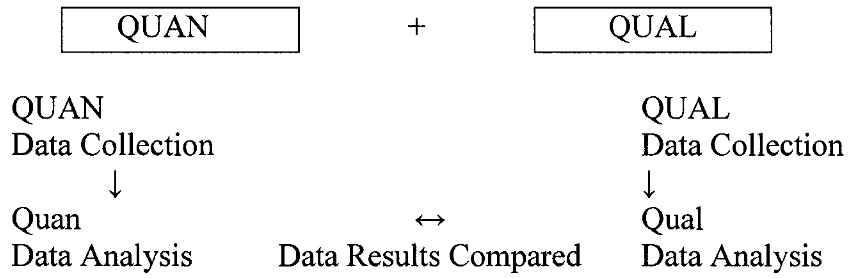
QUAN → qual

Vision, Advocacy, Ideology, Framework

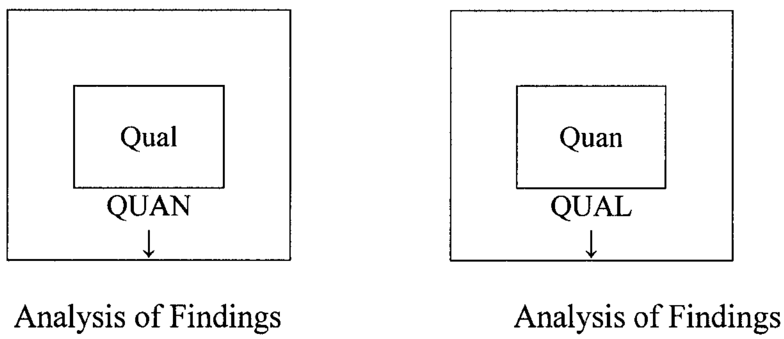
Mixed Methods Strategies: Creswell (2003) (continued)

| Design: | Feature: | Advantage: | Disadvantage: |
|---|---|---|---|
| (ii) Concurrent | Parallel/simultaneous collection of data | | |
| Triangulation | Use of two different methods in order to confirm, cross-validate, or corroborate findings within single study. The interpretation phase can either access the convergence of finding in order to strengthen the knowledge claims or explain any lack of it | Familiarity of this design can result in well-validated and sub-substantiated findings. Shorter data collection time compared to sequential design | This design requires great effort and expertise in order to adequately study phenomenon of researcher's area of interest. In addition a researcher may be unclear how to resolve discrepancies that arise in the result. |
| Nested | The method with less priority is nested within the predominant method | Data collection occurs simultaneously during a single data collection phase. The study contains advantages of both quantitative and qualitative data; therefore, one can gain perspective from the different types of data from different levels within the study | Literature lacks guidance on how to transform data in order to integrate in writing the analysis phase of research. Furthermore, a researcher may be unclear how to resolve and interpret discrepancies due unequal evidence within a study. |
| Transformative | Guided by a theoretical framework | Position mixed methods research within a transformative framework guides researcher's inquiry | This design shares disadvantages of triangulation and nested strategies |

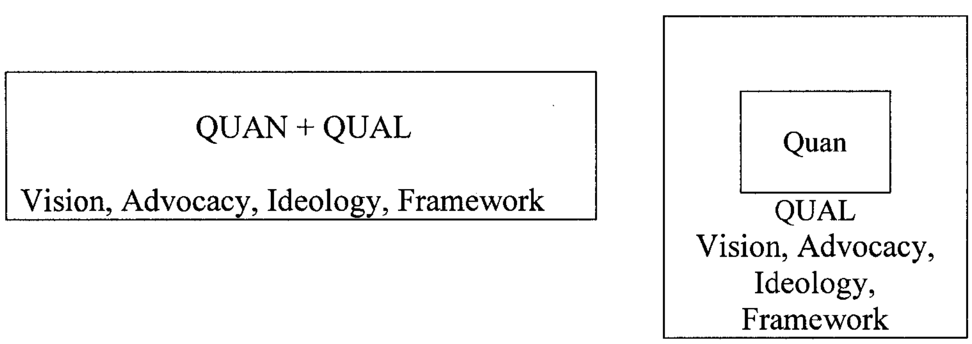
Concurrent Triangulation Strategy: Creswell (2003)




Concurrent Nested Strategy: Creswell (2003)




Concurrent Transformative Strategy



APPENDIX E:

LETTER OF PERMISSION TO THE DEAN OF FACULTY OF EDUCATION

Faculty of Education
University of Windsor
Windsor, Ontario
N9B 3P4

September 21, 2005

Dr. P. Rogers
Dean of the Faculty of Education
University of Windsor
Windsor, Ontario

Dear Dr. Rogers:

As a graduate student in the Faculty of Education at the University of Windsor, I am writing to seek approval for a research study which will be conducted to meet the thesis requirements for a Master's of Education.

The study will investigate preservice teachers' computer self-efficacy beliefs. Data will be collected from preservice teachers. Participation is voluntary and anonymity is ensured.

There are no known risks associated with this study and participants may withdraw at any time. Please find enclosed procedures to be followed and a sample of the questionnaire to be used.

Approval to conduct this research has been granted by the Research Ethics Board of the University of Windsor as per the attached Ethics approval letter of September 12, 2005. If you have any questions about the questionnaire or this study, you can reach me at (519) 253-3000 ext: 3200 or via e-mail jelena@uwindsor.ca. Concerns of an ethical nature can be addressed to my advisor, Dr. Anthony N. Ezeife who can be reached at (519) 253-3000 ext: 2890.

Thank you for your kind consideration of my application.

Sincerely,

Jelena Magliaro

# APPENDIX F:

## LETTER OF PERMISSION TO UNIVERSITY PROFESSORS

Faculty of Education
University of Windsor
Windsor, Ontario
N9B 3P4

October 3, 2005

Dr. XXXXX
Faculty of Education
University of Windsor
Windsor, Ontario
N9B 3P4

Dear Dr. XXXXX:

As a graduate student in the Faculty of Education at the University of Windsor, I am writing to seek approval for a research study which will be conducted to meet the thesis requirements for a Master's of Education.

The study will investigate preservice teachers' computer self-efficacy beliefs. Data will be collected from preservice teachers during your class at your convenience (approximately 15 minutes). Students will be requested to participate in the study, but participation is voluntary and anonymity is ensured.

There are no known risks associated with this study and participants may withdraw at any time. Please find enclosed procedures to be followed and a sample of the questionnaire to be used.

Approval to conduct this research has been granted by the Research Ethics Board of the University of Windsor and the Dean of Faculty of Education, Dr. P. Rogers. If you have any questions about the questionnaire or this study, you can reach me at (519) 253-3000 ext: 3200 or via e-mail jelena@uwindsor.ca. Concerns of an ethical nature can be addressed to my advisor, Dr. Anthony N. Ezeife who can be reached at (519) 253-3000 ext: 2890. Thank you for your kind consideration of my application.

Sincerely,

Jelena Magliaro

APPENDIX G:

UNIVERSITY OF
WINDSOR

# INVITATION TO PARTICIPATE IN A RESEARCH STUDY

Title of Study: **COMPUTER SELF-EFFICACY BELIEFS OF PRESERVICE**

You are invited to participate in a research study conducted by Jelena Magliaro, from the Faculty of Education, University of Windsor.
Your participation in this study will help me fulfil the research requirements for obtaining the Masters of Education degree.

If you have any questions or concerns about the research, please feel free to contact Jelena Magliaro at (519) 253-3000, extension 3200 or e-mail me at: jelena@uwindsor.ca. My faculty advisor at the University of Windsor is Dr. Anthony N. Ezeife. If you have further questions about this study, feel free to contact him at (519) 253-3000, extension 2890. His e-mail address is aezeife@uwindsor.ca.

## PURPOSE OF THE STUDY

The purpose of the research is to investigate the computer self-efficacy beliefs of preservice teachers Self-efficacy can be defined as an individual's beliefs in his or her competency to effectively carry out a particular task. This research examines self-efficacy beliefs in the context of computer use.

## PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

- Please read and sign the consent form and give it back to researcher
- Answer the questions to reflect your own personal feelings to the best of your ability. This should take approximately 15 minutes.
- Upon completion of the questionnaire please hand it in to the researcher.
- Nothing other then answering the questionnaire and returning it to researcher is required from you.

## POTENTIAL RISKS AND DISCOMFORTS

There are no known risks involved with this study.

## POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Educational Relevance:
The results of this computer self-efficacy study may be used to modify the University of Windsor Faculty of Education computer curriculum course to better meet the needs of the preservice teachers. In addition, the results from this study may be useful in initiating ongoing curricular reform in the context of teacher education programs in Ontario.

## PAYMENT FOR PARTICIPATION

No payment will be received for participation in this study.

## CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Once the questionnaires are received from the participants, the accompanying consent form will be kept in a locked file cabinet that will be only accessible to the researcher. Anonymity will be guaranteed. There is no personal information that can be used to identify a questionnaire as having been completed by you.

## PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may ask that you withdraw from this research if circumstances arise which warrant doing so.

## FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

A permanent copy of the completed research work will be available in the thesis collection of the Leddy Library at University of Windsor.

On April 1st, 2006 the results of this study will be posted on the University of Windsor Research Ethics Board website at:

http://www.uwindsor.ca/reb

## SUBSEQUENT USE OF DATA

Data from this study may be used in subsequent studies.

Do you give consent for the subsequent use of the data from this study? ☐ Yes ☐ No

## RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. This study has been reviewed and received ethics clearance through the University of Windsor Research Ethics Board. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; telephone: 519-253-3000, ext. 3916; e-mail: lbunn@uwindsor.ca.

## SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

______________________________ ________________

Signature of Investigator Date

Thank you for your time.

APPENDIX H:

UNIVERSITY OF
WINDSOR

# CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: **COMPUTER SELF-EFFICACY BELIEFS OF PRESERVICE TEACHERS**

You are invited to participate in a research study conducted by Jelena Magliaro, from the Faculty of Education, University of Windsor.
Your participation in this study will help me fulfil the research requirements for obtaining the Masters of Education degree.

If you have any questions or concerns about the research, please feel free to contact Jelena Magliaro at (519) 253-3000, extension 3200 or e-mail me at: jelena@uwindsor.ca. My faculty advisor at the University of Windsor is Dr. Anthony N. Ezeife. If you have further questions about this study, feel free to contact him at (519) 253-3000, extension 2890. His e-mail address is aezeife@uwindsor.ca.

## PURPOSE OF THE STUDY

The purpose of the research is to investigate the computer self-efficacy beliefs of preservice teachers Self-efficacy can be defined as an individual's beliefs in his or her competency to effectively carry out a particular task. This research examines self-efficacy beliefs in the context of computer use.

## PROCEDURES

If you volunteer to participate in this study, we would ask you to do the following things:

- Please read and sign the consent form and give it back to researcher
- Answer the questions to reflect your own personal feelings to the best of your ability. This should take approximately 15 minutes.
- Upon completion of the questionnaire please hand it in to the researcher.
- Nothing other then answering the questionnaire and returning it to researcher is required from you.

## POTENTIAL RISKS AND DISCOMFORTS

There are no known risks involved with this study.

## POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Educational Relevance:
The results of this computer self-efficacy study may be used to modify the University of Windsor Faculty of Education computer curriculum course to better meet the needs of the preservice teachers. In addition, the results from this study may be useful in initiating ongoing curricular reform in the context of teacher education programs in Ontario.

## PAYMENT FOR PARTICIPATION

No payment will be received for participation in this study.

## CONFIDENTIALITY

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Once the questionnaires are received from the participants, the accompanying consent form will be kept in a locked file cabinet that will be only accessible to the researcher. Anonymity will be guaranteed. There is no personal information that can be used to identify a questionnaire as having been completed by you.

## PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time without consequences of any kind. You may also refuse to answer any questions you don't want to answer and still remain in the study. The investigator may ask that you withdraw from this research if circumstances arise which warrant doing so.

## FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

A permanent copy of the completed research work will be available in the thesis collection of the Leddy Library at University of Windsor.

On April 1st, 2006 the results of this study will be posted on the University of Windsor Research Ethics Board website at:

http://www.uwindsor.ca/reb

## SUBSEQUENT USE OF DATA

Data from this study may be used in subsequent studies.

Do you give consent for the subsequent use of the data from this study? ☐ Yes ☐ No

## RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. This study has been reviewed and received ethics clearance through the University of Windsor Research Ethics Board. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; telephone: 519-253-3000, ext. 3916; e-mail: lbunn@uwindsor.ca.

## SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study **Computer Self-efficacy Beliefs of Preservice Teachers** as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

______________________________
Name of Subject

______________________________ ______________
Signature of Subject Date

## SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

______________________________ ______________
Signature of Investigator Date

# APPENDIX I:

## Computer User Self-Efficacy Scale

The purpose of this questionnaire is to examine attitudes toward the use of computers. The questionnaire is divided into three parts. In **Part 1** you are asked to provide some basic background information about yourself and your experience with computers, if any. In **Part 2** you are being asked to describe past computer experiences. In **Part 3** you are asked to indicate the extent to which you agree or disagree with a number of statements provided.

**Part 1:**

1. Sex: Male Female

2. Age: __________

3. Ethnic Origin: ________________________

4. In which faculty did you obtain your undergraduate degree?

a) Art b) Social Science c) Science d) Other (please specify) __________

5. In which division are you seeking teacher certification?

a) Primary/Junior b) Junior/Intermediate c) Intermediate/Senior

6. Experience with computers:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| none | very limited | some experience | quite a lot | extensive |

7. Please indicate by circling either "Yes" or "No" which of the following computer software packages you have used:

| | | |
|---|---|---|
| a) Word processing packages | Yes | No |
| b) Spreadsheets | Yes | No |
| c) Databases | Yes | No |
| d) Presentation packages (eg., Harvard Graphics, Coreldraw) | Yes | No |
| e) Statistics packages | Yes | No |
| f) Desktop publishing | Yes | No |
| g) Multimedia | Yes | No |
| h) Other (specify) | _______________ | |

8. Do you own a computer? YES NO

9. Have you ever attended a computer training course? YES NO

10. Income level (household):

| | | |
|---|---|---|
| under $30 000 _______ | $30 000-$39 999 _________ | $40 000-$49 999 ________ |
| $50 000 -$59 999 _______ | $60 000 -$69 999 _________ | $70 000 -$79 999 ________ |
| $80 000 -$89 999 _______ | $90 000 -$99 999 __________ | over $100 000 ________ |

**Part 2:**

i) a) What was the worst problem you had with computers?

b) How was this problem solved?

ii) Do you think that computer programs are geared more towards males, females, or both equally? Why do you think so?

iii) Which of the following factor(s) below have been the most influential in forming your attitude toward computers? Please indicate by ✓(check mark) in the **Experience** column whether this was a **positive (+)** or a **negative (-)** experience and explain why.

| **Factors** | **Experience** (+) | or ( -) | ***Please Explain*** |
|---|---|---|---|
| **Society** | | | |
| **School** | | | |
| **Family** | | | |
| **Employer** | | | |
| **Other** (please specify) | | | |

iv) Have you integrated computers into any of your lessons during your practicum placement? Please explain.

a) Did you find computer technology accessible in the schools during your practicum placement?

b) What computer software are you reluctant to use? Why?

c) Are you comfortable using various spreadsheets or databases (for example: Microsoft Excel, QuatroPro, Microsoft Access or others) to teach mathematical subjects or to deliver a technological lesson?

d) What computer software do you enjoy using the most?

e) Do you play video games? YES NO

f) Do you think that video games have a beneficial or detrimental effect on students?

**Part 3:**
Below you will find a number of statements concerning how you might feel about computers. Please indicate the strength of your agreement/disagreement with the statements by circling one of the numbers in the six point scale. It is important that you respond to each statement.

1. Most difficulties I encounter when using computers, I can usually deal with.

   Strongly Disagree 1 2 3 4 5 6 Strongly Agree

2. I find working with computers very easy.

   Strongly Disagree 1 2 3 4 5 6 Strongly Agree

3. I am very unsure of my abilities to use computers.

   Strongly Disagree 1 2 3 4 5 6 Strongly Agree

4. I seem to have difficulties with most of the packages I have tried to use.

   Strongly Disagree 1 2 3 4 5 6 Strongly Agree

5. Computers frighten me.

   Strongly Disagree 1 2 3 4 5 6 Strongly Agree

6. I enjoy working with computers.

   Strongly Disagree 1 2 3 4 5 6 Strongly Agree

7. I find computers get in the way of learning.

   Strongly Disagree 1 2 3 4 5 6 Strongly Agree

8. DOS-based computer packages don't cause many problems for me.

   Strongly Disagree 1 2 3 4 5 6 Strongly Agree

9. Computers make me much more productive.

   Strongly Disagree 1 2 3 4 5 6 Strongly Agree

10. I often have difficulties when trying to learn how to use a new computer package.

    Strongly Disagree 1 2 3 4 5 6 Strongly Agree

11. Most of the computer packages I have had experience with, have been easy to use.

    Strongly Disagree 1 2 3 4 5 6 Strongly Agree

12. I am very confident in my abilities to use computers.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

13. I find it difficult to get computers to do what I want them to.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

14. At times I find working with computers very confusing.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

15. I would rather that we did not have to learn how to use computers.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

16. I usually find it easy to learn how to use a new software package.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

17. I seem to waste a lot of time struggling with computers.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

18. Using computers makes learning more interesting.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

19. I always seem to have problems when trying to use computers.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

20. Some computer packages definitely make learning easier.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

21. Computer jargon baffles me.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

22. Computers are far too complicated for me.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

23. Using computers is something I rarely enjoy.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

24. Computers are good aids to learning.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

25. Sometimes, when using a computer, things seem to happen and I don't know why.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

26. As far as computers go, I don't consider myself to be very competent.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

27. Computers help me to save a lot of time.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

28. I find working with computers very frustrating.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

29. I consider myself a skilled computer user.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

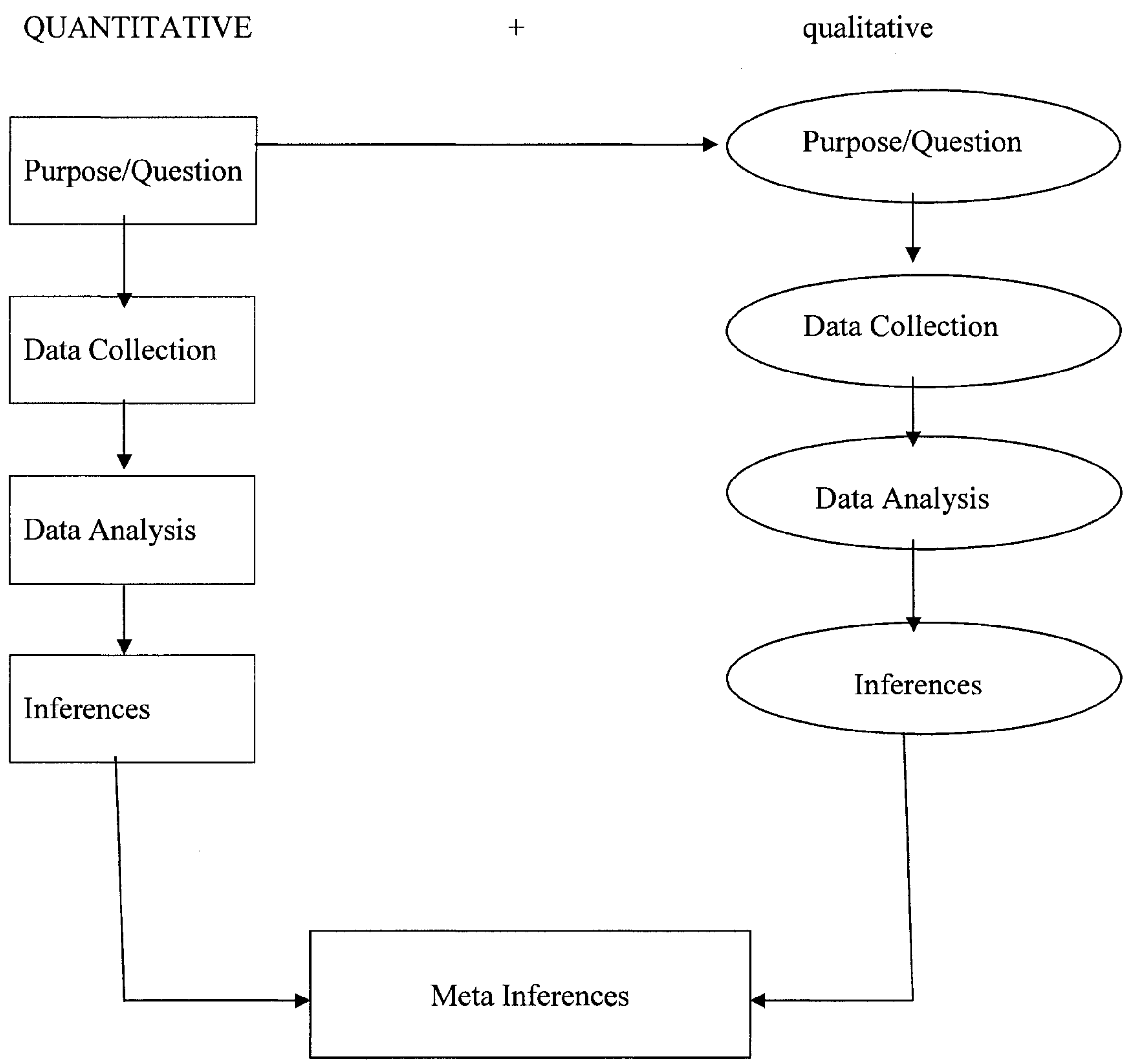
30. When using computers I worry that I might press the wrong button and damage it.

Strongly Disagree 1 2 3 4 5 6 Strongly Agree

Thank you for your time.

APPENDIX J:

Concurrent Mixed-Model Design




- A "+" indicates a simultaneous or concurrent form of data collection;
- A "→" indicates a sequential form of data collection; and
- Capitalization indicates an emphasis or priority on the quantitative or qualitative data and analysis in the study (Creswell, 2003).

# VITA AUCTORIS

| | |
|---|---|
| NAME: | Jelena Magliaro |
| PLACE OF BIRTH: | Mostar, Bosnia and Herzegovina |
| EDUCATION: | Gimanzija Fra.Gre Martica (High School)<br>Mostar, Bosnia and Herzegovina<br>June 1997 |
| | Bachelor of Computer Science<br>University of Windsor<br>Windsor, Ontario<br>June 2002 |
| | Bachelor of Arts (Honours Psychology)<br>University of Windsor<br>Windsor, Ontario<br>October 2003 |
| | Masters of Education<br>University of Windsor<br>Windsor, Ontario<br>June 2006 |