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Junko Yamamoto

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CONFIDENCE AND WILLINGNESS AMONG PRESERVICE TEACHERS TO USE  
TECHNOLOGY TO SUPPORT LEARNER-CENTERED STRATEGIES THAT ADDRESS  
THE DIVERSE NEEDS OF STUDENTS: A MULTIMEDIA EXPERIENCE

by

Junko Yamamoto

Submitted in partial fulfillment of

the requirements for the degree

Doctor of Education

Department of Instruction and Leadership in Education

School of Education

Duquesne University

May, 2007

**DUQUESNE UNIVERSITY**  
**SCHOOL OF EDUCATION**

***Dissertation***

Submitted in Partial Fulfillment of the Requirements  
For the Degree of Doctor of Education (Ed.D.)

EdDIT Doctoral Program

***Presented by:***

Junko Yamamoto

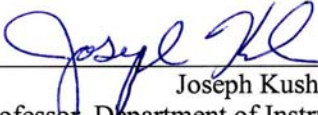
M.P.I.A., University of Pittsburgh, 2000

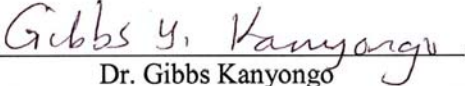
B.A., Ritsumeikan University, Kyoto, Japan, 1990

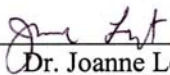
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CONFIDENCE AND WILLINGNESS AMONG PRE-SERVICE TEACHERS TO USE  
TECHNOLOGY TO SUPPORT LEARNER-CENTERED STRATEGIES THAT  
ADDRESS THE DIVERSE NEEDS OF STUDENTS: A MULTIMEDIA EXPERIENCE

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## Abstract

The purpose of this study was to examine the change in preservice teachers' attitudes towards using technology to meet the needs of diverse students as noted by the National Educational Technology Standards for Teachers (NETS\*S) III. B. This research included two interventions: a research paper assignment and a hands-on practice using technology to assist students with special needs. The study took place within the coursework in an instructional technology class offered for preservice teachers. After the pre-intervention survey was collected on the 10th week of the semester, the instructor explained the research paper assignment for assisting students with special needs with technology. The research question each student formulated was "How can I meet the needs of \_\_\_\_ with technology?" Each student selected his or her target group by filling in the blank. The second set of data was collected immediately after the paper was due. During the 13th week of the semester, there was a collaborative lecture delivered by the course instructor and a special education faculty member about readers' theater multimedia. The lecture suggested readers' theater as a way of including weak readers in a general classroom. Following the lecture, the class had a discussion to connect the knowledge that they gained from the research paper and an example of mainstreaming provided by the faculty members. During the 14th and 15th weeks, preservice teachers got into groups to create readers' theater multimedia productions using PowerPoint. The third survey was filled in at the end of the readers' theater multimedia production. The data analysis indicated that the research participants generally had positive attitudes about assistive technology prior to the interventions. Therefore, a significant change of attitude for positive direction occurred in limited items. The results of this study indicated that preservice teachers may have positive attitudes about special

education-general education collaboration prior to their field practicum or student teaching and increased knowledge about assistive technology may affirm this positive attitude.

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## CHAPTER I

### INTRODUCTION

#### Problem Statement

#### *Challenges in Teacher Education*

Society is constantly changing (Kolis & Dunlap, 2004). For example, the introduction of technology drastically changed education (Fletcher, 2001). The ability to analyze the changes in society and to adapt to them, therefore, is necessary for a successful life. Therefore, a function of formal education is to assist students in developing the skills to collect and analyze information from their environments and to build new concepts and to adapt to changes in the society. This is a challenging task.

The task to provide instruction that facilitates knowledge building is especially challenging because an environment surrounding each student is unique (Gregg & Sekers, 2006; Payne, 2006). Since people's external environments are different, the path for assimilation and accommodation would be different for each individual learner in the classroom (Jonassen, 2006). When presented with the same problem, the most rational solution may be different from one person to another and how each individual learner adjusts to the outcome of his or her solution would be unique. This diversity in any given classroom creates a special challenge for teachers, especially when a teacher does not share the same background with the learners. This is due to the fact that communication is difficult between people who do not share the same background (Dewey, 1920).

This challenge caused by a variety of experiences in the classroom is intensified by the Individuals with Disabilities Education Act (IDEA) / No Child Left Behind

(NCLB) Act because this regulation requires that students be taught in a least restrictive environment (P.L.107-110). This regulation allows schools to simulate society: society is made of a variety of individuals and teaching students to support each other's learning in a classroom helps them to become better citizens of a society consisting of diverse people. Therefore it will help all learners to better accommodate to their society. However, facilitating learning of all students regardless of their background is not an easy task.

Therefore, the role of a teacher education institution is to offer training to help future teachers be well-equipped to meet this challenge. The National Council for Accreditation of Teacher Education is in line with the regulation as it requires that teacher candidates have knowledge, skills, and dispositions to teach all students (National Council for Accreditation of Teacher Education, 2002; National Council for Accreditation of Teacher Education, 2006).

### *Technology as a Catalyst for Inclusion*

Technology can facilitate learner-centered strategies so that diverse students can receive individualized instruction (Jonassen, 2003). When teachers employ learner-centered strategies so each student can use his or her existing knowledge and experience to solve new problems in his or her own unique way, each student will develop the ability to accommodate to the changes in the society. In fact, the International Society for Technology in Education (ISTE) standard, the standard NCATE uses, requires all teachers to use technology to teach diverse students. Specifically, the National Educational Technology Standards for Teachers (NETS\*T) III. B. states that "Teachers

use technology to support learner-centered strategies that address the diverse needs of students” (International Society for Technology in Education, 2003, p. 51).

However, teacher candidates do not always come from an educational background in which their teachers used technology in an instructional setting, modeled learner-centered strategies, or successfully addressed the diverse needs of students. This leads to a challenge for a teacher education institution to assist future teachers in meeting this standard regardless of their previous experience.

*Teacher Preparation for Instructional Technology in Relation with NETS\*T III. B Using Technology*

*Expectation to use technology in classroom and teachers’ attitude*

Educators in today’s schools are increasingly expected to use technology to enhance instruction. This expectation includes mastering basic operations, designing learning environments with technology, enhancing curriculum with technology, collecting and analyzing data, increasing productivity, and observing ethical practice with technology (International Society for Technology in Education, 2003). However, not all teachers are willing to use technology to enhance their quality of teaching.

Thus, teachers’ attitudes towards the use of technology are key factors in instructional technology (Shaunessy, 2005). An attitude is a part of a belief system (Krathwohl, et al., 1964) formulated by experience and knowledge (Shaunessy, 2005). Three issues have been identified which are most beneficial to addressing teacher’s attitudes about technology. The first issue relates to teachers’ resistance due to low confidence in their abilities to use the technology (Batane, 2004). This causes computer anxiety, and may result in a resistance to use computers (Rovai & Childress, 2003).

Therefore, technology literacy training for teachers and teacher candidates functions as a catalyst to increase confidence in technology among teachers. When preservice and inservice teachers feel that they can use technology, the confidence transforms into their willingness to use it (Talsma et al., 2002; Wahab, 2003).

The second issue related to teachers' usage of technology is pedagogy. Even if teachers develop technology skills and are aware that technology promotes higher quality learning, they do not always know how to apply the knowledge into practice (Laffey, 2004). Specifically, even if preservice teachers become aware that they need to use learner-centered strategies and if their technology skills increase, they may not be able to combine their increased knowledge about learner-centered strategy and link it to their increased technology skill. This may lead to the lack of confidence to use technology as an effective teaching tool. Again, lack of confidence causes unwillingness to use technology as a teaching and learning tool. Teachers may not know what to do with technology if their technology training is not curriculum-centered or does not address pedagogy (Milken Family Foundation, 1999). Therefore, pedagogy-centered technology training is desirable for instructional technology training (Diaz & Bontenbal, 2000). Hence, preservice teachers need pedagogy-centered technology training to enable them to design and use technology-enriched instruction.

The third issue is the future teachers' attitude to use technology to assist diverse learners. Increased knowledge about assisting diverse learners by the use of technology is desirable because increased knowledge about learners in special education programs changes the attitude about special education among preservice teachers. For example, teachers who know how to assist special education students are more likely to help them



(Ammah & Hodge, 2005). In addition, special education teachers are more likely to believe in inclusion than general education teachers do (Taylor et al, 2001). Since general education teachers need to collaborate with special education teachers in inclusion, it is ideal that teacher candidates in both special education and general education tracks develop knowledge, skills, and the attitude to facilitate successful inclusion.

### *Using Learner-Centered Strategy to Teach Diverse Students*

#### *Language and social skills training for all students*

All students, regardless of their disabilities, need language and social skills training. This is because language is a device for knowledge construction (Bruner, 1983; Chomsky, 2002; Tough, 1977) and language use in a social context promotes students' logical thinking. Increased logical reasoning then feeds back to use the of the language to convince, persuade, or explain in a more complicated situation (Piaget, 1959). Thus, preservice teachers can benefit from learning an approach that utilizes technology to promote language and social skills.

#### *Learner-centered strategy*

Preservice teachers can use the constructivist framework to facilitate learner-centered activities. Constructivism originates in the epistemology of Dewey, Piaget (Lesh et al, 2003; Rakes et al., 2006), and Vygotsky (Chicoine, 2004, Smith, J., 2001). Constructivists believe that learners need to interact with their environments to form their knowledge bases or schemas. The results they get from their environments cause learners to change their future behavior. In addition, learners need cognitive challenges to experience qualitative changes in their thinking processes, and formal education can

facilitate this cognitive challenge (Piaget, 1973, Dewey, 1920). One way to facilitate a cognitive challenge is to have students of different abilities placed in the same group because interaction with more capable peers stimulates lower level students' cognitive growth (Vygotsky, 1978).

This epistemology of constructivism is gaining support among instructional technology specialists (McGregor & Lou, 2004; Rakes et al., 2006; Scheidet, 2003) because technology can facilitate deep learning that stimulates abstract thinking (Jonassen, 2006). As noted before, learners need to develop the skill to solve new problems and adjust to new environments throughout their lives; abstract thinking is required for this task. Therefore, knowing how to use technology and the pedagogical justification for using technology are central issues for instructional technology.

However, the presentation of the epistemology and technology training alone do not automatically transform future teachers' abilities to facilitate technology-enriched classroom activities that promote knowledge construction for all students. Therefore, instructional technology professors need to model a constructive approach while explaining learner-centered strategies. This modeling can provide real-life experience in a learner-centered use of technology, and preservice teachers can connect theory and practice through their experience (Brush et al. 2003; Gately & Hammer, 2005; Palmer et al., 2005). Thus, preservice teachers can benefit from seeing an example of using technology to facilitate a learner-centered approach that meets the diverse needs of students.

### *Readers' theater multimedia*

An example of a learner-centered approach that facilitates language skills training is readers' theater. Readers' theater is a group reading ability in which students take their parts and act them out. They practice reading with expression until they become fluent in reading their parts. This is a good activity for including students of various reading abilities because students with higher abilities can take difficult parts and students with lower abilities can take easy parts or repetitive parts (Katz & Boran, 2004). Repeated practices until students become fluent in reading are fun because the practices function as dress rehearsals (Flynn, 2004). Readers' theater is also learner-centered because the participants in the activity use their interpretations of the text to express their parts.

A readers' theater style multimedia production allows learners to combine their vocal performance and visuals. Artistic students can use their drawing skill as a part of the presentation and musical students can insert their music. Multimedia production in a group also promotes the social skills of learners because they need to negotiate style and organization of the production.

### **Purpose Statement**

Therefore, the purpose of this study was to find out if preservice teachers increased their willingness to use technology in order to meet the diverse needs of learners by employing learner-centered strategies. After they completed a research paper about meeting the diverse needs of students through the use of technology, preservice teachers enrolled in the Production and Utilization of Instructional Technology class in the College of Education listened to a co-lecture given by a special education professor

and the instructional technology professor. Then they experienced a hands-on practice for a multimedia readers' theater production.

### Research Questions

1. Will the research paper in which preservice teachers select their own target group to answer, "How will I help \_\_\_\_ with technology" increase their willingness to assist that target group? It is expected that there will be a difference in the increase between special education majors and general education majors. It is because special education majors are likely to have much more willingness prior to the intervention as compared to the general education majors. On the other hand, the intervention may provide the first information about assisting disabled students for general education students, creating an initial interest in assisting the disabled students.
2. Does the process of identifying a problem and finding a solution by literature review increase preservice teachers' willingness to assist diverse students with technology in general? It is predicted that increased knowledge about a targeted population will not only increase the willingness to assist the targeted group but will also heighten the interest in helping special education students in general.
3. Will there be a significant difference in the attitude towards using technology and meeting the diverse needs of students between the research project about using technology to assist special education students and the combination of the research paper and a hands-on practice for the readers' theater style multimedia production? It is predicted that the hands-on practice added to the literature based intervention will result in a greater increase in the willingness to meet the diverse

needs of students through technology use compared to the literature based intervention alone.

4. Is there a significant difference in the willingness to assist diverse learners with technology between the students who are working towards a special education certificate and those who are not majoring in special education? While the first intervention, the research paper, may not make a significant increase in the attitude of the special education students, the second intervention is likely to increase their confidence in using technology. Since the hands-on practice will increase the confidence to use technology for both special education and general education students, they will have an equal increase in their confidence to use technology to accommodate the diverse needs of learners.

### Significance of Study

Attitude is a critical factor that impacts an action (Bahr et al., 2004). Therefore increasing positive attitudes about using technology in a pedagogically sound manner is likely to cause preservice teachers to use technology in a classroom. Reducing anxiety about technology and increasing confidence about its use can be realized by training. For example, Rovai and Childress (2003) provided semester-long computer literacy training to 86 preservice teachers and compared their attitudes about computers prior to the training and after the training. The pre-post treatment comparison showed that there were significant decreases in computer anxiety and a significant increase in computer confidence and computer knowledge. However, this study left the question about the willingness to use computers among preservice teachers unanswered.

Benson et al. (2004) examined the unanswered question about the relationship between the confidence about technology and the willingness to use technology among teacher candidates. They combined a 12 week Instructional Media course and a three-week field training for 27 teacher candidates so they could reflect on their practical application of instructional technology skill in classrooms. Sixty three percent of the participants reported that they learned how to teach with technology and considered teaching with technology important. Forty one percent said that technology promotes a higher level of participation in their students. This study showed that feeling prepared to use technology increased the willingness to integrate technology into instruction.

While the connection between general technology education and an increased willingness to use technology in general is already confirmed, research that examines the relationship between instruction specifically targeted for using technology and the use of a learner-centered strategy to meet the diverse needs of students and the willingness to accommodate diverse students through technology use among preservice teachers has not been conducted.

### Study Overview

This study will be funded by the Teaching Learning Technology Roundtable (TLTR) grant at Slippery Rock University. Slippery Rock University is an NCATE accredited institution for teacher training and it is a part of the Pennsylvania State System of Higher Education. There are eighteen NCATE accredited institutions in Pennsylvania as of August 2006. Participants for this study will be preservice teachers enrolled in SEFE230: Production and Utilization of Instructional Technology class at Slippery Rock University, Slippery Rock, PA. Students in the class are working toward teaching

certificates including English, French, Spanish, Elementary Education, Special Education, Citizenship, and Environmental Education.

The duration of the study was from October 2006 to November 2006. The same instructor taught three sections of SEFE 230 with 24 students in each section. Participants first wrote a research paper with a question, “How can I assist the diverse needs of students with technology?” They were expected to collect empirical evidence from literature to design a plan that answers the question. The preservice teachers in Production and Utilization class then listened to a lecture about justification to implement a readers’ theatre style multimedia production. Later, students learned how to use PowerPoint and PC microphones. After they became familiar with both PowerPoint and PC microphones, they created a readers’ theatre style multimedia project. After this training, the participants completed the survey about their attitude towards using technology for instructional purposes. The survey also asked for their opinions about inclusion. The means between the pre-treatment, the research project only, and the instructor’s lecture and the hands-on practice were compared to examine if the treatments increased a positive attitude about instructional technology and inclusion.

### Assumptions

It was assumed that there was a wide variety of preservice teacher technology skills. It was expected that a majority of the students had no experience with a PC microphone prior to SEFE230. Not all the students had knowledge of multimedia design; some of them initially created a ‘busy’ slide show that distracts from learning.

All of the SEFE230 are expected to be able to teach diverse learners. However, they may have little idea about how they can meet the needs of the variety of students

they will encounter. In addition, they may not know the definition of diverse learners specified by NCATE. Finally, they also lack the experiences that help them connect literary-based knowledge to actual teaching practice.

### Definition of Terms

**Diversity:** “Differences among groups of people and individuals based on ethnicity, race, socioeconomic status, gender, exceptionalities, language, religion, sexual orientation, and geographical area” (National Council for Accreditation of Teacher Education, 2002, p.53).

**Hypermedia:** A media that combines different information in a non-sequential manner (Smaldino et al., 2005).

**Inclusion:** Inclusion is defined as students with special needs being taught in a general education class rather than segregating them (Rimm-Kaufman et al, 2003).

**Multimedia:** An official definition for multimedia does not exist (Grabe & Grabe, 2001) because there are different views about multimedia (Mayer, 2001). “Combination of several different types of media linked together by a computer and produced for viewing on the computer screen. The presentation media usually involved in multimedia are audio, text, videotape, print, and graphics.” (Bender & Bender, 1996, p.103) From a sensory modalities view, multimedia involves more than one sensory mode of a learner. This view is based on the theory that learners use different modes for receiving and processing different types of stimulus, such as verbal and pictorial information (Mayer, 2001). Multimedia is also defined as the simultaneous or sequential use of different media such as text, audio, visual, video, and manipulative (Smaldino et al., 2005).



Pedagogy-based training: a teacher technology training that focuses on implementing technology as an instructional tool. Under this training, the skill to use hardware and software is part of the training that emphasizes effective teaching (Diaz & Bontenbal, 2000).

### Organization of Remaining Chapters

The remainder of this study is organized into five chapters, a bibliography, and appendixes. Chapter Two will be a review of the related literatures of issues surrounding the attitudes towards technology incorporation into the classroom among preservice teachers, the factors that have influenced the attitudes and training that has increased the willingness to use technology to strengthen teaching and learning. This chapter will also explain why preservice teachers need theoretical knowledge about learner-centered strategies as well as experience in a learner-centered classroom. Chapter Three will explain the methodology used in this study. Chapter Four will be devoted to data analysis and discussion about the findings. Finally, Chapter Five will include the summary, the conclusions, and the recommendations of the study.

### Summary of This Chapter

Since society is constantly changing, the ability to recognize the changes in society and adjust knowledge or behavior according to these changes is necessary. Therefore, students should become life-long learners. To help students to become life-long learners, teachers need to facilitate knowledge construction. However, this is not an easy task because knowledge construction depends on existing knowledge and the

surrounding environment is different for all students. Therefore, teacher education institutions need to prepare future teachers for classrooms with diverse students.

The diverse needs of students can be accommodated if teachers use learner-centered strategies. Technology can mediate learner-centered strategies so instructional technologies specialists at a college of education should demonstrate learner-centered strategy while they teach technology. Increased knowledge about learner-centered strategy combined with increased technology skills and increased experience in learner-centered classrooms that use technology, are expected to increase preservice teachers' willingness to use technology and employ learner-centered strategies to meet the needs of diverse students.

Therefore, this study will measure the increase in the positive attitudes towards using technology to support learner-centered strategies in the diverse classroom. The remaining chapters will include a review of literature, methodology, data analysis, and conclusion.

### Limitation of This Study

Participants for this study were recruited from only one college. Therefore a similar study may yield a different result if it is conducted at a different teacher education institution. Moreover, the participants were undergraduate students and the attitude towards using technology or facilitating a learner-centered approach to teach diverse students may be different among graduate students.

Also, students in SEFE230 had several weeks of pedagogy and curriculum centered technology instruction including a digital movie making, word processing, digital image editing, and spread sheet making prior to the intervention. For this reason,

the willingness to use technology for instructional purposes may have already been high, resulting in an insignificant gain in the positive attitude towards using technology for instruction. Thus, a similar study needs to be replicated to compare if the intervention would make stronger gains in the willingness to use technology if it were implemented earlier in the semester.

In addition, this study was limited to a classroom experience. Other attitude change studies for preservice teachers are based on field study experiences because real life experience is a major component for influencing attitude. Therefore, if this research is conducted simultaneously with a field experience, one may observe a bigger increase in the willingness to use computer and learner-centered strategy.

Moreover, the researcher was also the instructor for the three sections of SEFE230 that participated in this study. Therefore, the participants' attitudes may have been influenced by the factors related to the class apart from the study. For instance, a preservice teacher who is earning a bad grade for the class may have displayed a negative attitude even if they liked the two interventions of this study.

Also, there is a possibility of carryover affect in this study typically accompanied with repeated measures ANOVA. Since the interventions in this study were delivered as a series of coursework, it was impossible to divide the classes into half to reverse the order of the interventions. In addition, the influence of activities outside of SEFE230 was not factored into this study. For example, all preservice teachers must observe schools in diverse settings for at least 20 hours in order to be admitted to the College of Education. Such activity can cultivate the positive attitude about teaching diverse learners. Hence, it

is possible that preservice teachers have positive attitudes about teaching diverse learners prior to the interventions in this study.

## CHAPTER II

### REVIEW OF LITERATURE

#### Challenges in Teacher Education

Even though animals can survive by instinct, humans need to adjust their actions using their organic understanding of the world (Chomsky, 2002; Piaget, 1973). This process is particularly challenging because the knowledge base is constantly expanding (Kolis & Dunlap, 2004) and every individual faces different challenges in life. Therefore one role of formal education is to help students to become life-long learners, so the students will be prepared to solve nonlinear problems in real life (Jonassen, 2003). In other words, students need to learn to take in new information from their environments and build new concepts in order to adapt to changes in society.

For knowledge construction to occur, learners need to come to a deep understanding of the environment, because judging an object in an environment from a surface does not allow them to take fundamental characteristics of it and to combine it with other factors to create something new. Deep understanding is necessary to assimilate and accommodate new information in the environment (Jonassen, 2006). Deep understanding requires abstract thinking and it takes maturity to develop abstract thinking; young children only think in concrete terms (Piaget, 1973).

However, maturity based on hereditary alone, does not guarantee the development of abstract thought. In order for abstract thinking to develop, learners need to be placed in an environment that facilitates thinking. As learners face challenges in the environment and experience cognitive conflict, they go through the process of assimilation and accommodation (Piaget, 1959). As a result, a qualitative change in

thinking, or self-renewal, will occur (Piaget, 1973, Dewey, 1920). The implication for formal education, therefore, is to create an environment that appropriately challenges learners' thinking so they can use existing knowledge to make sense of new information and build more complex knowledge structures. Teachers can create environments that promote or hinder this growth (Dewey, 1920). Creating an environment that stimulates a qualitative change in thinking or knowledge construction, however, is a difficult task.

What makes facilitating knowledge construction very challenging is that knowledge construction heavily depends on the past experience of each individual (Gregg & Sekers, 2006; Payne, 2006). Because each individual's experience differs, the process of assimilation and accommodation is unique for each person. The uniqueness is true for educators as well, for educators can come from different backgrounds from their students. Therefore, a teacher may design an instruction using the logic that makes most sense to her. This logic that the teacher employs, however, may not be understandable to her student who does not share the same experience. By the same token, a teacher may not understand why a student is experiencing difficulty understanding the instruction because she does not have the full knowledge of the learner's past experience. It is easy to communicate with those who have a similar background and those who think alike, but trying to make others understand becomes extremely hard when the recipients of the ideas are coming from a different environment (Dewey, 1920).

Thus, even one-on-one communication is challenging between parties with different experiences. This problem becomes more complicated when there are multiple people with diverse backgrounds and the facilitator of knowledge construction needs to simultaneously guide the knowledge construction of all. To add to this challenge, it is

expected that both general education teachers and special education teachers are expected to collaborate to teach special education students because the Individuals with Disabilities Education Act (IDEA) / No Child Left Behind (NCLB) regulates that students with a disability are taught in a least restrictive environment (P.L.107-110).

This implies that those two different teachers, a special education teacher and a general education teacher, who may or may not think alike, need to coordinate their efforts to teach diverse students. The need for educators from different backgrounds to collaborate to teach diverse students, no matter how challenging it is, cannot be ignored (Greves, 2005). Since the ability to do so does not develop naturally, a solution to the challenge is to educate future teachers to teach all students, regardless of ability and background. Thus, teacher education institutions have an important mission to empower future teachers to facilitate knowledge construction for all individuals.

The National Council for Accreditation of Teacher Education (NCATE), the organization that accredits over 600 teacher education institutions nationwide, is in line with IDEA/NCLB as it requires that teacher candidates have knowledge, skills, and the disposition to teach diverse students. Diversity is defined as “Differences among groups of people and individuals based on ethnicity, race, socioeconomic status, gender, exceptionalities, language, religion, sexual orientation, and geographical area” (National Council for Accreditation of Teacher Education, 2002, p.53). Hence, it is necessary that a college of education provide training for future teachers to meet this criterion.

### Technology as a Catalyst for Inclusion

Technology can be a medium for inclusion and knowledge construction. Students can create concept maps (Jonassen, 2003), collaboratively author quiz questions, answer

them, argue over the quality of questions and answers (Panetta et al., 2002), complete sentences in PowerPoint slides in a foreign language class (Spodark, 2005), or design hypermedia documents (Chen & McGrath, 2003). These processes allow students to learn at their own level, using their unique path of understanding and their individualized backgrounds to connect existing knowledge to new knowledge. In fact, the ISTE standard, the standard NCATE uses, requires all teachers to use technology to teach diverse students. Specifically, National Educational Technology Standards for Teachers (NETS\*T) III. B. states that “Teachers use technology to support learner-centered strategies that address the diverse needs of students” (International Society for Technology in Education, 2003, p. 51). This criterion has two dimensions: supporting learner-centered strategies and addressing the diverse needs of learners. In order to meet this standard, teachers need to implement “instructional activities integrate learner-centered strategies in teaching content using technology as a learning tool,” and “instructional activities identify learner-centered strategies and select appropriate technology targeting the diverse needs of learners.” To succeed the instructional activities need to “integrate multiple learner-centered strategies in teaching content using technology as a learning tool. These strategies foster challenging and creative uses of technology” and “select multiple learner-centered strategies that target the diverse needs of learners and challenge learners to think in new and creative ways” (International Society for Technology in Education, 2003, p.51).

However, teacher candidates do not always come from an educational background in which their teachers used technology in an instructional setting, modeled learner-centered strategies, or successfully addressed the diverse needs of students. When a



teacher candidate comes from predominately teacher-centered classroom, the concept of learner-centered strategy can be so foreign to them that it can be hard for them to grasp this concept or apply it to their practice. This leads to a challenge for a teacher education institution to let future teachers meet this standard regardless of teacher candidates' previous experience.

### Teacher Preparation for Instructional Technology in Relation with NETS\*T III. B

#### *Using Technology*

##### *Technology Anxiety as a Barrier for Using Technology*

Both inservice teachers and preservice teachers are reluctant to use technology when they feel under-prepared. This feeling transfers to technology anxiety, which creates the resistance to use technology (Angeli & Valanides, 2004; Batane, 2004; Hong & Koh, 2002; Rovai & Childress, 2003). Attitude is formulated by experience, and strongly influences action such as using technology in the classroom (Bahr et al., 2004; Shaunessy, 2005).

The connection between the attitude and action has been confirmed in the context of teachers' use of technology. As inservice and preservice teachers gain confidence about technology their willingness to use technology in the classroom increases (Talsma et al., 2002; Wahab, 2003). Thus, increasing positive attitudes about using technology among teachers by education has been the topic for countless researches (Beatty, 2003; Christensen, 2002; Simonsson, 2004).

##### *Connection between increased knowledge and skills and attitude.*

While a positive attitude causes a person to pursue further knowledge and skill, increased knowledge and skills are the catalysts for fostering a positive attitude about

using technology in the classroom. Specifically, technology training provided in teacher education institutions has a positive impact on the attitude about technology among inservice and preservice teachers (Benson et al., 2004; Coffland & Strickland, 2004). Therefore the teacher education institution needs to provide instruction that increases technology knowledge and skills within a context of learner-centered strategies, creativity, and cognitive challenge.

Likely, an increased knowledge about disabled students increases willingness to assist students with special needs among preservice students (Campbell et al., 2003; Taylor et al, 2001) and a positive attitude towards inclusion among teachers is viewed as a main ingredient for successful inclusion (Alghazo et al, 2003). As in the case of technology, teacher education for inclusion is associated with teachers' attitudes toward inclusion (Koegel & LaZebnik, 2004).

### *Teaching Diverse Students*

#### *Language and Social Skills Training for Special Education Students*

Language is a device for controlling the external environment because learners depend on language to facilitate understanding and knowledge construction (Chomsky, 2002). People use language to modify their thinking as they connect new experiences to existing ones (Tough, 1977). Therefore language is a crucial tool for learners to construct the meaning of a world (Bruner, 1983). Language is a reflection of thought, and it facilitates mental process. Hence, people depend on language to come to a deep understanding of a subject. In other words, language development is a device for complex thinking (Chomsky, 1966; Chomsky, 2002; Vygotsky, 1986) which is a key

factor for the academic success for all students. For this reason, literacy training is essential for fostering the increase of the cognitive function for all students (Wells, 1981).

In addition, language use for the purpose of communication or persuasion promotes logical thinking. In the speech development of children, for example, egocentric speech, the speech that ignores social interaction, develops before socialized speech. After the desire to work with others develops around the age of 7 or 8, children start to use speech to communicate. Social interaction with others forces them to use deductive reasoning to explain, persuade, or to inform. Without the need to explain, persuade, or to inform, therefore, children may not use universally acceptable logic. Thus social environment influences the transition from ego-centric speech to social speech, and ego-centrism is an obstacle to logical reasoning (Piaget, 1959). Hence, learners need a social environment to use language for communication and persuasion.

Therefore all students, regardless of their disabilities, need language training in a social setting. In addition, the interaction between language development, social skills, and cognitive ability, supports the aforementioned legal requirement that public schools must offer the least restricted educational environment for disabled students.

### *Supporting Learner-Centered Strategy*

#### *Constructivism*

Another piece of the ISTE standard is the learner-centered approach. To realize a learner-centered approach to meet the needs of diverse students, preservice teachers can use a constructivist approach to facilitate language and social skills training.

### *Origin of Constructivism.*

Constructive philosophy owes much to Dewey, Piaget (Lesh et al, 2003; Rakes et al., 2006), and Vygotsky (Chicoine, 2004; Smith, 2001). As early as 1920, Dewey stated that “Growth is not something done to them; it is something they do” (p.50). Dewey (1920) believed that maturation can not occur when learners are dependent, so learners have to have ownership of their learning process. According to this view, growth is fostered by experience. Experience, as previously defined, is made of actions to the environment and the consequences caused by the actions. For example, a child may put his hand over fire and get a burn. As a result, the child associates the fire with the burn and adjusts his future behavior *not* to put his hand over the fire. In sum, Dewey defined education as the individual’s adjustment to external environment.

Similarly, Piaget (1959, 1973) viewed external environment as the main facilitator for learning. Since learning occurs as individuals interact with the environment in order to make sense of it, Piaget claimed that learners should be encouraged to experience experimentation or exploration because it is the experimentation in the environment that facilitates logical reasoning. In addition, Piaget claimed that children need to use language in the social environment because the interaction with others using language promotes cognitive development.

Vygotsky (1978) agrees with Piaget’s view that language use in a social context is essential to mind development. Children use speech not only to understand and control the environment, but also to control their behavior. Vygotsky’s well-known justification for social interaction is represented by his idea of the zone of proximal development, the threshold between the child’s independent performance and the child’s potential level of

performance with the assistance of an adult or more capable peers. This idea is in agreement with the importance of interaction with the environment suggested by Dewey and Piaget.

*Increasing Interest in Constructivism among Instructional Technology Specialists.*

In the past, computer assisted instruction was often associated with drills for knowledge recall. However, constructivism influenced the field of instructional technology in the early 1990s (Jonassen et al., 2007) Since then, technology use that facilitates knowledge construction is gaining support among instructional technology specialists (McGregor & Lou, 2004; Rakes et al., 2006; Sheidet, 2003)

One constructivist framework that is widely accepted among instructional technology specialists is the Mindtool concept. The Mindtool concept views technology as a thinking partner, or an instrument to build information in a meaningful way to make sense of the world. Hence, technology is a thinking partner that assists conceptual change in thinking. If learners are using computers to free them from memorization and tedious calculation, for example, they can focus on creative production, knowledge construction, or logics. Thus, they are using computers as Mindtools (Jonassen, 2000; Jonassen, 2006; Jonassen et al., 1998).

Mindtool has three dimensions of complex thinking: critical thinking, creative thinking, and basic thinking. Critical thinking is associated with evaluating, analyzing, and connecting. Creative thinking represents synthesizing, elaborating, and imagining. Finally, basic thinking includes designing, decision-making, and problem solving. In addition, when students use technology to represent their knowledge, they are using technology as Mindtool. In other words, the focus is more about how technology is used

rather than which technology is used (Joanssen, 2000). For instance, if a teacher designs a WebQuest for a scavenger hunt, WebQuest is not a knowledge construction tool. On the other hand, if WebQuest requires students to put together seemingly isolated information and collaborate with peers to create something new, then the WebQuest becomes a Mindtool (Jonassen et al., 2003).

*The need for modeling as a means of providing experience for preservice teachers to build knowledge.*

When teacher educators present theoretical underpinnings about constructivism and how it relates to the Mindtool concept, they also need to provide experience for using technology as Mindtool. Even though increased knowledge from literature can have a positive impact on attitude, the gained knowledge combined with real experience is more powerful for knowledge construction. It is because people use experience or interaction with the external environment to make sense of new information. Preservice teachers may be able to state that technology can promote higher-order thinking and may be able to verbally state the difference between technology as mind transformation tool and technology as mind transfer tool. However, they do not necessarily know how to put this knowledge to use in their own teaching practice (Laffey, 2004). Since preservice teachers lack teaching experience in real life, they need an intervention to connect their technology knowledge to pedagogy in a hands-on experience (Brush et al. 2003; Gately & Hammer, 2005).

Hence, modeling is a strong medium that influences attitude (Falsetti & Rodríguez, 2005; Standage et al., 2006). Modeling about learner-centered instruction combined with a lecture about learner-centered instruction and reflective discussion or

reflective journal writing provides a concrete understanding about the learner-centered approach and the pedagogical justification for the learner-centered approach. Modeling is especially important for preservice teachers who received education from teachers who mainly used a teacher-centered approach. While such preservice teachers may be able to summarize literature and lectures referring to the learner-centered approach, they may not be able to design a learner-centered lesson; in general, implementing theories into practice is hard for preservice teachers, so it is important that teacher educators facilitate the connection between theory and practice (Burke, 2006; Ormrod, 2005).

Therefore, instructional technology professors need to model a constructive approach while they explain learner-centered strategies (Palmer et al., 2005). This modeling can allow preservice teachers to connect theory and practice, providing the opportunity to build their knowledge through their experience. Thus, preservice teachers can benefit from not only knowing about, but also from experiencing an example of using technology that facilitates a learner-centered approach that meets the diverse needs of students.

#### *Readers' theater.*

An example of a learner-centered approach that facilitates language skills training in a social context is readers' theater. Literacy training through drama allows each individual to interpret and express the content in a way that makes sense to him or her. Using this approach, a learner can expand knowledge by making someone else's experience as a part of his own (Wells, 1981).

Readers' theatre is an expressive reading aloud activity in a group; students with high ability read more difficult parts and students with low ability read easier parts or

repetitive parts. Thus, students with a variety of reading abilities can engage in a single activity as a group. Any text, including short stories and newspaper articles, can be used as scripts (Katz & Boran, 2004).

This method can be a good approach for including students with low verbal and social skills in a general classroom because readers' theater allows high ability readers to assist low ability readers (Katz & Boran, 2004). Moreover, it is a good intervention for students who need reinforcement for appropriate social rules, such as turn taking.

A student who resorts to temper tantrums when a classroom activity becomes challenging can repeatedly practice the text with a parent at home. During this practice, a parent can prompt the child to say, "Can you say the word?" instead of resorting to a socially unacceptable behavior. Practicing socially acceptable behavior prior to actual group activity may be useful for autistic students, for example, because autistic learners are capable of generalizing simple social and verbal tasks to similar situations in real life (Hetzroni & Tannous, 2004).

Readers' theater is an excellent approach not only for accommodating diverse reading ability for all, but the repetitive reading for the purpose of oral presentation to an audience makes repeated practice fun and meaningful. Since the practice is fun and meaningful, students are likely to practice their parts until they are completely fluent in reading their parts. Fluent reading is defined as "the ability to read a text with speed and accuracy, recognizing each word effortlessly and beginning to construct meaning from each word as group of words as they are read" (Corcoran & Davis, 2005, p.105).

Since practicing for fluency is a repetitive process, a teacher may choose to create a segmented presentation in advance. PowerPoint is an easy-to-use software used to



combine a visual text and an audio text and present parts in segments. If the teacher prepares a PowerPoint with a text in small segments and records accurate and fluent reading, then students who need to practice their parts with the model can do so.

Breaking the entire story into small parts is also a good strategy to prevent cognitive overload during information processing. Repetitive practice in reading aloud with an accurate model is likely to make a significant improvement in fluent reading among students with low verbal ability (Riches et al., 2005). Fluency in reading is correlated to spelling and reading comprehension (Savage et al. 2005). Therefore, an intervention that promotes reading fluency is necessary for students with limited verbal ability.

#### *Readers' Theater Style Multimedia Production*

##### *Definition of multimedia.*

An official definition for multimedia does not exist (Grabe & Grabe, 2001) because there are different views about multimedia (Mayer, 2001). One view sees multimedia as a "Combination of several different types of media linked together by a computer and produced for viewing on the computer screen. The presentation media usually involved in multimedia are audio, text, videotape, print, and graphics." (Bender & Bender, 1996, p.103) From a sensory modalities view, multimedia involves more than one sensory mode of a learner. This view is based on the theory that learners use different modes for receiving and processing different types of stimulus, such as verbal and pictorial information (Mayer, 2001). Multimedia is also defined as the simultaneous or sequential use of different media such as text, audio, visual, video, and manipulative in the same package (Smaldino et al., 2005).

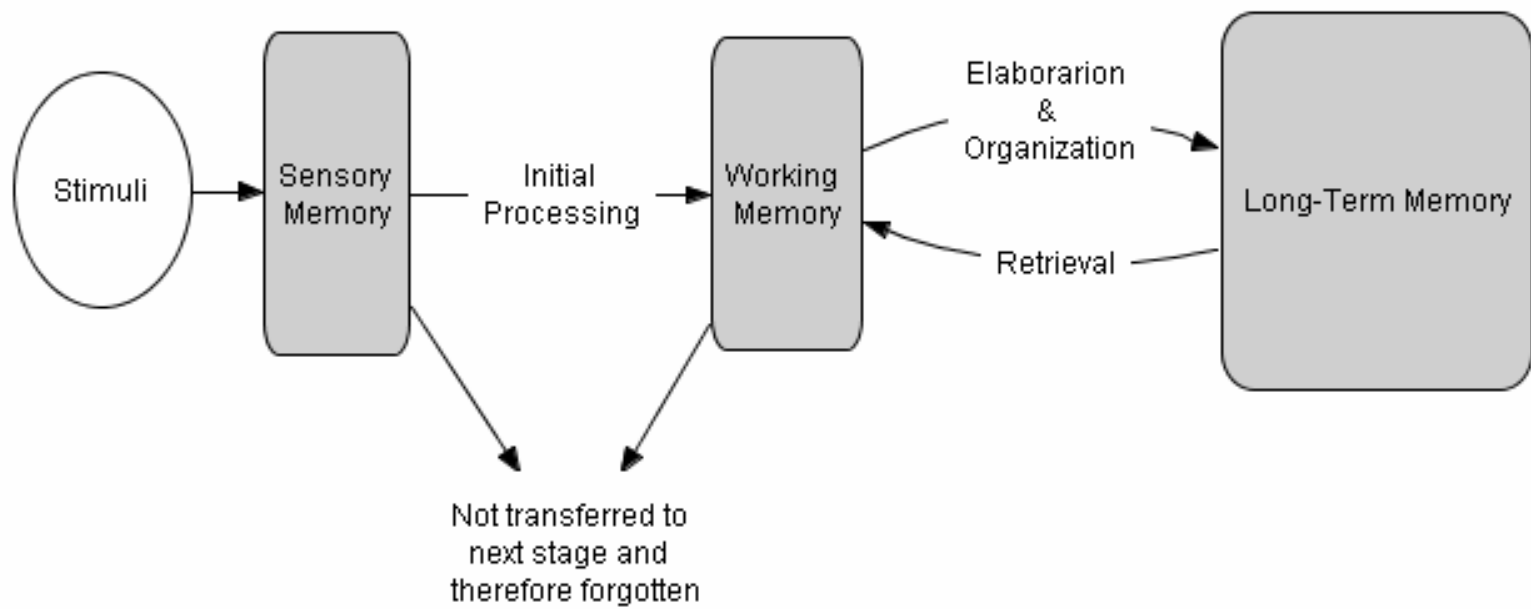
If teachers do not know multimedia theory, they may end up creating a multimedia that decreases the effectiveness of learning. For example, teachers may pack PowerPoint slides with an excess amount of sounds, animations, and slide transitions, and cause cognitive overload in working memory. As a result, learning becomes inefficient. Thus, in order for teachers to create or have their students create multimedia, they need to have an accurate understanding of multimedia theory. Therefore, it is ideal that multimedia theory is woven into the hands-on practice for multimedia creation. Moreover, meaningful learning about knowledge construction occurs when preservice teachers reflect on their own cognitive process of connecting their literacy-based knowledge to their experience. One way of facilitating this knowledge construction is presenting multimedia theory first, and then discussing how text, audio, and visuals should be combined as preservice teachers create multimedia later in the semester.

*Information processing: prior to knowing multimedia theory.*

Multimedia theory focuses on working memory's limited capacity to hold information at one time. For preservice teachers who do not know information processing theory, multimedia theory will be too hard to understand because basic knowledge about sensory, working, and long-term memory should be the building block prior to a closer look into working memory. Therefore, a brief summary of information processing theory should be presented prior to multimedia theory, which leads to a multimedia production.

Information processing theory claims that learning does not automatically occur just because learners are exposed to new information. First, learners have to select which information to attend to. Most of the stimuli that surround learners are discarded during

this selection process. This is a necessary process so that learners will not experience sensory overload. After this selection occurs in sensory memory, the information enters into working memory (Wolfe, 2001). Learners either rehearse the new information or use existing knowledge in long-term memory to make meaning out of the incoming information. Learners may construct a new knowledge domain during this information processing. This process is called schema creation. Schema makes new knowledge a part of long-term memory (Mayer & Moreno, 2003). Figure 1 (adopted from Wolfe, 2001, p.77) shows how information processing occurs.



*Figure 1.* An information processing model.

*Limited capacity of working memory.*

Once the basics of information processing theory are introduced, preservice teachers may recall their past experiences, or if they ever felt overwhelmed in a classroom. Preservice teachers may share how it happened (e.g. there was a lecturer talking very fast and the students took notes as quickly as possible for a long period of time) and if they felt that they could go on or they felt as if their brains were shutting down. After the preservice teachers recall their past experiences of information overload, the instructor can mention that there is a theoretical explanation that explains their past experiences.

It has been known that the capacity of working memory is severely limited. One way to test the capacity is to give a span test. For example, ask someone to read random numbers such as 2-5-6-8-9 one second at a time and then immediately repeat the numbers in the right order. The span that working memory can hold is approximately seven, even though seven is not a definite number. The format of information and dimensions of information, as well as the learner's ability to process information, changes the number (Miller, 1956). It is also known that working memory holds speech-based information for 1 or 2 seconds (Baddeley, 1992).

*Multiple channels for working memory.*

Once the limitation for working memory is established, preservice teachers can be made aware that multimedia can increase the efficiency of working memory. There are dual channels that learners take in adding new information into their working memory: one is auditory and the other is visual (Baddeley, 1992). Each channel has a limitation on

how much information a learner can process at one time (Brünken et al., 2002a; Brünken et al., 2002b; Mayer, 2001). Figure 2 (adopted from Mayer, 2001, p.44) shows different modality channels for information processing.

Figure 2 indicates that if text is presented with animation, the visual channel may be overloaded. On the other hand, if animation is presented with audio, then learner is using different modes, visual and audio, to acquire information. The cognitive load is lower in dual-mode because learners do not need to split their attention between the text and the picture or animation in the visual channel (Kalyuga et al., 1999). Therefore, the learner is not overloading one channel; thus, learning can be more efficient. In other words, the capacity of working memory can be expanded by using both audio and visual modes (Leahy et al., 2003; Mayer, 2001). In general, the use of both audio and visual modes increases the capacity of working memory. A lower cognitive load in audio and visual combination (i.e. diagram and audio text) compared to only visual instruction (i.e. diagram and visual text) has been confirmed by comparing reaction times of learners (Brünken et al., 2002b).

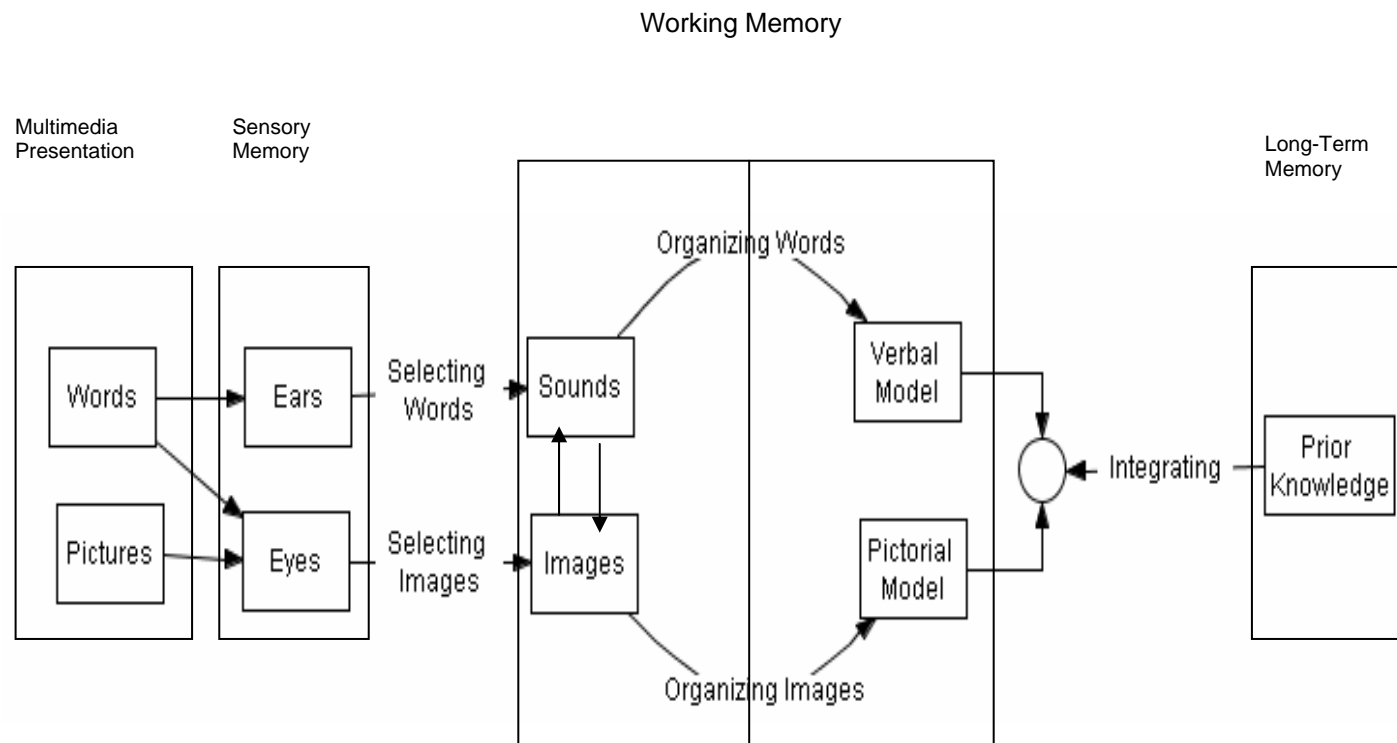


Figure 2. Cognitive theory of multimedia learning.

However, poor multimedia design results in cognitive overload. As stated before, cognitive overload occurs when a learner is exposed to more information than his or her working memory can process. As a consequence, learning becomes less effective (Kalyuga et al., 2000; Mayer, 2001). Therefore, cognitive load as relative to the capacity of working memory is a central issue for multimedia theory (Chandler & Sweller, 1991; Myer, 2001; Sweller & Chandler, 1994).

*Individual differences of working memory's capacity caused by schema in long term memory.*

Preservice teachers can then recall if they have had any experience that something became easier as they practiced it. They can also reflect if they can read a book faster if the content of the book is familiar to them. Then, they will be told that the 'thing' that makes information processing faster has a name: schema. The schema is stored in long-term memory (Cooper et al., 2001; Kalyuga et al., 2000). When learners use an existing knowledge or a skill, or schema, cognitive load in working memory is low so the information can be quickly processed in working memory (Kalyuga et al., 1999; Leahy et al., 2003). If a learner has well-developed domain knowledge related to the incoming information, he or she can quickly organize new information as a part of their own existing knowledge. On the other hand, if a learner is a novice, he or she would have to figure out how to organize or construct knowledge so the new information will stay in long-term memory (Sweller & Chandler, 1994).

Moreover, experts have chunked multiple related factors into one element. For example, one chemical compound may mean different elements for a student whereas it means one element for a chemistry teacher. This means that a chemistry student may



occupy multiple spans in working memory even though a teacher uses only one span in his or her working memory. Thus, cognitive load in working memory is lower for a teacher than for students (Carlson et al, 2003).

By the same token, high knowledge students and low knowledge students learn differently when they use same instructional media (Cooper et al., 2001; Mayer, 2001). Moreover, when learners do not have the control over the speed of information presentation, the information overload in the visual channel may not occur (Mayer, 2001). Hence, breaking up the whole presentation into small segments and allowing learners to decide when to receive the next piece of information can result in higher student achievement (Mayer & Chandler, 2001).

*Effective multimedia design.*

To summarize key issues for a multimedia production, Mayer (2001, p.187) defines five conditions for multimedia presentations:

- (1) Special contiguity – when corresponding words and pictures are presented near rather than far from each other on the page or screen;
- (2) Temporal contiguity – when corresponding words and pictures are presented simultaneously rather than successively in time;
- (3) Coherence- when extraneous words, sounds, and pictures are minimized;
- (4) Modality – when words are presented as speech rather than as text in multimedia presentations, and;
- (5) Redundancy – when words are presented as speech rather than as speech and text in multimedia presentations.

Since connecting different pieces of information can assist a better understanding of the topic, it is useful to facilitate a discussion about the relationship between student diversity and different levels of schema. An instructor can do so by asking a question, “Do you think everyone in the classroom has equally developed schema? Why or why not?” “When you were an elementary, middle or a high school student, did you observe that a reading assignment was easy for some students but was difficult for others? Why do you think this difference existed?” After the discussion, the preservice teachers should be able to draw a conclusion that experience or previous knowledge is different from one student to another, so schema formation for the individual student is unique. Finally, pre-service teachers can refer back to a learner-centered approach to conclude if it is better to have teachers control the speed of an information presentation or give the students the control over the speed.

### *PowerPoint*

PowerPoint is a presentation authoring software that is included in the Microsoft Office package. The software allows an author to combine pictures, animations, visual texts, and sounds into the same presentation. A producer of a PowerPoint presentation can make it a linear presentation or interactive non-linear presentation. Since most schools usually purchase computers with Microsoft Office, school computers are normally equipped with PowerPoint. It is user-friendly software, so it can not only be used as a teacher’s authoring software but can also be used as learners’ presentation authoring software.

*Justification for using PowerPoint by multimedia theory.*

As established earlier, learning efficiency increases if learners have control over the speed of the information presentation. PowerPoint allows a presenter to break up the information into small segments, allowing learners to decide when to proceed to the next piece of information. If the information is presented to the whole class using a PowerPoint, the presenter can stop the presentation in order to have a class discussion, allowing the recipients of the information to internalize the information until the next chunk of information is presented. If students view a PowerPoint presentation individually, then they can stop the presentation to take notes or to play the same slide again before proceeding to the next slide. This way, learners will have control over the speed of the information presentation.

*Combining PowerPoint with PC Microphone*

One of the powerful features of PowerPoint is that it allows audio inserting. By using this feature, teachers and students who author multimedia material can insert their speech to combine it with still images or animations. Hence, students can receive information via animation and audio text rather than animation and visual text. However, in order to utilize its feature, a presentation author needs a recording device. Some computers come with a microphone built into the monitor. However, such a microphone may not be useful when there are multiple authors simultaneously creating audiovisual presentations at different stations because the microphone will pick up the background noise. This is because there is some distance between an author and a microphone on a monitor: the distance forces an author to speak loudly. If multiple people in the same room are forced to speak loudly, the background noise for the finished products can be

disturbing. A PC microphone shortens the distance between the mouth and the recording device. As a result, background noise from the room is likely to decrease.

If an audiovisual material is produced in a room with multiple authors working on different presentations, a headset with a built-in microphone is superior to a stand-alone microphone. This is because each author can hear his or her own voice to check if they are satisfied with the recording without distracting neighbors. It also helps an individual to concentrate on his or her own production because they are less likely to hear noise around them.

Hence, this study will examine if the preservice teachers' willingness to "use technology to support learner-centered strategies that address the diverse needs of students," as described in NETS\*T III. B, will increase after a research paper assignment, and lecture and training for readers' theater style multimedia production with a microphone-equipped headset is provided. The aim of this study, therefore, is to find out if there is a significant increase in positive attitudes as a result of the instruction.

There is no agreed duration for interventions or for the lapse of time between interventions in literature that measures changes of attitudes. For instance, there are a variety of durations between data collection points including two weeks (Taylor et al, 2001), 15 weeks (Hodge, 2002), 6 semesters (Johnston, 2003), and 5 years (Pigge & Marso, 1997). Hence, this author will use her own thinking, explained in the methodology section, to determine the length of time between treatments.

## CHAPTER III

### METHOD

#### Purpose of This Study

The purpose of this study was to find out if preservice teachers increased their willingness to use technology in order to meet the diverse needs of learners by employing learner-centered strategies. After they completed a research paper about meeting the diverse needs of students through the use of technology, preservice teachers enrolled in the Production and Utilization of Instructional Technology class in the College of Education at Slippery Rock University of Pennsylvania listened to a co-lecture given by a special education professor and the instructional technology professor. Then they experienced a hands-on practice for a multimedia readers' theater production.

#### Research Questions

1. Will the research paper in which preservice teachers select their own target group to answer the question, "How will I help \_\_\_\_ with technology?" increase their willingness to assist that target group? It is expected that there will be a difference in increase between special education majors and general education majors. It is because special education majors are likely to have the willingness prior to the intervention compared to general education majors. On the other hand, the intervention may provide the first information about assisting disabled students for general education students, creating initial interest in assisting the disabled students.
2. Does the process of identifying a problem and finding a solution by literature

review increase preservice teachers' willingness to assist diverse students with technology in general? It is predicted that increased knowledge about the targeted population will not only increase the willingness to assist the targeted group but will also carry over to helping special education students in general.

3. Will there be a significant difference between a research project about using technology to assist special education students and the combination of a research paper and a hands-on practice for shared reading style multimedia production increase preservice teachers' willingness to assist special education students with technology? It is predicted that hands-on practice added to the literature based intervention will result in a larger increase in positive attitudes as compared to the literature based intervention alone.
4. Is there a significant difference in the willingness to assist diverse learners with technology between the students who are working towards a special education certificate and those who are not majoring in special education? While the first intervention, the research paper, may not make a significant increase in the positive attitudes of special education majors, the second intervention is likely to increase the confidence to use technology. Since the hands-on practice will increase the confidence to use technology for both special education and general education students, they will have an equal increase in technology to accommodate special needs of learners.

### Design

This study used a Likert-type scale survey to measure attitudes about preservice teachers' willingness to use technology to educate diverse learners. The Likert-type scale

survey is widely used to measure attitudes (Benson et al., 2004; Brush et al., 2003; Daane et al., 2001; Iding et al, 2002; Ng & Gunstone, 2003; Rovai & Childress, 2003; Taylor et al., 2001)

### *Context and access*

The research took place in the College of Education, Slippery Rock University of Pennsylvania. Slippery Rock University is one of the 18 accredited institutions for teacher preparation in Pennsylvania (Pennsylvania List of Accredited Institutions, 2006). All accredited institutions must meet standards set by the National Council for Accreditation of Teacher Education (NCATE), and are scrutinized by the accreditation review. Since Slippery Rock University meets the rigorous criteria set for the accreditation, samples taken from this institution are comparable to other accredited teacher preparation programs.

### *Participants and how they were selected*

The research participants were selected by convenience. The participants were preservice teachers enrolled in SEFE230: Production and Utilization of Instructional Technology class at Slippery Rock University of Pennsylvania during the fall 2006 semester. The researcher taught three sections with 24 students in two sections and 23 students in one section. The three sections of SEFE230 were on a 15 week schedule and classes met 150 minutes each week.

### *Instrumentation*

#### *Survey*

Survey (Appendix A) questions regarding the attitude about technology were taken from Brush et al. (2003, p.64) and the questions about collaboration and inclusion

were adopted from Taylor et al. (2001, p.12-13). Brush et al. used scales 1-4, 1 being “strongly agree” and 4 being “strongly disagree”. However, Taylor et al. used scales 1-6, 1 being “strongly disagree” and 6 being “strongly agree”. The reversed association between the number and the attitude may cause confusion among participants, causing them to choose incorrect items. Therefore, this author modeled after Taylor et al. (2001, p. 12-13) to use an increasing scale with the increasing agreement. This author showed the survey (Appendix A) to Brush and Taylor. Upon viewing this author’s modification to their surveys, they both approved this author’s use of the modified survey (Appendices B and C).

### *Treatments*

Scaffolding in teacher education includes theory, modeling, and practice. When preservice teachers reflect on all of them, they will develop the skill to connect book knowledge to the real world (Jacobs, 2001). For this reason, the treatments for this study included a research paper assignment for problem identification and solution and a lecture that models the instructor’s problem solution. In addition, hands-on practice for the technology solution that the instructor suggested took place. Moreover, scaffolding to connect theory and practice was modeled by the instructor, and the reflective discussion about how the preservice teachers connected theory and their experience followed.

In this study, students’ own problem identification and solution designing occurred prior to the instructor’s modeling for the same process. This sequencing is designed to realize a constructivist approach in a classroom. If learners need to explore the environment to find their own problems, find pieces of puzzles to solve the problems and put the puzzles together using their own logic and reasoning, then deep learning will



occur. On the contrary, if the instructor provides them with the model answer first, then students may only mimic the instructor's answer and may not come up with their unique problem and solution, resulting in a mere surface understanding. Therefore, reversing the sequencing of the research paper and providing the instructor's answer may inhibit the students' creativity and their knowledge construction process.

### *Research paper*

It was impossible to present cases for one college course to cover all special needs of learners that preservice teachers will encounter in the future. However, it was possible to provide a basic problem identification and theory-based solution designing procedure. To nurture such skill, problem identification and a solution designing paper was assigned (Appendix D). This research paper was designed to immerse preservice teachers into learner-centered learning environments.

When the instructor assigned the research paper, she asked her preservice teachers, "Have you ever had any type of experience with a disabled person? Did you have a classmate who needed special help? Do you have a neighbor who can not see? Do you have a relative who can not hear? Have you ever watched a movie about Helen Keller, a blind woman who became literate, and was fascinated by the contribution by her teacher, Anne Sullivan?"

"Imagine this disabled person sitting in your classroom. As a teacher, you are in charge of helping this person become successful. Obviously, you have a problem to be solved. Can you identify what types of problems need solutions?" The instructor paused to solicit answers every time she asked a question of the class. Then the assignment handout (Appendix D) was distributed. The instructor continued:

“When a teacher encounters a challenge, some may avoid such a challenge, but some may look for a solution to the challenge; the latter is likely to be successful. For this reason, I would like you to practice pinpointing a problem you would like to solve in an educational setting. Then, you will look for published materials to see if theories, researchers or existing practices will indicate that there is a solution that is likely to work. You may want to find out if others have successfully solved an identical problem. You will combine the information you collected from the literature to guide you to the solution.”

“In the introduction, identify your problem. The basic format for the problem is ‘How can a teacher assist \_\_\_\_ using technology?’ You may want to explain why you decided to focus on the problem. For example, you may state, ‘When I was in eighth grade, I had a classmate who did not have a right arm.’ You may want to use literature here to state why the problem needs to be solved. In the body of your paper, use the literature to convince readers that your plan is likely to solve the problem. In the conclusion section, state what you said in the introduction and the body.”

Further explanation for the procedure of the research paper was provided. The preservice teachers in SEFE230 individually identified the problem and collected literature. After they identified the problem and determined the direction for the problem, class time was provided to ensure peer interaction and interaction between the students and the instructor. Specifically, the students brought paper outlines or drafts and shared them with classmates in pairs or in small groups. The peers then asked questions or point out why the problem statement, plan, and the evidence to defend the plan lack cohesiveness. The students then used the feedback either to collect additional literature

via an online library or to revise their writing.

In the past sections of SEFE230, some students requested that they work at home because they “do better at home.” However, constructivists suggest that peer interaction and collaboration contribute to deeper understanding. Therefore, the instructor quoted multiple literary sources in order to support the view that those who receive formative feedback from peers would accomplish higher academic achievement than those who work alone.

In addition, the explanation was provided that answering peer’s questions will indicate holes in the written argument: the research paper needs to defend itself when the writer is not present to defend the plan in person because the research paper may be used for the professional portfolio or as job application material. When a prospective employer can skim for the main argument and is convinced, then a job applicant successfully impresses the employer. Those who work alone may not catch holes in their own written arguments.

Even though constructivists indicate that peer interaction facilitates deeper understanding, the noise level from discussion on ongoing papers can interfere with the writing. Hence, a classroom adjacent to the computer lab was used for peer feedback on drafts while the computer lab will be used for the paper revision and the quiet reading of additional literary sources.

### *Lecture*

In addition to the research paper, a collaborative lecture between a special education professor and the instructional technology professor about readers’ theater as a method of inclusion was delivered. The lecture was made into a digital movie so all

participants in the study, regardless of the sections of SEFE230 they attended, listened to the same lecture. This movie was produced by the special education professor and the technology instructor to show the collaboration between two faculties, providing a strong medium to formulate attitudes among preservice teachers (Lake et al., 2004; Wasonga & Piveral, 2004). Such collaboration is a powerful ingredient for utilizing technology to assist the special education students (Smith & Robinson, 2003) because when preservice teachers see the benefit of collaboration between special education professor and general education professor, they are more likely to support such collaboration (Jacobs, 2001).

*Hands-on practice for reader's theatre multimedia*

Reader's theatre can be used not only for reading fluency (Griffith & Rasinski, 2004; Keehn, 2003; Martinez et al., 1998), but also be utilized for enforcing other subjects' content. It can be used for math (Flynn, 2004) or science (Griffith & Rasinski, 2004; Young & Vardell, 1993) or history (Young & Vardell, 1993). In fact, the repetitive reading as the form of performance rehearsal enforces the content without boring the students (Martinez et al., 1998). Since the intervention was designed to promote a positive attitude about teaching diverse learners among preservice teachers, the author selected a text titled "The issues of diversity and multiculturalism in preschool education" by Christian (2001). The text is also appropriate because it presents multiple viewpoints about educational issues and a script with an ethical dilemma is appropriate (Martinez et al., 1998). Slippery Rock University subscribes to the journal in which the text was published, and a university's librarian confirmed that class use of this article is under fair use.

Student teachers were given the text one week before the recording, and

negotiated who would take which part. A one-week period seemed appropriate because examples of readers' theaters implementation (Griffith & Rasinski, 2004; Martinez et al., 1998) provided approximately one week to practice the scripts. However, the students met every day in both of the examples. Students in SEFE230 met twice or three times per week for 150 minutes of instruction. In addition, the treatment included the hands-on training for a multimedia creation in addition to reading theatre. Therefore, a two-week period was provided for the readers' theatre style multimedia.

The students were instructed to (1) use their logic to interpret the text (Hoyt, 1992), (2) negotiate interpretation (Wolf, 1993) via Blackboard's discussion forum during the week (at least one posting that reflects logical and/or creative thinking will be required), (3) practice until they are fluent (Griffith & Rasinski, 2004; Keehn, 2003) and they could say their lines with expressions.

While Blackboard's discussion took place, students had hands-on training for audiovisual PowerPoint for 150 minutes. This was the first PowerPoint authoring training in the class. This audiovisual PowerPoint production included combining text, images, sounds, and movies from Clip Art and the ones they harvested from the Internet. Since students had the option to choose to use visuals, animation, and audio files that were copyrighted to others, observing the copy right law and the fair use regulation was a part of the assignment. Students also practiced setting the automatic slide transition by deselecting "advance slide on a mouse click" and selecting "advance slide automatically."

In addition, students used entrance, emphasis, exit, and motion paths from the custom animation menu so they were able to add movements to their characters in a story.

This was a teacher-guided activity. While the instructor projected her PowerPoint's editing, students followed at their individual work stations. First, a short text, "Once upon a time in Slippery Rock, there lived a pig. The pig, whose name was \_\_\_\_, thought he/she was happy on the farm. One day, however, a terrible plot was revealed! The farmer was going to turn \_\_\_\_\_ into bacon!" was presented, and the students helped the instructor decide the name of the pig. They also created their unique continuation of the story. Then, the students selected the picture of the farm and the pigs and inserted them into their slides. After that, they practiced setting custom animation from the slide show menu at their individual stations. The preservice teachers who were not comfortable with the task were encouraged to seek help from more capable peers or the instructor.

After students animated their slides, they had the chance to connect their existing knowledge about multimedia theory to their newly learned skill to create animated slides. Earlier in the semester, there was a lecture about multimedia theory, a reading assignment for Mayer & Moreno (2003), and locating a web-based multimedia that resulted in cognitive overload. Once the preservice teachers located the web-based multimedia, they used Mayer & Moreno (2003) to explain why the media causes cognitive overload. The instructor prompted the preservice teachers to recall the previous assignment by asking, "Should you insert unrelated visual or animation? Why or why not?" When the preservice teachers could not answer, the instructor asked, "Which slide results in cognitive overload: a slide with the animation related to the content or a slide with unrelated animation?"

Once the preservice teachers recalled information about cognitive overload, the instructor pointed out, "According to the multimedia theory, which media has a lower

cognitive load: a combination of visual text and animation or a combination of audio text and animation?” The preservice teachers who remembered the multimedia theory answered that a combination of animation and audio text results in a lower cognitive load than the one with visual text. The instructor built upon the answer by saying, “Don’t you wish you could present the animation with the audio? I have a solution for you.”

The instructor then handed out the PC headset with microphone. The PC headset with a microphone was purchased through Slippery Rock University’s Teaching Learning Technology Roundtable (TLTR) grant. She showed the students how to create a wav file using Sound Recorder and insert the wav file into PowerPoint. Preservice teachers followed her demonstration at their stations. Then, the instructor prompted the preservice teachers’ knowledge recall by asking, “Which media has a lower cognitive load: the media with synchronized animation and audio, or the one with time lag between the audio and the animation?” The preservice teachers who remembered about temporal contiguity answered that one with synchronized animation and audio results in more efficient learning. Then the instructor showed how to time the animation in PowerPoint by selecting “slide show; custom animation; timing” (figure 3). She concluded the session by saying, “You have to remember how to create a multimedia with low cognitive load when you supervise your students’ multimedia production. However, elementary students will not understand the word cognitive overload. Just say something like, ‘Can you remove this animation because it is too busy?’.”

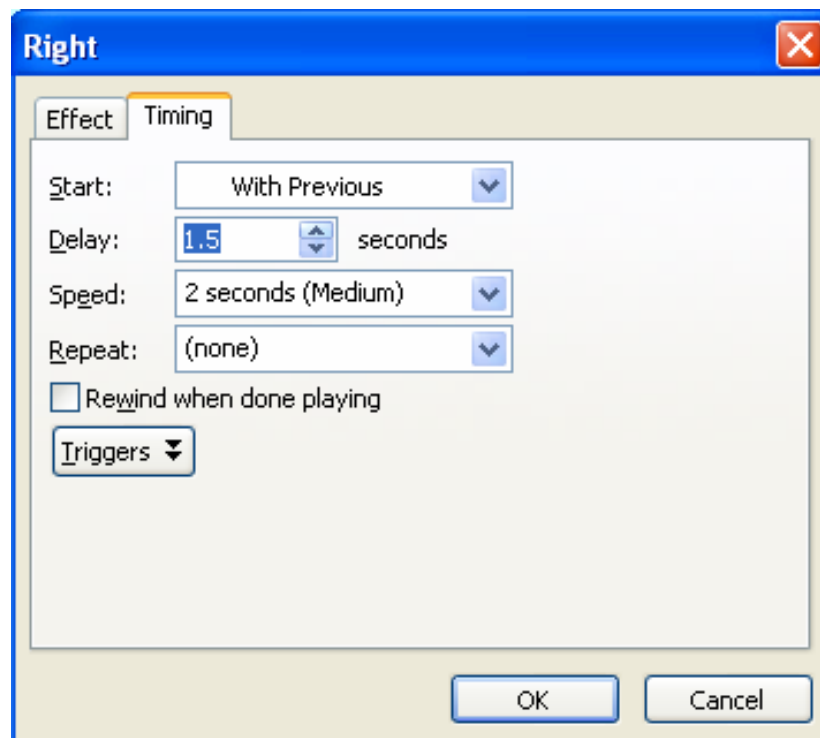
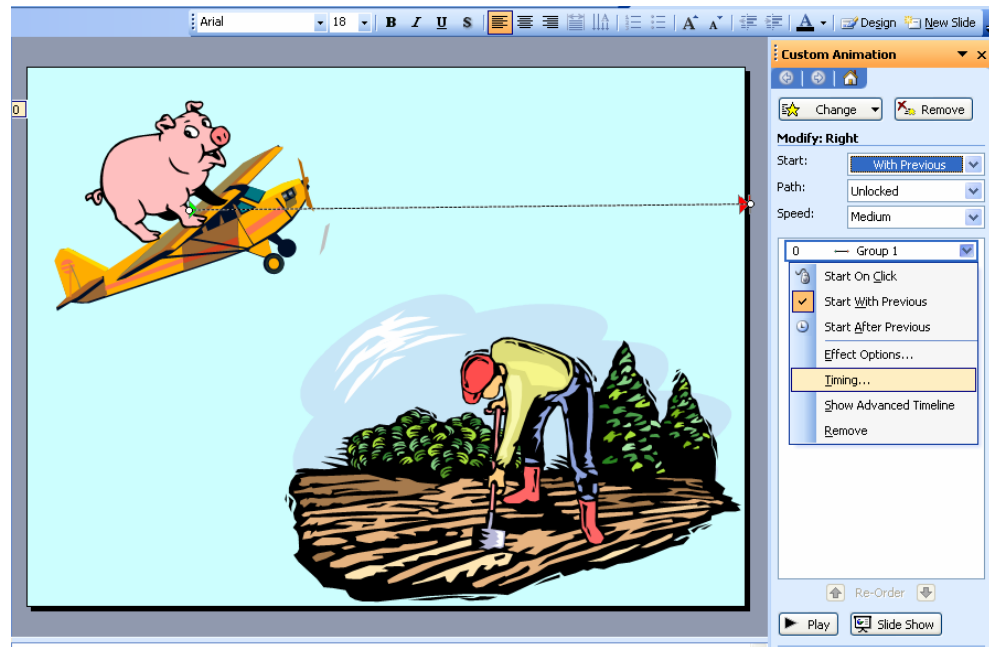


Figure 3: Setting up animation timing with PowerPoint.



At the end of this class, the instructor asked the students how the application of multimedia theory leads to a better understanding of the theory. She prompted the preservice teachers' reflection by asking, "Do you think reading Mayer & Moreno (2003) and writing the essay on it was enough to give you an understanding about multimedia theory, or discussion about multimedia theory as you create a multimedia significantly strengthened your understanding about the theory?" The preservice teacher answered that revisiting multimedia theory as they produced a story telling PowerPoint enhanced their understanding about the theory. The preservice teachers then orally gave their reasoning about why knowing theory is not enough and that they need a variety of concrete experiences to connect theory and practice. The aim for this discussion was to help the preservice teachers become aware of their own knowledge construction process. This discussion is likely to convince the preservice teachers through their experience why the constructivist theory is a good theory to put into their teaching practice.

Once the preservice teachers realized that they were experiencing constructivist instruction, then the instructor addressed NETS\*T III. B., which requires teachers to use technology to teach diverse students with a learner-centered strategy. This standard was introduced initially in the research paper assignment, but this was the first chance to formally connect their experience to the standard. Preservice teachers then had a reflective discussion about why the pig story activity was an example of a learner-centered use of technology, and why the activity is adjustable to diverse students. The instructor asked questions that lead the preservice teachers to conclude:

1. Learners create their version of the story
2. Learners select their own visual

3. Learners use their own tone of voice and expression
4. After the fundamental operations are demonstrated, learners work at their own pace
5. While learners with advanced technical skills or those who have the ability to figure out different functions of PowerPoint are encouraged to do so, learners with low technology skills are also allowed to work at their own levels.

At the conclusion of the discussion, the instructor mentioned that if they really wanted their students to experience learner-centered instruction, those who like to draw may draw at home and include their artwork with a story telling; those who are musically oriented can weave music into their literary presentation. This may be an abstract idea for preservice teachers who never had a teacher who allows such creativity, so the instructor provided an example of a multimedia PowerPoint with music and art work added to the pig story multimedia. The aim of showing an example that adds music and artwork is to encourage students to combine literacy and art if they are creative enough to do so.

After this instruction, preservice teachers created their readers' theater multimedia in groups. Those who were less confident in PowerPoint were instructed to sit next to the ones who were confident about PowerPoint. The group members negotiated to decide the slide design or background color they would like to use throughout the production.

#### Data Collection

##### *Letter of consent*

A letter of consent (Appendix E) was attached to the pre-treatment survey, informing participants about the general objectives of the study. This letter of consent

was written by using the standard format designated by Duquesne University's Institutional Review Board (IRB). Specific research questions and expected outcomes were communicated in writing or in person to the participants in order to prevent the researcher's influence on the survey answers. The consent form informed the participants about risks and benefits to the participants, and their rights to withdraw the consent any time they wished. Specifically, since the researcher was also the instructor for SEFE230, the letter clearly stated that participation in the study would not influence their course grade in any way. The letter also informed the participants where they could obtain further information about IRB.

#### *Data collection points*

The pre-treatment survey was collected prior to the first treatment. The second survey was collected immediately after the first treatment, the research paper about teaching diverse learners with technology (Appendix A). In this assignment, the definition of diverse learners by NCATE was provided to the students in SEFE230 and they chose their own target population to assist with the use of technology. In this assignment, the preservice teachers will formulate a question, "How do I help \_\_\_\_\_ with technology?" conducted a literature review to answer the question, and designed a plan to answer the question. The third data collection occurred immediately following the second treatment, the instructor's modeling for the same process and the hands-on practice for readers' theater style multimedia creation.

Since there are varieties of durations between data collection points in the existing literature, this author used her logic to determine the timing of the treatments and data collection. First, there should be no overlap between treatment 1 and treatment 2 because

the attitude survey from treatment 1 should not have the influence of treatment 2. This means that treatment 2 should not be administered until all the second data are collected. Since late submissions for the research paper are possible and causes the delay of data collection from treatment 1 by a couple of days, the cushion time between treatment 1 and treatment 2 should be designated. However, treatment 2 should be started while minimal instruction not related to the study is provided. This is to see the pure effect of the intervention. Thus, there should be one week between the literature-based essay (treatment 1) and the combination of the lecture and the hands-on practice (treatment 2).

### Data Analysis

Repeated measures analysis of variance (ANOVA) was employed because it is a method used to measure the same individuals for two or more times and it can be used to measure combining factors (Mathes et al, 2003; Toothaker & Miller, 1996). SPSS was used for data analysis because it is widely used among scholars to perform repeated measures ANOVA (Bauer et al., 2003; Boon et al, 2006; Devlin, 2005; Mathes et al., 2003; Sugden & Chambers, 2003).

### Study Outcomes

Any teacher education institution that strives to align instructional technology course objectives with National Educational Technology Standards for Teachers (NETS\*T) can use this study so that future teachers will receive education to increase their confidence and willingness to use technology to support diversity in classrooms. Likely, school districts that are seeking ways to train teachers so they will have knowledge and skills to include special education students in a regular classroom can

refer to this study.

## CHAPTER IV

### RESULTS

#### Demographic Information

Thirty two students in three sections of SEFE230: Production and Utilization of Instructional Technology answered all three surveys. All three sections were taught by the same instructor to guarantee the same quality of intervention. The data was then entered into SPSS version 14 for statistical analysis.

Table 1 shows that 90.7% of the preservice teachers were 25 years old or younger, 90.6% were female, and most were working toward either elementary or early childhood certificates. As for the familiarity with PowerPoint, 38.7% said they were somewhat familiar, and 58.1% said that they were not familiar with the software.

The repeated measures analysis of variance (ANOVA) for familiarity compared (1) pre-instruction; (2) research paper assignment that included the use of online library, the Internet, and Microsoft Word, but did not include the use of PowerPoint and; (3) hands-on training for PowerPoint, resulted in  $F(2,90) = 2.48$  and the p value of .10. In other words, the familiarity for PowerPoint did not change significantly at a 5% confidence interval before and after the intervention that used PowerPoint. Prior to the intervention, 1 participant (3.2%) said that she was not very familiar with PowerPoint. Twelve participants (37.5%) said that they were somewhat familiar and 18 participants (56.3%) said that they were very familiar with the software.

Table 1  
*Demographic Information Prior to the Interventions*

	N	%
1. Age		
20 or less	18	56.3 %
21-25	11	34.4 %
26-30	0	0 %
31-35	1	3.1 %
36-40	1	3.1 %
41-45	1	3.1 %
46-50	0	0 %
2. Gender		
Male	3	9.4 %
Female	29	90.6 %
3. Computer use		
Daily	3	9.4%
Weekly	1	3.1%
Less than weekly	26	81.3%
4. Familiarity with PowerPoint		
Very familiar	18	58.1%
Somewhat familiar	12	38.7%
Not familiar	1	3.2%
5. Certification		
Elementary	7	21.9 %
Elementary and Early Childhood	1	3.1 %
Elementary and Special Education	15	46.9 %
Elementary, Special Education, and Early Childhood	2	6.3 %
Elementary, Special Education, and Elementary Math	2	6.3 %
Secondary English	1	3.1 %
Secondary Social Studies	4	12.5 %
6. Experience in Education		
None	10	31.3 %
Under 1 year	3	9.4 %
1-2 years	7	21.9 %
Over 2 years	12	37.5 %

Prior to any interventions, 1 participant (3.2%) was not familiar with PowerPoint; 12 participants (37.5%) were somewhat familiar, and 18 participants (56.3%) were very familiar with PowerPoint. After the intervention that included a multimedia PowerPoint composition, 19 participants (59.4%) said that they were somewhat familiar and 13 participants (40.6%) said that they were very familiar with PowerPoint. In other words, the number of participants who were familiar with PowerPoint decreased after practicing PowerPoint composition. This was an unexpected outcome because all students in SEFE230 successfully composed a PowerPoint presentation that included at least one picture, sound, and movie on an individual basis. The gap between the gained skill and lack of confidence raised the concern that the participants did not carefully answer the surveys at the three data collection points, so this researcher used paired t-tests to validate the answers.

#### Validity of the Answers

It was a concern that the research participants may or may not have carefully answered the questions. It was possible that the participants signed up for the study in order to win the gift certificate, then rushed to complete the survey without reading the survey questions. Therefore, the data needed to be verified prior to comparing means with repeated measures ANOVA. The method to verify the data was paired t-tests with questions that had opposite meanings. If the questions were opposite, and the participants took time to answer the questions, the differences in means should be statistically significant.

The first pair was question 5, “Technologies used in a lesson should be selected based on the learning goals of the lesson,” and question 12, “It is important to select



technology to use in a lesson prior to planning for the content of the class. The second pair was question 6, “I can deliver a technology-integrated lesson with technical support preparing and delivering the lesson,” and question 13, “I do not need assistance to deliver a technology-integrated lesson.” The third pair was question 3, “Technical problems often occur regardless of the extent of teacher planning when integrating technology,” and question 16, “Technical problems can be avoided with proper teacher training.” The comparisons of the pairs were repeated for the three data collection points: pre-intervention (P), after research project (R), and after hands-on (H). The results of the paired t-tests are shown on Table 2. Table 2 shows that the research participants had significantly different attitudes about the opposing questions. All but one pair was significantly different at a 5% confidence level. All of the pairs are significantly different at a 10% confidence level. Overall, it is safe to conclude that the participants carefully answered the questions.

Likewise, the paired t-test was performed in order to compare the differences in means in opposing questions in terms of the attitude about inclusion. The first pair was question 1, “All students with disabilities should be taught in the general education classroom (GE),” against question 3, “No students with disabilities should be taught in GE.” The second pair was the comparison between question 4, “All students with disabilities should be taught in general education classroom (GE)(part of day),” and question 6, “No students with disabilities should be taught in GE (part of the day).” The final pair was question 7, “All students with disabilities should be taught in the general education classroom (GE) (academic areas),” and question 9, “No students with disabilities should be taught in GE (academic areas).” As in the case of the attitude about

technology, P, R, and H were used to represent the data collection points. The result of the paired t-test shown in Table 3 indicates that the participants answered differently for the opposing questions. P values for all of the pairs were less than .05. Therefore, it was concluded that they carefully answered the surveys.

Table 2				
<i>Paired T-test for the Attitude about Technology Integration</i>				
Pair	df	t	p value (2-tailed)	
Tech 5P – Tech 12P	31	4.214	.000	
Tech 6P – Tech 13P	31	3.283	.003	
Tech 3P – Tech 16P	31	6.387	.000	
Tech 5R – Tech 12R	29	2.347	.026	
Tech 6R – Tech 13R	30	3.053	.005	
Tech 3R – Tech 16R	30	3.851	.001	
Tech 5H – Tech 12H	29	2.350	.026	
Tech 6H – Tech 13H	31	2.792	.009	
Tech 3H – Tech 16H	29	1.829	.078	

Table 3				
<i>Paired T-test for the Attitude about Inclusion</i>				
Pair	df	t	p value (2-tailed)	
Incl1P-Incl3P	31	4.992	.000	
Incl4P – Incl6P	30	7.519	.000	
Incl7P – Incl9P	29	6.211	.000	
Incl1R-Incl3R	31	5.049	.000	
Incl4R – Incl6R	28	6.520	.000	
Incl7R – Incl9R	30	2.385	.024	
Incl1H-Incl3H	31	6.254	.000	
Incl4H – Incl6H	30	4.661	.000	
Incl7H – Incl9H	30	4.156	.000	

## Results

### *Attitude about Technology*

The results of repeated measures ANOVA for the change of attitude about technology integration is shown in Table 4.

Table 4  
*Repeated Measures Analysis of Variance for Attitude about Technology Integration*

Questions	Mean Pre-test	Mean Research paper	Mean Hands -on	F value	P value	Partial Eta Squared	Power
A lack of knowledge about technology will impede a teacher's ability to integrate technology	3.55	3.58	3.29	1.00	.38	.06	.21
A variety of technologies is important to enhance student learning.	3.66	3.53	3.22	.20	.16	.12	.37
Technical problems often occur regardless of the extent of teacher planning when integrating technology.	3.37	3.30	3.03	.95	.40	.06	.20
Content instruction should take priority over technology skills.	3.16	3.13	2.81	1.95	.16	.12	.37
Technologies used in a lesson should be selected based on the learning goals of the lesson.	3.71	3.54	3.18	1.94	.16	.13	.37
I can deliver a technology-integrated lesson with technical support preparing and delivering the lesson.	3.16	3.31	3.03	1.77	.19	.11	.34
I could integrate technology into a lesson with more technology skills training	3.34	3.21	3.03	.92	.41	.06	.19
I am confident about integrating technology into language arts, social studies, math, science, or other content area lesson.	3.16	3.32	3.03	1.25	.30	.08	.25
Given a learning goal, I am able to develop ideas for integrating technology.	3.22	3.28	3.06	.43	.66	.03	.11

*Note.* 1=strongly disagree; 2=disagree; 3=agree; 4=strongly agree

Table 4 (*continued*).*Repeated Measures Analysis of Variance for Attitude about Technology Integration*

A lack of knowledge about how to integrate technology into content areas is a barrier.	3.24	3.38	3.14	.60	.56	.04	.14
For effective technology integration in a lesson, a teacher needs to adapt his or her teaching strategies to become more learner-centered.	3.31	3.31	3.16	.29	.75	.02	.09
It is important to select technology to use in a lesson prior to planning for the content of the class.	2.84	3.09	2.01	.79	.46	.05	.17
I do not need assistance to deliver a technology-integrated lesson.	2.38	2.87	2.58	2.95	.07	.17	.53
I feel that my technology course has prepared me to integrate technology into my content area specialization.	3.10	3.23	3.13	.56	.58	.04	.13
I do not need more training on how to integrate technology.	2.00	2.62	2.53	8.48	.001	.36	.95
Technical problems can be avoided with proper teacher planning.	2.16	2.58	2.74	5.69	.008	.28	.86
Teaching students to use technology is not my job.	1.88	2.06	2.25	2.26	.12	.13	.42
It is unreasonable to expect teachers today to integrate technology into instructional activities.	1.53	1.84	2.22	4.55	.02	.23	.73

*Note.* 1=strongly disagree; 2=disagree; 3=agree; 4=strongly agree

Significant differences in means were found only on the following statements:

- (1) “I do not need more training on how to integrate technology.” For this statement,  $F(2, 93) = 8.48$  and  $p = 0.001$  were observed. Means for the first data collection point was 2.00; the second mean was 2.62 and the third was 2.53. Therefore the participants significantly increased the agreement with this statement. The effect size for the result was .38. Power, or the probabilities to reject null hypothesis correctly (Kempthorne & Folks, 1971; Liu & Raudenbush, 2004; Toothaker & Miller, 1996), was .95. Power is useful for confirming statistical significance because outliers lower power (Wilcox, 1995). In general power over .70 is considered high (Dowdy & Wearden, 1991). Pairwise comparison for this statement indicated that there was a significant difference between the first and the second data collection points and between the first and the third data collection points. However, there was no significant difference between the second and the third data collection points.

Table 5  
Pairwise Comparison for “I do not need more training on how to integrate technology.”

(I) Time	(J) Time	Mean difference (I-J)	p
P	R	-.625	.001
	H	-.531	.044
R	P	.625	.001
	H	.094	1.000
H	P	.531	.044
	R	-.094	1.000

*Note.* P = Pre-intervention; R = After research paper;  
H = After Hands-on

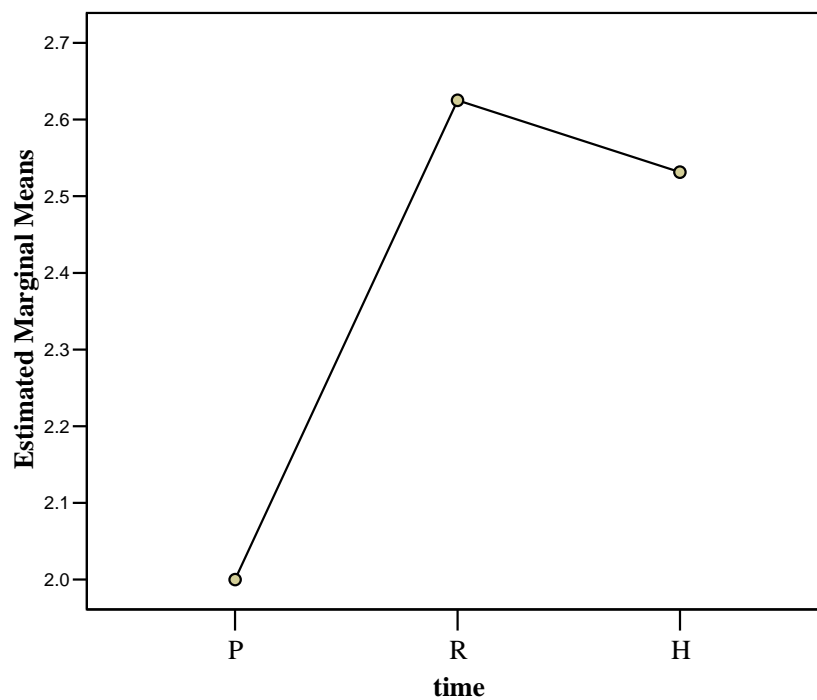


Figure 4. Mean comparison for “I do not need more training on how to integrate technology.”

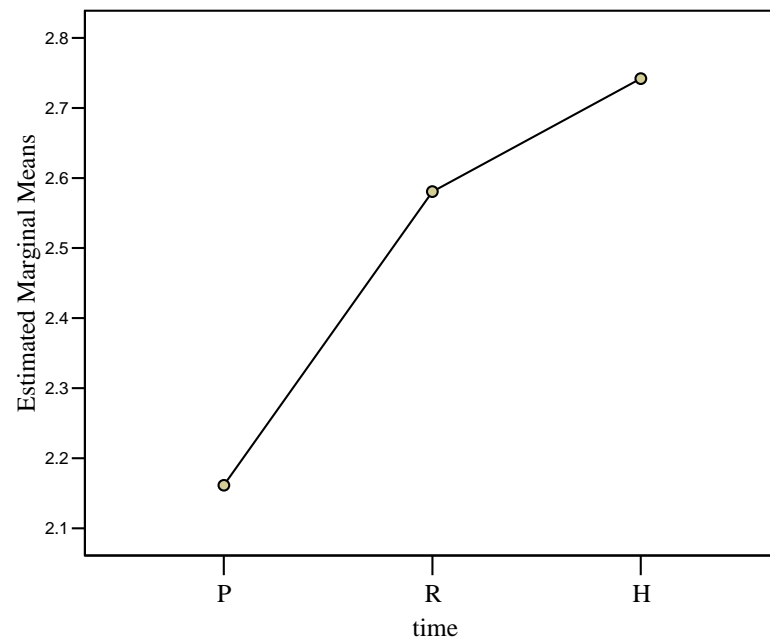


- (2) “Technical problems can be avoided with proper teacher planning.”

For this statement,  $F(2,92) = 5.69$  and  $p = .008$  were observed. The effect size was .28 and the power was .86. The means for the pretest, after the research paper, and after the hands-on intervention were 2.16, 2.58, and 2.74. As seen in the last statement, positive attitudes about technology integration for instruction increased. Pairwise comparison indicated that a significant difference in means existed only between the first and the third data collection points.

Table 6 <i>Pairwise Comparison for “Technical problems can be avoided with proper teacher planning.”</i>			
(I) Time	(J) Time	Mean difference (I-J)	p
P	R	-.419	.076
	H	-.581	.008
R	P	.419	.076
	H	-.161	1.000
H	P	.581	.008
	R	.161	1.000

*Note.* P = Pre-intervention; R = After research paper;  
H = After Hands-on



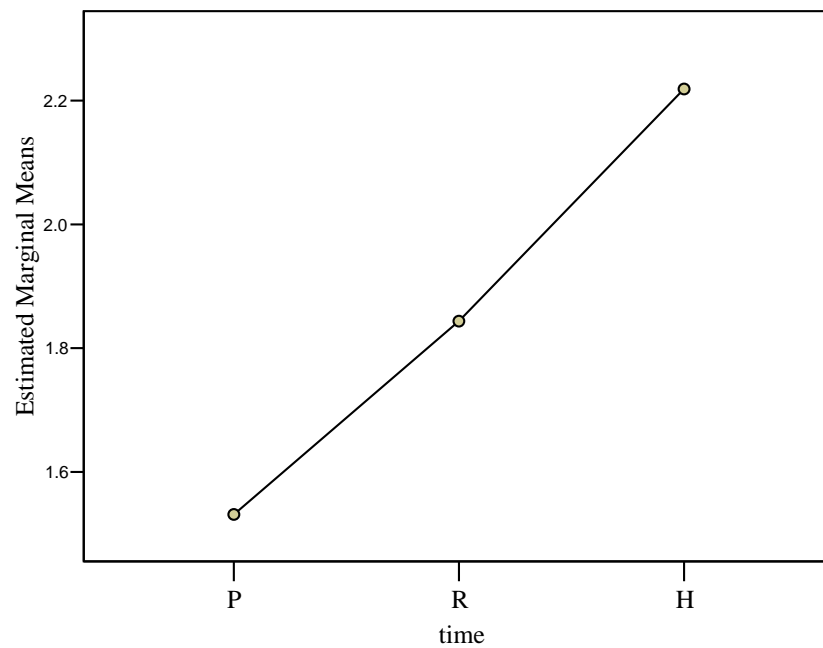
*Figure 5.* Mean comparison for “Technical problems can be avoided with proper teacher training.”

- (3) “It is unreasonable to expect teachers today to integrate technology into instructional activities.”  $F(2,93) = 4.55$  and  $p = .02$  were observed. Effect size and power were .23 and .73, respectively. The means for the three data collection points were 1.53, 1.84, and 2.22. The pairwise comparison of the means shows that a significant difference existed only between the first and the third data collection points.

Table 7  
*Pairwise Comparison for “It is unreasonable to expect teachers today to integrate technology into instructional activities.”*

(I) Time	(J) Time	Mean difference (I-J)	p
P	R	-.313	.259
	H	-.688	.014
R	P	.313	.259
	H	-.375	.270
H	P	.688	.014
	R	.375	.270

*Note.* P = Pre-intervention; R = After research paper;  
H = After Hands-on



*Figure 6.* Mean comparison for “It is unreasonable to expect teachers today to integrate technology into instructional activities.”

It was unexpected that preservice teachers increasingly agreed with this statement as they spent more time with technology during the course. One possible explanation is that the more time they spent using technology, the more they realized how time consuming it is to create quality lessons with technology. For instance, a teacher who received technology training in Beatty's study (2003) complained that even though technology can be beneficial there is no time to plan a lesson with technology. However, since there was no data collected to explain the increase of negative attitude towards technology in this study, there is no basis to explain the change of the attitude of the research participants in this study.

#### *Attitude about Collaboration*

There were 19 participants working toward special education and 13 participants who were not. Table 8 shows the means of the attitude about collaboration and Table 9 shows the results of repeated measures ANOVA. Neither the p values for time factor alone (i.e. comparison of means for the three data collection points) nor time and special education certificate factors indicated that there were significant differences in the attitude toward collaboration among the participants. Referring to both of Tables 8 and 9 indicates that since the positive attitude about collaboration already existed for both special education and non-special education preservice teachers, the interventions only affirmed this positive attitude. That is why there was no change in the attitude.

Table 8						
<i>Means for Attitude about Collaboration</i>						
Questions	Pre-test		Research paper		Hands-on	
	Spec	Gen	Spec	Gen	Spec	Gen
Special education and general education teachers should both be involved in teaching students with mild disabilities within the general education classroom	5.63	5.58	5.47	5.66	5.31	5.00
Special education and general education teachers should both be involved in teaching students with severe disabilities within the general education classroom.	4.37	4.69	4.47	4.69	4.31	4.61
Special education and general education teachers should both be involved in teaching general education students within the general education classroom.	3.84	4.62	4.36	4.61	4.47	4.46
Special education teachers should be responsible for teaching students with mild disabilities in the general education classroom and general education teachers should be responsible for general education students in that class.	2.53	3.77	3.32	3.62	3.21	4.08
Special education teachers should be responsible for teaching students with severe disabilities in the general education classroom and general education teachers should be responsible for general education students in that class.	3.37	3.77	3.94	4.46	3.26	4.08
<i>Note.</i> 1=strongly disagree; 2= moderately disagree; 3=mildly disagree; 4=mildly agree; 5=moderately agree; 6=strongly agree						
Spe = special education;						
Gen= general education or students who are not working for special education certificate						

Table 9

*Repeated Measures Analysis of Variance for Attitude about Collaboration*

Questions	F value		P value		Partial Eta Squared		Power	
	time	time*sped	time	time*sped	time	time*sped	time	time*sped
Special education and general education teachers should both be involved in teaching students with mild disabilities within the general education classroom	1.86	.65	.17	.53	.12	.04	.36	.15
Special education and general education teachers should both be involved in teaching students with severe disabilities within the general education classroom.	.06	.02	.94	.98	.00	.00	.06	.05
Special education and general education teachers should both be involved in teaching general education students within the general education classroom.	.45	.72	.65	.50	.03	.05	.12	.16
Special education teachers should be responsible for teaching students with mild disabilities in the general education classroom and general education teachers should be responsible for general education students in that class.	.98	1.21	.39	.31	.06	.08	.20	.25
Special education teachers should be responsible for teaching students with severe disabilities in the general education classroom and general education teachers should be responsible for general education students in that class.	2.60	.15	.09	.85	.15	.01	.48	.07

*Note.* 1=strongly disagree; 2= moderately disagree; 3=mildly disagree; 4=mildly agree; 5=moderately agree; 6=strongly agree

### *Attitude about Inclusion*

Table 10 shows the means for the attitude about inclusion for preservice teachers who are working for a special education certificate and those who are not. Table 11 shows the result of repeated measures ANOVA for the three data collection points with the time factor alone and time and special education factors.



Table 10 <i>Means for Attitude about Inclusion</i>						
Questions	Pre-test		Research paper		Hands-on	
	Spec	Gen	Spec	Gen	Spec	Gen
All students with disabilities should be taught in general education classroom (GE).	3.26	3.46	3.37	3.38	4.00	3.46
Some students with disabilities should be taught in GE.	5.00	4.62	4.79	4.46	4.84	5.08
No students with disabilities should be taught in GE.	1.21	2.38	2.05	2.46	1.78	2.15
All students with disabilities should be taught in general education classroom (GE). (part of day)	4.50	4.17	4.17	4.33	4.17	3.83
Some students with disabilities should be taught in GE. (part of day)	5.00	3.69	4.52	4.46	4.63	6.53
No students with disabilities should be taught in GE. (part of day)	1.31	1.83	1.88	1.67	2.13	2.67
All students with disabilities should be taught in general education classroom (GE). (academic areas)	4.00	4.83	3.20	3.77	3.67	4.00
Some students with disabilities should be taught in GE. (academic areas)	4.53	3.85	4.42	4.38	4.89	4.85
No students with disabilities should be taught in GE. (academic areas)	1.58	2.31	2.52	2.00	1.89	3.08
<i>Note.</i> 1=strongly disagree; 2= moderately disagree; 3=mildly disagree; 4=mildly agree; 5=moderately agree; 6=strongly agree Spe = special education; Gen= general education or students who are not working for special education certificate						

Table 11 <i>Repeated Measures Analysis of Variance for Attitude about Inclusion</i>								
Questions	F value		P value		Partial Eta Squared		Power	
	time	time*sped	time	time*sped	time	time*sped	time	time*sped
All students with disabilities should be taught in general education classroom (GE).	.49	.51	.62	.60	.03	.03	.12	.13
Some students with disabilities should be taught in GE.	.92	.85	.41	.44	.06	.06	.19	.18
No students with disabilities should be taught in GE.	.28	4.06	.75	.03	.02	.22	.09	.68
All students with disabilities should be taught in general education classroom (GE). (part of day)	.43	.44	.65	.65	.03	.03	.11	.11
Some students with disabilities should be taught in GE. (part of day)	.29	2.76	.75	.08	.02	.16	.09	.50
No students with disabilities should be taught in GE. (part of day)	2.58	8.90	.10	.42	.17	.07	.47	.19
All students with disabilities should be taught in general education classroom (GE). (academic areas)	1.74	.08	.20	.93	.12	.01	.33	.06
Some students with disabilities should be taught in GE. (academic areas)	3.50	.75	.04	.48	.20	.05	.61	.16
No students with disabilities should be taught in GE. (academic areas)	.89	3.00	.42	.07	.06	.17	1.9	.54
<i>Note.</i> 1=strongly disagree; 2= moderately disagree; 3=mildly disagree; 4=mildly agree; 5=moderately agree; 6=strongly agree								

### *Question 1*

The first research question was: Will the research paper in which preservice teachers select their own target group to answer, “How will I help \_\_\_\_ with technology?” increase their willingness to assist that target group? The attitude about inclusion shown in Table 11 was used to answer this question. Specifically, significances for three statements including ‘some students,’ were compared. The statement “Some students with disabilities should be taught in GE (academic areas),” resulted in the significant change in the attitude, increasing the degree of agreement. F value with the degree of freedom (2, 93) was 3.50 and the p value was .04. However, the statements “Some students with disabilities should be taught in GE,” and, “Some students with disabilities should be taught in GE (part of day),” did not result in significant change. F values for the statements were .92 and .29. P values were .41 and .75.

The means for these three statements shown in Table 10 explain why not all statements yielded significant result. For the statements that did not result in a significant change in attitude, the mean score prior to the intervention was already high. Overall, the data implies that the instruction enforced the positive attitude that already existed.

### *Question 2*

The second question was: “Does the process of identifying a problem and finding a solution by literature review increase preservice teachers’ willingness to assist diverse students with technology in general?” The change of the attitude for statements including ‘all students,’ and ‘no students,’ from Table 11 was examined in order to answer this question. P values for the time factor alone indicate that there was no significant change in the attitude about inclusion in general. The means for, “No students with disabilities

should be taught in GE,” “No students with disabilities should be taught in GE (part of day),” and “No students with disabilities should be taught in GE (academic areas),” in Table 10 indicate that the participants in this study disagreed with these statements prior to the study and continued to disagree after the interventions. On the other hand, the participants maintained positive attitude for the statements, “All students with disabilities should be taught in general education classroom (GE),” “All students with disabilities should be taught in general education classroom (GE) (part of day),” and, “All students with disabilities should be taught in general education classroom (GE) (academic area),” before and after the instruction.

### *Question 3*

The third research question was: Will there be a significant difference between a research project about using technology to assist special education students and the combination of a research paper and a hands-on practice for a readers’ theater multimedia production increase preservice teachers’ willingness to assist special education students with technology? To answer this question, the attitudes about technology, collaboration, and inclusion were simultaneously analyzed. First, Table 5 indicates that there was a significant difference for the statement, “I do not need more training on how to integrate technology,” between the pre-intervention point and at the point that students in the class submitted research papers. Likewise, there was a significant difference between the pre-intervention and the hands-on practice. However, there was no statistically significant difference between the research paper and hands-on practice.

For the statements, “Technical problems can be avoided with proper teacher planning,” and, “It is unreasonable to expect teachers today to integrate technology into

instructional activities,” a significant change in the attitude was observed only between the pre-intervention and hands-on practice. While the former is a positive statement about technology, the latter is a negative statement. Nonetheless, the participants increasingly agreed with both of the statements. All of the collaboration statements shown in Table 9 are statistically insignificant results.

Among the inclusion statements, the only statement that indicated a significant change in the attitude was, “Some students with disabilities should be taught in GE (academic areas).” The pairwise comparison on Table 12 indicates that a significant difference existed between the pre-intervention and hands-on and between the research paper and hands-on practice. In sum, the mixed direction of the attitude changes and significant outcome does not provide enough evidence to support or negate this research question.

Table 12

*Pairwise Comparison for “Some students with disabilities should be taught in GE (academic areas).”*

(I) Time	(J) Time	Mean difference (I-J)	p
P	R	-.217	.440
	H	-.684	.022
R	P	.217	.440
	H	-.468	.044
H	P	.684	.022
	R	.468	.044

*Note.* P = Pre-intervention; R = After research paper; H = After Hands-on

#### *Question 4*

The fourth research question was: “Is there a significant difference in the willingness to assist diverse learners with technology between the students who are working towards a special education certificate and those who are not majoring in special education?” Prior to the study, the hypothesis was made that there would be no change in the attitude among special education preservice teachers, but there would be for non-special education preservice teachers as a result of the research paper assignment, and there would be significant difference for both groups for the hands-on training. Differences between the time factor alone and time and special education factors combined shown in Tables 9 and 11 were examined to answer this question. While Table 9 shows no significant change in attitude about the collaboration between special education and general education teachers, Table 11 shows some significant differences in changes in attitude about inclusion between special education preservice teachers and their non-special education counterparts.

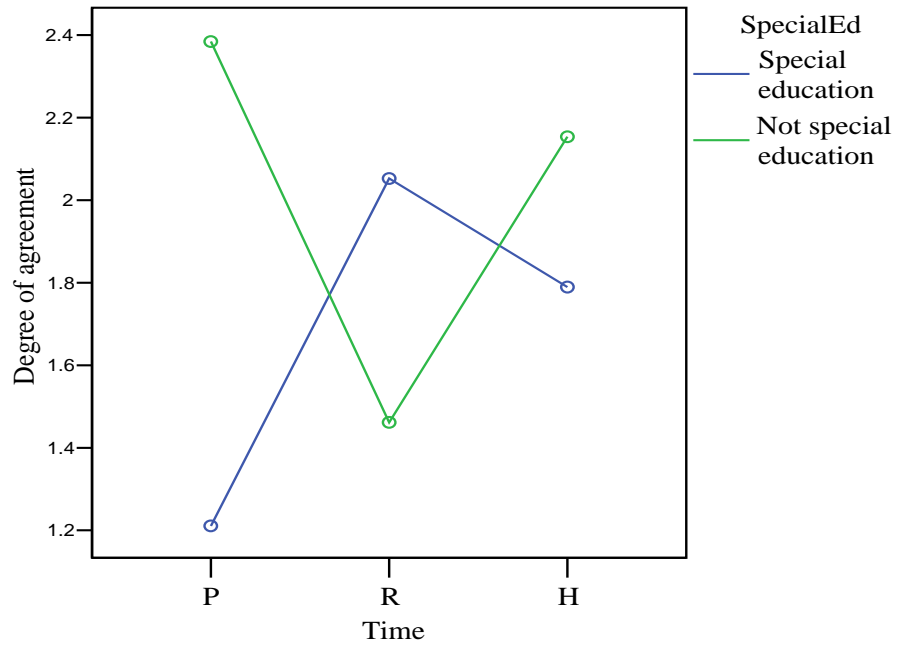
Specifically, there were significant differences in attitude for the following statements:

- (1) “No students with disabilities should be taught in general education.”

For this statement, the means for special education preservice teachers in the three data collection points were 1.21, 2.05, and 1.78. The means for non-special education preservice teachers were 2.38, 2.47, and 2.15. The time factor alone resulted in  $F(2,93) = .28$  and  $p = .75$ ; time and special education certificate considered together resulted in  $F(2, 93) = 4.06$  and  $p = .03$ . This means that while the time factor alone

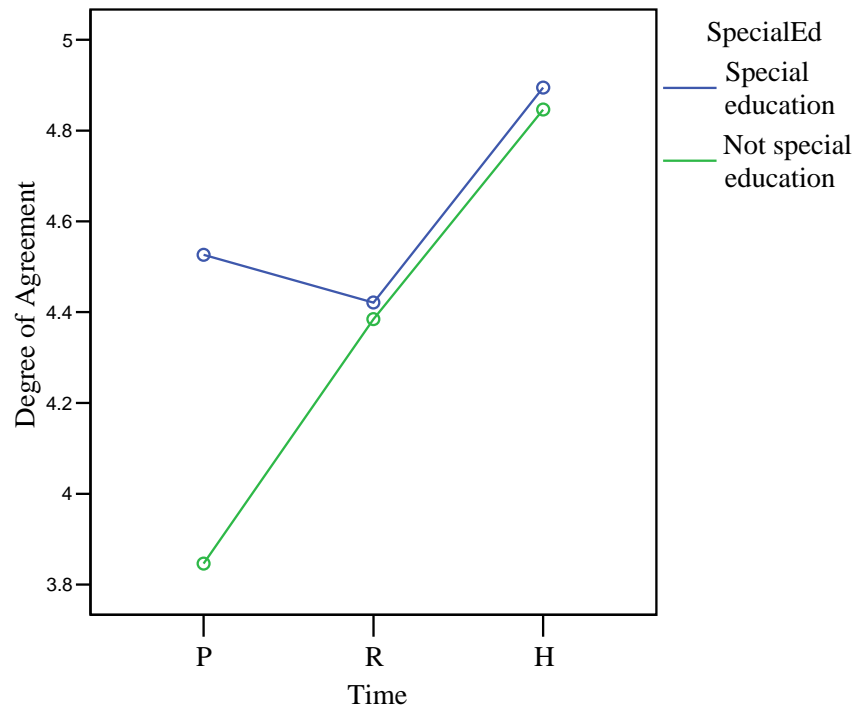
did not result in significant differences in attitude, special education and non-special education preservice teachers clearly had different attitudes. The data plot in Figure 7 indicates that while those in the special education certificate track and those who are not both disagree with the statement, the degree of disagreement is larger prior to the intervention. Figure 7 shows that even though the gap between special education preservice teachers and non-special education preservice teachers was large at the pre-intervention point, the gap closed by the second data collection point.





*Figure 7.* Means for “No students with disabilities should be taught in general education.”

- (2) “Some students with disabilities should be taught in GE (academic areas).” For this statement, the means for the special education preservice teachers at the three data collection points shown in Table 10 were 4.53, 4.42, and 4.89. On the other hand, the means for the non-special education students were 3.85, 4.38, and 4.85. Table 11 shows that repeated measures ANOVA for the time factor alone resulted in  $F(2,93) = 3.50$  and  $p = .05$ , showing a significant result. Repeated measures ANOVA with time and special education certificate factors yielded in  $F(2,92) = .75$  and  $p = .48$ , not resulting in a statistically significant difference. Figure 8 shows the means for both groups in the pre-intervention, research paper, and hands-on practice data collection points.



*Figure 8.* Means for “Some students with disabilities should be taught in general education (academic areas).”

Since it was already confirmed that there was no statistically significant change in the attitude among special education preservice teachers, it is necessary to examine if the significant change in the attitude existed immediately after the research paper intervention, or if it did not occur until the hands-on training for the time factor alone. Since Figure 8 displays the predicted pattern that, (1) For the research paper, a significant increase in the positive attitude about inclusion would occur only among non-special education preservice teachers, (2) A significant increase in the attitude will be observed for both groups. However, the pairwise comparison on Table 12 indicates that a significant difference existed between the pre-intervention and the hands-on training ( $p = .02$ ) and between the research paper and the hands-on training ( $p = .04$ ). However, there was no statistically significant difference between the pre-intervention and immediately after the research paper was due ( $p = .44$ ). Therefore, there was no significant result to confirm the predicted pattern.

Table 10 explains why the results turned out to be mostly insignificant. Both groups, preservice teachers working toward special education certificates and those who are not, already had the tendency to agree with positive statements and disagree with negative statements about inclusion at the pre-intervention point. The interventions merely reinforced the trends that already existed prior to the instruction.

## CHAPTER V

### DISCUSSION

#### Objective of This Study

This study focused on the National Educational Technology Standard for Teachers (NETS\*T) III. B. which states, “Teachers use technology to support learner-centered strategies that address the diverse needs of students” (International Society for Technology in Education, 2003, p. 51). This standard includes a technology component and a diversity component. Diversity is defined as “The differences among groups of people and individuals based on ethnicity, race, socioeconomic status, gender, exceptionalities, language, religion, sexual orientation, and geographical area” (National Council for Accreditation of Teacher Education, 2006, p.53). Preparing teacher candidates to teach diverse students is one of the four unit capacities designated by the National Council for Accreditation of Teacher Education’s accreditation standards (National Council for Accreditation of Teacher Education, 2006).

Since diversity has a broad scope, and it is easier for preservice teachers to work with a specific focus and concrete examples, it was necessary to choose a narrower segment of diverse learners. Hence, this research included two interventions that used technology to assist students with special needs. Also, this study examined the change of attitude about technology integration into the classroom, collaboration between special education teachers and non-special education teachers, and inclusion because the attitude is a crucial component for successful use of technology (Benson et al., 2004; Hong & Koh, 2002; Knight et al, 2004) and inclusion (Biddle, 2006; Burke & Sutherland, 2004;

Idol, 2006; Leatherman & Niemeyer, 2005; Monsen & Frederickson, 2004; Shade & Stewart, 2001).

### Structure of the Study

This study took place within coursework in an instructional technology class offered for preservice teachers. The study participants were recruited with the informed consent procedure set by Duquesne University's Institutional Review Board. Since the researcher was the course instructor, her colleague, a graduate assistant, and the departmental secretary assisted with the recruiting process to ensure that there was no pressure to participate in this study. Although all the students were expected to complete the activities required by the course, it was voluntary to fill in the pre-instruction survey, the second survey, and the third survey. The surveys to measure the attitudes about technology and inclusion of special education students were adapted from Brush et al. (2003) and Taylor et al. (2001) after the researcher received permission to use the modified survey by both Brush and Taylor.

The research started during the 10th week of the semester. After the pre-intervention survey was collected, the instructor explained the research paper for assisting students with special needs with technology. The research question each student formulated was, "How can I meet the needs of \_\_\_\_ with technology?" Each student selected his or her target group by filling in the blank. The instructor showed how to access online journals and other library resources through the university's library website. She also assisted students in selecting credible references and provided formative feedback for arguments and drafts. In-class time was provided to work on the research paper because (1) discussions and feedback as the preservice teachers form their ideas

can lead to meaningful learning (Dixon & Ecclestone, 2003; Rushton, 2005; Klecker, 2003; Orsmond et al., 2004; Smith, R., 2001) and (2) students appreciate having in-class time to work on assignments (Brown & Warschauer, 2006). However, many students chose to work outside of the class time as well. The research paper was due in two weeks. The second data was collected immediately after the paper was due. Since this data needed to be free of the influence of the additional intervention, there was a one week cushion between the research paper and the hands-on training. During this cushion time, the students had activities such as visual design, still-projected media, and display board production. These are relevant elements for multimedia PowerPoint composition, but there was no mention of PowerPoint during this cushion period.

During the 13th week of the semester, there was a collaborative lecture about readers' theater multimedia. This lecture was in a digital movie format and was created by a special education faculty member and the course instructor/researcher. The lecture suggested readers' theater as a way of including weak readers in a general classroom. Following the lecture movie, the class had a discussion to connect the knowledge that they gained from the research paper and an example of mainstreaming provided by the faculty members. They then read the text selected for their readers' theater multimedia production and formed their groups.

While the preservice teachers in SEFE230 read the text and posted their interpretation about the text on Blackboard's discussion forum as homework, they had hands-on practice to create a PowerPoint that included visual, audio, and video materials. They chose their own topics and combined visual, audio, and video materials available from PowerPoint's clip art with those harvested from the Internet. They also provided

copyright information for the media harvested from the Internet at the last page of the PowerPoint presentation. In many cases, preservice teachers in the class created hyperlinks to websites using the action buttons embedded in PowerPoint. In addition, the headset with PC microphone was introduced. Some preservice teachers utilized this hardware and the Sound Recorder to create their own narration and integrated it as a part of their multimedia. After they composed the multimedia PowerPoint, they demonstrated a smooth presentation of the shows starting from inserting the jump drive with the presentation in it and ending with ejecting the jump drive without an error message.

During the 14th and 15th weeks, preservice teachers got into groups with a maximum of six members per group to create readers' theater multimedia with PowerPoint. First, the instructor showed how to synchronize custom animation and sounds. Then, she gave the students the choice to either create a recording of voices at individual stations and put all the voices together later, or to have all group members pass a PC headset with a microphone among the members at a station. The third survey was filled in at the end of the readers' theater multimedia production.

The data collected at the pre-intervention, after the research paper, and after hands-on instruction, was put into SPSS version 14 for repeated measures ANOVA.

## Summary of Findings

### *Research Question 1*

The first research question was, "Will the research paper in which preservice teachers select their own target group to answer, 'How will I help \_\_\_\_ with technology?' increase their willingness to assist that target group?" The data analysis indicated that the research participants generally had positive attitudes about assistive technology prior to



the interventions. Therefore, a significant change of attitude in a positive direction occurred in a limited item. Most did not result in significant change, and no significant change in the negative direction was observed.

#### *Research Question 2*

The second research question was, “Does the process of identifying a problem and finding a solution by literature review increase preservice teachers’ willingness to assist diverse students with technology in general?” Participants maintained their agreement with positive statements and disagreement with negative statements before and after the research paper about assistive technology. There was no significant change in either direction.

#### *Research Question 3*

The third research question was, “Will there be a significant difference between a research project about using technology to assist special education students and the combination of a research paper and a hands-on practice for a shared reading style multimedia production increase preservice teachers’ willingness to assist special education students with technology?” There was an increase in agreement for positive and negative statements about technology use. Furthermore, while a significant increase in positive attitude was observed only for the research paper on one statement, a significant increase was observed between the research paper and hands-on training for the other statement. This mixed result left the third question inconclusive.

#### *Research Question 4*

The fourth research question was, “Is there a significant difference in the willingness to assist diverse learners with technology between the students who are

working towards a special education certificate and those who are not majoring in special education?” Since both special education and non-special education preservice teachers displayed affirmative attitudes about collaboration, there was no significant difference observed between the two groups.

One item out of nine statements about inclusion appeared to display the predicted pattern that the gain in increased positive attitude would be observed only in general education preservice teachers for the research paper while the gain would be observed for both special education preservice teachers and non-special education preservice teachers for the hands-on activity. Nonetheless, there was no statistical significance to confirm this hypothesis.

### Discussion of Findings

The literature suggests that an increased amount of knowledge about special education would lead to an increase in positive attitudes about inclusion (Burke & Sutherland, 2004; Shade & Stewart, 2001). In this study, the research was conducted in a 200 level class, and the acceptance to the College of Education is not a prerequisite for the class enrollment. Therefore, it was predicted that there was going to be a significant increase in positive attitudes about collaboration between special education teachers and general education teachers and about the inclusion of special education students after a research paper about assisting students with special needs with technology and hands-on training for inclusion of low level readers with readers’ theater multimedia. However, there was no significant change of attitude about collaboration and not all the statements about inclusion yielded a significant increase or decrease. Furthermore, the result

indicated that preservice teachers already had positive attitudes about collaboration and inclusion prior to the instruction.

Existing literature suggests that there is a significant difference between the two groups (Conte, 1994; Taylor et al., 2001). Therefore, the hypothesis was made that since special education preservice teachers tend to have more knowledge about general education students, they would have significantly more positive attitudes about collaboration and inclusion. However, the result of this research indicated that there may not be significant differences about attitude towards collaboration and inclusion between special education preservice teachers and non-special education preservice teachers. It may be possible that additional knowledge about special education students does not always transform into increased positive attitudes. The amount of time educators spend with special education students is not significantly related to the teachers' attitudes about inclusion (Alghazo et al., 2003). The matter may not be as simple as the amount of knowledge and skills. Rather, the quality of knowledge and skills can interact with the amount to change the attitudes.

Even though it was not originally included in the research questions, a post-hoc analysis produced an interesting finding. It is widely accepted that increased skills and knowledge about technology are correlated with an increased willingness to use technology (Bahr et al., 2004; Benson et al., 2004; Berlin & White, 2002; Christensen, 2002; Migliorino & Maiden, 2004; Rovai & Childress, 2003) and the decrease of technology anxiety, which is often associated with lack of training, is correlated to negative attitudes about technology (Hong & Koh, 2002). Therefore, the hypothesis was

made that as the participants receive training in using PowerPoint, their confidence in the software will increase.

The hands-on training for this study included a multimedia production using Microsoft PowerPoint. During this treatment, all the research participants successfully inserted pictures, texts, sounds, and movies to PowerPoint for their individual assignments. In addition, some created hyperlinks to web pages from PowerPoint. Moreover, all of the participants successfully created sound files with their voices and integrated them into their PowerPoint presentations. During the group work, the participants synchronized voice recordings with custom animations in PowerPoint. It is fair to say that the research participants developed an advanced level of competency in using Microsoft PowerPoint during the study. However, there was no significant change in the confidence in using the software. Prior to the intervention, the ratio of the participants who answered “Not familiar,” “Somewhat familiar,” and “Very familiar” with PowerPoint was 3.1%, 37.5%, and 56.3%. The ratio after the successful PowerPoint multimedia production was 0%, 59.4%, and 40.6%. In other words, the ratio of the participants who answered that they were very familiar with PowerPoint decreased after the hands-on training for multimedia PowerPoint. The data indicates that there may be a gap between the actual increase in technology skills and confidence in technology skills among preservice teachers.

In addition, participants in this study significantly increased agreement with the negative statement that, “It is unreasonable to expect teachers today to integrate technology into instruction activities.” It is possible that technology training in this class made the participants realize that integrating technology into class can be time consuming,

resulting in the increased agreement with the negative statement. This trend is observed in inservice teacher technology training (Batane, 2004; Beatty, 2003).

### Study Limitations

The study was conducted from the 10th week of the semester to the 15th week of the semester. The reason for the timing of this study was rather procedural than academic: no data collection or instruction related to the study could begin until IRB approval was received. It is possible that a comfort level with technology was developed during the first nine weeks of the semester. This may have resulted in insignificant results.

Likely, the students in the class were exposed to a diverse environment during the first nine weeks of instruction: some were comfortable with technology while some had close to no experience with technology. Some were already admitted to the College of Education while others were not. Such diversity was recognized and respected throughout the semester. For example, strategies to teach diverse students in the same class, such as grouping based on mixed knowledge and skills, was taught and modeled prior to the interventions described in this study. This may have contributed to the development of positive attitudes about inclusion prior to the study. Since participants already had generally positive attitudes about inclusion when the pre-intervention survey was collected, the study yielded generally insignificant results for the attitude change. Hence, if the same instruction was delivered earlier in the semester, it might have resulted in significant results in more items.

The sample size of the study was smaller than originally anticipated. There were close to 70 students enrolled in the three sections of SEFE230: Production and Utilization

of Instructional Technology. Since completing surveys for three times was not time consuming, the predicted sample size prior to the study was somewhere around 70. However, only 32 students answered all three surveys. The researcher strictly observed the voluntary nature of the informed consent procedure. While this preserved the integrity of the research, it also resulted in the low participation rate. If the same study were conducted over multiple semesters, a larger sample size could be collected while keeping the participation to the study voluntary. A larger sample size collected in such a way might yield more significant results.

In addition, the study was conducted in one institution only. Slippery Rock University is an NCATE accredited institution and it is an NCATE requirement that future teachers are educated to teach diverse learners. Therefore, there is a special emphasis on diversity. Thus, findings of this study can be generalized to all NCATE institutions. However, the results may not be applicable to non-NCATE institutions especially if the institutions do not make an effort to teach about diversity.

Also, there is a possibility of carryover affect in this study. Since the interventions in this study were delivered as a series of coursework, it was impossible to divide the classes into halves to reverse the order of the interventions. In addition, the influences of activities outside of the coursework were not factored into this study.

### Recommendations for Further Research

The following recommendations are made for future research:

1. In this study, there were some changes in the attitudes about technology use and inclusion. However, not all question items resulted in significant changes in the three data collection points. Further study

is recommended to examine if the interventions described in this study combined with other interventions will result in significant changes in attitudes in additional items.

2. It was puzzling that even though there was no significant change in the attitude toward the statement, “Technical problems often occur regardless of the extent of teacher planning when integrating technology,” there was a significant change in the attitude toward the statement, “Technical problems can be avoided with proper teacher planning.” Since these questions are almost opposite, it is reasonable to expect significant changes in the attitude for both of the statements. However, significant change was observed only for one of the two statements. Qualitative study in addition to the quantitative study used in this study may reveal the explanations for the puzzle.
3. Even though the paired t-test prior to repeated measures ANOVA indicated that the participants carefully answered questions, comparisons of attitudes for questions that are clearly opposite would be worthwhile. The wording of the survey for the inclusion segment clearly used such wording. The question remains if the similar results obtained in this study will be yielded if questions in the technology segment and the collaboration segment included opposite questions. For example, the question “I do not need more training on how to integrate technology,” can be paired up with, “I need more training on

how to integrate technology,” and be mixed with other questions in the same survey.

4. This study was conducted in a 200 level instructional technology class. If the similar study were conducted with graduate students in a 600 level instructional technology class, it may yield different results. Therefore, a study with a different population as research participants is suggested.
5. Likewise, undergraduate and post-baccalaureate students enrolled in this class may have had different attitudes about special education – general education collaboration and integration with technology if all of the research participants were close to graduation. In this study, those who were already admitted to the College of Education were mixed with those who were not. A comparison of participants who are in the College of Education and who are not may show some significant differences between the two groups. Therefore, asking the participants if they are already admitted to the College of Education in the surveys may be useful in future research.
6. Even though the best effort was made to make the intervention as close to real life as possible, the study was still conducted as a course activity without any interaction with p-12 students in special needs. Therefore, the interventions did not provide a real-life experience in which the participants were able to find a technology solution for collaboration between a special education teacher and a general education teacher.



Nor did the study provide a real life solution for inclusion. If the preservice teachers were in a p-12 environment in which they need to assist special education students with the help of a technology teacher and a special education teacher, more items may turn out to be significant than an intervention in which a special education faculty and technology faculty collaborate to lecture and provide hands-on technology training.

7. This study implied that an increase of knowledge alone may not be the single factor to change the attitude about technology use, collaboration, and inclusion. A longitudinal study that combines the qualitative and quantitative data including the background of research participants, types of instruction at a teacher training institution, and types of continuing education, support, and experience during student teaching and the first several years as inservice teachers, therefore, is suggested.
8. The scope of the training to use technology to assist diverse learners was limited to one research paper, one collaborative modeling between a special education faculty and a technology faculty, and a hands-on training based on the collaborative lecture. More modeling for collaboration by College of Education faculties throughout the course of teacher preparation may further strengthen the positive attitude about collaboration and inclusion that preservice teachers already seem to possess.

9. The smaller sample size for the study than originally anticipated created a limitation for this study. If the duration of the research were expanded so the same intervention and data collection could be conducted over multiple semesters, this may boost the sample size and may result in a different outcome for the same instruction. Additionally, it may be useful to investigate why some preservice teachers chose not to participate in a study such as this one.
10. Even though participants in this study developed advanced skills for PowerPoint multimedia production, the self-reported familiarity with PowerPoint did not result in a significant increase after the instruction. There may be a gap between actual skills increase and self-perception of the skills. However, since this research did not include a skills test for PowerPoint, there is no data to support this possibility. In the future, quantifying actual skills as well as self-reported skills with technology can confirm or disconfirm this hypothesis.
11. In order to counterbalance the possibility of the carryover affects mentioned in the limitation section, reversing the order of intervention and comparing the results of this study is recommended.
12. This research can be expanded to teacher education institutions other than Slippery Rock University. Specifically, a comparison between multiple NCATE accredited institutions and non-accredited institutions is suggested. The particular focus of such a study should be the

comparison of institutions' efforts to expose preservice teachers to diverse learners and course offerings about diversity.

### Conclusions

The literature suggests that lack of knowledge about what type of assistive technology is available is a barrier to the use of assistive technology (Gately & Hammer, 2005; Lee & Vega, 2005; Zascavage & Keefe, 2004) and college-based teacher training is positively associated with attitudes about inclusion (Avramidis et al., 2000; Jobe et al., 1996; Van Reusen et al., 2000). Therefore, teacher training institutions must provide rich preparation for technology for inclusion. The results of this study indicated that preservice teachers can have positive attitudes about special education-general education collaboration prior to field practicum or student teaching, and an increased knowledge about assistive technology may affirm this positive attitude.

Increased skills in technology can modify the way of teaching (Brinkerhoff, 2006). Some argue that the increase use may support learner-centered instruction (Judson, 2006) while others state that frequent use of technology is only connected to information-gathering activities with the World Wide Web and do not always result in creative activities (Wozney et al., 2006). Some may use PowerPoint to deliver lectures while others may facilitate their students' PowerPoint composition. Even though the interventions described in this research modeled a variety of technology use to support a learner-centered approach, if the preservice teachers immersed into the learner-centered environment will use technology for learner-centered activities in the future was out of the scope of this research. Such research needs to wait until the preservice teachers will

become inservice teachers. Nonetheless, this research opened up possibilities for related studies.

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## Appendix A: Survey

**Demographic Information**

Circle the one that is closest to you.

<b>Age</b>	20 or less	21-25	26-30	31-35	36-40	41-45	46-50
<b>Gender</b>	Male			Female			
<b>Computer Use</b>	Daily		Weekly		Less than Weekly		
<b>Familiarity with PowerPoint</b>	Very Familiar		Somewhat Familiar		Not Familiar		

**Certification (circle all that applies)**

- Elementary
- Secondary Math
- Secondary English
- Secondary Science
- Secondary Social Studies
- World Language
- Special Education
- Others (specify)

**Experience in Education**

- None
- Under 1 year
- 1-2 years
- Over 2 years

**If you have experience in education, what has your role been?**

**Attitude about Technology Integration (Brush et al, 2003, p.64)**

Circle the one that is closest to your opinion.

1= strongly disagree; 2=disagree; 3=agree; 4=strongly agree\*

\*Scale was reversed from the original publication so the increase of the agreement will be associated with the higher number.

A lack of knowledge about technology will impede a teacher's ability to integrate technology.	1	2	3	4
A variety of technologies is important to enhance student learning.	1	2	3	4
Technical problems often occur regardless of the extent of teacher planning when integrating technology.	1	2	3	4
Content instruction should take priority over technology skills.	1	2	3	4
Technologies used in a lesson should be selected based on the learning goals of the lesson.	1	2	3	4
I can deliver a technology-integrated lesson with technical support preparing and delivering the lesson.	1	2	3	4
I could integrate technology into a lesson with more technology skills training	1	2	3	4
I am confident about integrating technology into a language arts, social studies, math, science, or other content area lesson.	1	2	3	4
Given a learning goal, I am able to develop ideas for integrating technology.	1	2	3	4
A lack of knowledge about how to integrate technology into content areas is a barrier.	1	2	3	4
For effective technology integration in a lesson, a teacher needs to adapt his or her teaching strategies to become more learner-centered.	1	2	3	4
It is important to select technology to use in a lesson prior to planning for the content of the class.	1	2	3	4
I do not need assistance to deliver a technology-integrated lesson.	1	2	3	4
I feel that my technology course has prepared me to integrate technology into my content area specialization.	1	2	3	4
I do not need more training on how to integrate technology.	1	2	3	4
Technical problems can be avoided with proper teacher planning.	1	2	3	4
Teaching students to use technology is not my job.	1	2	3	4
It is unreasonable to expect teachers today to integrate technology into instructional activities.	1	2	3	4



**Attitude about Collaboration and Inclusion (Adopted from Taylor et al, 2001, p.12-13).**

Circle the one that is closest to your opinion.

1= strongly disagree; 2= moderately disagree; 3= mildly disagree; 4 = mildly agree; 5 moderately agree; 6 = strongly agree

**Collaboration**

Special education and general education teachers should both be involved in teaching students with mild disabilities within the general education classroom	1	2	3	4	5	6
Special education and general education teachers should both be involved in teaching students with severe disabilities within the general education classroom.	1	2	3	4	5	6
Special education and general education teachers should both be involved in teaching general education students within the general education classroom.	1	2	3	4	5	6
Special education teachers should be responsible for teaching students with mild disabilities in the general education classroom and general education teachers should be responsible for general education students in that class.	1	2	3	4	5	6
Special education teachers should be responsible for teaching students with severe disabilities in the general education classroom and general education teachers should be responsible for general education students in that class.	1	2	3	4	5	6

**Inclusion**

All students with disabilities should be taught in general education classroom (GE).	1	2	3	4	5	6
Some students with disabilities should be taught in GE.	1	2	3	4	5	6
No students with disabilities should be taught in GE.	1	2	3	4	5	6
All students with disabilities should be taught in general education classroom (GE). (part of day)	1	2	3	4	5	6
Some students with disabilities should be taught in GE. (part of day)	1	2	3	4	5	6
No students with disabilities should be taught in GE. (part of day)	1	2	3	4	5	6
All students with disabilities should be taught in general education classroom (GE). (academic areas)	1	2	3	4	5	6
Some students with disabilities should be taught in GE. (academic areas)	1	2	3	4	5	6
No students with disabilities should be taught in GE. (academic areas)	1	2	3	4	5	6

## Appendix B: Permission to Use Survey from Brush

From: Thomas Brush [tbrush@indiana.edu]	Sent	Thu
	:	7/27/2006
		6:21 PM
To: Yamamoto, Junko		
Cc:		
Subject: Re: permission to use part of your article		

This looks fine to me. Good luck with your dissertation!

Tom

Dr. Tom Brush  
Associate Professor, Instructional Systems Technology  
Education 2216  
201 N. Rose Ave.  
Bloomington, IN 47405

Phone: 812-856-8458  
Fax: 812 -856-8239

> From: "Yamamoto, Junko" <junko.yamamoto@sru.edu>  
> Date: Thu, 27 Jul 2006 14:12:21 -0400  
> To: <tbrush@INDIANA.EDU>, <tbrush@asu.edu>  
> Conversation: permission to use part of your article  
> Subject: permission to use part of your article  
>  
> Dear Dr. Brush,  
>  
> My name is Junko Yamamoto and I am working towards the Doctorate in Education  
> in Instructional Technology at Duquesne University, Pittsburgh, PA. My  
> doctoral dissertation is about facilitating the willingness to use technology  
> to assist special education students among preservice teachers, and I plan to  
> conduct the research at Slippery Rock University of Pennsylvania. I would  
> like your permission to use your survey questions that you published in  
> Brush, T., Glazewski, K., Rutowski, K., Berg, K., Stromfors, C., Hernandez  
> Van-Nest, M., Stock, L., & Sutton, J. (2003). Integrating technology in a  
> field-based teacher training program: The PT3@ASU project. Educational  
> Technology, Research and Development, 51(1), 57-72.  
> The draft for the entire survey that I plan to use is attached.  
>  
> Thank you for your response.  
>  
> Junko Yamamoto

## Appendix C: Permission to Use Survey from Taylor

From: Dr. Ronald Taylor [taylor@fau.edu]

Sent: Mon 7/31/2006 11:55 AM

To: Yamamoto, Junko

Cc:

Subject: RE: Permission to use part of your article

You have our permission to use the survey questions as long as you credit the source.

Ron Taylor

-----Original Message-----

From: Yamamoto, Junko [<mailto:junko.yamamoto@sru.edu>]

Sent: Thursday, July 27, 2006 11:25 AM

To: taylor@fau.edu

Subject: Permission to use part of your article

Dear Dr. Taylor,

My name is Junko Yamamoto and I am working towards Doctorate in Education in Instructional Technology at Duquesne University, Pittsburgh, PA. My doctoral dissertation is about facilitating the willingness to use technology to assist special education students among preservice teachers, and I plan to conduct the research at Slippery Rock University of Pennsylvania. I would like your permission to use your survey questions that you published in

Taylor, R. L., Smiley, L. R., & Ramasamy, R. (2001). Effects of educational background and experience on teacher views of inclusion. *Educational Research Quarterly*, 26(3), 3-16.

The draft for the entire survey that I plan to use is attached.

Thank you for your response.

Junko Yamamoto

Instructor, Department of Secondary Education / Foundation of Education,  
Slippery Rock University

## Appendix D: Research Paper

## **Research Paper: Diversity & Theory-Based Practice in Instructional Technology**

**Objectives:** Using Microsoft Word...

- You will write a concrete plan about facilitating theory-based practice addressing answering the question, “How can I meet the needs of (selected population from special education students) with technology?” Select your target group for the place of parenthesis (NETS\*T II A, B, E; III B, E, VI. C).
- You will select at least five *credible* sources that support your instructional plan and synthesize them in the way that all of them support your practice (NETS\*T II B, C; III D; VI. C).
- With potential employers as your audience, you will show that you have a plan to use technology to meet the needs of diverse students in no more than 3 pages in length, using 12 points Times New Roman and double spacing (NETS\*T II B; VI C) .
- You will use APA style citation correctly (NETS\*T VI. A).

### **Definition for Diversity according to National Council for Accreditation of Teacher Education (2002. p.53)**

“Differences among groups of people and individuals based on ethnicity, race, socioeconomic status, gender, exceptionalities, language, religion, sexual orientation, and geographical area”

For this class, focus on special education. Moreover, choose your own target group within special education students.

### **Selecting Credible Sources**

Is the author affiliated with credible organization? Is the source cited in peer-reviewed journals?

Does the source refer to a number of peer-reviewed journals? Is the writing research-based or is it an opinion coming out of nowhere? What is the motive for the publication?

### **Writing for Prospective Employers as the Targeted Audience**

If you do a good job, you will have something to submit to an employer. If your writing is sloppy, you will give a bad impression to an employer. The page length is limited to three because if it is too long a person in charge of hiring is not likely to read it. Look at it from the viewpoint of someone who is going over tons of application materials. If it is easy to skim for main ideas, and if the idea is interesting, then an employer may read your writing closely. If main ideas are not clear enough so that skimming is hard, an employer may not read it. Before submitting the paper, have your classmate take five minutes to skim it: and tell you what the main points are. That is how you can gauge the clarity of writing. If you locate someone who hires for a school district and use this person’s critique to improve your work in advance, you would be able to use the process for extra credit.

### **Recommended Structure**

Introduction: identify the problem

Body: offer a solution supported by empirical evidences

Conclusion: Summarize the introduction and the body

### **Late Policy and Policy against Plagiarism**

Late submission is subject to minus 5 points per day.

If you plagiarize in any way, the score for the paper will be zero and you may be subject to expulsion from the College of Education.

### **References**

International Society for Technology in Education. (2003). *National educational technology standards for teachers: Resources for assessment*. Eugene, OR: Author

National Council for Accreditation of Teacher Education. (2002). *Professional standards for the accreditation of schools, colleges, and departments of education*. Retrieved December 23, 2005, from [http://www.ncate.org/documents/unit\\_stnds\\_2002.pdf](http://www.ncate.org/documents/unit_stnds_2002.pdf)

## Assessment Criteria

Total: 100 points

	10 points	8 points	5 points	2 points	0 point
<b>Length</b>	3 pages plus or minus four lines, double-spaced and used 12 point Times New Roman	3 pages plus or minus five to 8 lines, double-spaced and used 12 point Times New Roman	3 pages plus or minus 9 to 12 lines, double-spaced and used 12 point Times New Roman	3 pages plus or minus 13 to 15 lines, double-spaced and used 12 point Times New Roman	3 pages plus or minus 16 or more lines; is not double-spaced, does not use 12 point Times New Roman
<b>Diversity addressed</b>	Diversity and concrete plan to meet the needs addressed: plan is clear enough for immediate implementation	Diversity addressed but a plan to address diverse learners' needs is not concrete enough for immediate implementation	Diversity is addressed but a plan to address the needs of diverse learners it is still in general direction; what should be done is discussed but ways to achieve goals are missing	Diversity is addressed but the plan to address diverse learner's needs missing	Diversity not addressed
<b>Credible Sources</b>	Five or more <i>credible</i> sources used	Four <i>credible</i> sources used	Two or three <i>credible</i> sources used	One or two <i>credible</i> sources used	No sources are credible
<b>Relevance of Sources</b>	All the sources used strengthen the argument	One source is unrelated to the discussion	Two sources are unrelated	Three sources are unrelated	Four or more sources are unrelated
<b>Organization</b>	Introduction, body, and conclusion logically support one another	No clear introduction, body, or conclusion. Even though there are three parts one part <i>does not support</i> other	n/a	No clear introduction, body, or conclusion. Even though there are three parts one part <i>contradicts</i> another	No clear introduction, body, and conclusion
<b>Context</b>	Used instructional technology as the context	n/a	n/a	n/a	Does not use the context of instructional technology
<b>Theory-based practice addressed</b>	Successfully backed up practice by theories or literature	Attempted to connect theory and practice	Theory and practice are isolated	Theory or practice is mentioned but not the other	Theory nor practice is mentioned
<b>Clarity of argument</b>	Easy to skim for the main argument	n/a	It takes close reading to tell the main argument	n/a	Main points are not clear
<b>Writing Mechanics</b>	No spelling or grammar errors	One spelling or grammar error	Two spelling or grammar errors	Three spelling or grammar errors	Four or more spelling or grammar errors
<b>APA citation</b>	APA citation used correctly	APA citation used incorrectly	One or more citation missing from either body or reference section	No APA citation either in the body or in the reference section	No APA citation at all



## Appendix E: Letter of Consent



DUQUESNE UNIVERSITY  
600 FORBES AVENUE ♦ PITTSBURGH, PA 15282

**CONSENT TO PARTICIPATE IN A RESEARCH STUDY**

- TITLE:** Confidence and Willingness among Preservice Teachers to Use Technology to Support Learner-Centered Strategies that Address the Diverse Needs of Students: A Multimedia Experience
- INVESTIGATOR:** Junko Yamamoto  
Department of Secondary Education / Foundation of Education  
206 McKay Education Building, Slippery Rock University,  
Slippery Rock, PA 16057  
724-738-2313
- ADVISOR:** Joseph Kush, Ph.D.  
Department of Instruction and Leadership in Education  
327 Fisher Hall, Duquesne University,  
Pittsburgh, PA 15282-0502  
412-396-1151
- SOURCE OF SUPPORT:** This study is being performed as partial fulfillment of the requirements for the doctoral degree in Instructional Technology at Duquesne University
- PURPOSE:** You are being asked to participate in a research project that seeks to investigate your attitude about using technology to meet the needs of diverse learners. You will be asked to answer likert-type survey for three times while you attend SEFE230, Production and Utilization of Instructional Technology class at Slippery Rock University. Completing the course requirement is mandatory for you to pass this class. However, answering the survey is voluntary and refusal to do so will not affect your course grade at all. The duration of the study is October – December 2006.
- These are the only requests that will be made of you.
- RISKS AND BENEFITS:** There are no foreseeable risks or discomfort greater than those encountered in everyday life. There are no benefits for you by participating in this study.
- COMPENSATION:** There will be no compensation for participating in this study. However, participation in the project will require no monetary cost to you. There will be drawing so that three participants from this study will win \$50 gift certificate to Barnes & Noble

book store. An envelope is provided for return of your response to the investigator.

**CONFIDENTIALITY:** Confidentiality will be protected to the extent that is allowed by law. Your name will never appear on any survey or research instruments. No identity will be made in the data analysis. All written materials and consent forms will be stored in a locked file in the researcher's office. Your responses will only appear in statistical data summaries. All materials will be destroyed at the completion of the research.

**RIGHT TO WITHDRAW:** While you must complete the course requirements, you are under no obligation to participate in this study. You are free to withdraw your consent to participate at any time. Your withdrawal from this study will *not* influence your course grade in any way. Your instructor is obligated to provide quality education: treatment of students will be the same regardless of participation to this study.

**SUMMARY OF RESULTS:** A summary of the results of this research will be supplied to you, at no cost, upon request.

**VOLUNTARY CONSENT:** I have read the above statements and understand what is being requested of me. I also understand that my participation is voluntary and that I am free to withdraw my consent at any time, for any reason. On these terms, I certify that I am willing to participate in this research project.

The researcher offers to answer all of the participant's questions and concerns and the participants will be given a copy of the signed consent form to keep. If you agree to participate in this study, please sign the designated place below.

I understand that I must complete course requirements whether I choose my data to be used in this study or not. However, refusal to participate in this study will not affect my course grade in any way. I also understand that should I have any further questions about my participation in this study, I may call Ms. Junko Yamamoto at 724-738-2313 or Dr. Joseph Kush at 412-396-1151. I may also contact Dr. Paul Richer, Chair of the Duquesne University Institutional Review Board at 412-396-6326.

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Participant's Signature

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Date

---

Researcher's Signature

---

Date