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A Case Study On The Integration Of Internet Technology With Mathematics And Science Content For Teachers

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A CASE STUDY ON THE INTEGRATION OF INTERNET TECHNOLOGY
WITH MATHEMATICS AND SCIENCE CONTENT FOR TEACHERS

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Dedication

This thesis is dedicated to my husband Virgilio, who always showed love and patience during all these years. To my beautiful daughters Sara and Pilar, whose daily support will always be in my heart. To my parents Luis Fernando and Carmen del Pilar, who taught me that with love, education, and hard work everything is possible. And, last but not least to my brothers Luis Fernando, Jose Luis and Javier Jaime, with all my love.

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Abstract

This study analyzed electronic discourse in an online mathematics/science education graduate course. The intention was: a) to identify the teacher's attitudes towards using internet resources, b) to motivate teachers to integrate the use of technology and c) to study how in-service and pre-service teachers find, access, and use technology resources.

The main activities in the class were for teachers to read chapters from textbooks, post personal reflections on the chapter, search and critically assess the companion websites and read classmates' reflections. Teachers also completed Thematic Units consisting of several technology-enhanced mathematical and science integrated lesson plans.

The teachers' success was assessed by participation in class and use of online resources through personal reflections, surveys, and semi-structured interviews. The results of this study indicated that 1) developing advanced strategies for searching online resources are appropriate and effective for an online mathematics/science education class, 2) chapter readings provided good content knowledge about reform, innovative, constructivist pedagogy that helped develop strategies for internet searching, and 3) on average 88% of the participants became more active and efficient in finding relevant and meaningful online resources, revised their pedagogical approaches, and changed their habits of mind as related to the use of technology resources in their teaching

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Introduction

1.1 BACKGROUND

The use of technology has become a necessity in our society. Being literate in technology is no longer a luxury; it is a critical 21st century skill our children must have to successfully participate in an educated workplace. Many areas of knowledge evolve continuously, and this amount of information requires the assistance of automated tools. We encounter these as daily life tools: smart-phones, GPS systems, smart appliances, up to the modern knowledge bases accessible through the internet. Therefore, we need to be more efficient when using the internet resources that are already here. Most training given to classroom teachers is more related to administrative use rather than academic (Tuck, 2008). That is why it is very important to guide our pre-service and in-service teachers' best practices in the use of internet resources for academic purposes, while they are attending classes in the university.

1.2 DESCRIPTION OF THE STUDY

This study collected data from 26 in-service and pre-service teachers (14 during Spring semester 2008, plus 12 during Spring 2009) enrolled in: Early Childhood Education (ECED 5354): Development of Math and Science Concepts in Young Children. This class was offered online, through the UT TeleCampus Blackboard™ platform. The researcher wanted to assess the teachers' approaches to finding, accessing and using internet resources while teaching mathematics and science. The purpose of the course is to help pre-service and in-service teachers design effective mathematics and science lessons in elementary grades by integrating internet technology. This class was part of the Alternative Teacher Certification Program (ATCP) and it also gives credit towards a Master in Education program. The class is offered through UT TeleCampus and students are located all around Texas. At the beginning of Spring 2008 77% of the participants were in El Paso region, and the rest were in Burnet, Friendswood, and Monahans. At the beginning of the Spring 2009 74% of them were in the metropolitan area of El Paso, and the rest were in New Braunfels, Marlin, Fort Hancock and Odessa.

Teaching a graduate class about basic mathematics and science concepts online leads to a natural incorporation of activities, including exploration of mathematics and science resources available online.

Teachers were provided with modules that were intended to be covered on a weekly basis. The main activities were to:

- 1) Read chapters from the required books (weekly).
- 2) Post a personal reflection on the chapter (weekly).
- 3) Search the companion websites (provided with the books) and post their selected websites together with critical assessment of it (weekly), and
- 4) Read and comment at least 2 of their classmates' reflections (weekly).
- 5) Create a final project, a Thematic Unit, which required the creation of several innovative, technology-enhanced mathematical and science lesson plans that integrated the use of technology along with different content areas.

The class was designed to have high computer driven interaction of both teachers with teachers, and teachers with instructor(s). All teachers participated in pre and post surveys and a sample also did a semi-structured interview.

For the sake of simplicity, the researcher defines the pre-service and in-service teachers as the participants in the study. The in-service teacher's pupils are referred to as students.

1.3 RESEARCH QUESTIONS

1. – How did pre-service and in-service teachers' attitudes toward using internet resources for teaching mathematics and science change during semester they took "Development in Math and Science for Young Children" ECED 5354 class?

2. – How do teachers (pre-service and in-service) search the internet, and what type of internet resources do they select to use in their teaching?

1.4 SIGNIFICANCE OF THE STUDY

There are certainly many technology tools available currently for teachers of mathematics and science. In-service and pre-service teachers, with whom we worked in "Development in Math and Science for Young Children", need experiences in evaluating and using technologies. Teachers should

clearly understand why teachers prefer to use this or that type of internet materials because they would be more effective tailoring them to their courses.

The researcher believes that this study could be the first step for most of the teachers in terms of incorporating technology in their classroom. The methodology used in this study focused on the effective integration of content, pedagogy and technology; not just the technology.

1.5 LIMITATIONS

Teachers' attitudes towards the use of technology were an important factor. Since the beginning of the semester both classes showed a clear desire or lack thereof, of looking at, assessing and using various websites. While the Spring 2008 class was ready to start with the activities, Spring 2009 class demonstrated more resistance to perform the internet searches through their postings on Blackboard.

The data collected in this study was obtained from teachers' self-reported work; including postings, surveys, interviews and emails to the instructors. The research did not make observations of the participants' doing the reported work.

1.6 ORGANIZATION OF THE STUDY

This chapter presents an introduction to the problem and general outline of the study. Chapter 2, the review of the literature, focuses on integration of technology, barriers encountered by teachers, and what has been done regarding the lack of technology in the classroom. In Chapter 3, the methodology of the study is offered. Chapter 4 reports analysis and results, and Chapter 5 presents the conclusions and issues for future study.

Literature Review

This chapter will focus on presenting a summarized review of the literature related to the research questions of this case study. The chapter will start with a statement of the importance of the integration of technology in the classroom. Second, the chapter will identify what research has been done exploring why teachers have not integrated technology with their teaching. Third, the chapter will review some attempts to increase the use of technology. Finally, the chapter will present the theoretical frameworks used for this study.

2.1 INTEGRATION OF TECHNOLOGY IN THE CLASSROOM.

Since the beginning of computer availability, research shows that teachers have wondered about the potential of this technology and its impact in the classroom. Not only is it believed that the use of technology can help to engage students, develop critical thinking skills and improve the students' results on standardized tests, but it also is seen as able to provide that which otherwise would not be possible, such as virtual field trips, videoconferencing with experts, etc. The idea that this technology will have an impact in students' lives has the government spend millions of dollars in buying equipment and implementing plans to reduce the lack of technology within the schools (Hew & Brush, 2007).

On "The School of the Future: Lesson in Failure", Stansbury summarizes a series of panels presented by the American Enterprise Institute in 2009. During this presentation several issues were highlighted as learning lessons, regarding the high use of technology. "...We've learned a great lesson here: that no matter how much money and technology you pour into something, it's really the people [who] matter." (Stansbury, 2009). Research shows that it is up to a well trained teacher to use the technology in such a way that it can improve students' performance, attitudes about themselves, and learning about their changing environments. The technology itself will not make the change (Earle, 2002). In order to be able to make use of technological resources, teachers need experiences using and evaluating those that are available, and deciding which one is the appropriate to use in a specific content area (Johnston, 2009).

National and International organizations have added the priorities that technology should have in today's education at schools. The International Society for Technology in Education (ISTE, 2010) mentions the top ten priorities for the year 2010. Some of them are:

1. **Establish technology in education as the backbone of school improvement.** To truly improve our schools for the long term and ensure that all students are equipped with the knowledge and skills necessary to achieve in the 21st century, education technology must permeate every corner of the learning process...

4. **Continuously upgrade educators' classroom technology skills as a pre-requisite of "highly effective" teaching.** As part of our nation's continued push to ensure every classroom is led by a qualified, highly effective teacher, we must commit that all P-12 educators have the skills to use modern information tools and digital content to support student learning in content areas and for student assessment. Effective teachers in the 21st Century should be, by definition, technologically savvy teachers.

5. **Invest in pre-service education technology.** Teacher preparation is one of the most important aspects of a world-class 21st Century system of education and learning. A federal investment in a new, technology-savvy generation of teachers is critical. To ensure their success in the classroom, pre-service teachers must be prepared to use technology and integrate it into the curricula before their first day as a teacher of record.

The National Council of Teachers of Mathematics has several principles that provide guidance to teachers and administrators when making decisions about teaching math. The Technology Principle states that:

Technology is a fundamental component in order to help students to achieve high order thinking skills. Technology is reshaping our world with tools such as computers and calculators, the mathematics classroom should reflect these changes as well. Students can learn more mathematics more deeply with the appropriate use of technology... Technology also offers options for students with special needs (NCTM, 2002-2004).

The National Science Teacher Association provides that technology is a very important part of the scientific learning. Today's job market looks for people who show advanced skills, such as the proper use of technology (National Research Council (U.S.), 1996).

Besides the National Standards, State education agencies recognize the importance of technology in education. For example the Texas Education Agency (TEA, 2009) has created a series of standards that requires schools to include technology as part of the curriculum, based on the impact it has in today's world.

2.2 BARRIERS ENCOUNTERED BY TEACHERS TO INTEGRATE TECHNOLOGY.

Many studies, reports and research papers show several reasons why teachers do not integrate the technology directly with their teaching. Several have found that the teacher's influence in the classroom is critical in the integration of technology. The challenge for teachers is not just being able to use technology in their classroom but, to integrate its use within the content areas (Zhao & Frank, 2003). The research shows that very little is known about how in-service and pre-service teachers find, access, and more importantly, how they evaluate the technology resources. Johnston states in his dissertation, "However, because it is available does not mean it is appropriate" (Johnston, 2009).

Farnsworth and his colleges, mention in their study (Farnsworth, Shaha, Bahr, Lewis, & Benson, 2002), that students will not perform better only because they were exposed to technology. Students need to master the tools before having more pressure put on them. Even though computers and internet access are available in schools, they do not necessary lead to a better student performance. There is not enough evidence to claim that access to technology will enhance, for example, standardized test results (Inan & Lowther, 2009).

People inherently resist to change, and schools as a social organizations also prevent the rapid adoption of a technological approach to education because it implies a change in their current practices. Some studies mention reasons such as limited classroom space, desks' size versus the bulky size of computers, the unwillingness of the teachers to take the students to the lab and the short periods of 45 minutes that will not allow the students to have a meaningful experience. Moreover, the teachers'

attitudes toward their own expertise will affect the use of the technology. If the teachers do not have a positive experience and opinion about it, they will not use it in teaching. To compound the problem, constant technology change, unreliability and the lack timely support makes teachers less eager to use it (Tuck, 2008; Zhao & Frank, 2003).

Teacher's attitudes can prevent them from using the technology. They feel the use of a computer as a threatening experience due to its complexity. Also, they perceive technology as a tool that will not support their teaching style and do not see the technological resources useful [as intended]. The training offered by school districts is mostly related to administrative tasks (Mansureh, Atsusi, Wendi, & Renee, 2009; NEA, 2008; Tuck, 2008).

Teachers say that even though their classrooms are connected to the internet, they do not feel prepared to integrate its use in their lessons. Besides the lack of training and technical support, they mentioned not having enough equipment/software and that the ones they have are obsolete. These reports state once again that teachers are using the technology for administrative use (Lewis, et al., 1999; Mumtaz, 2000; Wilson, Notar, & Yunker, 2003). Security is becoming an important concern when using online resources and other studies show that if teachers do not have the resources to keep the students safe while using the internet, they will not use it (Mansureh, et al., 2009).

2.3 ATTEMPTS TO INCREASE THE USE OF TECHNOLOGY

Peggy Ertmer (Ertmer, 2005) considers that in order to persuade teachers to use more technology in their classrooms it is necessary to change some of their beliefs. She proposes the following strategies to accomplish this:

- a) Personal experiences. Teachers need to have simple experiences that will not reflect a great change in their teaching practices. If these experiences can get a change in teachers' beliefs, it has been argued the change in practice will follow.
- b) Vicarious experiences: Teachers will make more use of technology if these actions are modeled by their mentor teachers, or supervisors. Research shows that this has not been the case, because most pre-service teachers do not use the technology during their field

experiences, and do not work under master teachers (or supervisors) that can advise them to use it (Moursund & Bielefeldt, 1999).

- c) Social-cultural experiences: "... teachers' practice is more likely to change as they participate in professional communities that discuss new materials, methods, and strategies, and that support the risk taking and struggle involved in transforming practice." (Ertmer, 2005). Ertmer presents this type of experience, as one where the teachers feel comfortable around a group of their peers. In this group they can share personal opinions about technology and encourage each other to take risks.

A strategy that is believed to obtain better results, when trying to engage teachers in the use of technology is "to introduce teachers to the types of technology uses that can support their most immediate needs" (Ertmer, 2001). The same strategy was used by the researcher in her study.

Since computers entered the classrooms the focus has been on letting the students have access to outside information, instead of specific academic achievement. Some differences arise from teachers and superintendents perspectives, while the first group claim we need more computers, the second one, asks for more teacher preparation to use the technology. "Change starts with the individual teacher, who, upon catching the vision, is willing to take risks, to experience Christopherian confrontations or encounters (Gardner, 1991) in rethinking teaching and learning, and to model for and be a mentor to peers." (Earle, 2002).

"Technology cannot replace the mathematics teacher, nor can it be used as a replacement for basic understandings and intuitions. The teacher must make prudent decisions about when and how to use technology and should ensure that the technology is enhancing students' mathematical thinking." (NCTM, 2002-2004) (M.L. Niess, 2005).

Through the "Enhancing Education through Technology" (Education, 2010) program, school districts are using federal resources, not only to acquire more technological tools such as electronic whiteboards and video equipment, but to train their teachers in the use and integration of the technology into their teaching. "... Ms. Herdman envisions such a transformation in North Kansas City. "It's no

longer going to be ‘Turn to page 10 and look at this,’ she says. It’s more collaborative work, the learning style is inquiry-based, and the teacher is guiding, facilitating learning rather than lecturing. It’s about teaching the curriculum using technology as your vehicle.” (Marie, 2009).

2.4 THEORETICAL FRAMEWORK

A pedagogy and content knowledge relationship was suggested in 1986 by Dr. Lee Shulman. He argued that teachers should possess a special type of knowledge that could clearly incorporate not only their content knowledge but “how to teach” (pedagogical aspect) as well (Shulman, 2008). This idea has been used extensively in the education field, from adding items related to pedagogy to teacher tests to the most recent one: technology, pedagogy and content knowledge (TPACK).

Since hardware and software change constantly and rapidly, it is necessary to provide the pre-service (and in-service) teachers with experiences that increase decision-making skills, regarding the incorporation of technology into their teaching. The focus should not only be in technology, but pedagogy and content as well. It is there where the understanding of the interactions TPACK has to be reasonable to the teacher (Cavin, 2007). Several researchers describe practices of working with pre-service and in-service teachers who integrate technology into teaching math, science and engineering, using TPACK framework (Kosheleva, Medina-Rusch, & Ioudina, 2007).

Niess (M.L. Niess, 2005) and Mishra (Mishra & Koehler, 2008) proposed a model, TPACK (previously known as TPCK) as the knowledge teachers need to comprehend in order to effectively integrate technology into their teaching. They define “good teaching” as the relationship of the three components: Technology Knowledge, Pedagogy Knowledge and Content Knowledge, as shown in Figure 2.1.

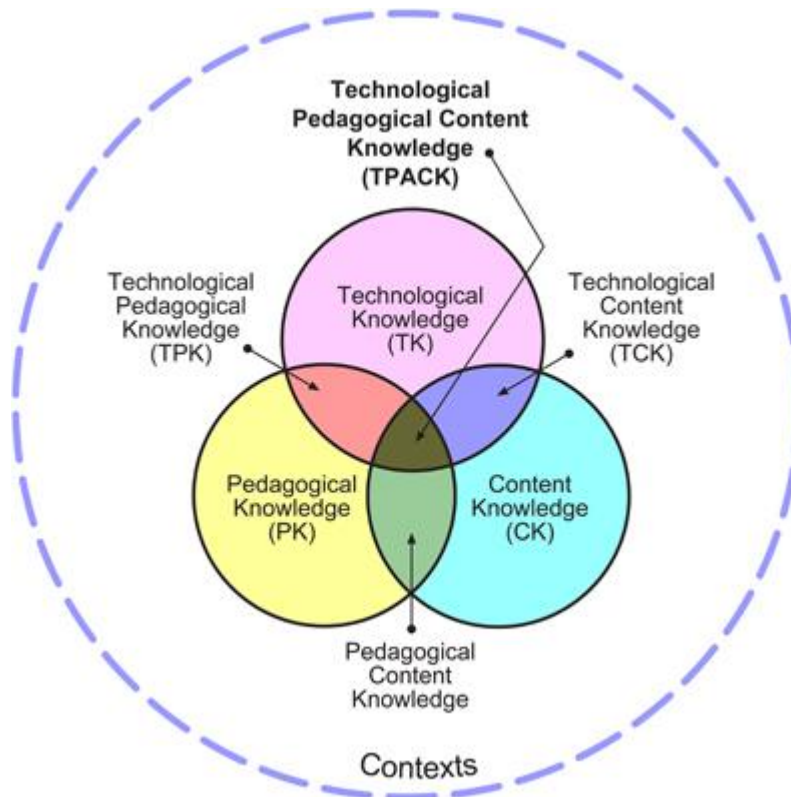


Figure 2.1: TPACK Framework and its knowledge components (Koehler & Mishra, 2008).

The authors define the different areas as follows:

A) Technology Knowledge (T or TK) is the knowledge of the current technology. If we use digital technology, then this would involve understanding not only the use of certain programs but also computer hardware, installing and upgrading software, maintaining files, etc. What it means, in other words, is constantly catching up with evolving technologies.

B) Pedagogical Knowledge (P or PK): Comprises understanding of the teaching and learning processes. “A teacher with deep pedagogical knowledge understands how students construct knowledge and acquire skills; develop habits of mind and positive dispositions towards learning.” (sic)

C) Content Knowledge (C or CK): This is the knowledge about the subject matter that is going to be taught or learned.

These three components are represented by circles that overlap with each other (Figure 1.1), the

intersection of the three represents “...how and when to use technology within the context of a rich [subject matter] learning environment.” (Johnston, 2009).

The TPACK framework has been used by several researchers while working with pre-service and in-service teachers preparing in the Science Technology and Mathematics (STEM) field (Gonzalez & Kosheleva, 2006; Margaret L. Niess, et al., 2008; Olive, et al., 2010).

With the rapid changes that technology suffers, teachers find themselves many times in front of certain tools that were not designed for teachers’ use. However, if educators can repurpose the final use of these technologies, it is possible to integrate them to the daily classroom experience (Mishra & Koehler, 2009). Mishra and Koehler offered three examples as repurposed technological tools: - microblogging for interchange of ideas between students, - specialized search engines that can help students visualize and arrange the results in groups, and even - DJ software that is being use in math lessons. They in no way mean that technology should guide pedagogy, but make a clear point when they say that with the rapid changes technology has, we encounter a new kind of knowledge that educators need to integrate.

These authors consider some of the barriers certain teachers may encounter, such as a limited amount of time in the computer lab a few days a week, firewalls or restrictions to the websites they could access: “... in this context, the issue is not to argue whether or not these restrictions are good or bad but rather something to consider when making curricular and pedagogical decisions.” - Teachers, they say, need to develop a willingness to play with technologies and openness to build new experiences for students.

2.5 RESEARCH IMPLICATIONS

The literature review focused on 4 areas:

- 1) Integration of technology in the classroom,
- 2) Barriers encountered by teachers in their attempts to integrate technology,
- 3) Attempts to increase the use of technology and
- 4) The theoretical framework of this study.

The literature review suggests that the government and professional associations recognize the importance of technology literacy for students; therefore the teachers should be able to accomplish such task. Teachers had been unable to comply with these objectives due to many barriers previously identified. Even though programs have attempted to remove some of those barriers, it remains an issue that involves teachers' abilities to integrate technology into their teaching.

Based on the frameworks previously reviewed, the researcher attempted a series of class modifications to address the teachers' personal beliefs, and consequently change their practice. The final results have been published in a journal (P. Gonzalez & Kosheleva, 2010).

Methodology

3.1 INTRODUCTION

The idea of this study started with the recognition that there are abundant technologic resources available for teachers but that these are not exploited to their fullest potential. The researcher wondered why this was true and through a literature review, the primary reason appeared to be the lack of teachers' exposure to TPACK. In other words the pedagogy, content, and technological knowledge have not been fully integrated by the teachers into their daily practice.

The researcher decided to do a qualitative study with the goals described below, and believes that this could be the first step for many teachers to incorporate internet technology in their classroom.

- 1) Explore the processes (Stake, 1995) followed by teachers to learn the use of internet resources for instruction.
- 2) Identify how the teachers' attitudes changed toward the use of technology in the classroom during this process.
- 3) Enhance the teachers' abilities to search for and choose good websites they could integrate into math and science.

3.2 PARTICIPANTS AND SETTING

Participants in this case study were 26 in-service and pre-service teachers (14 during Spring 2008 and 12 during Spring 2009) enrolled in Early Childhood Education (ECED) 5354 "Development of Math and Science Concepts in Young Children". This class was offered by the University of Texas at El Paso online through the UT TeleCampus Blackboard™ platform. The teachers were physically located all around the state of Texas. At the beginning of Spring 2008 77% of the participants were in El Paso region, and the rest were in Burnet, Friendswood, and Monahans. At the beginning of the Spring 2009 74% of them were in the metropolitan area of El Paso, and the rest were in New Braunfels, Marlin, Fort Hancock and Odessa.

The participants were enrolled in the ATCP program or pursuing a master's degree in Education. The description for this course was: "In this class you will study concept development in math and

science of young children (birth-4th grade) and the teaching strategies necessary for fostering this concepts development at each developmental stage of learning during this important time in the life of a young learner” (Kosheleva, 2009). During this course teachers were exposed to knowledge about reform, innovative, constructivist pedagogy.

Table 3.1 shows the participants information regarding their education, working status and technological resources available to them.

Table 3.1: Participants’ information

	Spring 2008	Spring 2009
Pre-service / in-service teachers	11 / 3	9 / 3
Bachelor’s degree in Education	4	6
Bachelor’s degree Liberal Arts	5	1
Bachelor’s degree in other area	5	5
Received training to use internet resources more efficiently, prior to this course.	9	5
Have technological resources to use internet in their classroom.	11	8

3.3 INSTRUMENTS

Yarosh presented an article (Yarosh & Guzdial, 2007) with a methodology to evaluate the results of an intervention on one of the courses she and Guzdial taught. The process consisted of three major steps. They applied a general survey to the entire class halfway through the semester, based on these results they formulated a semi-structured interview that applied to 7 students during the last quarter of the semester and finally they applied a post-survey to the entire class in order to validate their hypothesis. Based on this methodology the researcher designed her own assessment instruments and decided to follow Yarosh methodology while designing some of the instruments that would assess the results for the class. Three instruments were administered to, and collected from, the participants to obtain direct information. The questions involved in the surveys and interviews were specifically

designed to obtain a sense of the teachers' background, interests, beliefs and the availability of internet resources. Additionally, the weekly activities were analyzed to extract indirect information.

The researcher administered anonymous pre and post online surveys (see Appendix A and B for a copy of these instruments). The purpose of the pre-survey was to reveal the teachers' background before the class. For that reason the researcher divided it into the next categories:

- 1) **Participants' background.** This is information pertinent to certification status, education background, working status and student classification. (ATCP vs. Master degree seeking)
- 2) **Participants' technology resources.** The availability of hardware and software plus previous training regarding technology.
- 3) **Interests in teaching specific content area.** Teachers were asked how many days per week they taught math and science before and after the class.
- 4) **Teaching with internet technology.** Usage of technology for teaching. Description of teaching activities used.

The purpose of the post-survey was to reveal the impact this course had on the teachers' attitudes and abilities upon the use of internet resources. Therefore the categories for the post-survey included:

- 1) **Interests in teaching specific content area.** How many days per week did the teachers teach math and science.
- 2) **Teaching with internet technology.** Usage of technology for teaching. Description of teaching activities used.
- 3) **Impact of the class in the TPACK implementation.** Teachers' impression on the class objectives, and beliefs on their own abilities to use TPACK.
- 4) **Personal interaction.** Level of interaction in an online class; students with students and students with teacher.

Table 3.2: Question categories in each survey

Category	Questions used in each survey			
	Pre-survey 2008	Pre-survey 2009	Post-survey 2008	Post-survey 2009
Participants' background	Q1 – Q6	Q1 – Q6		
Participants' resources	Q7 – Q11	Q7 – Q11		
Interests in teaching specific content area	Q12 – Q13	Q12 – Q13	Q21 – Q22	Q1 – Q2
Teaching with internet technology	Q14 – Q20	Q14 – Q20	Q23 – Q29	Q3 – Q9
Impact of the class in the TPACK implementation			Q30 – Q35	Q10 – Q15
Personal interaction			Q36 – Q37	Q16 – Q17

The second instrument used to collect direct information was an interview for self-selected teachers, (see appendix C for a copy of this instrument). The participants who agreed to do the interview signed a consent form which along with the IRB form were done before the beginning of this study. The purpose of this interview was to clarify as much as possible, the process the participants went through when searching for the websites they posted on the Discussion Board. This interview was designed to collect direct information related to the research questions, and the dynamic of the online class.

Besides the use of those tools, several intertwined activities involving weekly class assignments were designed to collect indirect information. Students were provided with modules intended to be covered on a weekly basis. These modules were comprised of the following activities:

- 1) Read chapters from the required books (Charlesworth, 2007; Van de Walle, 2007).
- 2) Search the companion websites from the textbooks, explain the search strategy, and submit their selected websites together with its critical assessment.
- 3) Submit personal reflections on the chapter(s). In these reflections we asked the students to express their own experience as teachers in the classroom, or their experience as students if they were not teaching yet.
- 4) Read and comment upon at least 2 of their classmates' personal reflections.

The final project was to design a Thematic Unit. It required construction of several innovative, technology-enhanced mathematical and science lesson plans that integrated the use of internet technology along with different content areas.

The following table associates the different instruments with the corresponding research questions. The pre-survey was used to make a baseline and compare later with the post-survey.

Table 3.3: Research Questions and Data Sources

	Research Question 1	Research Question 2
Pre-survey	Baseline	✓
Post-survey	✓	✓
Interview	✓	✓
Weekly activities	✓	✓

3.4 PROCEDURE

The course ECED 5354 was selected during Spring 2008 and 2009 to apply the instruments previously described and to get answers to the research questions. The researcher was the teacher assistant for both courses, while Dr. Olga Kosheleva was the instructor of record. This online class had several logistic advantages that could be used to benefit the research. First, teachers already had content knowledge in math and science; second the class would provide most of the pedagogy and third it was assumed that teachers had at least a minimum internet technology background in order to take an online class.

The course employed the Blackboard capabilities to present a unified portal integrating all the elements to conduct the class. The included an announcement area, calendar of weekly activities, the course syllabus, course materials, and the discussion board. Outside this platform, we used the UTEP email system to have individual communication. Additionally, WebCT provided the functions to apply the anonymous pre and post-surveys. During Spring 2008, some of the interviews were conducted

through a telephone conference. At the beginning of the semester, we sent an email inviting the teachers to be interviewed for this research. Those who agreed were sent the consent form that later was faxed back to the instructor.

The entire semester was divided in sets of weekly modules as described earlier. During 2008, the class was required to answer the pre and post-survey approximately two weeks before the end of the semester. Even though both instruments were applied simultaneously, the questions were clearly indicated to refer to their experiences and procedures BEFORE and AFTER taking the course. During April 2008 self-selected participants were interviewed by the teacher assistant; some of these interviews were done through a telephone call, however some participants had schedule conflicts and decided to respond via email.

During Spring 2009, the pre-survey was applied during the first month of the semester and the self-selected participants submitted the interview answers via email. All the other activities remained the same as 2008.

3.5 DATA COLLECTION AND ANALYSIS

All the collected information was analyzed in the subsequent summers. This involved consolidating the survey responses into Excel spreadsheets and charts, identifying patterns in the interview answers, and on the weekly online submissions.

Results

4.1 PRELIMINARY RESULTS

The interviews were conducted in the middle of the semester, while the surveys required the post-survey to be completed at the end. Therefore the researcher was able to do a preliminary analysis of the interviews without having the surveys data. The preliminary results of this study have already been presented in several conferences such as 1st Summer International Conference on Education at UTEP, 2009 International Sun Conference on Teaching and Learning at UTEP and Constructing Knowledge in Mathematics with Technology: Abstracts of the 13th Asian Technology Conference in Mathematics at Bangkok, Thailand (P. Gonzalez & Kosheleva, 2008, 2009; Kosheleva & Gonzalez, 2008) indicating that:

1. Developing advanced strategies for searching online resources are appropriate and effective activities for an online mathematics and science education class.

Since the teachers were already taking this online class; the researcher developed this intervention to have them make the most out of the internet resources, which would help them to better deliver content while having students not only engaged but exposed to the use of the internet.

For example one of the participants reported during the interview how her attitude toward internet resources changed during the semester:

They [her attitudes toward internet] have improved, because like I said when we started this class thought: Why do have to do ALL this work, who cares? I was like the grouchy, lazy student. But now I know it was a worthy investment. It was something like I thought that Dr. Kosheleva encouraged doing because she knew what benefits it would have. So, I'm appreciative to that she made us do it because she changed our attitude. Now if I need to do something that I don't have any information at hand. I will just look for it. (sic)

2. Chapter readings provided good content knowledge about reform and innovative, constructivist pedagogy that helped develop strategies for internet searching.

Teachers mentioned that their search for internet resources was facilitated by reading the chapters first. After they read, they knew what they really needed for their students. During the Spring

2009 semester, we asked the teachers not only to look for the websites they could use with the specific weekly chapter, but to also define their criteria when searching. “What I did is I read the chapter and whatever information I thought it was important to reflect on, I searched the websites for that.” (sic)

The teachers who participated during the semester Spring 2008 class, made use of the companion websites that the textbooks provided. During the semi-structured interview, 4 of the 5 teachers who answered mentioned that they used these websites. Since the companion websites are divided by chapters, they thought that it was easier to look into the recommended sites first. The fifth teacher mentioned that the tool she was using was Google.

Even though the teachers who participated in the Spring 2009 class expressed that the companion websites were not as useful as they thought, they realized that when searching through the internet they need to be careful with the keywords they used. The following comment from a participant illustrates this: “I tried narrowing my search by using key words from the chapter.”

3. As evidenced by final surveys, most of the students became more active and efficient in finding relevant and meaningful online resources for teaching mathematics and science in elementary grades. One of the participants shared this comment: “Fortunately, I became a better web surfer over the course of the semester. I will say that the search is anything but efficient; however, I am hoping that implementing the ideas will make instruction more efficient.”

4.2 INTERVIEW ANALYSIS FROM SPRING 2008 AND 2009

The questions 1,3,5,6 and 7 address directly topics related to the research question 1, “How do teachers (pre-service and in-service) search the internet, and what type of internet resources do they select to use in their teaching?”

Answers from the question 1 shows that the two main strategies used here were the textbooks companion websites and Google™. If the results from the companion websites were not liked by the teachers, they then would use Google with specific keywords. During 2008 teachers made extensive use of the companion websites; however, during 2009 they were found not as helpful. This new semester used more Google, Yahoo™ and Ask®, besides the help from their teachers and colleagues.

From question, 3 the researcher learned that during 2008 the criteria the teachers used to search for the websites were a) age level or grade level and b) the criteria they learned after reading the chapters. Two teachers mentioned that after searching for grade level, they then directed their attention to a specific content area. During 2009 one participant clearly stated the evolution of her search criteria. She mentioned that initially she was searching for entertaining and visually stimulating websites, however after a while she changes to search for grade level activities from which her students would receive some benefit. It was during this semester that participants expressed their criteria that overcame the roadblocks that literature review already identifies. Teachers searched for free websites, unblocked by the school district, self-explanatory ones, related to their immediate lessons and tied to the Texas Essential Knowledge and Skills Standards (TEKS).

With question 5, the researcher found the teachers' favorite websites, however some teachers simply named the website without explaining why. Some reasons they mentioned are that websites were divided by content and grade level, contained a large amount of valuable information and the last one is seen as a direct application into that classroom. During 2009 teachers expressed their appeal for websites that pertained mostly to math, and that included the use of virtual manipulatives.

When answering question 6, only two teachers during 2008 complained about websites that required paid membership to access them. However, during 2009 reasons expanded to include such as "no user friendly", "cluttered", "not showing when an answer is incorrect". The researcher gave the participants a second opportunity to explain how they found internet resources in question 7. Two of them mentioned companion websites and their classmates' postings, the other 5 teachers mentioned Google™ with specific keywords from the chapter readings, 2 other sources were their employers and from other classes.

Questions 2, 4, 8, 9, 10, 11, 12, 13 and 15 address directly topics related to the research question 2 "How did pre-service and in-service teachers' attitudes toward using internet resources for teaching mathematics and science change during semester they took ECED5354 "Development in Math and Science for Young Children" class?". Based on the participants' responses, the researcher found that:

- **Several participants mentioned that they learned there is a vast amount of information;** however, 2009 teachers were more critical. They said that just because it is available does not mean it is good information. Two other participants mentioned that you have to have a clear idea of what you are looking for. The researcher assumed that the last comment is based on the fact that, indeed, there are a large number of resources.
- **In-service teachers are using internet resources in their daily teaching;** two pre-service teachers plan to use them in the future. A pre-service teacher made an interesting statement indicating she was compiling a word document with all the links to the websites she would use later.
- **9 of the participants felt at least comfortable regarding their knowledge in searching for these resources.** 5 participants said they felt confident (our highest level) and 4 felt comfortable (next to confident) 1 needs help and another one is unsure.
- **All the teachers agreed that this ability of knowing how to search and use these internet resources is a benefit.** The in-service teachers shared some experiences while using these tools with their students. All of them agreed that is very important for teachers to be familiar with these resources and some of them mentioned specific situations which proved how important this can be for a teacher. One example was that there are plenty of already developed lesson plans, and the second one was that she could easily incorporate this into her ESL classes. The researcher believes that if the teachers can see the immediate use of these tools, the easier will be for them to adopt them. Teachers from 2009 made several statements related to the importance of being able to engage the students, and moreover to train the students of the future.
- For question 12, regarding changes in teaching practices in a scale 0 to 10, two teachers made comments about the importance of being computer literate, but did not answer the question, the other nine participants said: 10, 10, 9, 8.5, 8, 7, 5 and 0. These results make me realize that there was at least such an impact that made the teachers think about this.

- **Question number 13 was a crucial one in analyzing the possible changes in attitude.** Two participants mentioned that their attitudes changed by learning how vast the internet resources are; one of these two said that now she uses internet resources on a daily basis. Another teacher stated that her confidence in searching and using the resources increased after taking this class. A pre-service teacher realized internet resources are a useful tool. Another change came from two teachers who went from a negative perspective (is an overwhelming task), to a positive enthusiastic one. Several mentioned that they are more aware of the technology in the classroom and they are willing to try new methods.
- **When asked “How many times a week did you search online resources before you took this class?”** the responses were grouped in opposite directions. Some of the participants did not make extensive use of the internet resources because they were new teachers and had little exposure to the resources. On the other hand, there were some experienced participants that used internet resources extensively.
- Several interesting comments came from their answers to question 15. Not only they are aware of the large number of useful resources in the internet, but they realize it is very important to make sure the source is a reputable one. Besides that, another participant mentioned that some of the websites helped her to make sense of the educational standards, as she prepares to take the competency test for her teacher certification. **Participants realized that more refined searches, were more beneficial, looking not only for something friendly, but for something that would benefit their students.**

Answers from questions, 16 and 17 were not used in this study. They were included in the survey by the class instructor to provide further insight of the students’ perception of the class dynamics.

4.3 SURVEYS 2008 AND 2009 RESULTS

After the teachers took the class and answered to both pre-survey and post-survey, the researcher analyzed survey results. Different questions tried to show the changes in practices, attitudes and confidence level that teacher had after taking the class.

Before taking the course 36% of the teachers from 2008 and 58% from 2009 semesters did not have any training related to technology. See figure 4.3.1

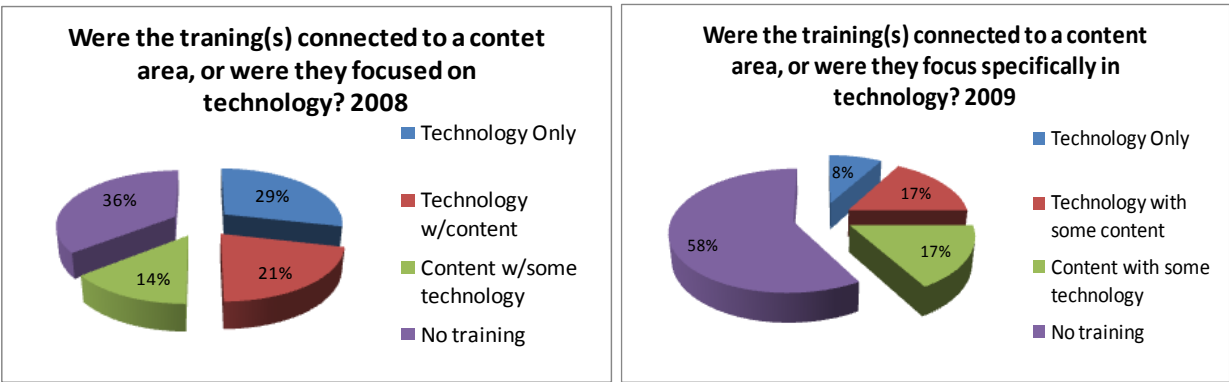


Figure 4.3.1: Previous technology training with 2008 and 2009 results

For **Spring 2008** Figure 4.3.2 and Table 4.3.1 show the number of days the teachers taught with technology before and after taking the class. After taking the class teachers tended to use technology during more days per week.

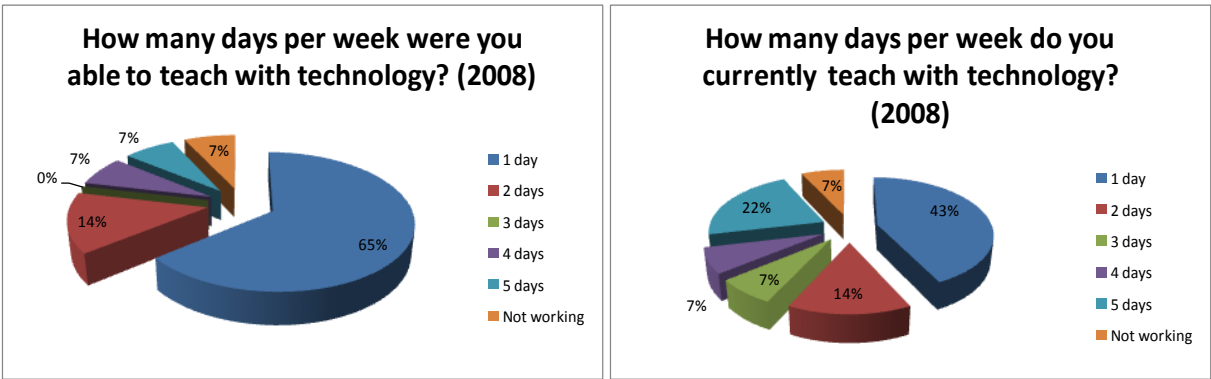


Figure 4.3.2: Use of technology, before and after taking the class in Spring 2008

A better result means a teacher used technology more days per week. In this specific case, the researcher found that more teachers used technology 5 days a week, showing a shift from 1 day per week towards 5 days per week.

Table 4.3.1: Change of number of days per week when teachers used technology in their practice

Number of days per week teachers used technology.	Percentage of participants before taking the class	Percentage of participants after taking the class
1 day per week	65%	43%
2 days per week	14%	14%
3 days per week	0%	7%
4 days per week	7%	7%
5 days per week	7%	22%
Teachers not working	7%	7%

For **Spring 2009** Figure 4.3.3 and Table 4.3.2 show the number of days the teachers taught with technology before and after taking the class. After taking the class teachers tended to use technology during more days per week.

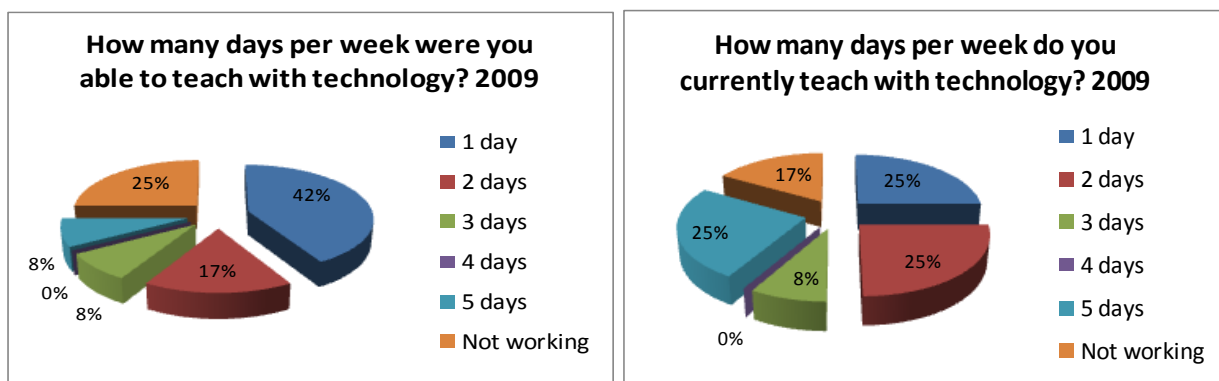


Figure 4.3.3: Use of technology, before and after taking the class

Table 4.3.2: Change of number of days per week when teachers used technology in their practice

Number of days per week teachers used technology.	Percentage of participants before taking the class	Percentage of participants after taking the class
1 day per week	42%	25%
2 days per week	17%	25%
3 days per week	8%	8%
4 days per week	0%	0%
5 days per week	8%	25%
Teachers not working	25%	17%

A better result means a teacher used technology more days per week. In this specific case, the researcher found that more teachers used technology 5 days a week, showing a shift from 1 day per week towards 5 days per week.

For both semesters Figure 4.3.4 and Table 4.3.3 show the level of interest the teachers had in searching for good math activities, before and after taking the class.

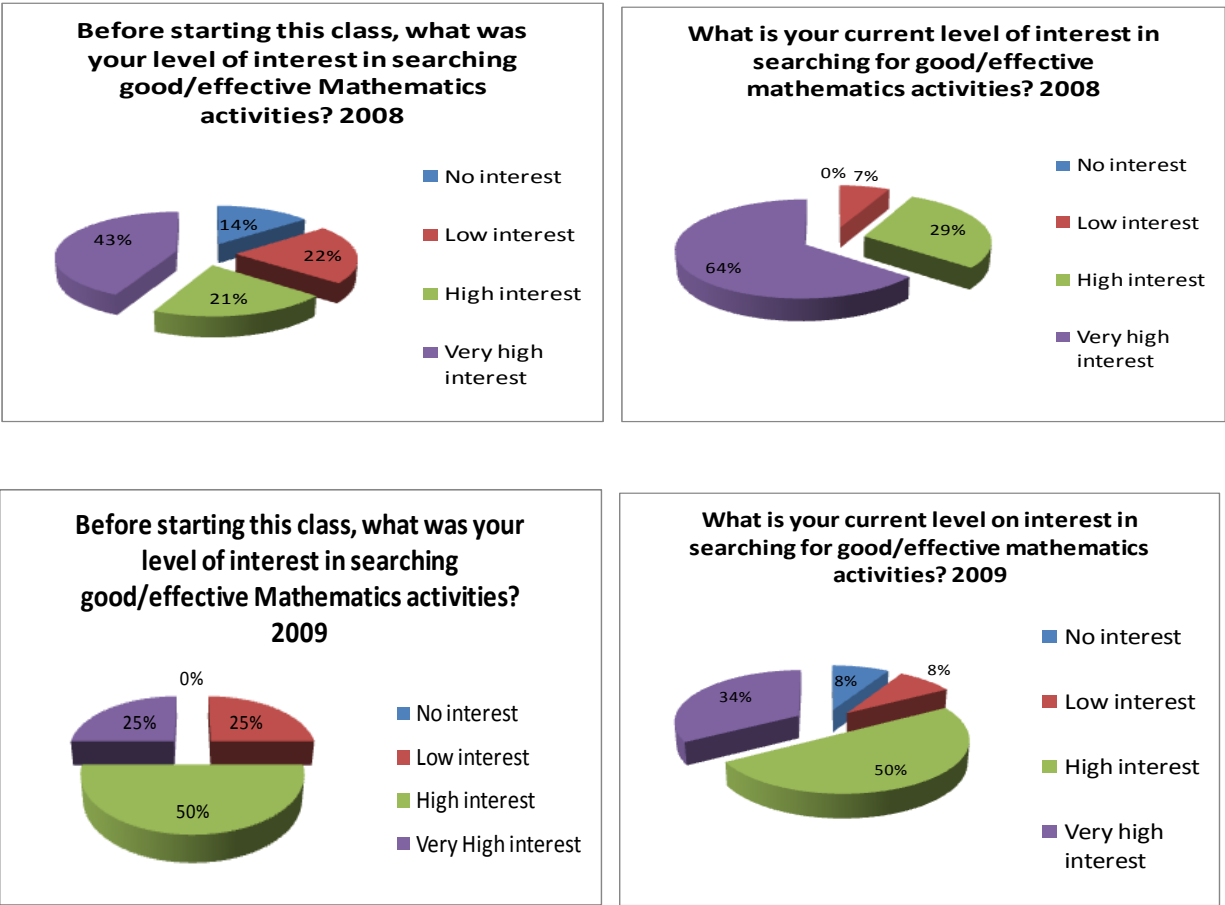


Figure 4.3.4: Interest in Searching Mathematic Activities

Table 4.3.3: Level of interest in search for Math activities

Level of interest	Before taking the class	After taking the class
No interest and low interest (2008)	36%	7%
High interest and very high interest (2008)	64%	93%
No interest and low interest (2009)	25%	16%
High interest and very high interest (2009)	75%	84%

The researcher found an improvement in both semesters because, the level of interest increased dramatically after taking the class. In the end 93% of 2008 students and 84% of 2009 students had a high or very high interest in searching for good math activities.

For both semesters Figure 4.3.5 and Table 4.3.4 show the level of interest the teachers had in searching for good science activities, before and after taking the class.

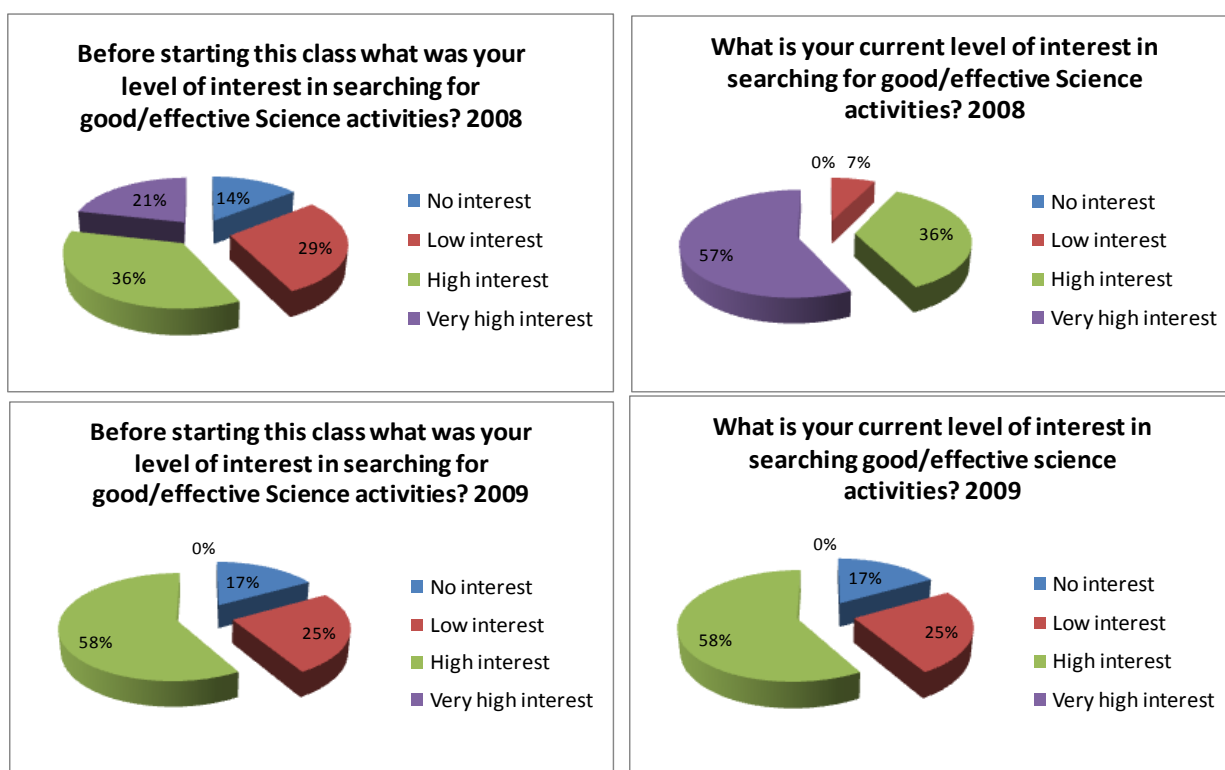


Figure 4.3.5: Level of interest in searching for Science activities

Table 4.3.4: Level of interest in search for Science activities

Level of interest	Before taking the class	After taking the class
No interest and low interest (2008)	43%	7%
High interest and very high interest (2008)	57%	93%
No interest and low interest (2009)	42%	42%
High interest and very high interest (2009)	58%	58%

The researcher found an improvement in both semesters because, the level of interest increased dramatically in 2008 after taking the class. In the end 93% of 2008 students had a high or very high interest in searching for good math activities. For the 2009 students the researcher saw a change in the math area but not in the science area.

For Spring 2008 Figure 4.3.6 and Table 4.3.5 show how often the participants taught activities related to mathematics, before and after taking the class.

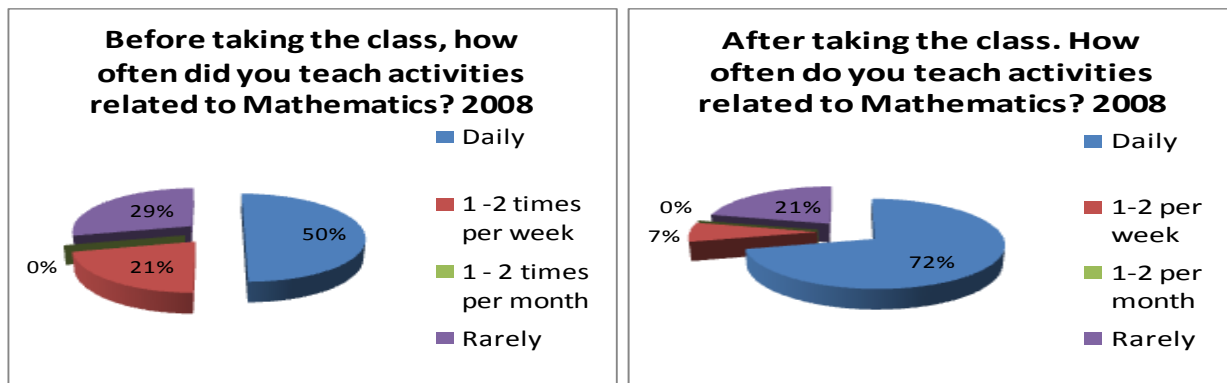


Figure 4.3.6: How often participants taught activities related to math during Spring 2008

Table 4.3.5: How often participants taught activities related to math during Spring 2008

Frequency	Before taking the class	After taking the class
Daily	50%	72%
1-2 times per week	21%	7%
1-2 times per month	0%	0%
Rarely	29%	21%

Results from the previous table clearly indicate an increment in the frequency math was taught. Before taking the class, only 50% of the teachers were daily teaching math that percentage increased to 72% after taking the class. During 2009 there was no change in the data from the surveys. However throughout the semester 59% of the participants taught math on a daily basis and only 8% rarely. There were 25% of pre-service teachers not working.

When asked the questions: “How often did you teach activities related to science?” on pre-survey and similar question on post-survey in both years the researcher saw that some of the teachers increased the daily teaching, while others actually decreased that total time spent. The instruments were not designed to contemplate this scenario, where answers grouped into opposite extremes on the same question. The researcher believes that a possible reason is that teachers dedicated more time to other content area.

When asked the question: “How did you find other activities?” the teachers reported that colleagues were one of their main sources in looking for new activities. After taking the class, the internet is seen as one important source for activities. See figure 4.3.6

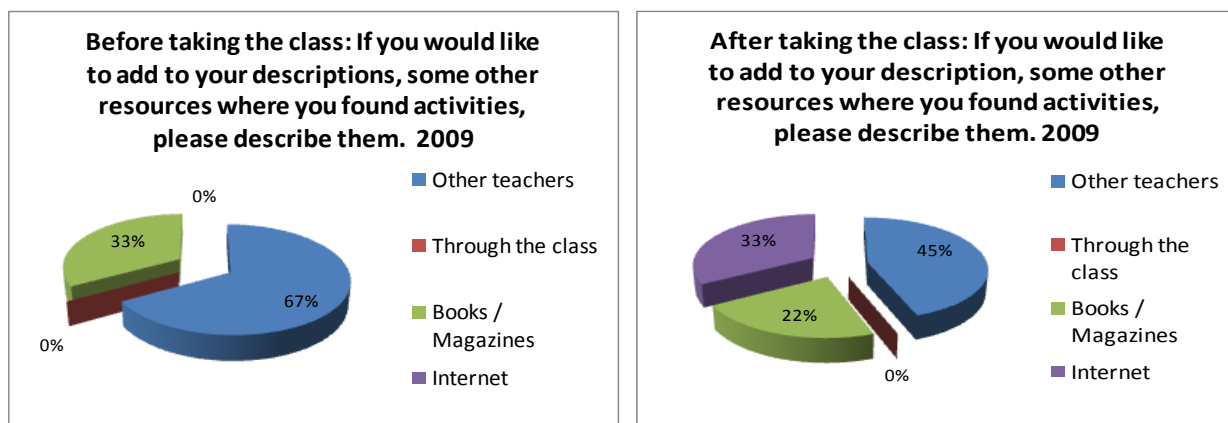


Figure 4.3.7: Other sources for math activities.

Results indicate that before taking the class the use of internet as a tool to find activities was not considered by the teachers. When the majority of the participants wanted to find more activities, they would ask other teachers; even after taking the class that remained as the mayor source. The researcher

thinks that it is possible to take advantage of that fact and use the networking between teachers to spread the use of internet resources.

An important issue to evaluate at the end of the course was the self-perception of the teachers' own abilities to apply the knowledge acquired during this course. Figure 4.3.8 shows how during Spring 2008, 93% of the teachers perceived those abilities to be good or very good; while during Spring 2009 84% had the same perception.

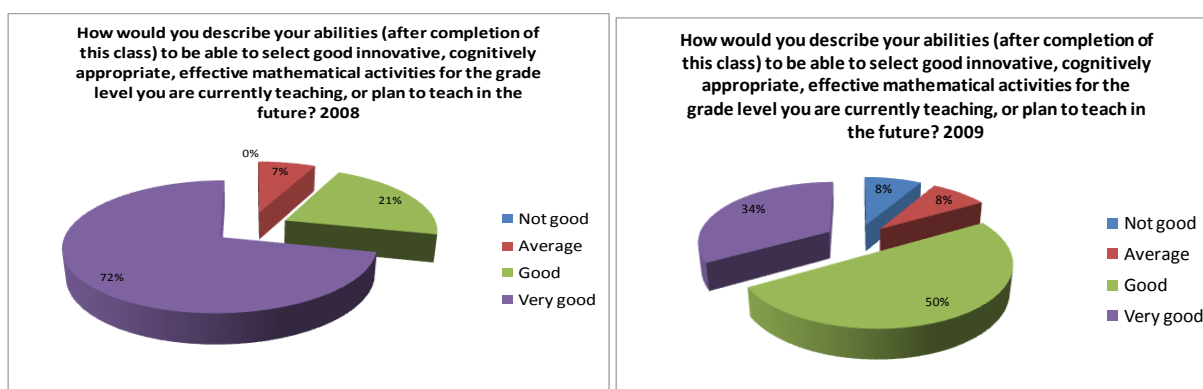


Figure 4.3.8: Abilities to select good activities for math after taking the class Spring 2009

4.4 ANALYSIS OF WEEKLY ACTIVITIES FROM SPRING 2008 AND 2009

There were differences in the attitudes from the teachers in different semesters. The group dynamic in Spring 2008 was more cohesive and collaborative, as evidenced through the participants' postings on the Blackboard. These teachers were more open to try new things and to embrace change. This class extensively used the companion websites from the textbooks and exchanged different resources. Through the indirect observation of the daily/weekly interaction, the researcher notice how the teachers created what she calls an e-community: they shared many experiences, both professional and in some cases personal. They became a self-directed group.

After reviewing the weekly postings from 2008 semester, the researcher noticed that the internet resources found by the participants could be classified into 3 main categories. The first type is Supercenters which are portal websites that contain multiple links to other resources; for example the

main portal www.pbskids.org The second type is Virtual manipulatives which are those websites that provide objects that a student can use to learn or strengthen a concept; a good example is www.nlvm.usu.edu The last type is Game, where the children practice a skill in an entertaining way; an example of this type of website would be http://www.mathplayground.com/hm_fractions.html.

Throughout the semester teachers began using more Supercenters than the other categories. However, at the end of the semester they were inclined to more Game websites. See figure 4.4.1

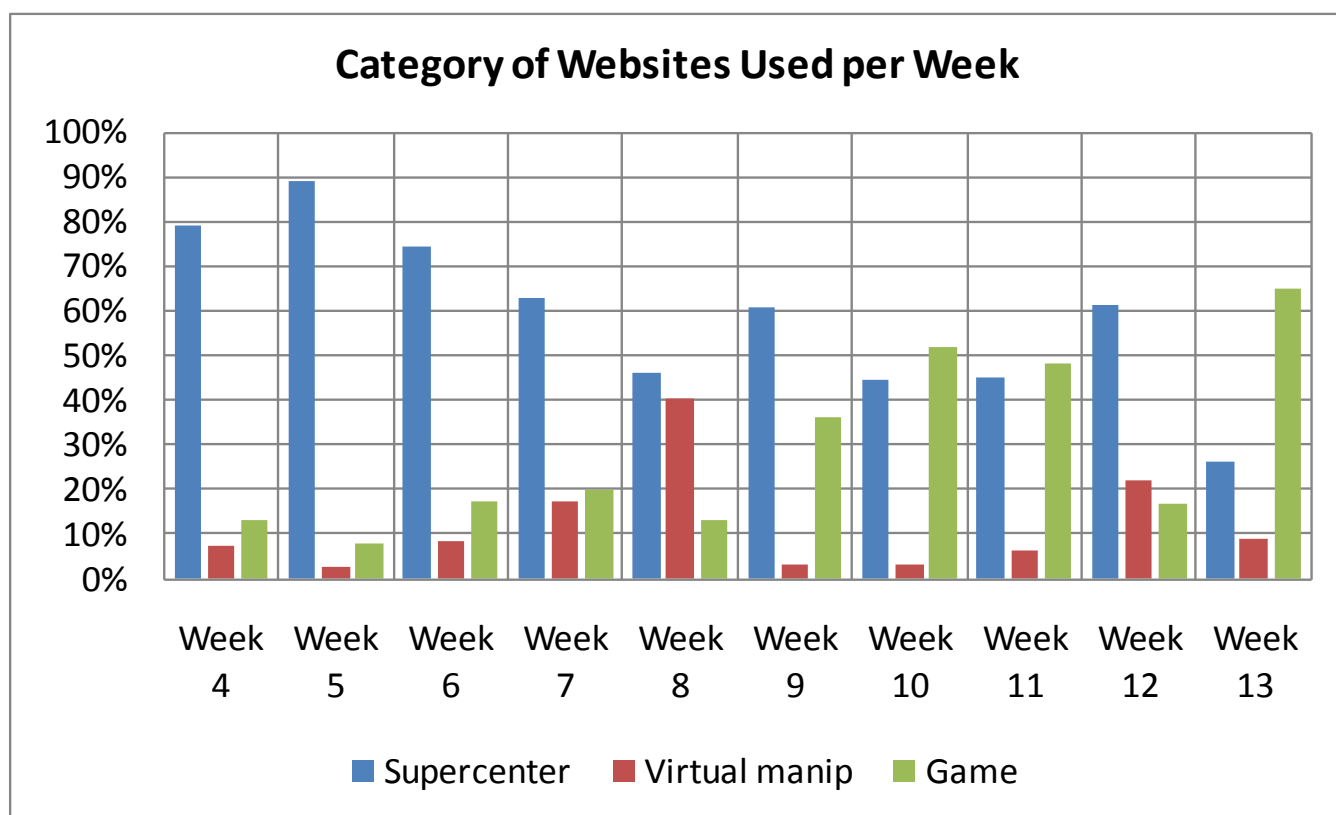


Figure 4.4.1: Website Categories Used Through the Semester 2008

For 2009, the dynamic was completely different. We had the same instructions and assignments posted online and available since the beginning. This group was passive and reticent to comply with the instructions. They expressed that they have very little time, and the assignments were too hard, and difficult to follow. They thought that the companion websites were not useful for the class; therefore they fell back to Google or other search engines. This resulted in an overwhelming number of results, and some of them got frustrated. The benefit is that they learned that they have to be very careful with

the wording in the searches, selecting specific keywords from the chapter readings to help them to narrow their results.

Nonetheless both groups, showed growth in their skills and increased the use of internet resources for teaching. An unexpected result from this study case was that the participants increased the amount of time dedicated to teach mathematics. The researcher speculates that this could be related to the fact that they were exposed to fun, new interactive activities on the web. It is important to realize that the course provided with a formal framework to be more effective when teaching math and science.

Discussion & Conclusion

5.1 ANSWERING THE RESEARCH QUESTIONS.

1. – How did pre-service and in-service teachers’ attitudes toward using internet resources for teaching mathematics and science change during semester they took “Development in Math and Science for Young Children” ECED 5354 class?

The researcher found that the majority of the teachers expressed that their initial attitude towards the use of internet resources in the classroom was negative because they considered it an overwhelming and time consuming activity. Some of the teachers thought it was not worth pursuing because they did not have the technological resources in the classroom nor the time to implement the use of it.

Initially, all of the teachers recognized that they had to have the skills and the confidence to know how to use the internet resources. They felt that if they did not have them, they would be at disadvantage compared with their students.

After taking the class, the teachers realized that even though there was a large number of internet resources, they needed to be careful and critical when searching for activities to use with their students. They realized that there was a difference between having the students “busy,” vs. having the students practicing a targeted skill. The surveys demonstrate that the number of teachers with a low interest in searching for websites decreased 17% during Spring 2008 and 29% during Spring 2009.

The class was designed to keep all the teachers motivated. All weekly activities were structured to compel them follow a predefined set of steps. They had to integrate the content of their lesson plans with the use of technology.

2. - How did teachers (pre-service and in-service) search the internet, and what type of internet resources did they select to use in their teaching?

The discourse from weekly postings and answers from surveys and interviews was used to discover how in-service and pre-service teachers find access and use internet technology resources we used. Teachers in general stated they began their searches by simply using Google and Yahoo. While students from Spring 2008 reported they made extensive use of the companion websites from the

textbooks, students from Spring 2009 kept using Google and Yahoo. The change for the later group, was that of narrowing their searches, by using the keywords and concepts from the assigned readings.

Some participants mentioned that in their earliest assessments of websites, they looked for something colorful and with good animation. Later during the semester they changed their criteria to a site that would be most helpful and clear to their students.

5.2 CONCLUSION

The researcher planned to teach an online graduate class which would lead to a natural incorporation of mathematics and science online resources into basic mathematics and science lesson plans.

These teachers learned by doing. They were required to find and use online resources in a systematic and repetitive structure. Thus they became more and more comfortable finding and using online resources. This comfort level and awareness also allowed them to become more selective in their assessment of the sites. This, in turn, changed their attitudes about integrating online resources into their lesson plans. These teachers will then pass these skills and abilities on to their own students ensuring the technological literacy of the next generations.

The participants were provided with a framework that included chapter readings, weekly postings and critical assessments, which repeated consistently throughout the semester. These teachers learned how to integrate lesson content with technology and realized at the end that this is a useful and worthy tool they could use in their classrooms.

As evidenced by final surveys, most of the teachers became more active and efficient in finding relevant and meaningful online resources for teaching mathematics and science in elementary grades.

The results of this study indicate that developing advanced strategies for searching online resources are appropriate and effective activities for an online mathematics and science education class and that this lead to a change in the teachers' attitudes.

One needs to keep in mind that without the proper resources and time for the teachers to take their students to the computer laboratory, these results cannot be achieved.

5.4 FUTURE RESEARCH

This study could be broadened in its scope. Many possibilities are set forth, such as:

- Observation of teachers in classrooms before, during, and after taking this course. Since this study was self reported online by the teachers, the research was unable to validate their answers and experiences. Having those observations at hand would help to improve the accuracy of the results.
- Collect sample lesson plans before and after teachers have taken this course. The researcher would be able to compare them and evaluate if the impact of the course resulted in the full implementation of TPCK.
- Follow teachers over a longer period of time to establish if the changes become permanent in the teachers' attitude towards the use of internet tools.
- Preserve the e-community established in class by maintaining a dynamic e-library and migrate the e-community from Blackboard to a social networking platform, such as www.teacherbook.com or www.teacherspace.com.
- Guide our former students to disseminate the methodologies, resources and experiences to their coworkers. As seen throughout this study, teachers tend to ask more experienced colleagues for tips, resources and guidance for their teaching. Therefore, this could possibly lead to the integration of internet resources and technology across curriculum.
- Identify and analyze factors external to the class which could possibly affect the outcome of this study. The teachers might be taking other courses or training that would enhance their abilities in using online resources; thus the result might be somewhat biased.
- Evaluate the impact on the children. The researcher would expect that the students would attain ownership of the online resources used in the classroom and master them to the point to where they will look more on their own.

- Research question number 2, could be studied in grader detail by splitting it in two. The first would look for the strategies used by the teachers, while the second would look into the different types of internet resources participants' use.

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Appendix

A) PRE-SURVEY

Please **underline and make bold** the appropriate answer:

QUESTION 1

Are you a certified teacher?

Yes

No

QUESTION 2

As a graduate student, are you pursuing a:

None

ATCP

Master degree

Both

QUESTION 3

Bachelor's degree area. If other please specify.

Education

Liberal Arts

Science

Science/Engineer

Other _____

QUESTION 4

Are you currently teaching?

Yes

Substitute

No

QUESTION 5

If you are currently teaching, please specify the grade. Circle all that apply.

PreK-K

Elementary

Middle

High

No teaching

QUESTION 6

If you are currently teaching, please specify the area. Circle all that apply.

Generalist/Bilingual

Generalist

Math/Science

Language Arts

Technology

Other

No working

QUESTION 7

Do you have technological resources to use and/or implement the use of it in your classroom?

Yes

No

QUESTION 8

Do you have technological resources to use and/or implement the use it in your campus?

Yes

No

QUESTION 9

Before taking this class did you receive any training, guidance, or instruction about how to use internet resources more efficiently?

Yes

No

QUESTION 10

If you answered YES to the previous question, who provided it? Check all that apply

Yourself

Your Campus

Your District

Previous employer

University/College

QUESTION 11

Were the training(s) connected to a content area (Math, Science ...), or were they focus specifically in technology?

Technology only

Technology with some content

Content with some technology

QUESTION 12

How often do you teach activities related to Math?

Daily

1 -2 times per week

1 - 2 times per month

Rarely

QUESTION 13

How often do you teach activities related to Science?

Daily

1 -2 times per week

1 - 2 times per month

Rarely

QUESTION 14

What is your level of interest in searching good/effective Mathematics activities?

No interest

Low interest

High interest

Very High interest

QUESTION 15

Where do you look for these activities? Check all that apply.

Websites

Educational Software
(Non internet based)

Activities involving
Manipulatives
Printed materials

QUESTION 16

If you would like to add to your descriptions, some other resources where you found activities, please describe them.

QUESTION 17

Before starting this class what was your level of interest in searching for good/effective Science activities?

No interest

Low interest

High interest

Very high interest

QUESTION 18

Where were you looking for these activities? Please check all the answers that apply

Websites

Ed. Software (non internet based)

Act. Manipulatives

Printed materials

Videos/Slide shows

QUESTION 19

If you would like to add to your descriptions some other resources where you found activities, please describe them

QUESTION 20

How many days per week were you able to teach with technology

1

2

3

4

5

Thank you!

Olga Kosheleva PhD
Pilar Gonzalez

B) POST-SURVEY

Each question on this survey has 2 different numbers. The first one corresponds to the number sequence used during 2008; while the number that appears inside the parenthesis corresponds to the number sequence used during 2009.

QUESTION 21 (1)

How often do you teach activities related to Mathematics

Daily
1-2 per week
1-2 per month
Rarely

QUESTION 22 (2)

How often do you teach activities related to Science?

Daily
1-2 per week
1-2 per month
Rarely

QUESTION 23 (3)

What is your current level on interest in searching for good/effective mathematics activities?

No interest

Low interest
High interest
Very high interest

QUESTION 24 (4)

Where are you currently looking for these activities? Please check all the answers that apply

Websites

Ed. Software (non internet based)
Act. Manipulatives
Videos/Slide shows
Printable materials

QUESTION 25 (5)

If you would like to add to your description, some other resources where you found activities, please describe them.

QUESTION 26 (6)

What is your current level of interest in searching good/effective science activities?

No interest

Low interest
High interest
Very high interest

QUESTION 27 (7)

Where are you currently looking for these activities?

Websites

Ed. Software (non
internet based)
Act. Manipulatives
Printed materials
Videos/Slide shows

QUESTION 28 (8)

If you would like to add to your description, some other resources, where you are currently searching for activities. Please describe them.

QUESTION 29 (9)

How many days per week are you able to work with technology?

1 day
2 days
3 days
4 days

QUESTION 30 (10)

By reading chapters in assigned textbooks and additional Assigned materials I acquire additional deeper understanding And knowledge of how effectively teach mathematics to young children.

Strongly disagree
Disagree
Neutral
Agree
Strongly agree

QUESTION 31 (11)

By reading chapters in assigned textbooks and additional Assigned materials I acquire additional deeper understanding And knowledge of how effectively teach science to young children.

Strongly disagree
Disagree
Neutral
Agree
Strongly agree

QUESTION 32 (12)

How would you describe your abilities (after completion of this class) to be able to select good innovative, cognitively appropriate, effective mathematical activities for the grade level you are currently teaching, or plan to teach in the future?

Not good
Average
Good
Very good

QUESTION 33 (13)

How would you describe your abilities (after completion of this class) to be able to select good innovative, cognitively appropriate, effective science activities for the grade level you are currently teaching, or plan to teach in the future?

Not good
Average
Good
Very good

QUESTION 34 (14)

How would you describe this class?

Technology only
Technology applied to content.

Mostly content
connected to
technology.

QUESTION 35 (15)

To what extent you rethought your teaching practices approaches after learning about a variety of resources available online? Please rate the extent to which this class and specific emphasis on learning online resources helped you rethink your teaching practices? Please evaluate on a scale from 1 to 4, where 1 means not at all and 4 means very much.

1(Not at all)
2
3
4 (Very much)

QUESTION 36 (16)

Online distance learning courses encourage more student participation than traditional face to face courses.

Strongly disagree
Disagree
Neutral
Agree

QUESTION 37 (17)

Online distance learning courses have more student-student interaction than traditional face to face courses.

Strongly disagree
Disagree
Neutral
Agree
Strongly agree

Thank you!

Pilar Gonzalez
Olga Kosheleva PhD

C) INTERVIEW

The purpose of this interview is to clarify as much as possible, the process that you went through when searching for the websites that you posted on the Discussion Board for the online class ECED 5354. Your participation in this interview will count as extra credit for your final grade, independently of the answers that you provide. Those responses will be kept confidential and anonymous. We want to thank you for your cooperation!

Please be as detailed and clear as possible.

- 1. How you did your queries (searches) for the websites? Search engines (Such as Yahoo, Google, Ask ..)? Friend's recommendations? From the book's companion's websites?**
- 2. What did you learn by searching internet in order to post your submissions on Discussion Board in ONLINE class?**
- 3. Which criteria guided you in selecting this or that website? Did your criteria change after taking the course? If yes, how? If not, why not?**
- 4. Do you plan to use or are you currently using internet resources in your teaching/tutoring of math and science? If yes, can you explain how, when? If not, why not?**
- 5. Did you find any website that you liked so much and you are really planning to use, or currently using? Which one, why?**
- 6. Did you find any website that you don't liked at all? Which one, why?**
- 7. Can you describe how you found these resources?**
- 8. Do you feel that you already know enough about searching for different websites that could be beneficial for you? (Confident, unsure, comfortable, need more help?)**
- 9. Do you see any benefit for you as teacher, in using this kind of technology? If yes, could you explain? If not, could you give your reasons?**
- 10. How important for teacher to be familiar and use internet resources in 21st century (where digital technology is predominant)**
- 11. Did this class (learning more about technology) help you in any way in order to be a more efficient teacher?**

12. To what extent you rethought your teaching practices/approaches after learning about variety of resources available online? From 0 (not at all) to 10 (very much), please rate the extent to which this class and specific emphasis on searching online resources helped you rethink your teaching practices?

13. To what extent and how your attitudes toward using internet resources in teaching changed?

14. How many times a week did you search online resources before you took the class?

15. How did your strategies and criteria for evaluation of online resources changed after taking this class? Are you searching internet online resources more now?

16. Online distance learning courses encourage more student participation than traditional face-to-face courses. (0-strongly disagree, 1-disagree, 3-neutral, 4-agree, 5-strongly agree)

17. Online distance learning courses have more student-to-student interaction than traditional face-to-face courses.(0-strongly disagree, 1-disagree, 3-neutral, 4-agree, 5-strongly agree)

D) INTERVIEWS 2008 STUDENTS RESPONSES.

1. How you did your queries (searches) for the websites? Search engines (Such as Yahoo, Google, Ask ...)? Friend's recommendation? From the book's companion's websites?

CM: *I would have to say that my queries were all based upon the two texts recommendations. I also searched some of the sites that were referenced in the student's recommendations. For those I am not sure as to their direction. For myself, I followed the text recommendations and found many wonderfully insightful and beneficial resources.*

DY: *I used the website that Dr. Kosheleva would provide on line after each assignment. I would then proceed to browse the websites until I was satisfied with what I was looking for. Most times I would try to research a website that related to the chapter that we were covering for that week.*

VH: *What I did is I used the companion websites I think she called them the companion websites, so I would use those and then if I couldn't find any valid information on the websites she gave us then I would use Google if needed. But mainly I would use the companion websites.*

RR: *What I did is I was looking for the subjects or topics we were studying like if it was counting, or if it was numbers, or number lines or fractions I would like type in Google. I would do like Google "First grade fractions", and then I would get a lot of websites and I would kind of go through them and see what I like and what I didn't like. And you know most of the time I didn't really have to make like a decision, because when I was googleing [sic] it I would find something that like of "Oh, I love this", and then I would start getting into it, because I have just read about it, I just learned about it and I was like there are so much information if we just look for it.*

SD: *I would go to the corresponding chapter in the book, and then go to the suggested website it indicates. Some of them didn't have enough and some of them were just selling software. So it was kind of hard, so I goggled some of the topics.*

2. What did you learn by searching internet in order to post your submissions on Discussion Board in ONLINE class?

CM: *For one thing, the resources available to us as educators really are vast. There are interactive books, videos, and also resources for professional development. Really there were so many*

different tools that I come across and had bookmarked to my favorites. I really enjoyed the websites that offered different interactive activities for the children as well.

DY: I learned that searching the internet provides numerous sources from which to select from. It is sometimes difficult to target exactly what you are looking for. Also researching is time consuming.

VH: Yes I did learn a lot. I learned a lot of lessons and these places to go when and these places to go when you are looking for information.

RR: Reading created a graph of what I was trying to find at the websites.

SD: I had to look for specific topic or a certain area for the kid; it makes it a lot easier.

3. Which criteria guided you in selecting this or that website? Did your criteria change after taking the course? If yes, how? If not, why not?

CM: I would say that first of all I just kind of looked for the different sites that pertained to early childhood through 1st grade as this is my current teaching grade level. Later, I began to look with my final thematic unit in mind. I looked for different interactive resources to be able to use. In the process, I found different sites that I found useful for my classroom as well.

DY: My criteria did not change. The only difference is that I looked at the complimentary websites to provide the information that was related to the chapter.

VH: What I did is I read the chapter and whatever information I thought it was important to reflect on, I searched the websites for that. [She was using the lessons we learned each week]. I did my research based on what I was reflecting on. [She has been using these criteria since the beginning of the semester].

RR: Grade level and topic was my guide to select. (Did you search for websites for your classroom before taking this class? Honestly no, because I just mh, I don't know if I'm lazy. I'm certified for Reading, English Language Arts 5 – 12 teaching. Everything Elementary is brand new to me; so when I'm reading it I'm really reading to understand and when I looking for websites ... at the first it was like "Oh, more time, more work Blah, blah, blah you know? But after a while I was like: Oh, I'm so glad they made us do this because I learned a lot and I know it's out there now.

SD: *My favorite website was PBS, because it has specific age groups, or a specific content area. On others I have to hit this or that, like when I am looking for a specific activity, for the age group that I needed.*

4. Do you plan to use or are you currently using internet resources in your teaching/tutoring of math and science? If yes, can you explain how, when? If not, why not?

CM: *I really have liked the blackline masters by Van de Walle which are also on the website. I also like the different addition/ subtraction interactive practice links on PBS. My class at workstation time does visit PBS and the different activities offered. The math fact master program is also fun for my class to work with.*

DY: *I always use the internet for all of my resources. For example at Edwards Elementary, the children are studying the Rain Forrest and I wanted to research how global warming is affecting the rain forest. Also when I teach grammar for example finding the subject and predicate I researched exercises to work out with the kids in the fourth grade.*

VH: (She works currently as a Social Worker for the Head Start Program; therefore this question was asked as, if she plans to use these resources in the future). *I'm using (right now) these websites basically for my classes, for good, you know, sites to know, for my classes and for studying for the content exam. (She is planning to be an EC – 4 Generalist).*

Do you think these are good resources for you in the future, for you to use in your classroom? *Absolutely, I think there are a lot of good ideas in there, a lot of information and definitions or explanations as to why things have to be taught in a certain way. It really helps to, how do you say it? Make sense of the standards and competencies.*

RR: (She is not currently teaching, so she is answering if she is planning to use them later). *Absolutely, what I did, what I'm doing is I opened like a word document and like every time I looked for my websites or I do to my classmates contributions I said "I don't want to lose it" so I did my Word document that I saved as "Websites for Math and Science EC – 4", so if I found something from my classmates I would cut it and paste it in my document.*

SD: *I am, for math. For math I would go and set up a computer for the children that are doing Math Center. I have computer in my classroom and we use it every day.*

5. Did you find any website that you liked so much and you are really planning to use, or currently using? Which one, why?

CM: http://www.abcya.com/connect_the_dots_donkey.htm
http://www.education-world.com/a_lesson/
<http://www.tefl.net/esl-resources.htm>

The first is a site that I would like to implement at our center time. The other two sites I have bookmarked and hope to use for next year lesson plans.

DY: www.thinkfinity.org is an excellent website because it provides many lesson plans for school teacher. I also like www.teachers.com, because it also provides so many resources that can be applied to the classroom.

VH: Yes, www.naeyc.org, that's the one that I found and liked the most. I liked it the most because I was able to find a lot of information there that I would be able to go and use it at school and I was able to find more information at that site vs. www.nctm.org and other ones that I found limited information.

RR: I would say that everybody was finding stuff on www.PBS.org, and I think that is like one of my favorite ones because I thought that was pretty friendly. I can't remember the name of a specific one, I think I was just lucky because like I said before I would look for "fractions first grade" and they just look through it.

SD: My favorite website was www.PBS.org, because it has specific age groups, or a specific content area. I didn't like the ones that were selling you services, or memberships.

6. Did you find any website that you don't liked at all? Which one, why?

CM: No, not really. I picked through the different sites and usually found what I needed.

DY: I guess the only websites that possibly I did not care too much for were the ones that discuss the history of the company or organization.

VH: *No, no I didn't find one that I really didn't like.* [She says that she wouldn't even go to those where you need to pay i.e. memberships]

RR: *No, well there were several that would say "Teacher resources" and "Student interactions" then something "for kids and teachers" whatever but then you go in there and you have to pay for it. I didn't like it, because if at least you can review it.* [She got frustrated when the links weren't working].

SD: *I didn't like the ones that were selling you services, or memberships.*

7. Can you describe how you found these resources?

CM: *I really just searched from the suggested web sites by student's and the texts.*

DY: *I usually use Google scholar, or I use the internet and some have to be scholarly writers.*

VH: *I was using the companion websites to start my searches. From there I would search for more specific topics or activities.*

RR: *I Google the topic and searched by different criteria, such as: Age group or topic.*

SD: *Googling and comparing the activities I had in mind, and filtering the websites according with age and topics.*

8. Do you feel that you already know enough about searching for different websites that could be beneficial for you? (Confident, unsure, comfortable, need more help?)

CM: *I feel reasonably comfortable searching for different helpful websites.*

DY: *I feel very confident about searching the websites.*

VH: *Yeah, after this class I would say I am pretty comfortable.*

RR: *I feel confident.*

SD: *I feel comfortable Like I told you I already have PBS and 2 or 3 more, but now I know that I can go back to the discussion board and I have all these websites there. I thought about making a master list with all those websites, but didn't have the time. I was always trying to catch up with readings and working, you know?*

9. Do you see any benefit for you as teacher, in using this kind of technology? If yes, could you explain? If not, could you give your reasons?

CM: *Most certainly, our grade level is just this week applying for projector/ laptop resources to integrate online technology for the children. Some that I've found just this semester, I see I could use for my class in this way.*

DY: *Absolutely, the internet is going to be the "heart" that "pumps" the blood throughout the classroom. I could not survive if it were not for my internet services*

VH: *Absolutely, definitely. You can be able to research what you are teaching, and research the best way get your teaching across to the students.* [She was asked if technology like the SmartBoard could in any way be beneficial for her students. She states that very much, like to reach the young children that are starting to use computers since they are very young; using programs where they can develop their cognitive abilities.]

RR: *Absolutely because it creates diversity for the teacher, it creates a multitude of resources for you. I mean any topic or subject you can be working on it can always be a little bit better and then, somebody else could probably figure something else by working on trial and error, and I think you can save time, because we look at what other teachers had done and invested in. I mean they already have done all the hard work for you, and I think this is a benefit you know?*

SD: *They are very useful, and after looking for a few places, I could find exactly what I was looking for. Like I like to play with manipulatives, so I brought it up on the Smart Board and I show it to the children, then they started saying: "Oh we can hardly wait for you to let us use the computers and play with it". So this really light them up, you know, get them engaged.*

[We talk about her students that are learning English as a Second Language, and the fact that they really know the content, like math and science, but it's the language barrier that keeps them "behind". I sent her a link from the SEP (Secretaria de Educacion Publica) in Mexico, which has activities for her students. We discussed some issues of the bilingual classes. We talk how using more languages are tools for you to improve your life. On the other hand we talk about the fact that the children HAVE to learn English].

10. How important for teacher to be familiar and use internet resources in 21st century (where digital technology is predominant)

CM: *Very important and beneficial as well.*

DY: *I believe that if you are computer illiterate you will be totally lost and unprepared as a professional. Today you must be well versed in the computer and you must as a school teacher know how to conduct a research.*

VH: *I think is a mega important. I think it is very important, because then it kicks these children to use it and to excel on it. And if you don't know how to use it then how are you going to teach it. [We were talking and agreed that today the children start learning about using the computer and internet at a very early age)]*

RR: *When I started teaching in 1998 (English Language Arts) we didn't have as many resources in internet like we have today. Like I had to make my own lesson plans like: Huckle Berry Fin. But you know everybody has done over and over for more than 15 years. So why they don't have anything available for free?*

SD: *I think it's very important, since these tools are there for me to use. I can go and find activities the children can use. I can find exactly what they are learning, so they can practice and have fun. She thinks that using these tools may help the ESL students, since they are not just hearing, but looking at images and sounds. [When students leave her class they are expected to have a 40% English and 60% Spanish. Silvia was concern about the fact that maybe she could do more for her ESL students].*

11. Did this class (learning more about technology) help you in any way in order to be a more efficient teacher?

CM: *Most certainly. I know that as well as looking for lesson plans that there are also activities that are available for online support and reinforcement of math and science concept.*

DY: *Absolutely, I have always been so afraid of math but after taking this class I realize that I can very easily learn math. Every math problem has a solution and there are a variety of ways that the answer can be found and worked out.*

VH: *Yeah, because like I said they have, the websites have examples where the kids could play with the little frog and learn about measurements and associating you know, like what measurements*

were. And they also have these really good geometric shapes; a lot of good things can come out of it if you searched them you can use them. I used it like with the geometric shapes what size and the kids can download them and print them for one of the lessons in my thematic unit.

RR: [From question # 9, She thought it was a very similar question]. *Absolutely because it creates diversity for the teacher, it creates a multitude of resources for you. I mean any topic or subject you can be working on it can always be a little bit better and then, somebody else could probably figure something else by working on trial and error, and I think you can save time, because we look at what other teachers had done and invested in. I mean they already have done all the hard work for you, and I think this is a benefit you know?*

SD: *Yes, because if we don't hit the kids with these tools they may not learn at all. The children start using the computer since a very young age. Last year the students were not using the computer as much as this year. I didn't use the computer that much before because I didn't know about all these websites that I now know.*

12. To what extent you rethought your teaching practices/approaches after learning about variety of resources available online? From 0 (not at all) to 10 (very much), please rate the extent to which this class and specific emphasis on searching online resources helped you rethink your teaching practices?

CM: *I would say about a 7. The text along with the resources found online really benefited me most.*

DY: *I will repeat that as a school teacher it is crucial to be literate on the computer. There are so many reliable resources for which to select when developing lesson plans, projects, or if just looking up a sport that the kids might be interested in. The computer is a "must have" and teachers must be educated on technology. Also life becomes so much easier when you are literate in computers.*

VH: [She isn't working as a teacher yet. But she states that this class helped her to know about all the resources she can use if she knows how to look for them].

RR: *As a new teacher I honestly have to change everything because I don't have anything ready.*

SD: *I did because before the class I didn't use the computers as much. I use to take them to the computer lab once a week. Then the use the FastMath (a program they have at her school). Now I take them to the computer lab every day. I would say an 8 or 9.*

13. To what extent and how your attitudes toward using internet resources in teaching changed?

CM: *I would say about the same. I do like knowing the multiple resources available are so vast in measure.*

DY: *When I first started college I was petrified of the computer. My husband was the one who brought home the first computer and he was literate but not me. I remember how I could not hold the mouse steady but somehow as I continued to go to school I became more competent.*

VH: [I had to accommodate this question since she hasn't been a teacher. She relates to the resources they have at her work place. I asked her if she used technology in her classroom before taking this class]. *Yes, where I'm working they do have computers in the classroom and they do use them. So, myself? Absolutely. But not to the extent with the online courses that I took with you, with this class. So my technology, obviously I learned more about being able to utilize the websites, to help me understand lessons or assignments. [I asked her if she thinks having a class where she could learn specific websites or programs to use within her classroom would be beneficial for her as a teacher]: Yes, I do. Because at first I thought Oh my god is a lot of work (searching for the websites) but once you get the hang of it, it doesn't become so overwhelming it is very educational, so yeah I would be good.*

RR: *They have improved, because like I said when we started this class thought: "Why do have to do ALL this work, who cares?" I was like the grouchy, lazy student. But now I know it was a worthy investment. It was something like I thought that Dr. Kosheleva encouraged doing because she knew what benefits it would have. So, I'm appreciative to that she made us do it because she changed our attitude. Now if I need to do something that I don't have any information at hand. I will just look for it.*

SD: She previously said that her attitude change in the sense that she wasn't aware of the vast amount of resources that are available for teachers. Since she knows now there are so many resources, she uses the computers on a daily basis. She really changed her practices.

14. How many times a week did you search online resources before you took the class?

CM: *Probably not that much, but 1 time per week if that.*

DY: *I would search on line resources every other day because I have been attending school for 7 yrs now.*

VH: *Ah, well none of my classes has been so intertwined with the internet as yours (the class) has. So this was like my first like website searching. So I couldn't say so many times prior to that, other than researching for papers.*

RR: *As a new teacher she wasn't looking for these resources before.*

SD: *On a daily basis.*

15. How did your strategies and criteria for evaluation of online resources changed after taking this class? Are you searching internet online resources more now?

CM: *Yes, I would say that I search for more online resources now.*

DY: *I have had to research more simply because of the courses that I am taking. I appreciate the fact that I have learned how to research information on the internet. I have learned that in order to get the best possible resources it is always wise to research someone that is credible and has a good reputation as a writer. Good sources are important because when you conduct a research you want to make sure the resource is reputable.*

VH: (From previous questions) *Before the class I use the internet to research for my homework. I learned more about being able to utilize the websites, to help me understand lessons or assignments. I use these websites to make sense of the content exam and the standards.*

RR: *I'm looking for resources (and using the websites that my classmates found) on a daily basis. I wasn't aware of the huge amount of websites and activities that the children can use. I wasn't using the computer as much last year. [She previously mentions that before the class she use to computers once a week, and now she is using it on a daily basis].*

SD: *No answer.*

16. Online distance learning courses encourage more student participation than traditional face-to-face courses. (0-strongly disagree, 1-disagree, 3-neutral, 4-agree, 5-strongly agree)

CM: 4

DY: 4 *Sometimes I feel like, "Oh I wish we could get class, because we get more interaction. But now that I had the online class I can say yes we can have discussions, we can really interact with each other". Sometimes I feel like if my classmates are not sharing enough, and I think "Come on guys, let's share some more". I feel like if some of them just want to do what they have to do. I would say ,4 Agree .*

VH: 4, *I agree because a lot of students do not like to be engaged while they are in class. As a matter of fact when you are on-line you can express yourself more freely and without any fear of being criticized*

RR: 5 *I strongly agree because you can write in that discussion board without feeling: "Oh, is it kind of dumb what I'm saying?"*

SD: *Yeah, I would go ahead and give it a 5. A 5 meaning strongly agree*

17. Online distance learning courses have more student-to-student interaction than traditional face-to-face courses.(0-strongly disagree, 1-disagree, 3-neutral, 4-agree, 5-strongly agree)

CM: 5

DY: *I would 4, agree because again people can express themselves freely on paper*

VH: *Yeah, I would go ahead and give it a (5) strongly agree.*

RR: *I strongly agree on that, I would give a 5.*

SD: *I think so, because you, I don't know I was talking with different people about their websites from each week, and from where they were. I think that if this was a face to face class I would just come to the classroom, take the class and then just leave; without that much interaction that I had in the online class. I would say 5.*

E) INTERVIEW 2009 STUDENTS RESPONSES

1. How you did your queries (searches) for the websites? Search engines (Such as Yahoo, Google, Ask ..)? Friend's recommendations? From the book's companion's websites?

A: My queries stemmed mostly from search engines such as Yahoo and Google. I did ask my math teachers for sites that they used but they soon tired of thinking of different math sites that would be applicable for the weeks focus. I was disappointed with the book's companion websites, I did not find them to be nearly as helpful as I would have imagined. Using the search engines did pose a problem of quantity of hits.

B: I used Google. I usually found enough from just the one search engine. In addition, I used websites that I knew of from my teaching experiences. Colleagues have recommended websites as well.

C: All I did was Google the name of the subject that we were studying and I searched different links. I looked for the most updated and the ones with the most information.

D: The first thing I take into consideration is the objective that I need my students to know. Next, I try search engines like Google or Ask Jeeves. I like these search engines because I can type in more than one word to narrow my search. Most of the time I do find the book's companion websites to be very helpful, but with the books we are using now, most of the companion websites for them are either no longer in existences, or they are not very helpful. I find that doing the searches on my own are usually more helpful because I can type in exactly what I am looking for and the results are usually very good and in abundance. I have more websites to choose from, when I do the searches on my own.

E: I tried to use the books companion websites, but did not really like the activities that I found on the sites. So, for the most part, I just used Google.

F: I searched for websites that were teacher-friendly, kid-friendly, aligned with our TEKS and age-appropriate. I used Google a lot, as well, and teacher recommended websites. These sites help improve readiness skills, problem-solving strategies and higher-order thinking skills

2. What did you learn by searching internet in order to post your submissions on Discussion Board in ONLINE class?

A: I found that there are literally thousands of online sources that can be linked to specific math and science terms. This does not necessarily mean that most of the sources are quality sources. It takes

great effort to find a site that actually helpful and has useful ideas to use in my University class and my fourth grade classroom.

B: A lot of information pops up that is not necessarily relevant. Also, you really have to be careful what you're opening. Key words are important because of all the websites that come with each search.

C: What I usually learn is that not all websites are kept up to date and that many are controlled by marketing. I have also learned that there is quite a bit of reliable information out there if one is willing to spend the time.

D: I learned that there are a lot of great resources as well as not so good ones. In order to find out which ones serve your needs, you really have to be patient and look through a lot of them before you can actually find one that best fits your objective. As a teacher you also have to try out the activity for yourself before letting the students try it. This is another way to share ideas and stay in communication with students from different parts of the country. It is always a good idea to hear other student's perspective on things because we don't always see the same thing the same way. We all have differences in opinions.

E: The internet is full of information that was useful for my submissions on the Discussion Board.

F: There is an abundance of information on the internet. I gained insight on how to be more specific when using search engines and how important it is try the site yourself before recommending it. Moreover, I've found lots of great games for my students to use, and that the internet is time-saving.

3. Which criteria guided you in selecting this or that website? Did your criteria change after taking the course? If yes, how? If not, why not?

A: Initially my criteria surrounded the idea that the students would find the site entertaining and visually stimulating. Over time my criteria was more focused on what I could be doing as a teacher to guide the children in a more constructivist classroom. Then I found myself swinging back toward finding sites that my particular grade level students would benefit from. It did not have to be entertaining just quality material to advance the students understanding.

B: *I had to make sure that the websites were student friendly and able to be opened on the district internet. A lot of sites are blocked. This course helped me to learn to narrow down my search and become familiar with the sites.*

C: *The criteria I use is up to date information and whether it catered to the subject area. No, my criteria did not change after taking this class there was not much about searching besides having to search.*

D: *The criteria that I used in making my selection, first of all the website has to provide free access. Second of all it really has to be age appropriate. Not all the websites are. For example if the website activity says that it is for kindergarten, the instruction has to match their grade level so that they won't need constant assistance from the teacher. The student should be able to maneuver through the website on her own after some instruction by the teacher. The website should also engage the student in a way that the student is learning and enjoying their learning at the same time. If the website is able to provide some extended lesson that the student can do with concrete manipulative that is even better.*

E: *My main criteria was how friendly the site was to you children, were the activities pretty self explanatory so that children could work independently, were the sites educational and did they relate to the lessons we were learning. I had never used the internet for my classes before. My criterion has not changed over the course of this class.*

F: *Yes, my criteria changed after taking this course. At first, I was not familiar with the number of online activities available and mainly searched for sites that were kid-friendly and animated. But, it is also important to find sites that are aligned with our TEKS and that are secure and free of charge. Several students shared great sites that I was not familiar with prior to this course.*

4. Do you plan to use or are you currently using internet resources in your teaching/tutoring of math and science? If yes, can you explain how, when? If not, why not?

A: *Currently I do not teach math or science and therefore I am not using the resources in my classroom at this moment. I do plan on using this information in my class in the future. I think that the most appropriate way to use the virtual manipulatives would be to show them after I have introduced the*

concepts using concrete materials. I will use a SmartBoard™ or similar technology to demonstrate the manipulative and then let the students explore individually.

B: We use yahoooligans and askkids.com for students to search the person they are writing their biography on. Also, we use programs such as www.Vmathlive.com, www.tickettoread.com, and www.learning.com

C: As a substitute I am always using the internet to get lesson plans because the teachers never leave any. In the long term position that I have now the internet is very handy because it guides me towards the level that the students should be in math, science, vocabulary.

D: I definitely plan on using internet resources in my classroom. The internet offers students access to resources that we might not otherwise have access to. In an age when technology is a big part of an interconnected world, students definitely need to have access and discover what the internet has to offer. Students can be taught that it is a tool that can help not only teach but reinforce their intelligences. I think that this tool also helps children become independent in their thinking and their learning.

E: I really like the idea of using the lessons in my teaching, but because I began the school year a month late, I have not felt that I have the time to work my internet resources in this year. I hope to use them in future years.

F: Yes, I constantly use internet resources. From United Streaming videos to online stories and games, my students benefit from this greatly. We also do our Morning Message on the computer and www.Starfall.com is one of our stations. My students also love watching Peeps and playing Peeps Games.

5. Did you find any website that you liked so much and you are really planning to use, or currently using? Which one, why?

A: I found many websites that were helpful but the following I will definitely use when teaching weather patterns. <http://www.scholastic.com/kids/weather/sim/game.htm> It show how the weather reacts when various factors come into play such as temperature, humidity, etc. Another virtual manipulative site that is helpful is http://www.harcourtschool.com/activity/solid_figures. This site helps

students see 3D shapes and categorize. The last site was http://www.internet4classrooms.com/skills_4th_math.ht . It gives 4th grade objectives- site with tons of links to math games and teacher resources.

B: There were a few that I would use to reinforce math concepts toward the end of the year.

C: No particular website actually I usually try a new one because I like trying new things that could offer more. Many times we become complacent with things that we tend to overlook other great sources.

D: One of my favorites was <http://www.hartcourtschool.com/thinkmath/topic/measurement.html> This websites offers plenty of activities one site without having to search for related math activities. All the math activities are engaging and challenging. I tried it and spent more time on it that I had planned on because it was that engaging. The activities are not necessarily teaching new concepts but instead help the student reinforce or practice what they already know. It reinforces the ideas in a way that will help students retain knowledge. This is a good website for students to go to, to review a concept they have recently learned.

E: <http://www.woodlands-junior.kent.sch.uk/maths/index.html> This is one website that I really liked. The measurement section is super. It has several different games for a variety of measurement activities. The activities are at a variety of levels.

F: As stated earlier, my students love Starfall and Peeps. In addition, I use TEA's website a lot as it provides an abundance of valuable information, including testing dates. I also use Math Wizard and have downloaded lots of great Language Arts sites.

6. Did you find any website that you don't liked at all? Which one, why?

A: Many sites were unsatisfactory to me but I cannot give web addresses because I just passed them over to look for valuable ones. I found sites that did not explain incorrect answers for students on this list often.

B: No.

C: *There were quite a few as a matter of fact that I did not like they were not user friendly and many times the links would direct you away from the material. Unfortunately I do have the URL but there were plentiful.*

D: *<http://hmlt.com/screenshot-popup.php?title=elementary> I didn't like this website at all. I don't know if the server was just down or maybe they are updating it. It was very confusing, there were no clear instruction and it was hard to get the cursor to go where you wanted it to go. The lessons and activities seemed like they were good but it was hard to tell since you couldn't really do anything with it. I guess it was more technical difficulties than anything else but there was no clear objective.*

E: *<http://oops.bizland.com/mathfun.htm> I did not like this website because it has lists of websites that are set up in a very unfriendly way. It is difficult to find sites that you may be looking for.*

F: *There isn't one in particular that I don't like, but I shy away from sites that appear "cluttered." If the site is distracting or is not age-appropriate, I will not make it a shortcut on my students' computers either. I also don't like sites that require additional plug-ins or require you to become a member to use their sites.*

7. Can you describe how you found these resources?

A: *I found these sites by spending time searching the web. I tried narrowing my search by using key words from the chapter. I found the website search extremely time consuming because of the quantity of hits- I did not usually find the quantity of hits resulted in quality sites.*

B: *I found them using Google*

C: *All I did was enter them in the search bar and started looking.*

D: *This was one that I found on the companion websites for the Math and Science for Young Children by Charlesworth. This was not the only companion website that was not good. Most the websites that they suggested were either advertisements, or you had to subscribe or they were not working. I didn't find those companion websites very helpful. You also had to maneuver through a lot before you actually arrived to a site with activities that I was looking for. They were a bit complicated to get to.*

E: *I found these websites through Google.*

F: *I found some of them through a search and/or obtained them from colleagues. I have also used our textbooks and kept a file while in college of recommended sites. Several of my Education classes encouraged us to search for teacher-friendly internet resources. In addition, our district sends out weekly newsletters with recommended sites.*

8. Do you feel that you already know enough about searching for different websites that could be beneficial for you? (Confident, unsure, comfortable, need more help?)

A: *I really could have used help on narrowing my searches down. As a new teacher I do not have a bank of resources so every time I went to find a website that was appropriate for this week's lesson, I had to wade through too many websites to find a good one.*

B: *Yes, I feel that I have more confidence in my internet searches. One site always leads to another which gives more options.*

C: *I am confident but not complete. I feel that as technology use increases so will our ability to search in addition I feel that the websites will also change.*

D: *Even though I have had a lot of practice searching for websites, I still feel unsure. I know that it is important to look at several websites before really finding one that you are comfortable about, but I still find that I am spending too much time searching. I know that I still need a lot to learn about searching for websites to cut down on the time spent browsing. You have to keep up to date with most of the websites because they don't update them often or they just disappear.*

E: *I feel much more comfortable now than I did before. I think this will better help me put technology to use in my classroom*

F: *Yes, I am confident with searching for different websites and am comfortable with online searches. However, I would love to add to my file of recommended sites. These are beneficial to both teachers and students.*

9. Do you see any benefit for you as teacher, in using this kind of technology? If yes, could you explain? If not, could you give your reasons?

A: *I see the importance of finding quality online sources. Especially as a new teacher, the sources end up being your support if you want to branch out and try something different than your*

colleagues are trying. Often times they are married to one particular way of teaching content and not open to new ideas.

B: Yes, there is a benefit because students are more and more proficient on a computer each year. When students are safely exploring the internet, they are learning things both technologically and academically.

C: Personally I see a huge benefit because it is much faster than having to thumb through text books.

D: Yes, the benefits are priceless. This is one way to get our students ready for the future. Our students need to be prepared to compete with the rest of the world in technology. Students need to learn at a very early age that technology is a tool that is needed to make advancements in science and math. Technology can be very helpful to them now as students and later when they start their career. Out state TEKS have included a section the standards for incorporating technology in the classroom. It is that important.

E: I think it give me as a teacher just another way to help reinforce the math and science concepts taught in the classroom in a fun and interactive way. Keeping my students engaged is important to me.

F: Yes, the internet helps students in the 21st Century and gives you more resources with varied information. Teachers also are able to find information at the click of a button that helps them answer questions, prepare lessons and make worksheets. Technology can elaborate information as well as expand explanations. The wonder of technology is the quickness in obtaining information in any language for any age.

10. How important for teacher to be familiar and use internet resources in 21st century (where digital technology is predominant).

A: I know it is important to use technology, but I feel that I have a hard time implementing this because of my lack of technology in my classroom. Ideally, this is a key element in the curriculum and it is essential for children to learn. I just struggle with the resources to provide this instruction.

B: *Teachers have to adapt to new things because jobs are changing and the way of life is changing and we have to be able to teach our students to live this way.*

C: *I think that it will be very important provided that the technology is available in the school campus. Plus provided that it can be used as a resource.*

D: *Today's teacher can't survive if she does not have skills using internet resources. The students are the ones that will suffer as a result. With the use of smart boards and doing presentations on power-point, and the use of in-focus, these technology tools help make instruction better and more efficient for both the student and the teacher. A teacher won't be very effective if she doesn't have the knowledge and skills to teach her students how to stay competitive in today's technology world.*

E: *I think it is important for several reasons. First, if students do not understand a concept, the teacher may find many different ways to present the topic so that students are able to understand. The internet is easily accessible to all teachers and is a great resource for additional activities teachers can use to reinforce concepts taught.*

F: *It is extremely important for teachers to use the internet. It is important because our children are so knowledgeable in this. It is there world with cell phone, computer games etc. If a teacher is not familiar and knowledgeable about these resources then the class will be at a disadvantage, Also children will be bored since their lives are surrounded by technology. Books can no longer be the only way to obtain information.*

11. Did this class (learning more about technology) help you in any way in order to be a more efficient teacher?

A: *Fortunately, I became a better web surfer over the course of the semester. I will say that the search is anything but efficient however; I am hoping that implementing the ideas will make instruction more efficient.*

B: *Any professional development makes you grow and this class has helped to see math and science.*

C: *I liked the lesson plans that were provided but I feel they are difficult to apply to any classroom.*

D: *Yes, it exposed me to the countless of resources available to teach math and science. There are fun and creative methods to teach these objectives and the internet is a great resource with literally thousands of ideas and the latest information about best teaching practices. Just knowing that there is an answer to almost any question at the tip of your fingertips is very comforting. You just have to be very diligent and be able to sift out the good websites from the not so good ones.*

E: *It has made me more aware of language I should use when using Google to find good websites.*

F: *Yes, I have gained knowledge from this class that has helped me to integrate more technology into my teaching. Communicating with my classmates was my favorite part of this distance learning class. Their feedback was so valuable. I know that in many classes there is limited time to discuss, but when one can get on the internet at anytime, you can spend more time and really think about your answers and how to give appropriate, relevant feedback.*

12. To what extent you rethought your teaching practices/approaches after learning about variety of resources available online? From 0 (not at all) to 10 (very much), please rate the extent to which this class and specific emphasis on searching online resources helped you rethink your teaching practices?

A: *This question is difficult to answer because the resources that I have found online relate to math and science. Right now I do not teach either of these subjects. However, I would say that I am much more likely (7) to be using online teaching practices in the classroom in the future.*

B: 8

C: *I am not a teacher so I thought about everything and I am sure I will apply one or many in the near future.*

D: *Children in this century are very technology savvy, which is a very good thing. They like the interaction they get from the internet. I think that the internet provides the students with a lot of*

independence and self monitoring skills. On a scale form 0-10, I think that I have rethought my teaching practices to about a 9. I can see the benefits that a good website activity can provide for students. I think that the only down fall is having the luxury of having enough computers in the classroom for every student.

E: 0. I don't think that searching online has made me rethink my teaching practices at all. The Van de Walle has made me rethink my teaching practices a lot.

F: I gained a 5, since I have always used and was exposed to technology since I was a little girl. My parents and my teachers had high expectations on learning in a variety of ways. Technology is the future and one must be ready to soar. Being exposed to the many resources online gives me an advantage over those who limit their thinking about how to obtain and use resources. Technology is an excellent multisensory tool. Kids love it and I do as well.

13. To what extent and how your attitudes toward using internet resources in teaching changed?

A: I see more value in online sources as I get further into my teaching career. The online sources provide different means of instruction, whereas some veteran teachers indicate that "this is the only way to teach fractions, multiplication, etc." What I see as a new teacher is that I am more willing to try new teaching methods than others and sometimes the ideas I receive online coincide with my ideas for instruction.

B: I am more aware of technology in the classroom after taking this course. The hard part is finding the time to be able to implement it but the course gave me the necessary groundwork to use it.

C: Nothing changed because I am open to change and I love the convenience and flexibility of having the information at the tip of your fingers.

D: I have always known the importance of using internet resources in classroom. This class has reinforced that theory. I know that the internet is a good source for research when writing a report or paper but I discovered all the resources all there for teachers to use. The websites and activities for students keep improving through the years. Before students didn't have opportunities like these to use

virtual manipulative or interact with the games they do now. Today students can really engage in the activities and become a part of their learning.

E: Before taking this class I thought I would never use technology in my classroom. I felt like it was too hard to find things I was looking for on the internet and I had absolutely no idea how much great information and how many wonderful activities there were.

F: As previously stated my attitude remains positive and open to the world of technology. My Kinder students enjoy online stories and interactive learning games. History can be come alive as was shown in several of my lessons. I will continue to learn more about how to fully use technology in the classroom. I have been assigned as our campus Tech Team which is responsible for Staff Development in how to use technology.

14. How many times a week did you search online resources before you took the class?

A: Because I am a brand new teacher I have not had much time to research online sources for a purpose other than for homework or assignments. Since I have begun teaching, I use online sources approximately 2-3 times per week. I foresee this increasing next year as I teach all subjects instead of only writing.

B: 2 times a week

C: I am always on the internet so I guess almost every day as I explained I use it in the classroom on a daily basis.

D: I can't say that I searched the internet a whole lot. I never thought the internet could be very helpful when looking for resources that could be helpful in the classroom. My searching online was strictly for gathering information not necessarily for sites that could help me become a better teacher.

E: Never

F: As a students and then teacher I searched for resources about one time a week. After taking this class, I now use the resources available about 4 times per week. The more I use it the more I want to lean. My goal is to teach my children/students more and more about the internet and its resources. As a

leader on my campus, it is my responsibility to research and teach other teachers. I want to be a good resources person.

15. How did your strategies and criteria for evaluation of online resources changed after taking this class? Are you searching internet online resources more now?

A: My criterion for online resources has evolved over this course. My search is more refined now. It is not enough for students to have fun games to play....I want the content to truly build on concepts not just give them something to do. Also, I am looking at more sites that help me with teaching content instead of my searches being only for student consumption. I am beginning to look online more often.

B: I do spend a more significant time searching for websites because I now know what is out there.

C: No, not more than before in previous courses at UoP most of our assignments required internet research of varied subject areas.

D: Yes I think that the more specific you are in your searches, the more you want to research and compare websites. By this I mean that when you know specifically what you are looking for and you know where to go to get that information, my first instinct is to go do some searches on the internet. This is how my strategies and criteria have changed, because the more you become familiar with the different websites, you become better at judging the qualities of the different websites. You definitely need a starting point; you just can't go in blindly.

E: Yes, I do research more. I try now to look closely at what the site offers. Is it merely fun or does it actually teach a skill or concept. Also I look at what others think about a certain site. Is it "friendly" and does it have a purpose? What will my students learn and will the site have an assessment attached to evaluate if my students progressed.

F: No answer.

16. Online distance learning courses encourage more student participation than traditional face-to-face courses. (0-strongly disagree, 1-disagree, 3-neutral, 4-agree, 5-strongly agree)

A: 3- *I don't really see much difference for me personally with an online class versus a traditional course. I feel that student participation is very personal and based on what the student plans to get out of the class. It seems very apparent to me that a more mature student is more likely to participate in class. Just like in my 4th grade classroom-effort is obvious!*

B: *4 agree*

C: *I feel that they do because no one shy's away from what they want to say. Unfortunately not much class discussion was done here.*

D: *5, I strongly agree. I think that the online courses give you more confidence in yourself. They also allow you time to think about what you are going to say. You have to time to make thought, insightful comments. The feedback that you get from the other students is also more positive and more engaging than face-to-face participation. Also everyone has the opportunity to respond or to be heard. I think that this also allows the professors more time for thoughtful responses to the students in a timely manner. As a student, I know I always appreciate the comments from my professors.*

E: *4. I would have to agree. I am a student who listens to others but do not participate in class discussions because I am so shy.*

F: *I strongly agree (5) due to the fact that you have more time and you can participate at any time. You can also learn from each other's experiences and since it is written you can save the information for later use. Distance learning students can share lesson planning ideas, resources and online takes away the feeling of giving an incorrect answer. You are not judged.*

17. Online distance learning courses have more student-to-student interaction than traditional face-to-face courses.(0-strongly disagree, 1-disagree, 3-neutral, 4-agree, 5-strongly agree)

A: *1- I disagree with this statement because to me the interaction is not internalized by so many students. Often it is apparent that the student is doing their mandated 50 word response and nothing else. It does not feel like a dialog. I have experienced that even though it may not seem like students are*

participating in class, I know that I have been listening so intently to the “experts” in my class that I was not verbalizing but trying to understand the content.

B: I disagree

C: In my previous experience yes, but not here. 1. Disagree

D: 5. I strongly agree, because we have more time to communicate with each other. There is no time constraint. We can communicate for as long or short as we want because we don’t have a clock hanging over our heads. It is a great way to encourage one another and have the freedom to be in contact with everyone in the course as opposed to just a couple of students. There is a great sense that we have something in common; working adults trying to further their education.

E: 4. In a traditional classroom, student to student interaction often occurs during small group discussions, which are not very frequent.

F: Yes, I say a 4. As I previously stated, students are able to interact on a daily basis. The fact that we can share and discuss brings up the confidence level. Everyone has access to your assignments. Checking your work is important as it is visible to all.

Curriculum Vita

Pilar Gonzalez was born in Veracruz, Ver. She is the second daughter of Luis Fernando Rueda Flores Calderon and Carmen del Pilar Uscanga Atienza. She graduated from “Valentin Gomez Farias” high school in spring of 1986. She entered Instituto Tecnologico de Estudios Superiores de Monterrey (ITESM)) and graduated in Licenciatura en Sistemas Computacionales Administrativos obtaining her degree in 1992. While pursuing her bachelor’s degree, she was a high school instructor for Computers Science, later she was part of the team that analyzed and designed a productivity system for a law firm; finally she worked as an administrative assistant for the Purchasing Department at ITESM. After graduation she kept working a staff member at the ITESM Direccion Administrativa.

In 2002 Pilar became a full time volunteer at El Paso Country Day School in the Elementary School. While working there she started her Alternative Teacher Certification Program at University of Texas at El Paso (UTEP). She obtained the EC – 4 Generalist by Texas State in 2006. She continued with the Master of Arts studies at UTEP, under Dr. Olga Kosheleva’s guidance. In 2009 she started working as a 4th and 5th grade Math and Science teacher at Loretto Academy in El Paso.

Pilar is currently member of The National Scholars Honor Society, member of Pi Lambda Theta Honor Society, and member of ASCD (Association Supervision and Curriculum Development). She has made several presentations at conferences such as: NASA PSTC Conference, February 2008, CETAL Conference (UTEP) February 2009, TNT and More Conference, Ysleta ISD, TX and more.

Results from this study have been accepted for journal publication at Academic Quarterly Exchange, on its Spring 2010 Volume.

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