Novice teachers today struggle to integrate engaging pedagogy in their standards-based curriculum. Twenty-first century students have been immersed in technology from birth and are accustomed to multi-tasking with several types of technology each day. Students no longer rely on the traditional ways of communication and absorb their information through multiple technologies. This research project examines one university course that prepares teachers, with limited technology skills, to use cutting edge technologies along with engaging and challenging pedagogy in integrated lessons designed to meet curriculum standards as well as to promote creativity, problem solving skills, cooperative relationships, and critical thinking skills. Research findings showed that preservice teachers’ fears about using technology in the classroom decreased as their understanding and experience levels increased. At the end of the course data revealed that preservice teachers were excited about, and confident in, their ability to use and teach various technologies to their K-12 students.

“Welcome to the first day of 9th grade! I’d like you to write down some information about yourself and then share that information with a neighbor.”

“When you finish reading Chapter 6, please answer the questions at the end. Remember to write in complete sentences.”

“I would like you to write a book report on your favorite chapter book read last year in 7th grade.”
“Today, you will begin your research paper on important inventions in the 20th Century. Who remembers the format for an outline...?”

The preceding quotes were observed in public school classrooms in 2007 but could have been observed in any classroom over the past 50 years. Teachers today are struggling to find innovative and creative ways to motivate and engage their students. Common complaints about students in 21st century classrooms are that they do not enjoy reading and rarely complete written assignments satisfactorily. The divide between teacher and student is at an all time high. A recent study by the U.S. Department of Education found that 31% of American students were dropping out or failing to graduate in the nation’s largest 100 public school districts (Thomas & Date, 2006). Students feel disconnected from the school curriculum and perceive the school experience as irrelevant to their future success as adults living and working in the “real” world.

On the other side of the issue are teachers who feel frustrated, disrespected, and undervalued by their students. Teachers feel an extreme amount of pressure to meet curriculum standards and produce students who score highly on competency exams (Moorman & Horton, 2007). They know that motivation and engagement are the keys to student success and work hard to create curricula and use pedagogy that will inspire students to higher levels of academic achievement.

The problem is that the teachers are working from their own perceptions about engaging curricula and pedagogy and often teach in the way they were taught. This preferred pedagogy is characterized as serious, methodological, individual, and slow-paced. In fact, the students in classrooms today are very different then in years past. Prensky (2001) explained that this generation of students is considered digital natives who have grown up with an assortment of digital technologies and live in a wired world. Moorman and Horton (2007) defined a wired world as one where, “87% use internet, 90% of these use email, 45% own cell phones, and 57% have contributed online content to the Internet” (p. 263). These digital natives or Millennials, as they prefer to be called, are unique in many ways from the preceding generations of learners.

How does growing up in a wired world make the Millennials unique? Howe and Strauss (2000) wrote extensively on this topic and described several traits that can be used to characterize those Millennials born between 1980 and 2002. Among others, Millennials are confident, team-oriented,
achievement oriented, pressured, and conventional in their beliefs and behavior. It is not only their personas that are unique but also their ways of gaining information, working with others, and communicating that have been influenced by their immersion in information and communication technology. Students today are used to getting information exceedingly fast and often parallel process and multi-task. They blossom in environments with frequent rewards and instant gratification. Millennials prefer random access and enjoy working best in cooperative groups. Not surprisingly, they prefer games to more serious work (Prensky, 2001). In addition, Oblinger (2003) concluded that Millennials also believe that knowing is less important than doing, learning is trial and error, and distinctions between creator and consumer are ambiguous.

Teachers are attempting to meet Millennials’ distinctive learning needs by introducing technology in the curriculum but are falling short of the mark in their pedagogy and overall understanding of how digital natives prefer to acquire new skills and concepts. One barrier here is that teachers and students have very different experiences and understandings of technology. Millennials are digital natives, whereas many teachers are digital immigrants. Digital immigrants are those who were already socialized in predigital ways when digital technology arrived on the scene (Prensky, 2001). In addition, digital immigrants struggle with their own limitations and anxieties about using new technologies in their classrooms. Research shows that one of the largest factors determining technology integration in elementary schools is the amount of computer knowledge the teacher possesses (Larner & Timberlake, 1995). Not surprisingly, teachers with little technological knowledge and experience report high levels of anxiety and this, in turn, hampers their ability to use effective technologies in their classrooms (Shick, 1996). McCannon and Crews (2000) found that when teachers did use technology, it was mostly in administrative ways and almost never in creative, interactive lessons. It is obvious that teacher education programs need to enact innovative ways to prepare teachers for 21st century classrooms. Preservice teachers need to learn about 21st century technology as well as gain experience in integrating emerging technologies in engaging lessons that will meet the needs of their students.

RESEARCH OBJECTIVES

The purpose of this research was to examine preservice teachers’ understanding and use of technology both in their everyday lives and in their
classroom practice and to assess the effectiveness of a university course aimed at teaching preservice teachers how to use and integrate technology in their classrooms. Specifically, the questions asked in this research project include:

1. What role does technology play in preservice teachers’ professional and personal lives?
2. What fears do preservice teachers have about using technology either in their personal lives or in their classrooms?
3. How successful was the course in decreasing preservice teachers’ fears about technology and teaching preservice teachers to use technology in their classrooms?

METHODS AND DATA SOURCES

This research was conducted in an NCATE accredited university in North Carolina. The university demographics include 14,000 students who are mostly residents of North Carolina. Students are traditionally white (95%), English-speaking, upper-middle class, and Christian. During the Spring and Summer semesters of 2007, Junior level education majors enrolled in the core course: CI 3850: Literacy, Technology, and Instruction, were asked to voluntarily participate in this research study. Spring semester yielded 25 participants and summer semester yielded 23 participants. All students volunteered to participate in the study.

Data consisted of surveys, course evaluations, and final project artifacts collected over the course of both semesters. Survey I (Appendix A) was given to students the first day of the spring semester and again on the last day of the semester. Students anonymously completed course evaluations (Appendix B) on the last day of class for spring and summer semesters. Project artifacts were created and submitted electronically throughout each semester.

Data were analyzed using a typological analysis system (Hatch, 2002). Specifically, Surveys Ia and Surveys Ib for spring semester were compared and contrasted. Major findings and themes were noted. Course evaluations were also compared/contrasted for continuing themes. These were noted as well. Finally, both sets of notes were compared and overall trends and themes were noted as larger findings/conclusions. Project artifacts were compared/contrasted both within groups and among groups with themes noted.
RESULTS

As noted earlier in this article, students enrolled in this class are junior-level education majors. The majority of students are noted as “traditional” students who ranged in age from 19 to 21 years old with four students classified as “nontraditional” students. The nontraditional students reported their ages to be between 28 and 40 years old. The ages of the students are important to note in relation to their generation identity. The majority of students enrolled in the courses were considered Millennials while the nontraditional students were considered Gen Xers (Moorman & Horton, 2007).

STUDENT KNOWLEDGE AND EXPERIENCE LEVELS (PRIOR TO COURSE)

Students enrolled in the courses were classified as Millennials and, as such, were expected to have high levels of use and experience with emerging technologies. Interestingly, results from the initial survey showed quite a contrasting picture. Students reported that they used cell phones, iPods, and their personal computers on a daily basis, using personal computers mainly to access the Internet and check email, but had little or no experience with more creative and innovative technologies such as digital cameras, iMovie, blogs, podcasts, personal web pages, and Macintosh computers. These findings contrast sharply with much of the research that describes Millennials as being techno savvy and immersed in emerging technologies. In fact, the results from this study found that the students’ knowledge and experience levels were more concurrent with those of the Gen X generation than those of the Millennial generation. However, students did show more Millennial characteristics when reporting how they learn new technologies. All participants, except for one, reported that they had some instruction from teachers or friends at first but after they “got the hang of it”, and “understood how technology worked,” they taught themselves most of the new technology such as how to use their iPods or to use new functions on their cell phones. These findings agree with others who have noted that Millennials learn best in cooperative groups and see the learning process as trial and error. These learning preferences are in sharp contrast to much of the pedagogy seen in classrooms today.

When asked about the technologies used by their teachers for instruction, students overwhelmingly reported teachers using overhead projectors, movies, and PowerPoint presentations. One student explained, “Overheads. And to this day I still hate them. It’s like asking your lesson to be boring.”
Only one participant of the sample reported use of an emerging technology, iClickers, by an instructor at the college level. Numerous research studies have found that the pedagogy of novice teachers often reflects those methods observed as students. In this case students will be using overhead projectors, movies, and PowerPoint presentations to disseminate information to their students who are digital natives used to multi-tasking, instant gratification, trial and error learning, and cooperative projects. This is a recipe for disaster.

**CI 3850: LITERACY, TECHNOLOGY, AND INSTRUCTION**

The purpose of this required course is to provide students with a broad understanding of professional issues related to literacy, technology, and instruction. The impact of media and various technologies on school and society are examined. Special emphasis is placed on developing understandings of what it means to be literate in a multimedia culture. Instructional strategies as research-based tools are explored in the context of traditional and emerging technologies.

The course is based on the assumption that knowledge is socially constructed, and that learning is achieved through active engagement of the learner. This theoretical view is addressed directly and modeled as the predominant instructional approach within the course. Students are expected to become active members of this learning community in preparation for their role, in and out of the classroom, as professional educators who understand and use appropriate theories and techniques for the successful integration of technology in the teaching/learning process.

Specific objectives for this course include:

Students will:

1. Learn to engage in dialogue as a primary means of increasing professional knowledge.
2. Develop an historical perspective on literacy, technology, and media.
3. Critically evaluate their own literacy and learning processes.
4. Develop computer, multimedia, and telecommunications skills.
5. Understand the role of ethnicity, gender, and socioeconomic status in literacy, technology, and instruction.
6. Critically analyze and evaluate mass media formats.
7. Use media and technology as part of a design/production process to communicate effectively.
8. Recognize the impact of media/technology on school and society.
9. Understand the role of computers and telecommunications in the classroom.

The course is taught in three sections: (a) Literacy, (b) Media Literacy, and (c) Instructional Strategies with emerging technologies embedded in the content, activities, and student projects. Students are required to create four artifacts that reflect their knowledge of, and ability to creatively implement, the concepts and skills taught throughout the course. The four artifacts required in this course are as follows:

**Literacy autobiography activity.** Through the course of this activity, you will be engaging in readings regarding various definitions of literacy that you will confront as a teacher as well as your own experiences with literacy development. You will also be reflecting on your life from birth to current age and creating a digital representation of your literacy development (webpage). You will share your literacy autobiography with a small group and reflect on this experience in a 1-3 page written response.

**Activity on instructional strategies/software evaluation.** You will work in a group to plan and present a complete lesson to the class (teaching a selected software platform) that integrates at least one instructional strategy, implements a well-developed lesson plan, and reflects considerations for diverse learners.

**Media literacy activity.** You will work in a group to design a lesson that implements media as a source for instruction. Additionally, you will evaluate media in education—either how media affects instruction or how it influences children, or you can look at it topically. How is a certain topic/issue reflected through various mass media arenas? Presentations will include hyperlinks to media clips, iMovie samples, and other digital media representations.
**Culminating project.** The goals of this presentation are to use a suitable instructional strategy that directly relates to a North Carolina Standard Course Of Study (NC SCOS) objective for your target age group/content area, collaborate with peers, effectively use technologies that are engaging and motivating to students (a short iMovie intro is required), build understanding through a sequence of activities that require active learning and creative higher order thinking skills, and finally evaluate and reflect on the activity.

**STUDENT KNOWLEDGE AND EXPERIENCE LEVELS: AFTER COURSE**

After course completion, students reported that their understanding of and ability to implement emerging technologies in their pedagogy sharply increased. Many students enjoyed the option to work in a group and felt that they learned a great deal from working with others who were in a similar discipline or grade level. Analysis of project artifacts within groups showed that technologies used within lessons became more extensive and creative as students progressed through the course. Students also showed a deeper understanding of how emerging technologies could be integrated in lessons and not just used as external tools. One example of this is a group who began their first project wanting to use direct instruction to teach Math Blaster to their first grade class. At the end of the course this group’s culminating project was a highly creative lesson integrating an iMovie introduction to a lesson about Seasons where groups of students would be using Kid Pix Studio to create their own season books for publication and display in the classroom library.

Another area where students showed growth is in their understandings of engaging and motivating instructional strategies. Many students began the semester with lessons that were highly structured and reflected direct instructional methods. As the students learned more about instructional strategies from readings, modeling, and experiences in the course, their lessons began to move from teacher-centered lessons to more student-centered lessons highlighting student engagement and interaction. A favorite example of this transition is a student who wanted to teach his high school students how to create an iMovie. At first he had planned to give students a step-by-step handout of the process then to guide them through each step as a whole class. After three weeks in the course the student came to me and reported that he wanted to change his idea. His new idea was to have students work in cooperative groups to explore iMovie then jigsaw the groups and have
students teach each other what they had learned. The lesson would end with each group creating an instructional iMovie focused on one component of the process.

Students also reported that this course helped them to “know what was out there.” Students ranked their knowledge of educational technologies/software as extremely low (1 and 2) at the beginning of the semester but reported that their knowledge significantly increased (mostly 4 and 5) by the end of the semester. This finding was supported by an analysis of student projects throughout the semester. Overall, the first two artifacts used only one or two educational resources but the last two artifacts, on average, used three or four emerging technologies. These technologies were deeply embedded in the lesson fabric where some were used by the teacher for instructional purposes, some were used by students to process, learn, or in some way interact with the content, and finally some were used by students to create or produce a product as an example of their learning.

Finally, students reported a decrease in their anxiety about using technology in the classroom. Before the course, student anxiety was focused in two areas: (a) Keeping up with the ever-changing technology and (b) their ability to troubleshoot the glitches that will occur when using technology in the classroom. After the course, students reported that their increased experience with, and understanding of, emerging technologies was a large factor in increasing their confidence to adapt to new technologies and to troubleshoot technological hiccups. Students also reported that the model provided by the instructor when faced with new technologies or when dealing with a technology glitch was extremely helpful as well in showing them ways to meet everyday challenges when working with technology. One student was in tears on the first day of class. She was frustrated trying to save her document and place it in the shared folder on the school server. When asked what the problem was she explained that she was “not good with technology” and had “bad karma” when it came to computers. By the end of the course, she was excited and smiling when talking about the lesson she was creating for her students. In fact, she used several innovative technologies and even created new ways of using them for her specific lesson and class. Her final presentation was confident and engaging. When asked about emerging technologies at the end of the course, this student broke into a wide grin and began bouncing in her flip-flops when she said “computers are like sooo cool!! I can’t wait to show my students everything!”

The findings from this study show a clear connection between students’ gains in these areas and their experiences in CI 3850. Students reported that three components helped them to move forward with relation to using tech-
nology in their own professional and personal lives: (a) readings and explicit instruction about Millennials and technology systems, (b) hands-on experience with various instructional strategies and technologies in a risk-free environment, and (c) working and learning with a group of peers. Preservice teachers commented that it was the three components used consistently together in the course that worked to improve their knowledge and use of technology. Overall, the experience was reported to be a great success in increasing preservice teachers’ ability to create and implement appropriate, challenging, and motivating lessons using various technologies for their students.

**IMPLICATIONS FOR TEACHER EDUCATION**

Teacher education has never been more complicated than it is today with so many pressures, demands, and expectations. Novice teachers face a veritable deluge of frustrations, challenges, and new learning experiences. How can we best prepare these new teachers to face the reality of teaching in 21st century classrooms? How can we break the cycle of the status quo where schools are perceived as outdated and disconnected from real world experiences? How can teachers learn what methods will be engaging and motivating to their students who spend their out of school time wired to video games, iPods, cell phones, and their laptop computers? One answer to these questions is to create a course that simultaneously teaches preservice teachers about emerging technologies and gives them a plethora of experience with these emerging technologies. This course must be anchored by authentic projects that the preservice teachers can and will use in their classrooms. These projects will form the foundation and model from which preservice teachers will create a curriculum of engaging and motivating lessons employing those very technologies that their students use when not in school. Bringing students’ lived lives into the classroom will lesson the divide between school and extra curricular time and increase student engagement and motivation.

Students must also be taught about methods and learner preferences. Teacher educators can and should do this with stimulating materials and plenty of time to discuss and debate the ideas found in them. Preservice teachers should be encouraged to reflect on their own assumptions and biases about teaching and using emerging technologies. Teacher educators must move preservice teachers away from the “same old grind” of using limited technology in teacher directed methods and model those engaging, creative,
and innovative methods they hope to develop in their own students.

Finally, teacher educators must remember that the students they teach are often from another generation and have different expectations, preferences, and experiences. Teacher educators must continue to ask who are our students? What do they know and how did they learn what they know? What are their strengths and weaknesses? How will they learn best and how can I effectively meet their needs? Last, teacher educators must find ways to translate this knowledge into course work that develops K-12 teachers that ask the same questions of their own students. Nearly one-third of all public high school students—and nearly one half of all African Americans, Hispanics, and Native Americans—fail to graduate from public high school with their class (National Center for Educational Statistics [NCES], 2005). Students feel a great disconnect between school and their lived lives. The findings from this study make it clear that preservice teachers gain a better understanding of this disconnect and develop specific strategies to help bridge the generational divide when enrolled in a course that explicitly addresses generational differences while at the same time scaffolding preservice teachers to develop technology skills and understandings that will motivate, engage, and challenge their digital native students.

References


**APPENDIX A**

**CI 3850 Research Survey I**

What technology do you remember your teachers using for instructional purposes (film strips, PowerPoint, overhead, etc.)

What technologies do you use on a daily basis?

What technologies do you use for academic purposes?

How did you learn to use various technologies?

What barriers do you experience as you integrate technology into your life?

1-Not at all experienced
2-Somewhat experienced
Use the above scale to indicate your level of experience with the following technologies:

- Macintosh computers
- Personal computer
- Email
- World Wide Web
- Power Point
- WebQuest
- iMovie
- Digital camera
- Digital video camera
- Blogs
- Personal website
- Educational software
- Other educational resources (specify below)

APPENDIX B

CI 3850 Spring/Summer 2007 Course Evaluation

Prior to this course, rate your hands-on technology skills as:
Limited experience  Moderate experience  Competent

This course is based on a community of learner’s model. How successful do you think the instructor (circled above) was in developing this community?

Extremely successful  very successful  moderately successful
fairly successful  not successful

Please circle each of the following:
1. This class has improved/increased my knowledge and understanding of a systematic model of instructional technology.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

2. The Media Literacy research and presentations increased my knowledge and understanding of the uses and misuses of technology in the classroom.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

3. The class increased/improved my awareness of state standards in my teaching area.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

4. This class increased my knowledge and understanding of media/technology in education.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

5. This class increased my knowledge and understanding of instructional strategies.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

6. This class increased my knowledge and understanding of literacy as it relates to education.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

7. The instructor allowed/asked me to share professional/personal viewpoints and ideas related to the course.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

8. The instructor’s methods helped me understand the subject matter.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
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</table>

9. I felt like I could approach the instructor about the course.
<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
</table>

10. The instructor was available to students (either in person, by phone, email, etc).
    | Strongly Agree | Agree | Disagree | Strongly Disagree |
    |----------------|-------|----------|-------------------|

11. Course-related materials, syllabi, outside readings, were helpful.
    | Strongly Agree | Agree | Disagree | Strongly Disagree |
    |----------------|-------|----------|-------------------|
What did you like about the course?

What would you change in the course?