

Instructional Strategies and Resources: Exploring the Use of Technology

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Through a review of current literature on the use of technology in education, it was found that new teachers are not being adequately prepared to teach with technology. In order to help preservice family and consumer sciences teachers develop a “thinking with technology” perspective, two areas need to be addressed in teacher education programs: (a) technology integration should be modeled with content-specific examples and demonstrations, and (b) self-efficacy in using technology should be encouraged with positive examples. Numerous examples and resources are provided to illustrate how technology can be used in family and consumer sciences education programs to enhance preservice teachers’ knowledge and abilities in using technology effectively. In particular, using technology to enhance students’ critical thinking skills is discussed with promising examples.

Technology has impacted every facet of our life so profoundly that we couldn’t imagine our lives without it. Computers, the Internet, digital cameras, MP3 players, cell phones, and personal digital assistants (PDAs) are just some of the technological advances we use everyday. And today’s youth are even more technologically savvy about these technologies than youth of the past. In order to fully prepare today’s youth to thrive in this digital world, educators must help students “use their native intelligence about technology in sophisticated, responsible ways that serve them well as they make their way in the Digital Age” (North Central Regional Educational Laboratory [NCREL], 2003, p. 2).

According to Standard 6 of the *National Standards for Teachers of Family and Consumer Sciences*, the beginning family and consumer sciences teacher will “facilitate students’ critical thinking and problem solving in family and consumer sciences through varied instructional strategies and technologies and through responsible management of resources in schools, communities, and the workplace” (National Association of Teacher Educators for Family and Consumer Sciences [NATEFACS], 2004). This article will focus on the use and value of technology as an instructional strategy and resource in family and consumer sciences (FCS) education. The information in this article is based on a review of current literature on the use of technology in education and in FCS.

Use of Technology in Today’s Schools

Access to technology has been one of the highest priorities in public education. Internet access was available to 35% of the schools in 1994, while today 99%, or virtually every school, has Internet access (Parsad & Jones, 2005). But *access* to technology is not enough today. Technology has become an integral component of our world and is transforming how people think, communicate, and manage their everyday lives. In order to prepare people for the new “Digital Age” they must learn how to use technology to its fullest potential.

More than 21 million individuals in the 12 to 17 age group (87%) use the Internet today, while 16 million (78%) use it at school. Most of these youth (86%) believe it helps them do better in school (Hitlin & Rainie, 2005). Children report they use technology for big projects at school and to complete their school assignments at home (United States Bureau of the Census, 2003).

Technology has changed our world and our near environments. Work settings and assignments have changed. Individuals must have technological skills as well as “an intellectual toolbox” that includes team building, critical thinking, problem solving, and accessing resources. Business and education leaders, however, have questioned whether students are able to compete internationally and whether students are able to think critically and engage in creative problem solving. Kay and Honey (2005) indicated that there are six literacy skills that are critical to a students’ success in the workplace: (a) effective communication, (b) analysis and interpretation of data, (c) understanding computational models and simulations, (d) managing and prioritizing tasks, (e) problem solving, and (f) safety and security. Technology is a critical tool to help learners acquire these crucial skills.

This represents a major national investment in educational technology. In fact, as a nation, over \$66 billion has been invested in school technology (Quality Education Data [QED], 2004). Schools have spent increasing proportions of their discretionary funds to acquire computer equipment, software, and related supplies and services (Pelavin Research Institute, 1997). At this level of investment, legislators and the public are now looking for returns on this investment. Has there been an increase in student achievement as a result of this investment?

Technology and Student Achievement

One of the important concerns in using technology in teaching and learning has been whether or not its use contributes positively to student achievement. The authors found no literature specifically related to the effects of using technology in family and consumer sciences on student achievement. The literature related to technology and student achievement in education, in general, was also limited. A number of meta-analyses, however, have been summarized by Waxman, Connell, and Gray (2002) in a report to the Institute of Education Sciences (IES) and funded by the United States Department of Education. These authors examined meta-analysis studies from 1975 through 2002. Overall, these analyses indicated educational technology has positive effects on student achievement. According to the Center for Applied Research in Educational Technology (Knezek, Christensen, Bell, & Bell, 2006), technology can improve student learning when it (a) supports curriculum objectives being assessed; (b) provides feedback about student performance to both the teacher and student; (c) allows for student collaboration, discussion, and reflection; (d) adjusts for diversity of learning styles and abilities of students; (e) extends curriculum content beyond the classroom; and (f) is supported by the school district and community.

In addition to examining the meta-analyses studies of others, Waxman, Connell, and Gray (2002) conducted a systematic search of the impact of technology on student outcomes. Their results indicated there was a “modest, positive effect of teaching and learning with technology on student outcomes” (p. 12). According to their findings, teaching and technology processes can directly or indirectly impact student outcomes. The analysis had several limitations, however, which are indicated below:

1. Having few quantitative research studies in peer reviewed journals is a serious problem in this research and in the field.

2. There were few randomized, experimental studies. Most were descriptive or exploratory and did not report specific findings.
3. The studies lack specificity resulting in difficulty in coding and analysis.
4. The findings are correlational and do not result in strong causal inferences.
5. Some of the studies were a decade old and technology has advanced greatly during this time frame.

The authors of this study recommend additional, continuous, high quality research on the impact of technology on student achievement (Waxman, Connell, & Gray, 2002).

Technology Standards

The National Council for Accreditation of Teacher Education (NCATE, 2006) provided recommendations for teacher education programs in preparing preservice teachers to use technology effectively in kindergarten through high school classrooms. In addition, the International Society for Technology in Education (ISTE, 2000) has developed two sets of technology standards, one for teachers and one for students. The ISTE *National Education Technology Standards (NETS)* for teachers focuses on understanding and integrating technology into the curriculum to maximize student learning. The ISTE NETS for students emphasizes that students' use technology safely and ethically to communicate and interact with others, to research topics and issues, to produce products that enhance learning, and to help them make informed decisions and solve real-life problems. While both sets of ISTE standards are interrelated, teachers should use the *NETS* for students as a guideline in planning hands-on, engaging, technology-based activities for the classroom.

Teacher education programs should be preparing preservice teachers to use technology by incorporating the ISTE *NETS* for teachers. All beginning teachers should be able to meet the following standards:

1. Demonstrate a sound understanding of technology operations and concepts.
2. Plan and design effective learning environments and experiences supported by technology.
3. Implement curriculum plans that include methods and strategies for applying technology to maximize student learning.
4. Apply technology to facilitate a variety of effective assessment and evaluation strategies.
5. Use technology to enhance their productivity and professional practice.
6. Understand the social, ethical, legal, and human issues surrounding the use of technology in PreK through 12 schools and apply that understanding in practice.

In order to assess preservice teachers on these standards, they must demonstrate their ability to use a variety of computer applications and advanced technologies throughout the teacher education program. A list of strategies and projects to be used in a family and consumer sciences teacher education program can be found in Appendix A. These projects should be assessed with appropriate rubrics to measure a preservice teacher's performance in using different technologies. Rubrics help identify the criteria and experiences necessary for a preservice teacher to meet (or exceed) the standards. Assessment is vital in teacher education programs to ensure that preservice teachers have mastered an acceptable level of competency in using and applying technology in creating units and lessons for the family and consumer sciences secondary classroom.

Technology Integration in Teacher Education Programs

Studies indicate that new teachers feel unprepared to teach with technology (National Center Education Statistics [NCES], 2000; United States Department of Education, 2000). Though preservice teachers are equipped with technical skills, they are not being adequately prepared to integrate technology into the curriculum in effective and meaningful ways (Doering, Hughes, & Huffman, 2003; Hughes, 2005). In recent years, there has been a shift in how preservice teachers learn about technology. Instead of taking technology courses that focus solely on technical skills, preservice teachers are learning how to use technology in content-based courses (Jacobsen, Clifford, & Friesen, 2002; Niess, 2001). They “need to be educated through models that emphasize learning *with* [italics added] technology, rather than learning *from* [italics added] technology” (Doering et al., p. 343). Hughes found that teachers who learned technology within a content-based framework were more likely to use technology in the K through 12 classroom. In addition, preservice teachers who are learning with technology are more engaged in the learning process and, therefore, able to construct their own knowledge from it. Technology becomes a cognitive tool for the learner to represent or express what they know. These tools facilitate cognitive processing where students are able to think more deeply about the subject matter they are learning and engage in knowledge construction rather than knowledge reproduction (Jonassen, 1994).

In what ways can teacher education programs help preservice teachers become more proficient at integrating technology into their curricula, which in turn, will promote student learning? First, let’s define what is meant by “learning or thinking with technology.” According to Ertmer, Conklin, and Lewandowski (2001), thinking with technology can be defined as “a state of mind when teachers use discriminating thinking to identify [and generate new examples of] activities using technology” (p. 351). It is not when a teacher uses technology to create a presentation, to prepare lesson plans or worksheets, or to record grades and student information. While these are other ways to use technology, they do not involve the students in the active learning process. The goal is to prepare future teachers who will use different technologies throughout the curriculum to help students expand their thinking and enhance their learning in the family and consumer sciences classroom.

Researchers’ found two areas that must be addressed in a teacher education program if preservice teachers were to develop a “thinking with technology” perspective: (a) to emphasize the value of integrating technology in the classroom through relevant examples and demonstrations (Doering et al., 2003; Hughes, 2004, 2005) and (b) to build each candidate’s self-efficacy in using technology as a cognitive tool (Ertmer et al., 2001). Hughes (2005) found that the more content-specific the examples were in using technology, the more likely teachers saw the value in it and used it in the classroom. She stated “the farther the example is from the teacher’s content area, the lower the likelihood that the teacher would spend time developing other possibilities for the technology” (p. 296). After taking a methods course in which technology was infused into the curriculum and used by participants, a group of preservice teachers’ changed their perceptions about using technology in the classroom from “a vehicle to deliver information” to a “mind tool with which students could learn” (Doering et al., p. 350).

In addition to building their skill level of technology, preservice teachers need to build their self-efficacy of teaching with technology. According to Bandura (1997), self-efficacy refers to one’s beliefs about their ability to perform an action. A person can have knowledge and skill of technology, but without self-efficacy, they may never attempt to use technology. Ertmer et al. (2001) stated that teachers with higher levels of self-efficacy for using technology in the

classroom are more likely to spend time and effort, and persist longer on technology-related tasks than teachers with lower levels of self-efficacy. Researchers (Bandura; Schunk, 2000) described three areas that can influence an individual's self-efficacy: (a) personal experiences and mastery of the material, (b) observation of material modeled by others, and (c) positive social persuasion from peers and mentors. As these areas build up for an individual in using technology, fear and anxiety diminish and they feel more confident in their ability to integrate technology into the classroom. In other words, the more positive experiences a preservice teacher has using technology in their content area, the more value they see in it and the more confident they become in using technology in the classroom.

Another area of concern in developing a "thinking with technology" perspective for preservice teachers is their student teaching placement. The role of the cooperating teacher can either enhance or inhibit a preservice teacher's use of technology in the classroom. If a cooperating teacher does not regularly integrate technology into the curriculum, a preservice teacher's ability to work with technology during their student teaching experience will be limited (Doering et al., 2003).

In order to provide preservice teachers an opportunity to observe teachers using technology during their student teaching, case studies can be presented via video or CD-Rom (Ertmer et al., 2001; Hughes, Packard, & Pearson, 2000). This is particularly important for preservice teachers who are not placed with a cooperating teacher who regularly uses technology in the classroom. If preservice teachers are to develop a "thinking with technology" perspective, they need access to models of exemplary teachers teaching content with technology. Ertmer et al. found the use of electronic models a viable means for increasing preservice teachers' ideas and self-efficacy for technology integration.

Technology Trends Impacting Education

New technologies are emerging every year and are making a significant impact in higher education. In order to adequately prepare the future generation of family and consumer sciences teachers, educators must keep abreast of these new technologies and integrate them into their teacher education programs. While this might seem like an impossible task as new technological advances are developing at warp speed, this article will help sort out the technology trends and ways to use them in the college classroom. For examples, see Appendix A: Strategies to Enhance Intellectual and Process Skills in Preservice Teachers and Appendix B: Teaching and Management Tools.

According to *The Horizon Report*, a collaboration between the New Media Consortium and the Educause Learning Initiative (2006), two technologies will continue to expand and impact the higher education environment: social computing and personal broadcasting. Social computing is described as "the application of computer technology to facilitate collaboration and working in groups" (New Media Consortium and Educause Learning Initiative, 2006, p. 8). Unlike the widely used technology tools that promote asynchronous group work (like e-mail and computer management systems), social computing tools promote synchronous "virtual" meetings and the ability to share information and receive feedback in an online community. The use of blogs, wikis, instant messaging, and interactive video conferencing are some of the technological tools used for social computing. These tools allow for more knowledge generation and knowledge sharing in a collaborative learning environment. One example of using these tools could be to create an online network of family and consumer sciences educators where topics and resources are shared and discussed. This is particularly important since family and consumer

sciences (FCS) educators are spread out across the country. The use of social computing tools can help to promote more collaboration in constructing research projects and increasing the exchange of ideas in teaching practices. Other examples and resources for using these tools in FCS education are listed in Appendix A.

The second emerging technology trend described by *The Horizon Report* was personal broadcasting. It is described as “informally produced personal audio and video content ... as a form of personal expression and as a means of information delivery” (New Media Consortium and Educause Learning Initiative, 2006, p. 11). The report mentions podcasting, webcasting, and video blogging (or vlogging) as the main types of personal broadcasting. With the widespread use of portable listening devices like MP3 players and iPods, podcasts are quickly making their way onto college campuses and into museums. They are audio recordings that can be downloaded from the Internet into a personal listening device and then played back anytime or anywhere.

Webcasts are video recordings which are streamed live to the Internet and made available to an intended audience. Institutions like Stanford and MIT are using webcasts to provide students a recording of class sessions for future review. And video blogging is a “form of blogging where the main content is in the form of video clips and text entries of annotations” (New Media Consortium and Educause Learning Initiative, 2006, p. 11). The potential of using personal broadcasting in education is in its infancy, but the possibilities are endless (see Appendix A for examples). Think about the following ideas to use in a family and consumer sciences education program with preservice teachers:

1. To record an interview with a family and consumer sciences teacher or expert as a podcast.
2. To shoot a digital video during fieldwork and then share it with others as a multimedia presentation or webcast.
3. To capture video clips of what goes on inside family and consumer sciences classrooms to add to an e-portfolio.

Using Technology to Enhance Critical Thinking

While critical thinking has been well defined in the literature, its meaning is not always clearly understood by educators. They may confuse *critical thinking* with *creative thinking*, *thinking at the analysis level*, or *higher level thinking*. Technology can enhance all types of student thinking and learning, but it is particularly useful when teachers want students to engage in critical thinking.

Paul and Elder (2006) indicated that “critical thinking is the art of analyzing and evaluating thinking with a view to improving it.” A critical thinker:

1. raises vital questions and problems, formulating them clearly and precisely;
2. gathers and assesses relevant information, using abstract ideas to interpret it effectively;
3. comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards;
4. thinks open-mindedly within alternative systems of thought, recognizing and assessing, as need be, their assumptions, implications, and practical consequences; and
5. communicates effectively with others figuring out solutions to complex problems (Paul & Elder, p. 4).

Educators want to teach their students to think critically, to analyze their thinking, and to understand how to develop a rational basis for the beliefs they hold, as well as a way to examine their own beliefs, and test and evaluate them for their soundness.

According to a report from the 21st Century Literacy Summit (2002) the explosion of technology has afforded us the “unique opportunity to engage our citizens in economic and civic life” (p. 4). The exponential growth of knowledge combined with greater globalization and a high rate of change has required us to think critically about the information we are presented. We are bombarded by information from all types of media. Critical thinking skills are necessary skills for students because it causes them to examine the information and search for the truth. They can begin to pose critical questions, explore issues, and solve problems. These critical questions may include: Is the information we receive true? Does it apply to all cultures? What expertise is needed to resolve an issue? What criteria can be used to judge the expertise of the authors of new knowledge?

The following are examples of using technology to enhance critical thinking in students. While they were written for family and consumer sciences teachers to use in secondary classrooms, they can also be used in family and consumer sciences teacher education programs as good content-specific examples of “learning with technology.”

Practical Reasoning, Research Projects, White Papers, Letters

Practical reasoning. Teachers can choose a variety of strategies to help students solve perennial problems and practice the skills involved in critical thinking. Practical reasoning is one process used to resolve complex, continuing concerns (Olson, 1999). Through the practical reasoning process, students explore questions related to (a) revealing the *context* of the situation, (b) determining the *valued ends* or goals of those affected by the issue, (c) identifying the possible *means* or alternatives to resolving the issue, (d) identifying the *consequences* of the valued end or means, and (e) coming to a reasoned *judgment*. Teachers might find examples of a family or community issue on the Internet and students could use the Internet to find answers to the questions they pose. For example, the teacher might share a news story on the crisis in Israel and Lebanon and the continuing violence and war in these countries. Then she might pose the question, “*What should be done to strengthen families?*” using this scenario or case study.

Research projects. Students might investigate a question or concern about families or communities. Examples could be: Should the legal drinking age be lowered? Should schools require community service? As part of the assignment, they would find at least two, but possibly more, conflicting views on the topic through an Internet search. Students could identify the specific conclusions of each author and examine the reasons each author gives for his/her view. Using a graphics program they might make a Venn diagram showing the opposing reasons and similarities or agreements between two authors. Again, as part of their research project assignment they might keep a list of words or phrases that the authors used that were ambiguous or evoked emotion. They could determine the strength of the evidence and the credibility of the authors. Who are they? Again, they may need to search the Internet for information about the author. A research report might be the final result with several assignments, as described, helping them move through the critical thinking process.

White papers or letters. A fun assignment for students is to develop two “white” papers or two letters that could be sent to the mayor, senators, or an influential person about an issue

they have investigated. They (or their team) write two different letters that come to two conflicting conclusions. Each letter must be convincing and sincere. Of course, the research for these letters comes from Internet searches for evidence to strengthen their argument. Students may even choose to send one, but the exercise is meant to flex their *mind muscles* with this critical thinking exercise.

Developing a Podcast or News Broadcast

Students could investigate a topic or issue; perhaps, the obesity issue. They might brainstorm the perspectives on this issue and the information that a variety of people might provide. Each student could investigate this issue after being assigned a role. For example, one person might be a fast food company president or representative, another might be a nutritionist, another might be a cattle rancher producing beef for consumption, another might be a medical doctor, another a consumer, and another might be a grocery store owner. After preparing, they might have some time on a panel that would be recorded for a podcast. The podcast might be shared on the school website or with parents on school night. Another idea is to have students give a five-minute news broadcast about obesity and the effects on our national economy. Several students might do the research and one would do the broadcast.

WebQuests – A Teaching Strategy Using Critical Thinking

One teaching strategy used to develop critical thinking is a WebQuest, originally developed by Bernie Dodge and Tom March. This teaching strategy is “an inquiry-oriented activity in which most or all of the information used by learners is drawn from the Web” (Dodge & March, 1997, p.1). The strategy is designed to help students examine multi-disciplinary, real world problems. These problems can include those on sensitive topics such as human rights, courage, and prejudice, or they can be on other everyday problems affecting families and communities. The WebQuest strategy lends itself well to the critical science orientation, one curricular approach for teaching family and consumer sciences in middle and high school classrooms (Johnson & Fedje, 1999). This approach is directed toward resolving recurring concerns of the family and community, such as multi-dimensional issues recurring generation after generation. Recurring concerns or practical perennial problems require examining multiple perspectives and making reasoned judgments about what ought to be done.

A WebQuest includes an introduction, a task, a process, resources, an evaluation, and a conclusion (Yoder, 1999). The introduction and task can bring real world problems into the classroom where students can create products or solutions and can help build critical and creative thinking skills. It may be an ethical issue, such as euthanasia and its potential impact on families and society, or it could be an everyday problem such as the effect of the rising cost of gasoline on families and the services and products they need for everyday life. They could also use their imagination on a “pretend trip” to a future time period when they already have families of their own and the problems they may encounter.

The process used in a WebQuest can vary. Generally, the teacher facilitates the students’ work and they may identify a step-by step linear process or may include cooperative learning strategies. The teacher also identifies a number of relevant and acceptable resources that can be used by the students. This usually includes Internet sites, but can also include books, videotapes, field trips, people, and other useful resources. The websites and other resources may include inaccurate information, conflicting views, and incomplete data. This is particularly helpful to start a discussion about judging the value of the information.

It is important to have an evaluation section in the WebQuest to see if the student has mastered the learner outcomes. This section should include rubrics for the teacher and the student to evaluate the students' knowledge and skills. The rubrics should include criteria and appropriate descriptors.

The final section of the WebQuest is the conclusion which allows the students to review their learning and to reflect upon the process and result of their learning. This may also include time for the teacher to get additional feedback from the students.

Cooperative Learning

While cooperative learning does not have to be directed toward helping students think critically, it can be used as one component in a critical thinking exercise. As a team, students can identify a goal and the various perspectives related to a family or community issue. Armed with their specific goal, the team could investigate websites from the Internet to gather information about a topic. They could assign each other roles. For example:

Researcher(s): One or more persons would do the initial searches for information.

Credential's Checker: Once material is found on the topic, the credential's checker uses the Internet to check the credentials and background of the author and perhaps rates the information based on criteria the students set up to judge the credibility of the information.

Conflict Character: Another student may have the assigned task to look for areas of conflict in the information. This student might develop a list of conflicting ideas found and then search more specifically for information about the conflicting ideas.

Illustrator: Another student may be the illustrator and create a visual, using PowerPoint, a graphics program, or some other computer related program, to help the team share their learning in a visual way.

As you can see in all of these examples, the teacher becomes the facilitator of learning and not the *sage on the stage*. One teacher saw his role differently when he was asked about changing instruction to use more technology, "...students want to use technology to learn, they don't want teachers to use it to teach them" (Rice, Wilson, & Bagley, 2001, p. 222).

Social, Ethical, and Legal Issues Surrounding Technology

In the process of preparing tomorrow's family and consumer sciences teachers to effectively integrate technology into their curricula, care needs to be taken to also address issues related to the social, ethical, and legal uses of technology in the classroom. Many concerns have been raised by parents and educators regarding Internet safety and helping young people use technologies in a responsible manner (Berson, Berson, & Ralston, 1999; Hoj, 1998).

A major concern focuses on the reliability, credibility, and appropriateness of certain websites. This has more than 90% of school districts nationwide installing filtering software to their computer systems (National School Board Foundation, 2002). Unfortunately, filtering software is not 100% effective in protecting students from inappropriate and harmful material on the Internet. School districts have also instituted rules on how technology can be used safely in the classroom through Accepted Use Policies (AUPs). While AUPs and filtering software are helping to protect students and minimize misuse of technology in schools, it is the teacher who is ultimately responsible for maintaining safety within their classroom (Hicks, Sears, Gao, Goodman, & Manning, 2004). Cunningham (2002) stated that "teachers with no practical preparation or experience in social, ethical, and legal issues surrounding digital technologies

create another area of concern” (p. 31).

Teacher education programs need to ensure that preservice teachers are prepared to use technology, especially the Internet, in a safe and ethically responsible manner. This way, teachers can then “lead students on exciting, educationally enriching learning adventures” (Willard, 2002-03, p. 4) with the help of technology.

One study of beginning teachers who learned how to safely integrate technology into their lesson plans reported they were not fully aware of the social and ethical issues of using technology prior to taking the technology course in their program (Hicks et al., 2004). The teachers gained a clearer understanding of “their roles and responsibilities as a teacher in [the] 21st-century classroom” (p. 477). The researchers developed a WebQuest called “Ethics and Technology in the Classroom (ETC)” to help prepare beginning teachers to use technology safely at their schools. The purpose of the WebQuest was two-fold: (a) to show how to use technology as an instructional strategy, and (b) to expose beginning teachers to the ethical and social issues surrounding the use of technology in the classroom. The WebQuest can be used as a short-term or long-term project and is filled with excellent resources for teaching preservice teachers about the topic.

There are numerous websites, articles, and books available on the social, ethical, and legal issues of using technology in today’s classroom. Safety concerns include access to inappropriate material, violation of personal privacy, and being the recipient of sexual predation, harassment, stalking, or scams. Issues concerning responsible use of the Internet include netiquette, plagiarism, copyright infringement, cyberbullying, computer security violations (such as hacking and spreading viruses), and dissemination of harmful or abusive material. A list of resources on this topic can be found in the Annotated Bibliography.

Conclusion

The current literature on the use of technology in education shows that great strides have been made to provide access to technology, but it is not being used to its fullest potential to help students think more critically and creatively. In order for this to happen, preservice teachers need to be adequately prepared in their education programs on how to integrate technology into the curriculum. As a result of reviewing current research, the authors recommend two areas that should be addressed at the post secondary level if preservice teachers are to develop a “thinking with technology” perspective: (a) demonstrate how to integrate technology through relevant examples that will transfer into the secondary classroom, and (b) build each candidate’s self-efficacy in using technology. A list of strategies and project examples are included to help family and consumer sciences teacher educators enhance the intellectual and process skills of the preservice teachers in their programs (see Appendices A and B).

A key component of Standard 6 is that a beginning teacher will be able to “facilitate students’ critical thinking and problem solving in family and consumer sciences” (NATEFACS, 2004). Several examples are provided of how technology can engage students in these important process skills, while at the same time enabling student learning in the family and consumer sciences (FCS) content areas, which relate to Standards 1 through 4 for beginning teachers. In fact, technology is an integral component within all ten Standards. Whether it is being used as a management tool, a strategy to teach the FCS content, or to engage teachers in professional practice, the use and application of technology can enhance a preservice teacher’s knowledge and skills within all ten Standards. If the next generation of FCS teachers is expected to effectively use and integrate technology into their teaching, then FCS teacher educators must

provide them with more opportunities to acquire the technological skills necessary to succeed. And it all starts with just one click.

Annotated Bibliography

Help Using Technology

Brooks, S. & Byles, B. (2000). *Technology tutorials found on the web*. Retrieved September 8, 2007, from <http://www.internet4classrooms.com/on-line2.htm> This website provides tutorials on how to use different software programs commonly used on computers. There are tutorials on all the Microsoft Office programs, multimedia presentation programs like HyperStudio, graphic programs like Inspiration, and webpage development programs like Dreamweaver.

CSC Holdings. (2006). *Power to learn: Teaching with technology*. Retrieved September 8, 2007, from http://www.powertolearn.com/articles/teaching_with_technology/index.shtml This website provides an array of information from articles on the newest technology, to educator blogs, to interactive games for students, to Internet safety.

Educause Learning Initiative. *7 things you should know about series*. Retrieved October 17, 2008, from <http://www.educause.edu/7ThingsYouShouldKnowAboutSeries/7495> This resource provides the most current information on emerging technologies. Each brief in the series focuses on one technology tool or practice and describes it in detail with respect to teaching and learning.

Imperial College Department of Computing. (2006). *FOLDOC: Free on-line dictionary of computing*. Retrieved September 8, 2007, from <http://foldoc.org> This is a dictionary of technology terms. The site is easy to use and provides definitions for over 14,000 terms.

Virginia Society for Technology in Education (VSTE) Journal. Retrieved October 17, 2008, from <http://www.vste.org> The VSTE is a community of educators who are interested in supporting technology's role in education. While VSTE is Virginia's affiliate of the International Society of Technology in Education, its membership is open (and free) to anyone interested in educational technology.

Online Safety

Be CyberSmart! curriculum. Retrieved September 8, 2007, from <http://www.cybersmartcurriculum.org> The Be CyberSmart curriculum consists of Kindergarten through 8th grade standards-based lessons for teachers to introduce secure, responsible, and effective use of technology in the classroom. The curriculum is correlated to the *International Society of Technology in Education Standards* and supported by many educational organizations like the National Educational Association, American Federation of Teachers, and National School Board Association. The website also includes a list of good resources.

CSC Holdings. *Power to learn: Internet smarts*. Retrieved September 8, 2007, from http://www.powertolearn.com/internet_smarts/index.shtml This website is Cablevision's education initiative to empower Kindergarten through 12th

grade learning in the tri-state area (Connecticut, New Jersey, and New York). Power to Learn created *Internet Smarts* which provides a wealth of information and resources on safe and ethical practices on the Internet. There are also interactive case studies with teacher guides related to a number of topics.

Federal Trade Commission. *Facts for consumers*. Retrieved September 8, 2007, from <http://www.ftc.gov/bcp/edu/pubs/consumer/tech/tec14.htm>

The nation's consumer protection agency provides tips for socializing safely online and a list of resources to find more information on the topic.

Federal Trade Commission. *Kidz privacy*. Retrieved September 8, 2007, from <http://www.ftc.gov/bcp/conline/edcams/kidzprivacy/index.html>

The Federal Trade Commission explains the Children's Online Privacy Protection Act (COPPA) to kids, parents, educators, and businesses. The site provides tips, resources, and Public Service Announcements as MP3 files.

Get net wise. Retrieved September 8, 2007, from <http://www.getnetwise.org>

Get Net Wise is a coalition of private Internet corporations and public interest organizations that provide information and resources about online safety and protecting your computer.

Hicks, D., Gao, H., & Sears, P. (2004). *Ethics and technology in the classroom: A WebQuest for pre-service teachers*. Retrieved September 8, 2007, from

http://www.soe.vt.edu/ethicstechnology_webquest/index.htm

This is a WebQuest for preservice teachers to learn about the social and ethical practices of using technology in today's classroom. There is a good list of resources included in the WebQuest.

National Cyber Security Alliance. *Stay safe online*. Retrieved September 8, 2007, from <http://staysafeonline.org>

The National Cyber Security Alliance is a public-private alliance of companies, associations, and government agencies that provide help for how to teach young people safe online practices.

Using Technology in Family and Consumer Sciences

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Appendix A

Strategies to Enhance Intellectual and Process Skills in Preservice Teachers

Technology	Intellectual and Process Skills	Content-based Examples & Resources
Blogs (or Weblogs)	Communication Creative thinking Critical thinking Reflection	Preservice teachers reflect on their student teaching experience in an online journal called a blog. Other preservice teachers in the same cohort/group are encouraged to read each other's blogs and respond with appropriate comments. Resources with information about using & creating blogs: http://www.wtvi.com/teks/04_05_articles/educational_bloggin.html http://www.ibritt.com/resources/wp_blogs.htm http://edublogs.org
Course Management System (CMS)	Communication Critical thinking Leadership	Preservice teachers discuss family and consumer sciences issues related to teaching through threaded online discussions. This strategy is a good way to keep preservice teachers connected when they are student teaching. CMSs include Blackboard, WebCT, Lotus Notes, and Moodle.
Concept Mapping	Creative thinking Critical thinking	Preservice teachers create a concept map of a unit plan and represent how the process skills fit into the unit. Concept mapping software that can be purchased includes Inspiration, Decision Explorer, SMART Ideas, and The Graphic Organizer. Resources with information about using and creating concept maps: http://www.education-world.com/a_tech/tech164.shtml http://www.columbia.k12.mo.us/she/cncptmap.html
Desktop Publishing	Communication Creative thinking	Working as a group, preservice teachers create a newsletter or brochure on a particular topic in family and consumer sciences to be sent to local elementary or secondary schools,

	Critical thinking	<p>organizations, or local libraries.</p> <p>Resources with information to use desktop publishing to create projects: http://lessonplans.btskinner.com/dtp.html http://eduscapes.com/sessions/publishing/evaluating.htm</p>
Digital Camera and/or Video	<p>Communication</p> <p>Creative thinking</p> <p>Critical thinking</p> <p>Leadership</p>	<p>Working as a group, preservice teachers research a social issue and create a public service announcement (PSA) on it, e.g., teen pregnancy, homelessness, etc. Final product can be distributed to local schools and libraries.</p> <p>Ideas for creating digital videos and PSAs can be viewed at: http://edtech.guhsd.net/video.html http://teachersnetwork.org/teachnetnyc/nacionales/psa.htm</p>
E-portfolio	<p>Communication</p> <p>Creative thinking</p> <p>Critical thinking</p> <p>Leadership</p> <p>Problem solving</p> <p>Reflection</p>	<p>The e-portfolio is a culmination project where preservice teachers display, critique, and reflect on their work. It can include lesson plans, a unit plan, teaching philosophy, classroom management plan, student assessment plan, and other artifacts that document the preservice teachers' strengths and qualifications as a beginning teacher.</p> <p>Resources with information about using and creating e-portfolios: http://electronicportfolios.org http://members.shaw.ca/dbrear/dseportfolios.html http://eduscapes.com/tap/topics82.htm</p>
E-mail	<p>Communication</p> <p>Leadership</p>	<p>Preservice teachers can use e-mail to communicate with each other, their teachers, or other professionals in the field. They might e-mail a legislator about a child or family issue as part of an assignment.</p>
Internet	Critical thinking	<p>Preservice teachers can critique websites for credibility and reliability as a resource, create a topic Hotlist or Scavenger Hunt, or design a Virtual Field Trip.</p> <p>The following resources provide guidelines on how the Internet can be used in a variety of challenging ways: http://www.library.cornell.edu/olinuris/ref/research/webcrit.html http://school.discoveryeducation.com/schrockguide/edproj.html http://www.kn.pacbell.com/wired/fil/formats.html</p>
Podcast	<p>Communication</p> <p>Creative thinking</p>	<p>Working as a cooperative group, each member will listen to a different podcast on related family and consumer sciences or educational topics and discuss or teach the topic to their group. Guest speakers might be included in a podcast format.</p>

		Resources with information about using and creating podcasts: http://learninginhand.com/podcasting/ http://recap.ltd.uk/articles/podguide.html http://www.ibritt.com/resources/dc_podcasting.htm http://www.wtvi.com/teks/05_06_articles/classroom-audio-podcasting.html
PowerPoint	Communication Creative thinking	As an introduction to each other, preservice teachers develop a PowerPoint presentation to create a story about themselves. These can include digital cameras to create pictures, clip art, animation, sound, and video clips. Resources to create presentations that are more engaging and active are: http://www1.umn.edu/ohr/teachlearn/tutorials/powerpoint/index.html http://www.actden.com/pp/index.htm
Spreadsheet	Critical thinking Problem solving	Spreadsheets can be used to count calories, track investments, create budgets, report survey results, etc. Resources with information about using and creating spreadsheets: http://www.internet4classrooms.com/on-line_excel.htm http://www.amphi.com/~psteffen/excel.html
WebQuest	Communication Creative thinking Critical thinking Reflection	Preservice teachers are given a task or problem to solve where they gather information from the Internet and other resources to complete the project. At the end, they reflect on what they have done. The WebQuest Portal is filled with lots of information about WebQuests, as well as good examples to use. http://webquest.org Other resources on creating and using WebQuests: http://www.eats.ecsd.net/curricular/webquest/create_webquest/ http://midgefrazel.net/lrnwebq.html
Website	Communication Creative thinking Critical thinking Leadership	Working as a group, preservice teachers create a website on a family and consumer sciences topic. Resources with information about using and creating websites: http://www.infotoday.com/MMSchools/jan01/cybe0101.htm http://www.socialpsychology.org/articles/top99.htm
Wikis	Communication Creative	Different family and consumer sciences and educational concepts are actively explored by preservice teachers when

thinking		they add links, summaries, explanations, questions, quotations, and images onto a wiki webpage. Each concept explored becomes a collaborative work of many authors.
Critical thinking		Resources with information about using and creating wikis: http://www.coe.ilstu.edu/etip/activities/usingwikis.shtml http://recap.ltd.uk/wiki/Main/Guide
Word Processing	Communication	Preservice teachers create a lesson plan with appropriate worksheets and other assignments. This is just one of many examples that can be used with word processors.

Appendix B
Teaching and Management Tools

Technology	Management
Data Base	Mailing lists, student records, behavior management records
E-mail	Communication with parents, students, administrators, other faculty, outside resources – provides a written record of communication
Internet	Finding resources for teaching
PowerPoint	Lecture
Spreadsheet	Inventory, grades, attendance, graphs
Website	Provide course information, assignments, and activities/events to students and parents
Word Processing	Lesson plans, letters, worksheets

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