Dawson, K. (2004). Illustrations of technology integration in the Unified Elementary Proteach program. *Contemporary Issues in Technology and Teacher Education*, *4*(1), 64-72

Illustrations of Technology Integration in the Unified Elementary Proteach Program

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Program Description

The Unified Elementary ProTeach (Professional Teacher; http://www.coe.ufl.edu/school/proteach/index.html) program at the University of Florida (UF) prepares teachers with a dual emphasis in elementary education and mild disabilities. All graduates are also prepared to work with students who are English speakers of other languages (ESOL). The program is designed to ensure that teacher education students accept responsibility for the learning of all children and requires that they develop appropriate inclusive pedagogy to facilitate student learning and master content knowledge needed for instruction.

Educational technology is considered alongside foundations of education, pedagogical knowledge, inclusive methods and ESOL integration as one of the pillars of the program (Ross, Lane, & McCallum, in press) and its integration is grounded in findings from the past decade of research in technology and teacher education. For example, research suggests that stand-alone technology courses are important but not sufficient to prepare technology-using educators (Willis & Mehlinger, 1996; Milken Exchange on Educational Technology, 1999) and that teachers must be prepared to integrate technology in content areas to advance student learning (Bull, Willis & Bell, 2000; Cooper & Bull, 1997). In the Unified Elementary ProTeach program technology is integrated explicitly through two required technology courses and implicitly within many content and pedagogy courses where professors model the effective uses of educational technologies and require students to use technology as an integral component of assignments and activities. In addition, educational technology is integrated throughout the program via an electronic portfolio requirement (http://www.coe.ufl.edu/OIT/ep-home.htm) and is a graduate specialization option for students.

Uses of technology within the program are aligned to NETS*T (International Society for Technology in Education, 2002) and to the Florida Accomplished Practices, 12 best practices in which preservice teachers in Florida must demonstrate competency prior to certification (Florida Education Standards Commission, 1999).

There are several advantages to intertwining technology-specific and general teacher education standards. First, content and methods faculty are enabled to see technology as an integral component of their courses rather than as an add-on to the benchmarks and standards to which they are already required to teach. Second, educational technology faculty members are required to intertwine technology-specific standards with more general teacher education standards to ensure that stand-alone technology courses do not favor technical skills at the expense of classroom applications. Finally, it portrays to our students that technology is one of many tools and strategies with which they must become proficient in order to become successful educators.

Examples of How Educational Technology Is Integrated Within the Program

The following sections provide examples of how educational technology is integrated throughout the Unified Elementary ProTeach program. The examples are described in chronological order as a student may experience them in the program. A comprehensive look at how technology is integrated in the Unified Elementary ProTeach is available on our website (http://www.coe.ufl.edu/school/proteach/NETS/index.html). See Ross, Bondy, and Webb (in press) for more detailed information about the Unified Elementary ProTeach program.

Freshman and Sophomore Years

During the freshman and sophomore years students wishing to become education majors complete 60 hours of state-mandated coursework, primarily in the College of Liberal Arts and Science. This coursework is designed to align with the Sunshine State Standards, content standards all students in the state are expected to learn (State Board of Education, 1996). During this time students also take EME 2040: Introduction to Educational Technology, a state-mandated course and one of two courses focusing explicitly on educational technology in the program.

EME 2040 is designed to meet the needs of future educators in applying technology within educational settings. In this course students are introduced to each domain of the NETS*T and develop the foundation they need to be successful in subsequent courses and experiences requiring basic technical skills and understanding of technology-related concepts. For example, students are challenged to consider how technology can help students represent their knowledge in different ways and create an example of how this may be done using a content standard of their choice. One secondary mathematics students created an image to help students visualize Pythagoras' triangle (see Figure 1).

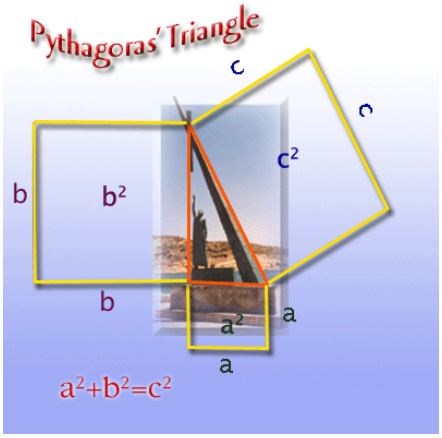

Figure 1. Student-created image for visualizing Pythagoras' triangle.

Figure 2. Screenshot of sample portfolio.

In this course students also begin to create their electronic portfolio (Figure 2; http://www.coe.ufl.edu/OIT/ep-home.htm). All ProTeach preservice teacher education students are required to develop an electronic portfolio over the course of their study. These electronic portfolios have multiple purposes including to demonstrate proficiency in the Florida Accomplished Practices (Florida Education Standards Commission, 1999), to promote technology integration in preservice teachers' preparation and to provide a forum for connecting a student's university experience to personal and professional insights (Ring & Foti, 2001). Video 1 (see http://www.coe.ufl.edu/OIT/ep-rationale.html) provides additional information about the electronic portfolio requirement.

Junior Year

Students earning a GPA of at least a 2.6 and an SAT score of at least 1010 are admitted to the College of Education during their junior year. This year of the program focuses on an introduction to teaching, an introduction to pedagogy, and information on diversity within families and among children. During this year students explore their personal perspectives about teaching, focus on issues related to multiculturalism and social justice, study child development, are introduced to several instructional strategies and their supporting learning theories, consider issues of classroom management, and explore strategies for dealing with difficult students.

During this year students have an opportunity to participate in many curriculum-based, technology-enhanced activities including a modified Webquest activity (http://plaza.ufl.edu/alyson67/inductive/home2.htm) designed to prepare them to teach a concept from the Sunshine State Standards in an inductive fashion. Students also use Internet-based research and a concept-mapping tool (see http://plaza.ufl.edu/darralb/childlit/thebirchbarkhouse.htm) to compare and contrast the way history is portrayed in children's books versus the way it is portrayed on the World Wide Web and in textbooks. In addition, students participate in a Culture Study Project in which they research information about a particular country's geography, educational system, food, holidays, language, music, and other dimensions. Then, students locate children's literature that would be appropriate for students from this country and develop classroom ideas for working with students from this country in the classroom. The students present their projects in class and the teacher burns a CD containing all the projects so students can refer to them later in the program and during their teaching careers.

See Appendix A for additional examples of technology integration in the junior year.

Senior Year

The senior year is referred to as the "methods year" and is the time in which technology is most integral to students' coursework. It is also the year in which technology serves as a catalyst for integration among courses and faculty members within a semester. In addition to methods courses, students enroll in complementary content courses in the College of Liberal Arts and Sciences. During the fall semester of the senior year students are enrolled in the Mathematics, Science, and Technology semester and during the spring semester they are enrolled in the Democracy, Diversity, and Literacy semester. The Democracy, Diversity, and Literacy semester includes courses in social studies, languages arts and integrated teaching. During this semester students actively participate in an online community and complete their electronic portfolios (view Video 2 at http://www.coe.ufl.edu/OIT/ep-rationale.html).

The Mathematics, Science, and Technology (MST) semester demonstrates an innovative model of technology integration in that faculty members collaboratively design, implement, and evaluate activities and assignments that encourage students to consider how technology can be used as a tool to facilitate interdisciplinary, theme-based instruction that addresses state and national standards. These activities and assignments are an integral component of all three classes and account for 40% of the students' final grade in each class.

For example, during the MST semester students develop and teach a 30-minute lesson that integrates mathematics, science, and technology and that addresses state and national standards (see http://www.ep.coe.ufl.edu/2003/christinemckaig/ap1i1.htm). These lessons are taught to their peers and observed and evaluated by the mathematics, science, and educational technology instructors. This activity requires students to consider technology as a tool to facilitate content-area learning, recognize issues associated with planning for the use of technology in the classroom and implement technology in an instructional setting.

Students also visit Camp Crystal on two different occasions during the MST semester. Camp Crystal is an outdoor education environment in which all students in Alachua County have an opportunity for hands-on exploration of the environment. These opportunities include water quality investigations and hikes through and around three different Florida ecosystems. University students work with the K-12 students to collect and analyze environmental data using laptop computers and a wireless network. This data is inputted into an online database maintained by Camp Crystal and used to explore yearly data at the site. Students also utilize various technical tools such as digital cameras and camcorders for data collection. (For additional examples of technology integration within MST courses, see Appendix B.)

The Graduate Year

During the graduate year students complete a one-semester, full-time internship (often referred to as student teaching) and select a 12-hour area specialization. Each year between 15 and 25 students elect to specialize in educational technology. Students in this specialization experience what it is like to take a course online. They also participate in a technology-based field experience in which they spend a semester collaborating with a local teacher to integrate technology in the curriculum. In addition to theses experiences, students take two courses designed to build on the NETS*T knowledge developed in the undergraduate ProTeach program: Designing Technology Rich Curricula and Integrating the Internet in K-12 Instruction. More detailed information about these courses is available on UF's educational technology website

(http://www.coe.ufl.edu/Courses/EdTech/) and is not elaborated on here because they are not taken by all ProTeach students.

Although each student may experience technology integration in different ways, the examples provided allow readers to visualize how technology is an integral component of the Unified Elementary ProTeach Program. These and other uses of technology are possible, in part, because the "Essential Conditions for Implementing NETS for Teachers" (see http://cnets.iste.org/teachers/t_esscond.html) have been purposefully addressed on a college wide basis (UF's NCATE Report, 2003). These conditions are "required for teachers to create learning environments conducive to powerful uses of technology" (ISTE, 2002) and include a shared vision, access to technology, skilled educators, professional development, and availability of technical assistance.

Conclusions

The integration of technology into the Unified Elementary ProTeach program can be described as a continuing evolution (see our website for more examples of technology integration). When the program was designed technology was highlighted as a key component of the program, but the ways in which it is used have changed throughout the years and have recently been aligned to NETS*T. Likewise, many of the professors currently teaching in the program were not teaching at UF when the program was designed. As new professors joined the program the use of technology became more and more prominent, as well as more substantial. The addition of new faculty members, hired, in part, because of their ability to integrate technology and the infusion of technology throughout all courses via the electronic portfolio requirement provided the catalyst for the current level of technology integration.

We refer to our technology integration as a continuing evolution because each semester more faculty members are incorporating technology in their courses and more faculty members are experimenting with new forms of technology integration. Thus, this article is simply a snapshot in time. While we have reached an integration level that has earned us an ISTE Distinguished Achievement Award (http://cnets.iste.org/netsawards/index.html), we continue to explore new ways to enhance and improve our program through the integration of technology.

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Appendix A
Selected Examples of Technology Integration in the Junior Year

Course Description/Assignment Description

EEX 3257: Core Teaching Strategies
This course is designed to assist students in learning how to apply selected research-based and theoretical information in both general and special education classroom settings. In this class students participate in a modified Webquest activity designed to prepare them to teach a concept from the Sunshine State Standards in an inductive fashion. Students are required to consider research related to teaching and learning and to use the Web to find resources that support this research. Students create an abbreviated lesson plan, referred to as a concept analysis that lists the concepts, its characteristics and a series of questions that lead students from open-ended discussions to lesson closure. View an online inductive lesson at http://plaza.ufl.edu/alyson67/inductive/home2.htm

LAE 3005: Children's Literature
In this class students read a historical fiction book such as Avi's, The Secret School, Radin's, Escape to the Forest Based on a True Story of the Holocaust, or Erdrich's, The Birchbark House. Students are then required to use Internet-based research to compare and contrast the way history is portrayed in the books versus the way it is portrayed on the World Wide Web. Next, students meet in groups (called Literature Circles) to discuss how the book may be used in an elementary classroom and considerations, including historical accuracies, they must consider when using the book. The students then use a concept mapping program to organize and synthesize what they have researched and read. View a concept map example at http://plaza.ufl.edu/darralb/childlit/thebirchbarkhouse.htm

TSL 3526: Language and Culture in Elementary
This course examines issues of language and culture that are relevant for elementary learners of English as a Second Language (ESOL). The role of the native language and culture and their influence on learning for language minority students is a major focus of the course and student are required to conduct a Culture Study Project in which they research information about a particular country's geography, educational system, food, holidays, language, music, etc. Students are then required to locate children's literature that would be appropriate for students from this country and to develop classroom ideas for working with students from this country in the classroom. The students present their projects in class, and the teacher burns a CD containing all the projects so students can refer to them later in the program and during their teaching careers. View "Cuban Culture" example at http://www.coe.ufl.edu/school/proteach/NETS/Standard-VI/integration/domainC/TSLCultureStudyCuba.ppt.

Appendix B
Selected Examples of Technology Integration Within MST Courses

EME 4406: Integrating Technology in the Elementary Curriculum

Assignment Descriptions

Students create a one-page newsletter that could use in their elementary classroom. Class discussions focus on what content should be included in newsletters to parents, how students could be creators of these newsletters and how having multiple ways to communicate with parents is very important. For example, the newsletter could be printed out and sent home, converted to a PDF and placed on a web page, converted to HTML and placed on a web page and be hung outside the classroom door. In this course students also other discuss ways that technology can be used to facilitate school-home relationships such as creating a classroom home page with "topic hotlists" for each unit of study, links to class presentations and assignments and email access to the teacher. See http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-V/integration/domainD/newsletter.pdf and http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-V/integration/domainD/newsletter2.pdf

Students select a science topic that is covered in the Sunshine State Standards and that they feel ill prepared to teach at present. They research this topic as they would to prepare

for their lessons and create an annotated bibliography. They also develop a concept map that helps them visually represent the knowledge. Class discussions focus on preparing to teach content standards and on how concept maps can be used in elementary classrooms.

For an annotated bibliography example go to http://www.ep.coe.ufl.edu/2003/meredithhoneycutt/bibliography.htm.

For a concept map example, go to http://www.ep.coe.ufl.edu/2003/julianoll/conceptmap.htm.

Students participate in an expert group activity in which each group is given a scenario to which they must respond in front of the class. Within their response students must extend the knowledge presented in class readings, provide a resource list and actively involve each group member. Scenarios relate to the following:

Digital Divide (http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-VI/integration/domainE/index.html)

Adaptive Technologies (http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-VI/integration/domainE/index.html)

Copyright (http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-VI/integration/domainA/index.html)

Internet Safety (http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-VI/integration/domainD/index.html).

SCE 4310: Elementary Science Methodology for the Inclusive Classroom

Assignment Descriptions

In this course students use I-Movie as a continuous data collection tool and as tool to review science content found in the Sunshine State Standards. Students explore the growth of flowering plants, observe a variety of seeds, investigate the internal structure of a red bean and consider how to best teach these topics to elementary students. As a classroom project, students observe the growth of seeds from seed to seedling through to flower and fruit. Student keep a log of their plant growth by drawing, measuring and writing a narrative about the changes on their plants. They also take images using a digital microscope that are uploaded into the computer to prepare an I-Movie about the growth of flowering plant. Students take pictures every day until the first leaves appear. Then, students take pictures every week until the first seedling grows. By using all pictures, they prepare an I-Movie that shows all stages of plant growth. The I-Movie is used to discuss the content, instructional pedagogy and management strategies involved in such an activity at the elementary level.

For movie example in QuickTime, go to http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-IV/integration/domainB/germination1.mov

For the Real Player version, go to
http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-IV/integration/domainB/germination.avi)

In a lesson on electric circuits, students explore simple circuits, work in groups and construct circuits in different ways. As they work on their project, pictures are taken. Those pictures are organized as assessment tool and uploaded on a computer as an I-movie. This I-movie forms the framework for discussing alternative assessment strategies. Student watch the movie and on the basis of given instructions each student describes the circuits on the movie and tries to answer the question asked on each screen. Through this activity students consider how technology can be used as a tool for assessing science content and see such strategies modeled by their instructor.

To view an example in QuickTime, go to
http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-IV/integration/domainA/electricity.mov

For the Real Player version, go to
http://www.coe.ufl.edu/school/proteach/MSTAwardApp/Standard-IV/integration/domainA/electricity.avi

When discussing the topic of cell structure, students work like scientists to prepare a slide to observe the structure of a cell, discuss with their peers and document findings. In the classroom, students get chance to look through both a light and digital microscope. While a group of the students are using the light microscope, other groups of the students are working with the digital microscope and others are discussing a diagram on the wall. Digital microscope enables students to see the same structure at the same time. This helps them to discuss structure of the cell more clearly and precisely. Students also have the opportunity to discuss how the use of technology facilitates a change in the dynamic of interactions and in the structure of the science lesson. They are also able to consider how technology may change the structure and function of group activities in their classroom and how they would manage such changes.