

Running head: Tech in Teaching

Integrating Teaching and Technology

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Generally speaking, students enrolled in EDS 5226 *Introduction to Computers in Education* at Florida Institute of Technology will be entering their second careers. Due to the close proximity of Patrick Air Force Base and numerous defense contractors, you can expect a number of these individuals to be ex-military. Most students will be moving into mathematics or science education. These students will typically bring rich work experiences, but may have a weak background in educational methods.

Goal of this Course

Students will develop skills and understandings necessary for the appropriate use of educational technology in the K-12 classroom.

Rationale

Research findings in educational technology paint a bleak picture. Teachers are ill prepared to appropriately use technology. Little training on educational technology is available to inservice teachers and most of what *is* available is inappropriate. It is vitally important to prepare future teachers to use technology to support teaching and learning so their future students can benefit from the active and engaged learning technology can provide. This must be done before they leave the university or it is unlikely to be an unmet need throughout their careers.

Mere technology literacy is no longer enough. Acquiring technology “fluency” will allow preservice teachers to face the changing technology field with the confidence needed to sensibly apply new developments to their teaching.

This course is designed for the novice teacher who brings rich work experience to the classroom. While a few students in the class will be recent university graduates, many will be older and beginning a second career. They will have seen little in the way of effective classroom

uses of technology in their personal experiences. Modeling instructional strategies compatible with technology integration will be an important part of the new class. In fact, modeling research-based teaching practices in general will be crucial. Students should participate in authentic projects and tasks they can take into the classroom as they develop fluency with today's classroom technology.

Prerequisites

Students are expected to have basic skills in managing computer files, using the Internet (including simple searches), and developing PowerPoint presentations. They should also know how to send and receive email, including attachments. Finally, they should be familiar with word processing at the intermediate level. Their mastery of these essential skills should be confirmed with a pre-assessment test during the first class. Students with insufficient skills will need to enroll in an introductory computer course to acquire them.

Preassessment Suggestions

On the first day of class, instructors should administer a screening test to be certain students have the prerequisite skills needed to succeed in the remainder of the class. This preassessment might take any of several forms:

- Performance test using the computer. This is the preferred format for the preassessment screening. A performance-based test at the computer allows the students to accurately demonstrate their abilities to perform the requisite tasks.
- Pencil and paper quiz. This format is easy to administer if no computers are available.
- Student self-report of skills. As in any self-report, this approach is flawed because students don't always have an accurate picture of their knowledge, skills, and

abilities. Nevertheless, circumstances may render this the best choice. Several self-assessment tools are available in chapter five of ISTE's *NETS-T Resources for Assessment* (ISTE, 2003).

Knowledge and skills to be demonstrated on the preassessment include: simple file management tasks including copying, deleting, saving, renaming, and moving; using the Internet, including entering URLs, performing simple searches, using hyperlinks, and the basic functions of their web browser; developing PowerPoint presentations, including creating new slides, entering text, adding clip art, applying design templates, and playing a slide show. Students should also demonstrate their ability to send an email, including an attachment. Finally, they should be familiar with word processing at the intermediate level. Intermediate level tasks include changing margins, inserting page numbers, using headers and footers, printing documents and using simple edit commands including cut, copy, and paste.

Assumptions

Students coming to this class are likely to have a wide variety of skills in any given area. Furthermore, there will probably be wide variance in aptitude for the skills. A number of individuals are likely to be highly skilled in some areas and much less skilled, perhaps deficient, in other areas. The instruction should be certain to allow highly skilled students to customize course requirements in ways that retain the spirit of the assignment, but also make it a meaningful learning experience for them. Because applying technology to educational objectives will be relatively new to many students in the class, they may have difficulty determining how the skills they possess can be used effectively in the classroom.

Objectives

The objectives for this class support five strands or themes:

- It's about the teaching;
- Important foundational skills;
- The Internet has changed everything;
- Tools for teaching and learning; and
- Cheap and free Internet resources. See appendix for suggestions.

These themes are interrelated and many objectives can be categorized under multiple strands. For convenience, each objective is listed only once. The objectives are of four different types: knowledge, skills, cognitive skills, and experience. A few of the objectives are absolutely critical to the content of the course, whereas others are classified as important. Finally, one experiential objective is desirable and should be presented, but need not be assessed. All objectives and classifications are listed in table 1.

Instructional Strategies

The International Society for Technology in Education (ISTE) has published a book called *Preparing Teachers to use Technology* (ISTE, 2002) to help those in higher education prepare teachers. This book is also available on the web at http://cnets.iste.org/teachers/t_book.html. In the chapter, "Using Model Strategies for Integrating Technology into Teaching," the authors suggest introducing new teachers to the following models and strategies:

- Web-based lessons, including WebQuests, CyberGuides, and Filamentality
- Multimedia presentations
- Telecomputing projects

- Online discussions

Additional instructional strategies are listed in Table 1. While each of these suggested strategies is appropriate for a number of different objectives, it is important to use and model a variety of strategies throughout the course, and even throughout one class session. Definitions and additional resources for five of the listed strategies are provided here:

Graphic organizers – Graphic organizers use a visual presentation of information or concepts to enhance a learner’s comprehension. *Inspiration* (available at <http://www.inspiration.com>) is a popular software application used to generate graphic organizers.

Guided practice – The Monarch School Parent Glossary (retrieved from <http://www.monarchschool.org/ParentsGlossary.html>) defines guided practice as “the part of a teaching lesson in which the learner first attempts to execute new learning, carefully orchestrated and checked by the teacher before the learner progresses to independent practice.”

Modeling with thinkalouds – The instructor makes the thought and decision process evident to the learners while performing a specific task.

Rubrics – Rubrics are an assessment tool that assists teachers and students in scoring subjective products. They are often designed in a grid. One axis of the grid lists dimensions against which a product will be assessed. The other axis defines specific standards for various levels of performance on a dimension. Rubrics are widely used in education. Instructors new to using rubrics may wish to review Mertler’s (2001) article on Designing scoring rubrics for your classroom available on the web at <http://edresearch.org/pare/getvn.asp?v=7&n=25>.

Scenarios – Scenarios allow learners to consider a course of action that takes place in the context of a scenario based on real-life experiences of experts and practitioners.

Table 1: Course objectives

	Objective	Importance	Type	Instructional strategies
	Strand: It's about the Teaching! Student will:			
1	1 plan for curriculum-focused lessons using educational technology. *	Critical	Cognitive skill	modeling, guided practice, design lessons, use graphic organizers
2	2 understand how the appropriate use of technology can enhance student learning.	Critical	Knowledge	lecture, readings, case studies
3	3 understand instructional designs and philosophies compatible with educational technology.	Critical	Knowledge	lecture, readings, modeling
4	4 understand how to assess student work that involves the use of technology.	Critical	Knowledge	modeling, reading, self-assessment, design rubrics
5	5 design assessments for student work that involves the use of technology.	Critical	Cognitive skill	modeling, design rubrics, self-assessment, guided practice
6	6 know strategies for using technology in the one-computer classroom, classroom clusters of computers, or computer labs.	Important	Knowledge	modeling, reading, design in sample lessons
	Strand: Important foundational skills Student will:			
7	7 acquire fluency in important skills (i.e. file management, online bookmarking, advanced searching, web editors, and FTP)	Important	Skill	practice, modeling, peer critiques, computer-aided instruction

*Marked skills are terminal objectives. All others are enabling objectives to reach one or more terminal objectives.

Table 1: Course objectives (continued)

Strand: The Internet has changed everything Student will:				
8	learn to evaluate web-based resources for credibility and bias.	Important	Cognitive skill	guided practice, modeling with thinkalouds, practice
9	understand legal and ethical situations involved with using computers and the Internet in classrooms.	Important	Knowledge	reading, lecture, simulations or scenarios
10	know how to use technology to communicate with students, their families, and the community*	Important	Skill	reading, practice, modeling
Strand: Tools for teaching and learning Student will:				
11	become proficient with a variety of learning-focused applications of technology in education (i.e. productivity suites, DTP, Inspiration, HTML editors, web browsers, digital photo, and movie editing.)	Important	Skill	practice, modeling, peer critiques, computer-aided instruction
12	become proficient with record-keeping tools to enhance teacher productivity.*	Important	Skill	practice, modeling, peer critiques, computer-aided instruction
Strand: Cheap and free! Student will:				
13	use a variety of free (or nearly free) Internet resources to support teaching and learning	Desirable	Experience	experience

*Marked skills are terminal objectives. All others are enabling objectives to reach one or more terminal objectives.

Assessment Plan

This course will have both formative and summative assessments. Throughout the course, students should be assigned projects and tasks in which they have a chance to apply their developing skills to classroom uses of technology. For many projects, a rubric will be an efficient and informative form of feedback. Because participants in this class need to develop skill in assessing student work, it would be beneficial to seek their participation in creating one or more of the rubrics against which they will be evaluated.

NETS-T Resources for Assessment (ISTE, 2003) and *NETS-T Preparing Teachers to Use Technology* (ISTE, 2002) contain many suggested rubrics, checklists and observation tools suitable for use in this class. Additional assessment tools and sample rubrics are widely available on the Internet.

Portfolio of Authentic Assessments

The predominant form of assessment will be an electronic portfolio of authentic assessments. Throughout the course, students will engage in the four stages of portfolio assessment (collection, selection, reflection, and direction) to develop a summative portfolio.

Collection. Students will develop a working portfolio throughout the course. This portfolio will contain all assignments, authentic projects, and in-class exercises. The instructor and classmates will review and critique assignments throughout the term using rubrics.

Selection. Near the end of the semester, each student will select work from their working portfolio that provides the best evidence they have met the NETS-T standards and course objectives. Required artifacts include:

- 1) classroom technology plan that may demonstrate mastery of objectives 7, 8, 9, 10, 11, 12, and 13;

2) technology in an instructional unit that may demonstrate mastery of objectives 1, 2, 3, 4, 5, 6 and 13;

3) technology in communication that may demonstrate mastery of objectives 1, 7, 8, 9, 10, 11, and 13;

4) technology for record keeping that may demonstrate mastery of objectives in any or all course objectives;

5) professional development in applying technology to teaching and learning that may demonstrate mastery of objectives in any or all course objectives;

6) technology in education vision/philosophy statement or platform that may demonstrate mastery of objectives, 2, 3, 4, and 6;

7) Additional artifacts are welcome.

Note: Required artifacts are those recommended by the NETS Leadership Team and Assessment Task Force as providing better evidence than other types of portfolio evidence (ISTE, 2003). This is due to the efficiency of using these specific artifacts.

Reflection. Each artifact will have a corresponding student reflection. This reflection entry will inform the instructor as to how this artifact provides evidence in meeting specific course objectives, along with additional information the student may wish to provide, i.e. how it shows evidence of growth.

Direction. The completed portfolio should reflect skill and preparation in the student's desired area of employment. Additionally, the student should identify future learning goals related to each standard within the portfolio. This electronic portfolio should be suitable for presentation to prospective employers as evidence of skill with educational technology.

In lieu of a final exam, instructors should consider having students present their electronic portfolios to small groups who are preparing to teach in similar fields or similarly aged students. Hopefully, hearing and seeing the results of other students' efforts will spark even more creative ideas to use in classrooms at a later date. While presenting to the whole group is an alternative, it would result in presentations focused on breadth and would lack depth. The electronic portfolio should be assessed by the instructor who may choose to use the NETS-T Portfolio Metarubric (ISTE, 2003, p. 168) as a starting point for assessment. A copy is provided at the end of this paper.

Class Participation

The instructor will post discussion starters on the class discussion board that focus on the assigned topic for the weekly reading, observation, or projects. Student contributions to the discussion should be assessed using a rubric designed to measure thoughtful and constructive participation. A useful example provided at the end of this paper is also available on page 336 of ISTE's *NETS-T Preparing Teachers to Use Technology* (ISTE, 2002) or at http://cnets.iste.org/teachers/web/t_rubric_reflection.html.

Evidence of participation in and completion of in-class assignments and activities will be collected.

Grading Plan

Course grades will be weighted as follows:

- 20% Class and online discussion participation
- 30% Independent projects throughout the semester
- 30% Final electronic portfolio
- 20% Final presentation of portfolio to classmates

Note: A final exam should be required of students if they are unable to present their portfolios in person.

In order to pass the course, students must demonstrate mastery in all of the objectives categorized as critical.

Resources

Print Materials

I recommend *Integrating Educational Technology into Teaching* (Roblyer, 2003) as the text for the class. After reviewing most of the texts used at UCF, I concluded there was too much focus on the means and not enough focus on the ends. By that I mean there was too much emphasis on learning specific software applications and not enough emphasis on teaching. Reviewing the Preface to Roblyer's text, the first thing I noticed was the bold-faced bullet points. The first one said, "Good teaching comes first" (p. ix). The rest were philosophically compatible with the research I've read and my personal experiences. The body of the text seemed to be focused on good teaching practices and not screen shots of computer software.

For additional readings, instructors may rely on selections from *Learning and Leading with Technology*, an ISTE journal that focuses on sharing educational technology ideas with practitioners. ISTE membership allows access to PDF files of these articles and, I believe, permission to use them with classes. Alternatively, the *Learning and Leading with Technology* journal is available in the library and online.

ISTE's *National Educational Technology Standards for Teachers: Preparing Teachers to Use Technology* (2002) was designed for use by teacher education faculty to stimulate ideas for modeling technology integration strategies in teacher education programs. A rich set of appendices offers content area standards, sample rubrics, evaluation forms, and other resources.

Also from ISTE, the *National Educational Technology Standards for Students: Connecting Curriculum and Technology* book (ISTE, 2000) offers sample lesson plans to use with students in K-12, and codes lesson ideas to national standards. These are also available on ISTE's website (http://www.cnets.iste.org/students/s_book.html) and will be freely available to preservice teachers attending classes.

Equipment

Minimum: Computer with Internet access, standard productivity software, multimedia projector, and screen. Periodic access to a fully equipped computer lab. In addition to the cost of networking, if not already available, the computer setup will cost approximately \$5,000.

Acceptable: Instructor multimedia station with projector and screen, along with student multimedia Internet-connected computers sufficient to provide a student:computer ratio of 4:1 or better. The cost for this will depend on the size of the class. Assuming a class size limit of 32, the cost for student computers will be approximately \$16,000 and a \$5000 setup for projection capabilities. Any networking costs will be in addition to this.

Ideal: Fully equipped computer lab to provide a student: computer ratio of 1:1. Computers should have Internet access. Instructor station with multimedia projector and screen. Assuming a class size limit of 32, the cost for this option is approximately \$64,000 plus \$5,000 setup for projection capabilities.

Dream: Computer access listed as ideal, along with ample student workspaces in the center of the room with furniture that can be arranged flexibly. The cost for equipment is still \$69,000 but the classroom is larger.

Personnel

Instructors for this class should be knowledgeable in how educational technology is used in schools. In addition to a Master's degree plus 18 hours in a relevant field, the instructor needs to have excellent technology presentation skills in order to support student learning as students develop their own ideas about using technology in the classroom. In addition, the course instructor should have a good command of a variety of instructional strategies in order to model them during instruction. Feedback to students should be constructive, encouraging, and frank as necessary.

Time

This course is planned for a standard 3-credit hour semester.

Instructor Resources

Instructor resources include access to computer and software, along with a copy of the student text and any available ancillary materials. It is also recommended that instructors have access to the ISTE books listed in the references.

Budget

The budget for this class might vary substantially, given specific circumstances. Fortunately, Florida Tech already has a collaborative arrangement to use a computer lab in a nearby school and there should not be a significant cost associated with equipment. Software to implement this program is already in place, however any changes in software may incur licensing fees. Printing costs for the class will vary depending on the number of students and computers, but should not exceed \$500. Students provide their own textbooks. Salary for an instructor is required.

References

- ISTE. (2000). *National Educational Technology Standards for Students: Connecting curriculum and technology*. Eugene, OR: ISTE.
- ISTE. (2002). *National Educational Technology Standards for Teachers: Preparing teachers to use technology*. Eugene, OR: ISTE.
- ISTE. (2003). *National Educational Technology Standards for Teachers: Resources for Assessment* (1st ed.). Eugene, OR: ISTE.
- Roblyer, M. D. (2003). *Integrating educational technology into teaching* (3rd ed.). Upper Saddle River, NJ: Merrill Prentice-Hall.

Appendix

Cheap and Free Internet Tools and Resources

Filamentality at <http://www.kn.pacbell.com/wired/fil/> – Create Hotlists, Subject Samplers, Treasure Hunts, and WebQuests without server space or learning HTML.

I Keep Bookmarks at <http://ikeepbookmarks.com/> - I Keep Bookmarks is a free online bookmark manager that gives access to Internet bookmarks from any Internet-connected computer.

Lesson Plan Architect at <http://www.ibinder.uwf.edu/Steps/> - Sponsored by the University of West Florida, this free resource helps teachers create and document standards-based lesson plans.

ModuleMaker at <http://questioning.org/module/module.html> - Jamie McKenzie's Module Maker helps teachers create online research modules to encourage higher order thinking in students.

Plagiarism Sleuth – Think you might be reading plagiarized work? Plagiarism Sleuth, sponsored by 2Learn.CA, uses the Google search engine to help busy teachers track down the original source.

Printable Concept Map@2learn.CA - This site offers a selection of printable concept maps for use in the classroom. It is free.

PuzzleMaker at <http://puzzlemaker.school.discovery.com/> - Discovery School's Puzzlemaker enables teachers to create crossword puzzles or mazes online. There is no cost.

Quia at <http://www.quia.com> - For \$49 annually, Quia lets teachers create a teacher web site, quizzes and surveys, and a number of Flash-based games from any Internet-connected computer.

QuickTopic at <http://www.quicktopic.com/> - Need an online discussion space but don't have access to WebCT? QuickTopic is a free forum just for such a purpose.

Rubistar at <http://rubistar.4teachers.org/> - Rubistar is an online rubric creation tool that allows teachers to modify pre-defined Rubistar rubrics or create rubrics from scratch. There is no charge to use Rubistar.

Survey Monkey at <http://www.surveymonkey.com/> - Survey Monkey allows anyone to easily create simple surveys. A free option is available.

TeacherWeb at <http://www.teacherweb.com> - Create simple but effective teacher web sites for only \$25 per year.

Yahoo Groups! at <http://groups.yahoo.com/> - Create and manage a mailing list at no cost.

Web and Flow Interactive by Ozline.com at <http://www.web-and-flow.com/> - From one of the originators of the WebQuest, this inexpensive tool lets teachers join a community of educators, create a home page and a number of Internet-based activities.

Web Page Creation tool at <http://www.2learn.ca/webauthoringtool/CREATEYOURPAGE.HTML> - Also from 2Learn, this web site helps busy teachers generate their own web pages without learning HTML or buying expensive software.