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ABSTRACT

This document contains the following papers on concepts and procedures from the SITE (Society for Information Technology & Teacher Education) 2001 conference: "Using School District Standards To Develop Thematic Lessons for Electronic Portfolios" (Cindy L. Anderson and others); "Using Adobe Acrobat for Electronic Portfolio Development" (Helen C. Barrett); "Discetech: Advanced Training on Technologies and Didactic for Italian Teachers" (Mario A. Bochicchio and others); "Online Portfolios vs. Traditional Portfolios (Renee L. Cambiano and others); "Instructional Strategies for Adobe Photoshop: Developing Teacher Training that Works" (Barbara Chamberlin); "Teaching & Technology: A Natural Integration" (Carole A. Cobb and others); "An N-Dimensional Model for Digital Resources" (Charles Dickens); "Cyber Spaces and Learning Places: The Role of Technology in Inquiry" (Juli K. Dixon and Judith Johnson); "Audio on the Web: Enhance On-line Instruction with Digital Audio" (Brenda J. Gerth); "Tres Faciunt Collegium--Paderborn's Collaboration Centred Approach for New Forms of Learning" (Thorsten Hampel); "Using Student Projects To Meet the Information Needs of Teachers on the Internet" (Danielle Heyns); "Developing and Teaching a Computer-Mediated Second Language Course in Academic Reading" (Esther Klein-Wohl and Gila Haimovic); "Lessons Learned: School Based Reform and Its Impact on the Restructuring of a Teacher Preparation Program" (Jan Mastin and others); "Putting the Instructor in Charge: Component Architecture and the Design of a Course Web Site" (Punyashloke Mishra and Matthew J. Koehler); "Troubleshooting Windows" (Sharon Reynolds); "Dancing with Technology To Teach Technology" (Tweed Ross); "Development of English Department of Computer Information Systems as a Way of Worldwide Educational Integration" (Anatoly Sachenko and others); "Applying Social Learning Theory to the Teaching of Technology Skills: An Interactive Approach" (Eric A. Seemann and others); "Applying Rogerian Theory to Technology Resistant Students" (Eric Seemann and others); "Remote-Control Computing" (Mark Smith); "The Use of Instructional Technology To Enhance Teaching Outcomes on the Site and at a Distance" (Armand St-Pierre); "How On-line Collaborative Study Improve Human Cognition: A Perspective on the Evolution of Modern Education" (James T.J.

Wang and others); and "Impact of Technology on Student Socialization in the Classroom" (Lamar Wilkinson and others). An abstract of the following paper is included: "The Role of Assessment in Online Instruction" (Robert J. Hall and others). Most papers contain references. (MES)

CONCEPTS & PROCEDURES

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This year's papers Concepts and Procedures section are considerably more diverse than in previous years both in terms of topical coverage and the greater international flavor of the submissions. Geographically, almost all continents (with the exception of Africa and Antarctica) are represented with submissions from close to a dozen countries in addition to the United States.

The first grouping, dealing with areas of pre-service and in-service teacher training, attracted fewer submissions than in prior years. In *Disitech: Advanced Training on Technologies and Didactic for Italian Teachers,* Mario Bochicchio and his colleagues from the University of Leece, Italy note that the "...teacher's role must be reinvented; its primary goal is not to be well programmed schoolbook explainers, but to supply students the ability to manage the primary keys..." Jan Mastin, Joseph Polman, and Kathleen Beyer from the University of Missouri-St. Louis report on the impact of school-based reforms on their teacher preparation program. Tweed Ross from Kansas State University describes the evolution of instructional technology in the College of Education from PowerPoint enhanced lectures to learning support. Barbara Chamberlain from the University of Virginia has a selection on the use of training teachers to use Photoshop and Sharon Reynolds from the Des Moines Public Schools provides insight on training teachers to troubleshoot Windows. Finally Juli Dixon and Judith Johnson from the University of Central Florida describe a course designed to train teachers in the "art of problem posing" in a high tech environment.

The second cluster of papers deal with issues of performance assessment with respect to teaching performance and learning. Cindy Anderson, Elizabeth Smith, and Joan Briscoe of National-Louis University together with Kevin Anderson from the Kenosha Unified School District report on the development of teaching portfolios. Alejandra Fernandez and Ana Beatriz Martinez from Universidad Central de Venezuela and Renee Cambiano from the University of Arkansas take portfolio development one step further examining the differences between an online portfolio and a traditional portfolio. Helen Barrett from the University of Alaska-Anchorage reports on the use of Adobe Acrobat for portfolio development.

Several of the submissions deal with knowledge representation and learning theory. Charles Dickens from Tennessee State University presents a paper that considers several facets of knowledge representation including constructivist theory, visual thinking, and the mathematical notion of hyperspace. Thorsten Hampel from the University of Paderborn in Germany describes a project in which students use document management systems to represent the current state of their knowledge Eric Seemann, Walt Buboltz, Lamar Wilkinson, and Sonia Beaty - all from Louisiana Tech University have a presentation on the application of social learning theory to the teaching of technology skills, and the same group of authors also have a paper on the application of Rogerian Theory.

The next selection of papers deal with issues attendant to Distance Learning and Course Management Systems (CMS). The first paper by Brenda Gerth from the University of Victoria in Canada is a primer on the incorporation of digital audio in web-based instruction. Another approach to the CMS is presented by Punyashloke Mishra and Matthew Koehler from Michigan State University who describe the use of modular components in the development of web-enhanced coursework. Esther Klein-Wohl and Gila Haimovic from the Open University of Israel describe teaching in a second language employing CMS technology. Armand St.Pierre from the Royal Military College in Canada has a selection that examines the Web-based Instructional Model (WBIM) to enhance distance education. Mark Smith from Purdue University North Central has a paper that evaluates various software packages to enable an instructor at a distance to take control of a student's computer. Finally, James T.J. Wang and David C.Y. Lin, both from National Taipei University of Technology in Taiwan, examine the intersection of virtual learning and human cognition.

The last group of selections deal with ethical, social, and legal issues. Lamar Wilkinson, Walter Buboltz, Adrian Thomas, and Eric Seemann, all of Louisiana Tech University examine the impact of technology on the socialization of students. Anatoly Sachenko and Hrygory Hladiy from Ternopil Academy of National Economy in Ukraine explain how they use the Internet as a means of enhancing a world view of their students. In the same vein, Carol Cobb from Bellarmine University describes her institution's measures to produce "culturally responsive, inclusive, and reflective" teachers.

The greater breadth of issues in the section this year as well as the increased geographic diversity speak well to the maturation of the discipline beyond the earlier emphasis on technical issues.

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Using School District Standards to Develop Thematic Lessons for Electronic Portfolios

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Abstract: The National Council for the Accreditation of Teacher Education (NCATE) suggests that teacher education institutions require portfolios as a method for demonstrating that their preservice teachers have mastered NCATE standards including those technology standards recognized by the International Society for Technology in Education (ISTE). At the same time, school districts are requiring their teachers to demonstrate how their K-12 students have mastered the academic standards of that school district. This paper presents an electronic portfolio template that blends these standards, providing the opportunity to demonstrate how one artifact, in this case, a thematic lesson, acts as a performance indicator of mastery for each of these standards.

The National Council for Accreditation of Teacher Education (NCATE), in cooperation with the International Society for Technology in Education (ISTE), has developed a list of minimum competencies for beginning level teachers in technology (NCATE, 2000). This list is known as the National Educational Technology Standards for Teachers (ISTE, 2000). These competencies were developed from a list representing minimum competencies that ISTE has determined as being necessary for today's public school children to know. This list will help teachers prepare their students to be ready for tomorrow's jobs where projections indicate that five of the ten fastest growing job areas will be computer related (College Planning Network 1996). To remain accredited through NCATE, teacher education institutions must demonstrate that they are addressing this area, that is, they must be training preservice teachers in the use of technology (NCATE, 1997), so that, in turn, their public school students will be able to meet their minimum technology standards.

At the same time that NCATE is emphasizing the infusion of technology in teacher education, NCATE is suggesting teacher education institutions demonstrate that their graduates have mastered these technology competencies through performance-based artifacts found in preservice teacher portfolios. The portfolios developed by preservice teachers can then be used as part of the teacher education accreditation process by NCATE. These portfolios provide evidence ensuring that preservice teachers have mastery of NCATE performance standards including the National Educational Technology Standards for Teachers (NETS) developed by ISTE. These portfolios can be either print-based or digital, saved on paper or saved on disk.

Preservice teacher work samples or artifacts within these portfolios are chosen by the preservice teacher to serve as a representation of the preservice teacher's mastery of the NCATE performance standards.

As teacher education institutions are addressing these NCATE requirements, they are exploring the professional literature in their search for programmatic changes that will result in effective technology-using teachers. In particular, a study by the International Society for Technology in Education (ISTE, 1999) explored several methods that teacher education institutions use to train their preservice teachers in the use of technology. This research concluded that technology infusion into the education courses of preservice teachers was more successful than separate technology training classes. One of the frequent requirements of these education courses is a lesson or unit plan. As teacher education institutions are attempting to respond to NCATE directives, many teacher education programs are requiring that their students develop these thematic units or lessons, frequently suggesting that the preservice teacher include a technology-infused lesson. These thematic lessons then are added to either the print-based or the electronic portfolio as a demonstration of the preservice teacher's mastery of the NCATE performance standards including NETS technology standards.

While preservice education is emphasizing technology integration and performance standards, inservice education is also emphasizing technology integration and student performance standards (NCREL, 2000). Increasingly, public school teachers are being asked to integrate technology into their classroom instruction (U.S. Dept. of Education, 1994). At the same time, these teachers are being asked to demonstrate the mastery level of their own K-12 students on state and national academic performance standards (NCREL, 2000). Reflecting these standards, many school districts have developed benchmarks for mastery and are asking their teachers to assess their students according to these benchmarks. The inservice teachers are then required to demonstrate through the use of performance-based assessments that their students have mastered these benchmarks. It follows that these K-12 standards or benchmarks and their assessments should be reflected in the artifacts that are included in the preservice teacher education portfolios. Indeed, NCATE is recommending that teacher education institutions begin to require the inclusion of K-12 student assessment samples with portfolio artifacts to function as a measure of the success of the students being taught by the preservice teacher (NCATE, 1999).

As part of the NCATE accreditation process, preservice teachers are asked to use these portfolios to demonstrate their expertise in teaching and learning through performance-based evidence in the form of artifacts. A logical blending in this portfolio is to develop artifacts that not only reflect these NCATE standards but also the academic standards of the school district where the field experience associated with the artifact takes place. Two preservice teachers from National-Louis University, using an electronic portfolio template developed to demonstrate mastery of the NCATE standards, as well as the ISTE standards, produced thematic lessons that combine these national standards with the local standards of the two districts where they did their field experiences. The software used for the template is an HTML template developed by the teacher education faculty member responsible for the technology integration of preservice teachers. The template includes links from the NCATE standards, the ISTE standards, and the district standards to the appropriate artifact, in this case a thematic lesson. The first page of the template presents a concept map that has branches labeled according to each of these standards. These branches act as a linking image map, allowing entrance into the portfolio by each of the different lists of standards. One branch enters the template through the NCATE standards while another enters the template through the ISTE standards. A third branch enters the template through a simple listing of artifacts while a fourth branch enters through one of four practicums that occur each term of the MAT program. Finally, the template can be entered through the appropriate K-12 school district standards. Figure 1 shows the illustration of the entrance page with the concept map for one of the two preservice teachers.

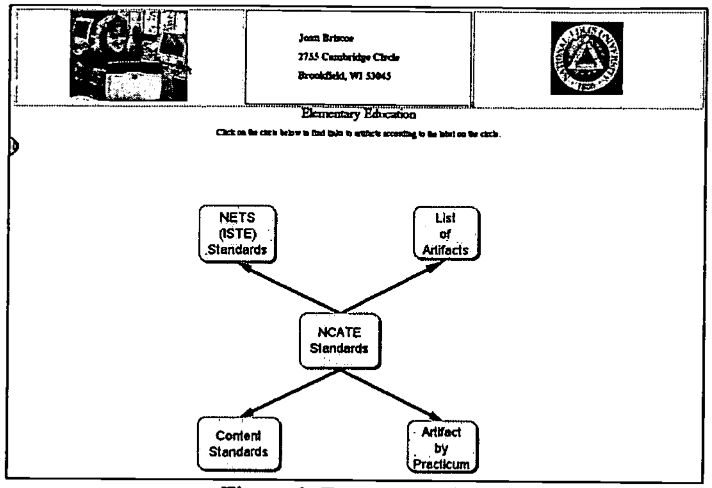
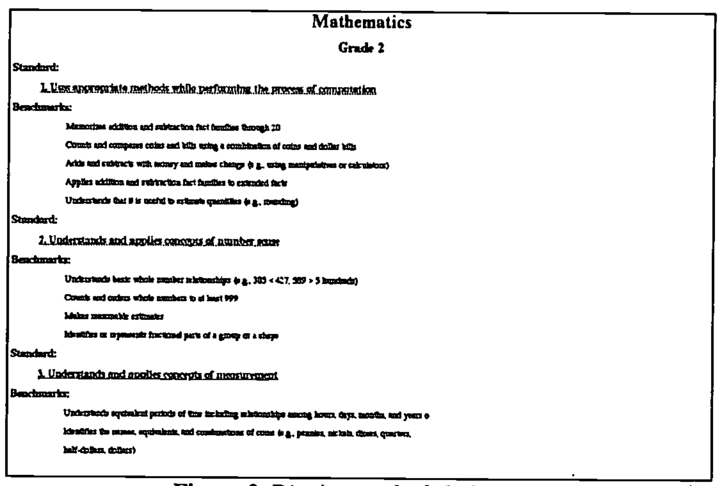


Figure 1: Entry to template

Each of the entrance points or buttons leads to a listing of the standards that are in turn linked to the artifact that functions as the performance indicator reflecting that standard. Figure 2 illustrates the link page of district standards from one sample portfolio while Figure 3 illustrates the link page from the ISTE standards to the artifact.



Mathematics

Grade 2

Standard:

1. Uses appropriate methods while performing the process of computation

Benchmarks:

Memorizes addition and subtraction fact families through 20

Counts and compares coins and bills using a combination of coins and dollar bills

Adds and subtracts with money and makes change (e.g., using manipulatives or calculators)

Applies addition and subtraction fact families to extended facts

Understands that it is useful to estimate quantities (e.g., rounding)

Standard:

2. Understands and applies concepts of number sense

Benchmarks:

Understands basic whole number relationships (e.g., 305 < 427, 589 > 5 hundreds)

Counts and orders whole numbers to at least 999

Makes reasonable estimates

Identifies or represents fractional parts of a group or a shape

Standard:

3. Understands and applies concepts of measurement

Benchmarks:

Understands equivalent periods of time including relationships among hours, days, months, and years o

Identifies the names, equivalents, and combinations of coins (e.g., pennies, nickels, dimes, quarters, half-dollars, dollars)

Figure 2: District standards links page

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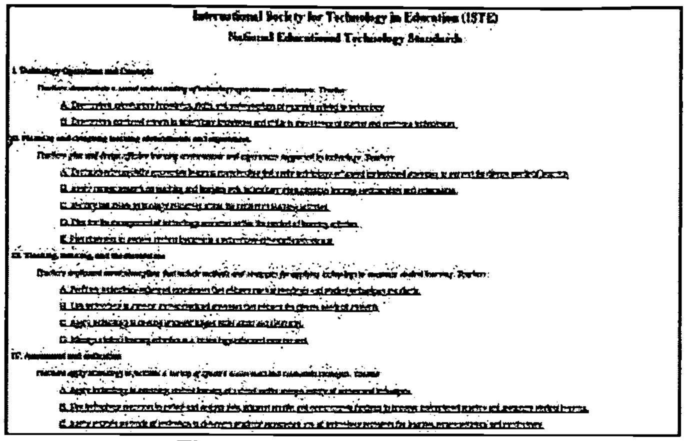

Figure 3: ISTE standard link page

The electronic portfolio template provides a place for the preservice teacher to represent himself or herself in resume format. On the same page, the template provides a listing of NCATE performance standards that act as links to pages describing that appropriate NCATE standard. Figure 4 illustrates this page.

Each of the pages that are linked to the page in Figure 4 describe the appropriate NCATE standard. They also contain links to the artifacts selected by the preservice teacher to represent their mastery of this standard. Figure 5 is an illustration of one of these pages.

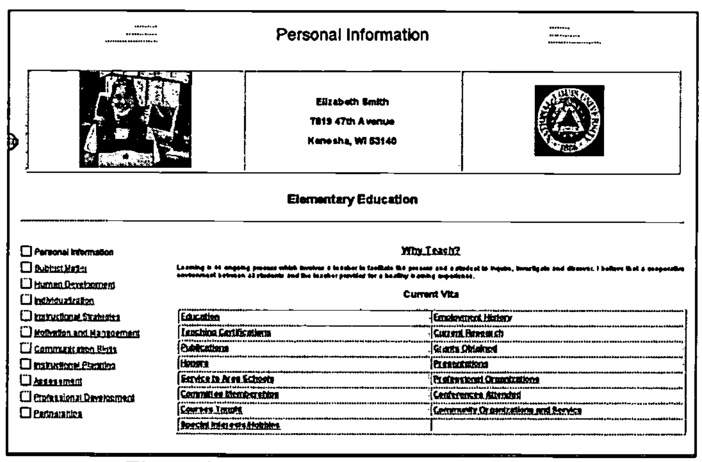

Figure 4: NCATE links and resume links page

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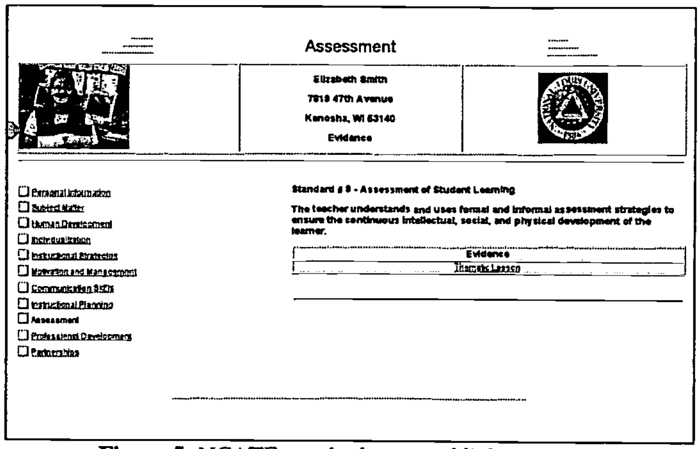

Figure 5: NCATE standard page and link to artifact

The template page that displays the artifact selected by the student is a framed page. This framed page has five frames. One frame includes the appropriate district standards that are covered in the thematic lesson. Another frame lists the appropriate NCATE and ISTE standards. A third frame includes the artifact itself, in this case, the thematic lesson. A fourth frame displays the reflection paper written by the student about the artifact. Finally, a fifth frame includes the teacher education instructor's comments concerning the artifact or the thematic lesson. Figure 6 is an illustration of a framed page that includes these items.

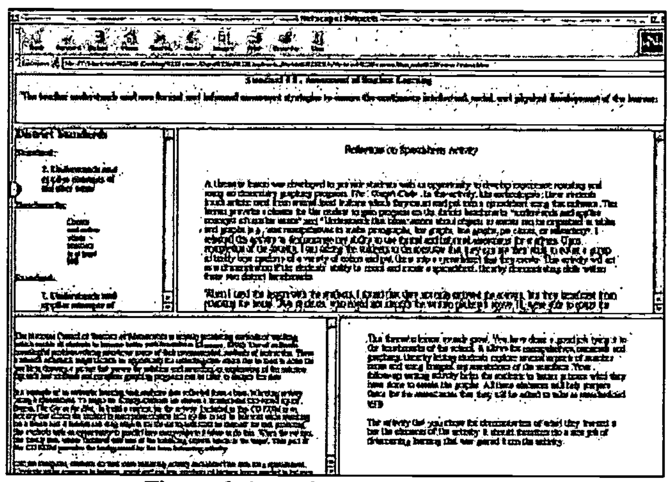

Figure 6: Framed page with the artifact

The use of standards as a measurement of preservice teacher success is recognized by many institutions that have an impact on teacher education programs and teacher education candidates. The International Society for Technology in Education has developed a list of standards composed of technology skills that are expected to be met by beginning level teachers, NETS. The National Council for the Accreditation of Teacher Education recognizes this list of standards, but has their own list of standards, as a measure of competency for the beginning teacher. A suggested measure of this competency has been the production by the teacher candidate of a portfolio, in some cases, an electronic portfolio, that contains artifacts reflecting mastery of each of these standards.

At the same time, states and districts have developed lists of academic standards for their public school students. All these lists of standards can be reflected in the artifacts contained in a preservice teacher's portfolio. Using links from these standards in an electronic portfolio, preservice teachers can select artifacts that demonstrate their mastery of these teacher education standards and their students' mastery of K-12 district standards. Thus, their artifact, in this case, a thematic lesson, reflects mastery of NCATE standards, NETS standards, and school district standards.

References:

College Planning Network. (1996, October 16). *Back to school: A guide for adults returning to college*. Seattle, WA: Author. Retrieved October 29, 1999 from the World Wide Web: http://www.collegeplan.org/bcksch/bkschool.htm.

International Society for Technology in Education (2000). *National educational technology standards for teachers.* Eugene, OR: International Society for Technology in Education.

International Society for Technology in Education (1999). *Will new teachers be prepared to teach in a digital age?* Santa Monica, CA: Milkin Family Foundation.

Task Force on Technology and Teacher Education. (1997). *Technology and the new professional teacher: Preparing for the 21st century classroom (1997)*. Washington, DC: National Council for Accreditation of Teacher Education. Retrieved November 14, 2000 from the World Wide Web: http://www.ncate.org/projects/tech/TECH.HTM.

McNabb, Mary L. (2000). *Perspectives about education.* Oak Brook, IL: North Central Regional Educational Laboratory.

National Council for the Accreditation of Teacher Education (2000). *NCATE program standards.* Washington, DC: National Council for Accreditation of Teacher Education.

National Council for the Accreditation of Teacher Education (1999). Performance-based accreditation for the new millenium. *Quality Teaching* 9(1). pp. 5-6.

U.S. Department of Education. (1994). *Revising the 1996 national educational technology plan.* Washington, DC: US Department of Education.

Using Adobe Acrobat for Electronic Portfolio Development

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Abstract: Adobe's Portable Document Format is the ideal container for electronic portfolio reflections connected to digital artifacts. This paper describes the software environment, and then describes the process for converting digital artifacts from many applications into the Portable Document Format, and maintaining a cross-platform, web-accesible, hyperlinked digital portfolio.

Introduction

There are many tools and strategies that can be used for Electronic Portfolio Development. In the SITE 2000 Conference Proceedings, I outlined a five-stage, five-level model of electronic portfolio development, using off-the-shelf software. In addition to the stages of portfolio development, there appear to be at least five levels of electronic portfolio development, each with its own levels of expectation and suggested software strategies at each stage depending on technology skills of the student or teacher portfolio developer (Barrett, 2000). There are several commercial templates for creating electronic portfolios using PowerPoint and Hyperstudio, books and resources for creating digital portfolios in HTML, and a variety of proprietary software packages. However, there are few resources available on how to publish an electronic portfolios using Adobe Acrobat. This paper outlines strategies for using this software to create an electronic portfolio.

Adobe Acrobat and the Portable Document Format: the Universal Container

Acrobat has been branded as *ePaper* by Adobe, with the following description on their website:

> Adobe® Portable Document Format (PDF) is the open de facto standard for electronic document distribution worldwide. Adobe PDF is a universal file format that preserves all of the fonts, formatting, colors, and graphics of any source document, regardless of the application and platform used to create it. PDF files are compact and can be shared, viewed, navigated, and printed exactly as intended by anyone with a free Adobe Acrobat® Reader™. You can convert any document to Adobe PDF, even scanned paper, using Adobe Acrobat 4.0 software.
>
> Adobe PDF is the ideal format for electronic document distribution because it transcends the problems commonly encountered in electronic file sharing. Anyone, anywhere can open a PDF file. All you need is the free Acrobat Reader. PDF files always display exactly as created, regardless of fonts, software, and operating systems. PDF files always print correctly on any printing device.
>
> Adobe PDF also offers the following benefits:
>
> - PDF files can be published and distributed anywhere: in print, attached to e-mail, on corporate servers, posted on Web sites, or on CD-ROM.
> - The free Acrobat Reader is easy to download from our Web site and can be freely distributed by anyone. More than 110 million copies have been downloaded or preloaded onto PCs.
> - Compact PDF files are smaller than their source files and download a page at a time for fast display on the Web.
> - Using Acrobat 4.0 software, bookmarks, cross-document links, Web links, live forms, security options, sound, and video can be added to PDF files for enhanced online viewing. (Adobe, 2000)

Adobe Acrobat is based on the PostScript, a device independent page description language, introduced by Adobe in 1985 to control printing documents to laser printers. The Portable Document Format (PDF), introduced in 1993, is an advanced version of the PostScript file format, which saves each page is an individual item, incorporating fonts within the document while creating a file that is usually smaller than the originating document. The underlying concept of creating a PDF document is printing to a file (Andersson et, al., 1997).

Creating a PDF file makes it portable across all computer platforms, using the free Reader that can be downloaded from the Adobe web site. Adobe grants permission to publish the Reader Installer on a CD-ROM without written permission from Adobe. There is even a version of the Acrobat Reader that can be pre-installed on a CD-ROM, although most computers are being shipped today with the Acrobat Reader pre-installed on the hard drive. PDF files are WWW compatible, with the PDFViewer plug-in for most web browsers. The latest version of Acrobat can even download web pages with fully functional web links.

Electronic Portfolios published in Acrobat

An electronic portfolio includes technologies that allow the portfolio developer to collect and organize artifacts in many media types (audio, video, graphics, and text). A standards-based electronic portfolio uses hypertext links to organize the material, connecting artifacts to appropriate goals or standards. Often, the terms "electronic portfolio" and "digital portfolio" are used interchangeably. However, I make a distinction: an electronic portfolio contains artifacts that may be in analog (e.g., videotape) or computer-readable form. In a digital portfolio, all artifacts have been transformed into computer-readable form. (Barrett, 2000)

In my opinion, Adobe Acrobat is the most versatile and appropriate tool to publish an electronic portfolios because this software most closely emulates the 3-ring binder most often used in paper-based portfolios. In my opinion, PDF files are the ideal universal container for digital portfolios. In fact, here is how John Warnock, Co-founder and CEO of Adobe Systems, Inc. defined the Adobe Acrobat Portable Document Format:

> PDF is an extensible form of paper, a hypermedia that is device independent, platform independent, color consistent and it is the best universal transmission media for creative and intellectual assets.

What else is a portfolio but a container for our creative and intellectual efforts? If Adobe Acrobat is chosen as the development software, here are the skills I have found to be important:

1. Convert files from any application to PDF using PDFWriter or Acrobat Distiller
2. Scan/capture and edit graphic images
3. Digitize and edit sound files
4. Digitize and edit video files (VCR -> computer)
5. Organize portfolio artifacts with Acrobat Exchange, creating links & buttons
6. Organize multimedia files and pre-mastering a CD-ROM
7. Write CD-Recordable disc using appropriate CD mastering software OR
8. Post PDF files to a web server

Structure of my Electronic Portfolio

Here is the process I use to create and then update my electronic portfolio every year. I maintain two separate PDF files: The **Portfolio.PDF** file is organized by the major sections as outlined in my table of contents:

- INTRODUCTION
  - Table of Contents
  - Introduction to the Reader
  - Workload Agreement
  - Annual Activity Report
  - Self-Review and Standards Achievement
  - Vita
- TEACHING SUMMARY
  - Curriculum Development
  - Course Syllabi
- RESEARCH & CREATIVE ACTIVITY SUMMARY
  - Publications
  - Grants
  - Conference Presentations
- SERVICE SUMMARY
  - University Service
  - Community & Professional Service
  - Summary of Professional Development
  - Supporting Correspondence

The **Artifacts.PDF** file contains copies of each artifact I might want to include, organized chronologically with all of the artifacts together for each year. The order of each year's files follows:

- Annual Activity Report
- Syllabi for the year for all courses taught
- Course Content Guides for all new courses developed or revised
- Grants written/received during the year – full text
- Publications for the year – full text

How I Create and Update my Electronic Portfolio using Adobe Acrobat

1. **Organizing files and folders** - My hard disk drive is really my working portfolio. Once a year, I "mine" my hard drive for those "gems" that I want to include in my artifacts file.

   1.1. During the year, collect appropriate artifacts in a folder called, "new items" or in a folder named for the year. I keep a "Working Folder" to store all of the artifacts for inclusion in the portfolio that have been converted into Acrobat format. Sometimes I add contemporaneous reflections to the artifacts using the Notes tools in Acrobat.

   1.2. Set up a new folder for the working files for the new year. Save all of the new summary files in the new current year folder if you want to maintain source documents for prior years (the prior year folders can be tossed later, if hard disk space is an issue). Once a PDF file is inserted into the main Portfolio.PDF or Artifacts.PDF document, I store them into a folder that I call "PDF files" inside the current year's folder.

2. **Contents of portfolio pages**

   2.1. At the end of the summer, I write up my Annual Activity Report (AAR). Each component of the report becomes the foundation for updating the separate sections of the portfolio. The formatting of each section matches each section of my Vita.

   2.2. From my Annual Activity Report (AAR), copy the publications, conference presentations, and any other appropriate information into my Vita. Print the Vita to PDF.

   2.3. Update major section summary pages (Teaching, Research, Service)

2.4. From my Annual Activity Report (AAR), copy the contents of each section to the Summaries of each type of activity (i.e., classes taught, different types of service, publications, conference presentations, etc.) after adding a heading for the current year. This results in a summary of the different aspects of my work for all years. I recommend organizing these summaries in chronological order, adding the current year's record at the end. That way, if links have been made to artifacts, those links would remain in the same place when the new information is added at the end.

2.5. Convert these summary pages to PDF (all of these items are drawn from the AAR):
- Summary of Courses Taught
- Overview of Curriculum Development
- Summary of Research & Creative Activity
- Summary of Publications
- Summary of Grants Received including paragraph Abstracts
- Conference Presentations
- University Service
- Professional Service and Affiliations
- Community Service Summary (including School District In-Services)
- Paid Consulting
- Summary of Professional Development
- Supporting Correspondence (see description #3.6)

3. Organizing the PDF files

3.1. Take last year's PDF portfolio, save with another name. Create a new folder to hold the new portfolio and place this new file into that folder.

3.2. I maintain my artifacts in a separate PDF file. Make a copy of that file, but keep the same name if you want the old links to that file to work. Move that new file to the new portfolio folder.

3.3. Replace the appropriate pages in the portfolio, updating them with the new versions. This will leave the links intact. Don't Delete Pages and Insert Pages; the links will disappear. The only pages to insert should be those where the page counts exceed the previous year when the additional information is added.

3.4. Review the artifacts that might be included in the portfolio file (in my case, the current year's syllabi), and copy those pages to the end of the Artifacts file. From prior experience, the cross-document links from the Portfolio PDF file to individual pages in the Artifacts PDF file will be correct only if pages are not inserted in the middle, but rather at the end of the document. I insert a divider page before the beginning of the new year's files.

3.5. While the Artifacts file may be filed in chronological order, the Bookmarks can be organized by artifact type, so that each major heading can have sub-headings that link to individual documents.

3.6. An important component at the end of my portfolio is a collection of correspondence that I have received during the year that support my portfolio. Many of these items are e-mails and have been converted to PDF at the time they were received, and are stored in the folder described in Step 1. I create a summary list of these pieces, convert that document to PDF, and insert into the portfolio. This is the only page that I delete and insert, and then need to update the links and the bookmarks. I also make links to each individual piece of correspondence.

4. Adding Reflections (Reflections turn *artifacts* into *evidence* of achievement)

4.1. When creating the PDF version of an artifact, sometimes I add a reflection to the file, using Acrobat's Annotations Tools.

4.2. Update the Introduction to the portfolio, convert to PDF, and replace the older version in the Portfolio file. If necessary, link from the Table of Contents and re-link Bookmark.

4.3. Write up my summary reflection for the year, convert to PDF and insert into the Portfolio file. If necessary, link from the Table of Contents and re-link Bookmark.

4.4. Review the document that contains the Standards I have chosen, and update the reflections from the prior year. I keep my ATE reflections in a FileMaker Pro database. Convert to PDF and replace the older version in the Portfolio file. If necessary, link from the Table of Contents and re-link Bookmark.

5. Fine-tuning the finished files before publication

5.1. Check all Bookmarks or make new ones.

5.2. Check all links or make new ones.

5.3. If file size is not an issue, create all Thumbnails.

5.4. If you want the PDF files to open with the Navigation Pane showing, select File Menu -> Document Info -> Open and select the appropriate Initial View.

5.5. Before finalizing the PDF files, do a "Save As..." using the same name to compress the file. If saved too many times, the file becomes very large.

5.6. If the files are to be posted in a public space, such as a web server, I save the files with Normal Security, to prevent printing, copying, adding notes, making any changes or form fields. I also assign a password required to change those security provisions. Be sure to remember the password, or keep another version without the security provisions.

6. Adding Multimedia

6.1. I review the portfolio for standards or reflections that could benefit from a multimedia reflection. I also review the video clips that I have collected over the year. I create short video clips to illustrate a component of my portfolio (try to keep each clip less than 30 seconds).

6.2. Save the files in Quicktime cross-platform format or AVI format. Store in a "Movies" folder inside the current portfolio folder. Once stored in a place that will not change, create links from the Portfolio document to the appropriate video file.

6.3. If appropriate, I will create a tour of the portfolio using CameraMan or another Screen Recording software package, narrating the overview for a novice viewer, and saved in QuickTime or AVI format.

7. Publishing the Portfolio

7.1. Using a CD-mastering program, I set up a temporary 650 megabyte partition and copy the all appropriate files and folders in the current portfolio folder to that partition. Organize the windows the way they should appear when the CD is loaded in the CD drive (Macintosh only). Write the CD.

7.2. Post the appropriate files to a web server. I post only the Portfolio.PDF file, not the Artifacts.PDF file to a web server. I also use the Normal Security so that the document cannot be printed, pages or text/graphics copied, etc. I do not include the video clips with the online PDF files, since the links to video do not work over the Internet.

References:

Adobe Corporation (2000) "Adobe PDF" Retrieved from the World Wide Web: December 4, 2000 at: http://www.adobe.com/products/acrobat/adobepdf.html

Adobe Creative Team (2000). *Adobe Acrobat 4.0 Classroom in a Book.* Adobe Press

Alspach, Ted; Alspach, Jennifer. (1999) *PDF with Acrobat 4: Visual Quickstart Guide.* Peachpit Press

Anderson, Mattias; Eisley, William; Howard, Amie; Romano, Frank; Witkowski, Mark; (1997) *PDF Printing and Publishing.* Micro Publishing Press

Barrett, Helen C. (2000) "Electronic Teaching Portfolios: Multimedia Skills + Portfolio Development = Powerful Professional Development" Published in the *Proceedings of the Annual Conference of the Society for Information Technology & Teacher Education.*

Padova, Ted (1999) *Acrobat® PDF Bible.* IDG Books Worldwide

Discetech: Advanced Training on Technologies and Didactic for Italian Teachers

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Abstract: The Discetech project was conceived in 1996 at *Politecnico di Milano* (Italy) to integrate technological training and educational practice.
In Discetech, in fact, we train teachers on the use of computer applications (CD's, Internet, software, videoconference, ...), then we prepare it to design teaching experiences to be performed in their own classrooms. Each experience is observed and measured, from the didactic point of view, by adopting a number of parameters (about the training process, the educational aspects, the knowledge acquisition and the contents selection).
In the final phase of each year the results are evaluated, compared and shared among all participants in order to gain the largest possible amount of knowledge about the adopted teaching modalities and the achieved results.
Discetech is an experimental project rather than a simple upgrading course; it is conceived to observe and to better understand different aspects of the Italian School.

Introduction.

The Discetech project was started in 1996 at *Politecnico di Milano*; in the first year it was performed in the high schools of Como, then, in 1997 it was extended to the high schools of Lecce (in the South East of Italy) in collaboration with the local University. This paper is about the Lecce branch of the project.

Discetech is an experimental project rather than a simple upgrading course. It is conceived to analyze different aspects of the Italian School:

- the first aspect is about the extraordinary spread of new technologies among the students in the last years: it is interesting to observe that, in most cases, the use of computers, Internet, CD/DVD-ROMs etc. is not pushed from School but from other factors (essentially computer games and the relatively low cost of the hardware).
- the second aspect is about the "embarrassment" of many teachers with respect to technological issues ("how to find something on Internet?", "how to read a CD-ROM?", "how to insert an image in a composition written on the PC?", etc.): teachers need to be credible towards students without transforming itself in computer scientist. Teachers need to use (and to demythicize) technologies by using it, not to learn internal details about it.
- the third aspect is about the current learning process, primarily (almost exclusively) based on schoolbooks: teachers don't know how to evaluate/use new media in their teaching practice.
- finally, we consider that today students may have several information sources, like CD's or Web sites, so they can be *more informed* (in some case) and/or *more updated (in most cases)* than their teachers, nevertheless students need a method to organize this information and to transform it in knowledge.

For these reasons Discetech is above all directed to teachers, and not to students: the coordinated training on technological applications and didactic experimentation is the key point of the project (Henderson & Bradey, 1999) (Suen & Szabo, 1999).

This paper is about the experience acquired in last three years of the Discetech project in Lecce.

The project.

Concisely, in Discetech we train teachers on technologies and computer applications (CD-ROMs, DVDs, Internet, e-mail, software, videoconference …), then we prepare it to plan a teaching experiment to be performed in their own classrooms. The technological training and the preparation of the experiments is carried out in the first semester of each year, while the experiments (the duration is on the order of 3 months) are performed in the second semester.

During each experiment, the whole class, and each student in it, are observed from the teacher(s), and a number of parameters are evaluated and registered, mainly about the training process, the educational aspects, the knowledge acquisition and the contents selection.

In the final phase of each year the results are evaluated and shared among all participants in order to gain the largest possible amount of knowledge about the adopted teaching modalities. A suitable didactic background is essential in this phase to compare the results coming from the various experiments and to extract from it a more global and reusable knowledge.

In more details, at its fourth year, the project is structured into 3 levels and each level is organized into 3 phases. Each phase is structured into modules with both theory and practice.

- The Base level is oriented to teachers approaching for the first time to Computer and multimedia technology (Sims 1999).
- The Advanced level is oriented to teachers coming from the base level or with previous experiences about multimedia technologies. The goal of this level is to learn an advanced use of Internet resources for both searching the Web and participating to virtual communities (Bennet 1999) (Harasim 1995) (Slavin1995) (Hiltz 1994)
- The Experimental level is oriented to teachers coming from the previous levels. Here teachers learn how to evaluate existing CD-ROMs and Web Sites, how to conceive new hypermedia applications and how to develop it (Frohlich 1999) (Hackbarth 1996) (Garzotto et al. 1993).

Each level is structured in 3 phases with different contents according to the level, but with a common goal.

- In the first phase, technical tutors provide to teachers the needed know-how for that level.
- In the second phase, didactic tutors provide to teachers the knowledge needed to develop teaching experiments in which "normal" teaching aids and new technologies are jointly used to achieve specific didactic goals.
- In the third phase the teachers, in its own classrooms, performs the teaching experiment. A given number of parameters are measured during this phase in order to evaluate the results and to compare it with the results of their colleagues.

Base Level: Modules Structure.

The base level has the goal to quickly supply the teachers with the initial computer practice and the base principles to understand a multimedia application. This level is structured into the following modules:

- Module A: Introduction to the PC, the Windows Operating System, Word 2000;
- Module M: CD-ROM and multimedia application; introduction to the Hypermedia Design Model (HDM)(Garzotto et al. 1993); evaluation parameters for multimedia applications;
- Module M1: advanced topics on the evaluation of the hypermedia applications; presentation of the main criteria to select a CD-ROM as teaching-learning aid (a media library with more than 300 titles is used). In this module are presented the best didactic projects of the past years;
- Module I: Introduction to the Internet, search engines, e-mail;
- Module W1: Didactic evaluation: parameters and tools
- Module W2: planning of the teaching experiments (individual meetings with didactic tutors);
- Module W3: results presentation and analysis.

Advanced level.

In the advanced level, teachers achieve to the ability to correctly use the Internet in their usual teaching-learning activities. This level is structured into the following modules:

- Module I1: Introduction, objectives and examples;
- Module I2: Internet Browsers: configuration and basic operations;
- Module I3: Internet communication: e-mail, newsgroups, chat, mailing list;
- Module I1: exploration and evaluation of about 100 Web sites selected for the purpose; in this module each teacher select one or more Web site to be used in its teaching experiment;
- Module C1: virtual communities; building a community with WebBoard;
- Module C2: collaboration tools and video-conferencing tools; MS Netmeeting
- Module P1: issues and technical planning of a teaching experiment based on the above-described tools;
- Module W1: Didactic evaluation: parameters and tools
- Module W2: didactic planning of the teaching experiments (individual meetings with didactic tutors);
- Module W3: presentation and evaluation of the results.

Experimental Level.

At this level the teachers are involved in the creation of an hypermedia application. The level is structured into the following modules:

- Module H1: the HDM methodology to evaluate Hypermedia Applications; (Garzotto et al. 1993)
- Module H2: the HDM methodology to model Hypermedia Applications;
- Module T1: tools for media authoring (Adobe Premiere, Adobe Photoshop, ...);
- Module T2: hypermedia authoring environments (Macromedia Director, Flash, DreamWeaver, ...);
- Module D1: design and development of a specific hypermedia application;
- Module E1: Evaluation of the efforts to develop the above application. Evaluations of the results.

In the last 3 years Discetech involved, in Lecce, about 100 teachers and 1700 students, participating to 75 different teaching experiments.

Didactic Project.

A synthetic example of teaching experiment is reported in the following. The project was developed for an history class in the first year of a professional high school, using a CD Rom about the Ancient Rome.
Two kinds of goals (generic and specific) are defined:

the generic goals, structured into 4 categories:

1. training:
   - to enhance the student's interest for the History;
   - to enhance the class-group understanding;
2. instrumental:
   - to correctly use the computer;
   - to acquire the ability to interact with different information sources;
3. knowledge:
   - to understand texts of medium difficulty and to elaborate it;
   - to establish links between arguments and to compare them;
4. content:
   - to grasp the fundamental concepts of the subject;
   - to grasp the links with other subject in a multi-disciplinary environment;

the specific goals:

- to correctly explain the arguments
- to appropriately use of the vocabulary
- to correctly evaluate the CD contents.
- to place the historical events in the correct time/space dimension
- to understand the political, social and economic situation in the ancient Rome.

The expected results are:

- To analyze and to list the main concepts
- To find the hot keys and to understand the links between arguments
- To verbally explain the acquired information
- To find/understand the implicit and explicit means in the non-verbal (multimedia) information;
- To enhance the motivation of students with low proficiency problems.

evaluation parameters.

The evaluation of the teaching experiments is based on the observation of different groups of parameters: two of this groups are reported in Tab. 1. Teachers fill the tables by observing each student, and the whole class in almost two different times: before and after the experiment. The normal scholastic tests performed during the experiment are also recorded and analyzed.
Tab. 1, as well as the other tables of parameters, has been designed specifically for the Discetech project from the didactic equipe of Lecce.

Parameters	**Technical Abilities**						**Orientation Abilities**				
Description	**He/she is able to access to PC**	**He/she is able to open a program**	**He/she is able to save data**	**He/she is able to copy files**	**He/she is able to print data**	**He/she is able to use the navigation tools**	**He/she is able to use technical terms**	**He/she is able to understand the main arguments**	**He/she is able to correctly use links to study in depth**	**He/she is able to correctly use the Internet navigation**	**He/she is able to access the information easly**
Student's Name											

Table 1. Technical and Orientation Ability

Final Considerations.

During the last 3 years we observed that the teachers, initially embarrassed in using the computer, and skeptical about the effective use of multimedia and Web applications into their lessons, changed radically their opinion when experimented the combined use of traditional and innovative media in their projects.
They generally become more able to select new CDs and new Web sites related to specific fields of interest.
The teachers well understood and interpreted their new role, becoming more and more a guide for the students, in a cooperative learning experience, and working with other teachers on similar projects.
Furthermore, teachers became more interested in this new way of teaching, as a consequence of the increased preparation and participation of the students.

In general, during the running phase of the projects, teachers observed the following points:

- The motivation and the interest of students with a good profit were enhanced and the project was a stimulus to consolidate their self-esteem.

- The motivation and the interest of students with lower scholar profit were more oriented to the instruments than to the contents, but also this result is remarkable.
- All the students well understood the structure of adopted CDs or Web sites
- The final result of each student was generally better than before the experiment.
- In general, all students participated to the experiment and cooperated with their colleagues independently from any previously established friendship relation. The project stimulated an effective exchange of information and experiences.

To sum up, in our opinion teacher's role must be reinvented; its primary goal is not to be a *well programmed schoolbook explainers*, but to supply to students the ability to manage the primary keys, the conceptual supporting structure and the principal concepts of a given subject, independently from the technical nature of the media (TV, CDs, Internet, Books, Computers, ...) used to teach.

References.

Bennet J.F.(1999). Incorporating the Internet in the Class Room, *ED-MEDIA 1999 – World Conference on Educational Multimedia, Hypermedia & Telecommunications.*

Frohlich R. (1999). Strategies for Selecting Technology for Education: Choosing the Right Tool for the Job, *ED-MEDIA 1999 – World Conference on Educational Multimedia, Hypermedia & Telecommunications.*

Hackbarth S. (1996), *The Educational Technology Handbook: A Comprehensive Guide: Process and Products for Learning*, Educational Technology Publications.

Harasim L., Hiltz S. R., Teles L. & Turoff M., (1995), *Learning Networks: A Field Guide to Teaching and Learning Online*, MIT Press, Cambridge MA.

Henderson L. & Bradey S. (1999). Getting Computer Information Used in Teaching and Learning: A Model of Technology Diffusion in K-10 Schools, *ED-MEDIA 1999 – World Conference on Educational Multimedia, Hypermedia & Telecommunications.*

Hiltz S. R., (1994), *The Virtual Classroom - Learning without limits via computer networks*, Ablex Publishing, Norwood, NY.

Sims R. (1999). Interactivity and Narrative: Strategies for effective Learning, *ED-MEDIA 1999 – World Conference on Educational Multimedia, Hypermedia & Telecommunications.*

Slavin R. E., (1995), *Cooperative Learning: Theory, Research and Practice*, John Hopkins University.

Suen C.& Szabo M.(1999). A Study of the Impact of a School District Computer Technology Program on Adoption of Educational Technology, *ED-MEDIA 1999 – World Conference on Educational Multimedia, Hypermedia & Telecommunications.*

F. Garzotto, P. Paolini, & D. Schwabe,(1993), HDM - A Model Based Approach to Hypermedia Application Design, *ACM Transactions on Information Systems*, 11 (1), 1-26.

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Online Portfolios vs. Traditional Portfolios

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Abstract: Portfolio is a methodology for teaching and evaluation. A certain time and requirement must be followed when developing a portfolios must. It implies different activities such as: homework, presentations, research, projects, interviews, comments and others. This methodology demands students to compromise the process of learning, being the ultimate goal to fulfillment the program objectives. For this study, two groups were compared using online portfolios and traditional portfolios. The populations were composed of 58 college students from two different universities. Data were collected from September 1999 to January 2000.

Introduction

Education today is touched by diverse paradigms some of them are: the high develop of new technologies for communication and information, the cognitive science and its impact in teaching and learning and the continuing education. Based on this framework one of the most important issues to discuss is the learning evaluation. Today it is accepted that evaluation plays an important role for the process of learning to give meaningful feedback to the learner, to improve the learning process, and to teach practice and educational options (Gonzalez & Flores, 1998).

Education today is searching for new meaning for the teaching and evaluation process. It is looking for alternative ways to teach and evaluate. Today evaluation is more than asking students to select answers; it is asking students to generate questions and answers to situations related to the real life (Sacristan, 1988). Also, it is important to explore the meaning of knowledge and make it meaningful to the learner (Ausubel, Novak, Hannesian, 1983). Evaluation has to relate not only to the academic tasks, but also to the many possible answers the learner can create, based on creative and divergent characteristics (Lazear, 1991).

Alternative evaluation will require radical changes into the process of teaching and learning. In fact the evaluation process needs to be open, flexible, and diverse to related students performance with real life situations. Evaluation has to be a continuous process, with permanent feedback. Finally, alternative evaluation has to consider mistakes as a method of learning.

Portfolios are a method that can be used as an alternative way to evaluate the process of learning. They offers many possibilities to enrich the teacher's work and student's possibilities to learn, but also its practice emphasizes the action and decision students have on their own learning. Portfolios can be used as a collaborative work that will help develop cognitive processes (Castelli, 1999).

Portfolios offer the learner opportunities to make decisions on their learning, and the opportunity to think about the process of learning. Using the portfolio method, allows students to be aware of their own learning and help them to develop cognitive process (Brien, 1994).

Portfolios are a method for teaching and learning. Portfolios can be a collection of many works, experiences, or assignments. Portfolios are a method of evaluation, referring to an authentic evaluation that puts students in relevant, and meaningful tasks (Perez Gomez, 1991) related to the real life.

Using portfolios, the learner will build their own progress to the expertise. Students are autonomous and responsible for their own learning. Its allow students to conform real criteria about the quality of their performance. Finally, portfolios permits learners visualize their own production and compare them with others to determine progress and weaknesses in the learning process. Portfolios can be used as formative or summative ways to evaluate learning.

New technologies of communication and information are affecting education. On this mediated environment portfolios can be developed online. It is possible to evaluate the process of learning based on electronic portfolios. Its represents dimensions, abilities, examples and answer to brainstorming. Portfolios have been used to make a search on the Internet, do assignments, and give feedback throughout e-mail. In the process of building portfolios online it is requires students to create lectures, use portfolios with other learners, and build a CD-ROM version.

Research Questions

1. Relating to the process of developing and conducting portfolios in the process of teaching and learning, how do students who develop traditional and online portfolios differ?
2. Relating to the evaluation of the portfolio as a tool for learning, how do students who develop traditional and online portfolios differ?
3. Relating to the portfolio as an evaluation methodology, how do students who develop traditional and online portfolios differ?

Methodology

A survey was developed by the researcher, and was used to gather the data. The survey was developed to measure three variables: (1) developing and conducting a class, (2) methodology and (3) evaluation. The survey consisted of 12 questions to be answered on a scale of A= totally agree, B= partial agreement, and C = disagree. Items 1, 2, 3 and 4 pertained to criterion 1, items 5,6,7,8,9 and 10 pertained to criterion 2, and items 11 and 12 pertained to criterion 3. The Survey took approximately 20 minutes to complete.

The research was designed to acquire information on portfolios that are used in instruction. The data was collected from twenty-nine participants that created a traditional portfolio and twenty-nine participants that created an online portfolio.

T-tests were conducted in order to determine if there was a significant difference between the students developing traditional and online portfolios. Descriptive statistics were also utilized.

Findings

The sample consisted of 29 students developing a traditional portfolio and 29 students developing an online portfolio. Upon analysis, the t-test indicated that there was a significant difference between the two groups. ($t = 2.31$ $p = .03$).

The t-test indicated that there was a significant difference between the students who developed traditional portfolios and the students who developed online portfolios concerning how a portfolio was developed in class ($t = 3.12$ $p = .02$). A t-test indicated that there was no significant difference between the students who developed traditional portfolios and the students who developed online portfolios the methodology of developing the portfolios ($t = .73$ $p = .47$). A t-test indicated that there was no significant difference between the students who developed traditional portfolios and the students who developed online portfolios the methodology of developing the ($t = .46$ $p = .69$).

One hundred percent (n = 29) of the students that developed traditional portfolios and 100% (n = 29) of the students that developed online portfolios, agreed that the professor was clear and precise with homework concerning the portfolios. One hundred percent (n = 29) of the students that developed traditional portfolios and 100% (n = 29) of the students that developed online portfolios, agreed that the answers were according to the topic.

Ninety-six percent (n = 28) percent of the students that developed traditional portfolios and 100 % (n = 29) of the students that developed online portfolios agreed that the portfolios consisted of more effort and dedication in the class. One hundred percent (n = 29) of the students that developed traditional portfolios and 100% (n = 29) of the students that developed online portfolios indicated that the portfolio demands pertained to the class.

Ninety-seven percent (n = 28) percent of the students that developed traditional portfolios and 100 % (n = 29) of the students that developed online portfolios indicated that creativity and the portfolio were related. One hundred percent (n = 29) of the students that developed traditional portfolios and 100% (n = 29) of the students that developed online portfolios indicated the portfolios promoted cooperative learning.

One hundred percent (n = 29) percent of the students that developed traditional portfolios and 100 % (n = 29) of the students that developed online portfolios indicated that the demands were according to the students' backgrounds. Ninety-three percent (n = 27) of the students that developed traditional portfolios and 93% (n = 27) of the students that developed online portfolios indicated that the portfolios required extra time.

One hundred percent (n = 29) percent of the students that developed traditional portfolios and 97 % (n = 28) of the students that developed online portfolios indicated that the assignments and activities were interesting and useful. One hundred percent (n = 29) of the students that developed traditional portfolios and 97% (n = 28) of the students that developed online portfolios indicated that the portfolios were relevant.

Ninety-three percent (n = 27) percent of the students that developed traditional portfolios and 100 % (n = 29) of the students that developed online portfolios agreed with the professors' evaluation of the portfolio. Forty-one percent (n = 12) of the students that developed traditional portfolios and 24% (n = 7) of the students that developed online portfolios indicated that they knew how to develop portfolios.

Conclusion

Knowing how students are using portfolios can be beneficial in several ways. First of all, knowing this information allows educators to incorporate it into curriculum in both traditional and online situations. This will in turn provide an opportunity to enrich the learning environment. Imagining the future, there will be more access to online learning. Educators can take this information to incorporate it into new courses and distance learning or Web-based environment.

Portfolios can be used to visualize students' performance and to certify students progress. It can be utilized as a methodology for teaching and learning, a methodology for evaluation, and finally as a methodology to develop educational values. In higher education professors can use portfolio in a wide range that enrich the instructional process and to evaluate the performance. However the most important part is that the students have the opportunity to control their own process of learning and to value it and to compare their own criteria with professor's criteria.

References

Ausubel, D; Novak, J; Hannesian, H. (1983. Psicología educativa. Un punto de vista cognoscitivo. Edit. Trillas.

Brien, R. (1992). Science cognitive & formation. Presses de l''Universite du Québec, Canada.

Castelli, E. (1999). El enfoque cooperativo y el uso del portafolios. Revista de pedagogía. No. 59. Universidad Central de Venezuela.

González, C.; Flores, F.M.(1998. El trabajo docente. Enfoques innovadores para el diseño de cursos. Ed. Trillas.

Lazear, (1991). Seven ways of teaching. The artistry of teaching with multiple intelligences. IRI. Skilight Publishing Inc. Palatine Illinois.

Pérez Gómez, A. (1991). Cultura escolar y aprendizaje relevante. Revista Extramuros. Junio 47-62. Universidad Central de Venezuela.

Table 1. The Professor is Clear and Precise with Homework

Response	Traditional	Online
Partially Agree	58.63%	79.32%
Totally Agree	41.37%	20.68%
Disagree	-------	-------

Note. Online n=29; Traditional n=29

Table 2. Answers are According to Topic

Response	Traditional	Online
Partially Agree	41.38%	86.21%
Totally Agree	58.62%	13.79%
Disagree	-------	-------

Note. Online n=29; Traditional n=29

Table 3. The portfolios consisited of more effort and dedicaion to the class

Response	Traditional	Online
Partially Agree	48.28%	58.62%
Totally Agree	48.28%	41.38%
Disagree	3.44%	-------

Note. Online n=29; Traditional n=29

Table 4. Portfolios demands pertained to the class

Response	Traditional	Online
Partially Agree	62.07%	82.78%
Totally Agree	37.93%	17.22%
Disagree	-------	-------

Note. Online n=29; Traditional n=29

Table 5. Creativity and the portfolio were realted

Response	Traditional	Online
Partially Agree	68.96%	79.31%
Totally Agree	27.58%	20.69%
Disagree	3.46%	-------

Note. Online n=29; Traditional n=29

Table 6. The portfolios promate cooperative learning

Response	Traditional	Online
Partially Agree	68.96%	93.01%
Totally Agree	31.04%	6.99%
Disagree	-------	-------

Note. Online n=29; Traditional n=29

Table 7. The demands ofthe portfolio were according to the students' backgrounds

Response	Traditional	Online
Partially Agree	72.41%	82.75%
Totally Agree	27.59%	17.25%
Disagree	-------	-------

Note. Online n=29; Traditional n=29

Table 8. The portfolios required extra time

Response	Traditional	Online
Partially Agree	24.14%	55.18%
Totally Agree	68.97%	37.93%
Disagree	-------	6.89%

Note. Online n=29; Traditional n=29

Table 9. Assignments and activities were interesting and useful

Response	Traditional	Online
Partially Agree	79.31%	68.96%
Totally Agree	20.69%	27.58%
Disagree	-------	3.46%

Note. Online n=29; Traditional n=29

Table 10. Relevance of portfolio

Response	Traditional	Online
Partially Agree	82.75%	65.52%
Totally Agree	17.25%	31.03%
Disagree	-------	3.45%

Note. Online n=29; Traditional n=29

Table 11. Students' opinion on their evaluation

Response	Traditional	Online
Partially Agree	62.06%	96.56%
Totally Agree	31.04%	3.44%
Disagree	6.90%	------

Note. Online n=29; Traditional n=29

Table 2. Answers are According to Topic

Response	Traditional	Online
Yes	41.38%	24.14%
No	58.62%	75.86%

Note. Online n=29; Traditional n=29

Instructional Strategies for Adobe Photoshop: Developing Teacher Training That Works

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Abstract: Adobe Photoshop is a powerful image-editing program with extended capabilities. Unfortunately, the power and versatility of the program can result in teacher training that is too broad, difficult to apply immediately to classroom resource development, and overwhelming to those new to image editing. Instructional conditions often place additional constraints on Photoshop instruction, such as lack of adequate lab facilities and short training periods. Skill-based training in Photoshop should be relevant, easy to learn and implement, well documented with tutorials for further exploration, and should build confidence and develop problem-solving capabilities.

Adobe Photoshop is a comprehensive graphics program - the industry standard in manipulating photographs and bitmap graphics. Technologists often fall in love with it because it is fun to use and teach and offers creative outlets rich in visual possibility.

The technical community is so enamored of Photoshop that instruction in its use often assumes an evangelical flavor: Instructors may emphasize the full range of its features, stressing that 'anyone doing a website must learn Photoshop.' Because Photoshop is so comprehensive, teachers could easily devote more time mastering this graphics tool than developing educational content.

Photoshop can be valuable to teachers and is a valid component of teacher education: however, teachers need instruction designed for K-12 use and applications. Teachers need Photoshop training that is applicable to their uses. While other instructional methods such as project-based learning may be an effective way to develop teachers' skill in Photoshop, hour-long workshops seem to be the norm. Educational technology specialists can employ this format effectively, provided they focus their workshop on the appropriate instructional objectives for teachers.

Teachers are now required to master a broad range of software. Photoshop instruction should draw correlations among the range of graphics programs that teachers may encounter, and specify how Photoshop is particularly geared to a specific task. Instruction should develop skill in the program while also developing skill in directing self-learning in the program.

Consider this possible scenario:

> Mary is a 6th grade teacher who uses WebQuests regularly in her Life Science classroom. Though the WebQuests are effective and generally liked by her students, she wishes she could have more control over her images. She tries to make her web pages visually interesting, using clip art whenever possible. She knows her pages are slow to load because of the images, and wishes she could resize them to the correct size. She also thinks she could do a lot with a graphics program; such as separating some bones out of the human skeleton image for the "No Bones About It" lesson where her students make predictions on bone use based on structure.
>
> Mary was enthusiastic about attending the Photoshop training Saturday morning. Photoshop was a great program. The trainer clearly loved the tool and showed a lot of what it could do. She loved how the trainer restored the old photo to

remove the fold line across the middle, and was impressed by the fancy borders he could make around the animal photos.

The best part of the workshop occurred when the instructor demonstrated how easy it was to use the selection tools. She took detailed notes as the trainer used the magic wand tool to select one sunflower from a field of flowers, and then pasted the flower into a graphic for a web page. She couldn't wait to get to her computer at school to tackle the bones image.

Mary's schedule was as busy as it usually was. During the first three-day weekend after the workshop (about 4 weeks later), she fished out her notes and opened Photoshop and her bones image. Wait a minute... Her notes weren't as clear as she thought they were. At the top she had scribbled something about 'check the resolution', but now that didn't make any sense to her. She was able to use the magic wand tool and select parts of the background around the bone in the photo. The background had a lot of different colors in it, so it was tricky. She was very careful, and spent about 45 minutes selecting exactly the background around the bone. She selected another part of the picture and -- oh no -- she just double clicked. She lost the selection she spent 45 minutes getting! "Forget it," she thought, and decided to crop the image close, leaving the background in the photo. She saved it as a JPEG (she remembered the trainer said jpeg was a good format for the web) and used Front Page to put it in her WebQuest. "That doesn't seem right", she muttered, the image was huge! "It was so much smaller on the screen," she thought to herself, "What am I doing wrong?" She opened the second bone image she wanted to work with. A friend had given her this photo she took at the museum. Mary opened it, made some changes and tried to save... Photoshop wouldn't save it as a JPEG... Why not? She had just done it successfully minutes earlier... "Why doesn't it work now?"

Over dinner, Mary was grumbling about her experience, saying she wasted her time even trying to learn the program. Her daughter, visiting for the weekend, tried to console her, "Mom, don't feel bad, I had to get a degree in graphic design before I started to really understand the program. Maybe you should leave Photoshop to the artists."

The instructor in this scenario was right in believing Photoshop could serve teacher's needs. The instructor was enthusiastic about the program, and was able to get the students excited. Several instructional strategies could have been implemented in the workshop that would have changed Mary's experience. These include:

Instruction Should be Relevant

All instruction in Photoshop should be placed within an educational context. Will teachers be restoring old photos? Will teachers need to add a third eye to the photo of a fashion model? Instruction should demonstrate real applications related to the classroom curriculum such as Mary's bones example.

Teachers frequently prepare images for the web; so any Photoshop instruction should include a demonstration of saving in web formats. When altering existing photos, most teachers need to highlight a certain area, add simple graphics such as an arrow or box, or include text in an image. Teachers also frequently handle several images in the same manner, such as preparing individual images from each student. When structuring a planning session, begin with a list of tasks teachers will need to perform using Photoshop, and teach software skill relating to those tasks.

For example, Photoshop's "Effects" feature applies drop shadows effortlessly to any layer, though drop shadows rarely enhance the educational power of a single image. Rather than emphasize this glamorous feature, emphasize the power of navigational graphics in the design of a web page. When developing buttons for navigation, users are more likely to differentiate navigational text buttons from traditional text if the buttons look like traditional, three-dimensional buttons. Using common WebQuest headings, create text over colored square blocks. Use the "Effects" feature to bevel these square blocks, creating simulated buttons. In this manner, you have helped the teacher strengthen interface design skills, as well as demonstrate a simple component of the program. Additionally, the next time the teacher is making WebQuest buttons; they will remember this lesson, recalling a relevant, easy to apply Photoshop skill. In an extension of this skill, the teacher can explore the "Effects" options, learning that drop shadow is an option, should they choose to use it.

Additional relevant skills include:

- *GIF v. JPEG: When to Use Which for Web Images*

  Include a discussion of saving as any file type, as well as a conceptual overview of why we use different file types.

- *1001 Words: Adding Text to an Illustration*

  Text can be used many ways in Photoshop, including labeling parts of a specimen, 'signing' students' names to work. Text is also a good way to demonstrate layers and how they work in Photoshop.

- *Getting What You Want: Selection Tools in Use*

  Frequently teachers wish to remove the subject of their photo from the background, most will find using a combination of Quick Mask mode, the magic wand, and other selection tools helpful. Remember to use a real example that could be used in an educational setting.

- *Size Does Matter*

  The most common mistake in web pages is resizing images in the web page, resulting in images that print too large, overprinting text on the page. When developing pages, specialists should resize images to the desired size in Photoshop, requiring a rudimentary understanding of pixels, resolution, file size and the "Image Size" dialog box. As an example, prepare snapshots of student work for a standard web size, approximately 250 pixels wide by 300 pixels tall. Remember to use a real example that could be used in an educational setting.

- *32 GIFs per Second: Batch Processing Your Class Images*

  The Actions palette allows for batch processing of several steps, including opening a file, resizing, and saving as a GIF or JPEG.

Instruction Should be Easy to Learn and Implement

In-service instruction is often delivered in short doses. Instructors can specify small parts of using Photoshop; such as "JPEG or GIF: when to use which" or "Five Ways to Select Items in Your Photos." Instructors should remember that Photoshop is just a small part of each teacher's collection of software skills. A teacher doesn't have to understand how professional graphic artists use CMYK mode, or how alpha channels work to crop a simple image.

Successful strategies for keeping training digestible include the one-third, two-thirds rule: use one-third of your allotted time for demonstration, and two-thirds for hands-on practice. Consider this format:

- Provide a conceptual overview for what will happen, including a view of the 'finished' product.
- Clarify that you will demonstrate twice, once while they watch and once while they follow along.
- Provide extension activities in writing, so that quick learners will be able to move forward exploring the tools ("Once you have mastered the 'bevel' mode of the Effects feature, experiment with your text by applying a drop shadow, or embossing").
- Provide sample images so that everyone is working with the same file on which you have worked.
- Teach no more than one conceptual idea (such as resolution or layers) per hour session.

Workshops Should be Well-documented, with Tutorials for Further Exploration

Teachers' schedules rarely allow for immediate practice of learned software skills: Mary's notes would have been well supplemented by an online tutorial, reviewing the sunflower example the trainer demonstrated. Mary could have downloaded the same flower the instructor used, developing her selection skills on an 'easier' image before tackling her own work. Unfortunately, preparing effective tutorials can be time consuming, so the wise trainer establishes a library of tutorials for multiple uses. Don't hesitate to use other's tutorials if you demonstrate them in training using those files. Effective tutorials:

- Replicate given training exercises. Learners may not remember that you were discussing selection techniques, but they may remember you were doing something useful with the bones photo.
- Provide sample files. At the beginning of the tutorial, include a beginning image for download.
- Include specific instructions, cross-platform commands (PC and Macintosh) and extensive images visually conveying the steps included.
- Encourage additional exploration and extension activities for the tools. These activities don't need to be explained step by step, but learners can be encouraged to explore in certain places within the menu.
- Provide additional resources. Remind learners of the resources available to them, the book, web, perhaps even your email for personal inquiries.
- Print well. Especially if you post your tutorials to the web, print the final product from a series of printers, making sure any colored text, images or headings print correctly. Learners will want to print the tutorial and follow it while working in Photoshop.
- Use the proper terminology. You may call the selection the 'marching ants', but a confused learner will come up empty handed when searching for this term in online help. Whenever possible, provide the terminology Photoshop uses in addition to your own lingo. This is especially important with tool names.
- Can be completed within an hour. Really, how much patience do you have with tutorials? Remember that the brain can only absorb what the seat will endure.

Instruction Should Emphasize Problem Solving

No instructor could prepare Mary for every problem she may possibly have in trying to save her image as a JPEG. How could Mary have investigated why the photo wouldn't save? How does online help work? What is the most efficient way to use the book? What other resources are available? Some of the most effective training begins with an exploration of the menu, emphasizing that savvy Photoshop users don't always know exactly where to go in the menus, but feel confident exploring until they find what they need.

Part of this problem solving is established in using the proper terminology, as addressed in developing tutorials. Learners need to be able to speak the language before effectively using help or search tools. Additionally, training can include an example of using the online help, the index, or the Adobe web site.

The most accessible problem-solving tool for most learners is are other learners. As much as possible, facilitate relationships between your learners. If possible, group learners of comparable skill together, and allow time for learners to get to know each other (over coffee and doughnuts after a session, if needed). Encourage learners to help each other in small groups. If training sessions are continued over a length of time, consider asking teachers to share a simple trick or tip in the program with others. In addition to building their own confidence, it helps teachers identify a resource for additional help. Finally, at the close of your training, consider asking teachers to sign an "I can help" list, giving their name, email, and phone, as well as one area they feel confident in. This can work will in many areas of technology training, not just in Photoshop.

Instruction Should Build Confidence

Few people, even graphics professionals, will master all the capabilities of Adobe Photoshop. The instructor in the scenario could have used hands-on lab time to reinforce Mary's newly gained knowledge. If lab time is not possible, several other techniques including self-paced tutorials, graduated training methods and question-answer time can be utilized. Effective trainers are able to demonstrate simple procedures, motivate learners to try the task at hand, and encourage learners that everyone learns by messing up a few times.

Build confidence for learners by drawing parallels between Photoshop and other programs, such as the save as, open, and even the marquee selection tool. If there is an image program at the school that most of your learners are familiar with, point out the similarities among all image tools such as file size, selection, and adjusting brightness and contrast.

Also, prepare your learners for frequent mistakes. Encourage saving multiple versions of documents and saving frequently, so that catastrophic errors won't cause a complete loss of data. Consider demonstrating the History Palette as a multiple undo mechanism. Demonstrate how to save documents with the layers intact as Photoshop .psd documents, before flattening into other formats like pict and .gif.

While Adobe Photoshop is considered a professional tool, it can greatly benefit teachers who prepare websites or develop other classroom materials. In conveying its power and enjoyment to use, demonstrate its effectiveness in the classroom. Finally, remember that your learners may also serve as trainers for others, so be sure to model effective instructional techniques.

TEACHING AND TECHNOLOGY: A NATURAL INTEGRATION

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Abstract: In keeping with Bellarmine's School of Education theme, ***Teachers as Reflective Learners***, the Middle/Secondary MAT Program's aim is to produce forward-thinking professional educators who are culturally responsive, inclusive and reflective in their teaching. The Program provides high quality educational experiences which enable pre-service teachers to gain conceptual proficiencies for creating a secure and nurturing learning environment that appeals to a wide variety of students; and that supports both a sense of collective purpose and individual construction of complex responses. This is achieved through the use of technology instruction and management tools; creative activities used throughout the curriculum for teaching and learning, and for assessing and evaluating student progress; and through use of on-line discussion group assignments. Our constructivist approach stresses teaching for *meaning-making* rather than memorization or practice of rote skills; thusly, calling for students to construct their knowledge as active inquirers into the subjects they are studying.

The Program

The original proposal I submitted and that was approved by the State in the Spring of 1999 was an accelerated five module (semester) secondary program. But because of the now critical shortage of both middle and secondary teachers in the Jefferson County School District, we combined our middle/secondary offerings and collapsed the program into four modules whereby student teaching would occur during Module IV: The Professional Semester. I then added a Primis Custom Built Case Study Book with content specific cases for each Module to promote discussion pedagogy.

The Middle/Secondary MAT Program provides high quality educational experiences which enable pre-service teachers to gain conceptual proficiencies for creating a secure and nurturing learning environment that appeals to a wide variety of students; and that supports both a sense of collective purpose and individual construction of complex responses. The following curriculum strands are intentionally integrated throughout each Module and delivered through constructivist teaching practices:

- **Diversity** – instruction and activities that intentional reflect a culturally responsive and relevant curriculum while providing the means for pre-service teachers to create bridges between home, school and community experiences, incorporate learning activities and assessments that address various learning styles.

  Sample Activities:
  - Make Philosophy of Education paper inclusive of a multicultural perspective and meeting the needs of special needs students. (Builds on Philosophy paper assigned in Module I).

- Develop Cultural Autobiography that includes implications for effective teaching.

- **Special Needs** – collaboration between regular and special needs pre-service teachers that results in the careful and systemic interfacing of the regular education program and classroom; this includes skills and techniques in multilevel instruction.

  Sample Activity:
  - Unit Plan in content area, age level appropriate, using inclusive multi-tasking instruction consistent with Kentucky's Core Curriculum.

- **Technology** – used as an instruction and management tool; creates activities used throughout the curriculum for teaching and learning, and for assessing and evaluating student progress; use of on-line discussion groups and assignments.

  Sample Activities:
  - Developmental Theory Research Project (topical ideas expanded from Module I include Piaget Assessment; Learning Styles; Motivation.)
  - Summary Presentation of research project utilizing effective multimedia/technology, such as Power Point, Digit Cameras, Interactive Presentations, etc. (See Figure 1: Integrated Technology Schema).

In 1990 The Kentucky Department of Education, as a result of KERA (Kentucky Education Reform Act), created eight Kentucky New Teacher Standards for Preparation and Certification (KNTS). More than the demonstration of teaching competencies, these Standards imply a current and sufficient academic content that promotes consistent quality performance of authentic teaching tasks. Thusly, they describe what first year teachers should know and be able to do in authentic teaching situations i.e. the academic content, teaching behaviors, etc. that are necessary to connect prior knowledge to new knowledge.

- Standard I: Designs and Plans Instruction
- Standard II: Creates and Maintains Learning Climates
- Standard III: Implements and Manages Instruction
- Standard IV: Assesses and Communicates Learning
- Standard V: Reflects and Evaluates Teaching and Learning
- Standard VI: Collaborates with Colleagues/Parents/Others
- Standard VII: Engages in Professional Development
- Standard VIII: Knowledge of Content

In 1999 KDE added a ninth:

Standard IX: Demonstrates Implementation of Technology - The teacher uses technology to support instruction; access and manipulate data; enhance professional growth and productivity; communicate and collaborate with colleagues, parents and the community; and conduct research.

This Standard became our primary delivery mechanism for the other eight standards.

An Integrated Technology Schema

MODULE I: Foundations of Middle & Secondary Education

Learning Activities	Product	Kentucky New Teacher Standards	Learned Society Comps. Technology Education
Communication Tool: Synchronous discussion using E-groups, Tapped In or Judi Harris web site; Send documents to professor by Email	**Case Studies:** Classroom Management Behavior Management Diversity Special Needs	KNTS = I, V, VI, VII, VIII, IX	Special Needs = CC:1S1; CC:1K1; CC:1K2; CC:4S4; CC:7K1
Research Tool: Intellectual Property Law Study (web site); Web site evaluation (BUILT); Search Engine Assignment	Philosophy Paper (APA Style) **Continuous Assessment Reflection I:** Reflective Journal		
Headers, Footers, Page Numbering, Tables, Hypertext links, references, endnotes, spell check, grammar check; accessibility options			
Productivity Tool: Taxonomy of Domains; Multiple Intelligence Inventory (chart results) and implications for instruction; Visit Entech-Assistive and Assertive Devices; construct rubrics Spreadsheet/Use tables in MS Word; Personal Learning Plan document	Lesson Plan Individual Development Plan		
Productivity Tool: Name Poem (Moving text, Thesaurus, Formatting by setting Tabs, include picture; class yearbook)	**Continuous Assessment Reflection II:** Admission to Teacher Education Portfolio		
Start Personal Web Page-Digital camera, Word processing, Graphical Organizers, and Scanning (include Picture and biographical data; add philosophy link)			

Presentation Tool: PowerPoint - Creating a presentation, incorporating audio, pictures, and/or video; style checker; save as an HTML file—add to web page; Presenters University Web site	**Oral Presentations:** Micro-teaching Curriculum Report		
MODULE II: Principles of Learning			
Learning Activities	Product	Kentucky New Teacher Standards	Learned Society Comps. Technology Education
Communication Tool: Synchronous discussion using E-groups, Tapped In or Judi Harris web site; Send documents to professor by Email; Collaboration/Instructional uses of Email	**Case Studies:** Learning Styles; Special Needs i.e. Inclusion; Diversity; Parent, School and Community Relations	KNTS = I, II, III, IV, V, VI, VII, VIII, IX	Special Needs = CC:1S1; CC:1K1; CC: 1K2; CC:1K4; CC:1K5; CC:2K1; CC2K7; CC:4S2; CC: 4S4; CC:3K1-3K4; CC:7K1
Research Tool: Use *Multiple Intelligences in the Classroom 2nd Ed.*	Philosophy Paper Developmental Theory		
Right Brain-Left Brain personal analysis (Brain.exe) and web-based study			
Productivity Tool: Continue lesson plan development began in Module I; Internet, Databases (off and online); Graphical organizers; Digitize video frames Digitize audio	Extended Lesson Plan		
Presentation Tool: Use b and w to blank a screen while presenting; Inspiration software; Drawing and painting software; Use pen for emphasis in presentation	Power Point Presentations; Digitize video frames Oral Reports: Cultural Autobiography Mini-lessons		
MODULE III: Middle & Secondary Pedagogy			

Learning Activities	Product	Kentucky New Teacher Standards	Learned Society Comps. Technology Education
Communication Tool: Synchronous discussion using E-groups, Tapped In or Judi Harris web site; Send documents to professor by Email; use Email for collaboration & instruction	**Case Studies:** Planning & Instruction; Pedagogy; Evaluation; Teacher Expectations	KNTS = I, II, III, IV, V, VI, VII, VIII, IX	Special Needs = CC:1K4; CC:2K1; CC2K7; CC:4S2; CC:4S4; CC:3K1-3K3; CC:7K1
Research Tool: Assessment & Evaluation Examine units on web; construct rubrics	Multicultural Unit		
Research Tool: Assessment & Evaluation Examine plans on web; construct rubrics	Curriculum Plan w/Syllabus		
Presentation Tool: Video/Audio; Use Herrell & Fowler *Camcorder in the Classroom* – Digitize a video clip for portfolio; Gather materials (data files, audio, video, stills) to include in your portfolio	**Continuous Assessment Reflection III:** Admission to Student Teaching Portfolio		

MODULE IV: Professional Semester

Learning Activities	Product	Kentucky New Teacher Standards	
Communication Tool: Participate in an electronic discussion of concerns about student teaching; Correspond with students and teachers using Email; Use technology when communicating with parent when possible; Appropriately incorporate technology into teaching	**Student Teaching/ Social Context Cases**	KNTS = I, II, III, IV, V, VI, VII, VIII, IX	

Presentation Tool: Use Herrell & Fowler *Camcorder in the Classroom* – Digitize a video clip for portfolio; Gather materials (data files, audio, video, stills) to include in portfolio	**Continuous Assessment Reflection IV:** Exit Portfolio		
Research Tool: Use internet to research best practices and methodologies in reading;	**Reading in the Content Portfolio**		
Productive Tool: Power Point presentation on reading strategies and best practices found on internet			

Figure 1

Our focus in developing this program has been the curriculum outcome, not the technology. It is through our instructional methods that Standard IX can be met while addressing district, state and national learner expectations. Our first Cohort will student teach Spring 2001. We will continue to monitor and evaluation their progress, gathering data for continuous program improvement.

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An N-dimensional Model for Digital Resources

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Abstract: This short paper proposes an n-dimensional communications model for digital resources such as presentations and hypermedia projects. The model combines multidimensionality, use of visual tools, and constructivist views of knowledge.

- COMMUNICATION: an exchange of knowledge between individuals
- DIALOGUE: communications within a heterarchy.
- HETERARCHY: a spontaneous lateral network of autonomous individuals; a system of authority based on the evolving performance of individuals; e.g., a cybernetic circus.
- NETWORK: an ephemeral, freely evolving, unpredictable dynamical four-dimensional pattern.
- CIRCUS: a cybernetic state of free interactions; a community of autonomous performers, continuously reformed by the independent choice of each; a feedback loop; a recursive mechanism.
- EXPERIENCE: an exchange of knowledge between individuals.
- MEANING: the free interaction of values.
- KNOWLEDGE: the invention of the world in all the complexity and multiplicity of its phenomena.

(Woods 1991)

The definitions above are from experimental architect, Lebbeus Woods from the book *Lebbeus Woods: Terra Nova*. They seem to fit quite well with the developing state of the contemporary constructivist learning theory and seem especially applicable for teachers in the electronic and information rich environment we are creating in schools today.

The purpose of this short paper is to propose a conceptual model for teachers and students to use in thinking about and presenting information in the digitally enhanced learning environment. As the title suggests, the model itself is "n-dimensional," i.e., having dimensions above or beyond the limited one-, two-, and three-dimensional conceptions of Euclidean space referred to as hyperspace.

What is the value of such a reconceptualization of existing models of communication prevalent in educational practice? To begin with, by adding more directions of movement we increase the volume of ideas that can be contained. Consider a line of length a. Move the line in a perpendicular direct through distance a and a square of area a^2 is produced. Move the square a distance and you have a cube of volume a^3. Imagine if you could move the cube likewise in another perpendicular direction, i.e., through a fourth dimension, and the hypervolume becomes a^4. As the hypercube adds dimensions, its volume increases to the power of the dimension, e. g., a 20 dimensional hypercube of side a has a volume of a^{20} (Pickover 1999).

Knowledge representation in the traditional classroom is overwhelmingly linear in nature, having only one degree of freedom. The text on this page is a linear representational form. Such meaning as can be communicated must be embodied in this one-dimensional, beginning to end progression. Thinking mathematically, as we add degrees of freedom to move, in this case additional directions of representational depth, we increase the volume of the communications space exponentially.

Constructing meaning and communicating that meaning through representational forms is one basis by which knowledge can be defined. Digital media, which allow flexible encoding of multiple representational forms, have become a dominant mode for information manipulation, storage, and retrieval for today's society. The Internet is already such a multidimensional entity. The tools for access and creation of information to reside in whole or in part in that dynamic hyperspace are readily available and already widely used in classrooms.

There is a need, however, for a formal yet flexible model for this communication to prepare teachers and their students both to become adept at interpreting and building information constructs that have multidimensional features. Moving in that direction, Hyerle's work with developing and using visual tools

(1996, 2000) moves knowledge construction into at least a two dimensional space with tools such as brainstorming webs, graphic organizers, and thinking-process maps. A recent addition to the Graphic Organizer web site is an article on "layering" which suggests creating linked layers of information (Freeman no date) adding another dimension to the visual tool schemata.

Notions about the nature of knowledge and information representation continue to change over time. Recently, cognitive psychology has taken a renewed interest in mental imagery and that information represented in both a verbal and an imaginal coding system produces stronger memory traces (Brunning, Schraw, & Ronning 1999). In the information and technology rich environment of the new century, teachers and students will need to modify their personal epistemologies to construct knowledge with and from more robust modes of representation.

In teacher education, we emphasize the teacher's role as a facilitator of learning and the constructivist view of learners as knowledge creators, not simply information recipients. Integration of the multimedia and online technology with classroom practices requires the utilization of the technologies by both teachers and students. In my two graduate courses in technology for teachers, I have my students create presentations and Web based activities for their own students' use as well as participate in the student role, taking part in the creation of a group thematic project. The n-dimensional model is used as they develop their products and to create the rubrics for assessing them.

References

A + U. (1991). *Lebbeus Woods: Terra nova, 1988-1991.* Tokyo, Japan: A + U Publishing Co., Ltd.

Bruning, R., Schraw, G., & Ronning, R. (1999). *Cognitive psychology and instruction, 3rd edition.* Upper Saddle River, NJ: Merrill.

Freeman, G. (no date). Layering. [Online]. Available:
http://graphic.org/layerng.html [2000, November 29].

Hyerle, D. (1996). *Visual tools for constructing knowledge.* Alexandria, VA: Association for Supervision and Curriculum Development.

--- (2000). *A field guide to using visual tools.* Alexandria, VA: Association for Supervision and Curriculum Development.

Pickover, C. (1999). *Surfing through hyperspace: Understanding higher universes in six easy lessons.* NY: Oxford University Press.

Cyber Spaces and Learning Places: The Role of Technology in Inquiry

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Abstract: This paper describes a course designed for K-8 science and mathematics teachers to learn how to teach using an inquiry approach within a technology-rich environment. The World Wide Web and calculator-based data collection devices are the primary sources of inquiry-based technology we will share. We will describe the World Wide Web as a resource for assisting teachers to learn the art of problem posing, to increase their repertoire of problem solving strategies, and to enrich their sources for data collection. The calculator-based data collection devices are useful tools for generating real data from natural phenomena. Elementary and middle level teachers are often unfamiliar with the use of these tools much less their effectiveness as tools for inquiry.

Introduction

Throughout the country, there are many efforts to enhance effective science and mathematics teaching and learning in K-8 classrooms. Authentic and meaningful inquiry in mathematics and science depends on teachers, who themselves, have investigated their own questions. These experiences provide contexts for teachers to think critically, explore phenomena, and solve relevant problems. In order to do this they must have experiences in planning and conducting investigations in relevant settings, gathering and collecting information to construct reasonable explanations and solutions, and engaging in discourse about their ideas, explorations, and conclusions. The purpose of this paper is to describe the use of technological tools to initiate the posing and investigating of questions necessary for authentic inquiry-based learning of science and mathematics. Specific examples will be shared about how technology can be used, within the context of a graduate course for K-8 mathematics and science teachers, to provide teachers with experiences in an inquiry approach to learning. Without these kinds of experiences, it is unlikely that the teachers will orchestrate this approach in the learning environments they provide for their students.

Calculator-based data collection devices and the World Wide Web are the primary sources of inquiry-based technology used in this graduate inquiry course. Calculator-based data collection devices are useful tools for generating real data from natural phenomena. Elementary and middle level teachers are often unfamiliar with the use of these tools much less their effectiveness as tools for inquiry. The World Wide Web provides a plethora of data from which teachers and their students can pose problems and design investigations. Both types of technology are used to increase K-8 teachers' repertoires of strategies for implementing an inquiry approach by enriching their sources for data collection and analysis.

Our research in using technology to assist teachers to experience and learn more about the inquiry approach is helping us uncover the relationship between finding patterns and posing problems in the process of designing authentic investigations and reaching logical conclusions. Using technology that is available to these teachers, but has not previously been used in these ways, has opened new avenues for assisting teachers to become more effective in the teaching of science and mathematics in their own classrooms.

Background

A response to the calls for reform in mathematics, science and technology education resulted in the initiation of an innovative project at the University of Central Florida. The Lockheed Martin/University of Central Florida Academy for Mathematics and Science is an education/industry/community partnership aimed at improving mathematics, science, and technology education in Florida. Funding was initially provided by the National Science Foundation. Currently an endowment from Lockheed Martin Electronics, Inc., and a partnership between the University of Central Florida and five local school districts fund the program. The purpose of the Academy is to cultivate and support a qualified teacher workforce, which is a key to a nation's educational welfare. The Academy supports and promotes quality education (K-8) in mathematics, science, and technology, with an ultimate goal to increase the number of students prepared for high school mathematics and science coursework leading to careers in mathematics, science and/or technology

The Lockheed Martin/UCF Academy is a Master's degree program for K-8 teachers who have had a minimum of three years of teaching experience. Upon completion of the program of study, the teachers receive a Masters of Education (with emphasis in science, mathematics and technology). The cohort groups of approximately 25 K-8 teachers are admitted to the Academy each spring, and complete their study in 24 months. The project began in 1992, there are now 305 Scholar graduates, and there are currently 38 teachers enrolled in the Academy. Both long-term and short-term quantitative and qualitative studies are sketching a picture of the significant impacts of this project in the diverse and complex public education environment of Florida.

The common threads woven throughout the program include emphases on teacher leadership, inquiry, and content updates in mathematics, science, and technology. Overlaying these threads is the ongoing inquiry into practice action research project conducted by each program participant. Teacher research has a powerful potential for educational reform because it allows teachers to view their teaching as research (Russell and Munby, 1992; Schon, 1983, 1987; Van Manen, 1977), it encourages teachers to accept and implement others' research (Judd, in Grinder, 1981) and promotes a deeper understanding of practice and thus results in improvement (Carr and Kemmis, 1986; Elliott, 1976-77; Noffke, 1992). The Academy Scholars' inquiries assist them to learn from what fails as well as from what works and to realize their own control over their professional lives as they examine the effects of schooling on themselves and their students. As they produce knowledge they reconstruct their professional lives and re-vision their worlds of expertise and voice.

General Description of Course and Population

The course that is the focus of this paper is called "Inquiry in Mathematics and Science". While inquiry is suggested in national and state standards as a way to develop knowledge and understanding, in reality it is seldom observed in practice in classrooms. Teachers must be actively learning as they teach. Teachers must confront the dilemmas and create contexts so that teachers have the tools for self-renewal to make informed decisions about their actions in classrooms, and to be able to systematically address the preparation of students for the 21st century.

This course is designed to foster and enhance teacher development for K-8 teachers in mathematics, science, and technology. It is embedded within a Master's degree program specifically aimed at school/teacher reform. Our goal is to bring about fundamental transformations of teaching practice within classrooms rather than the traditional staff development 'innovations' that "... have become . . .modest additions to existing practices or have slipped away leaving few traces of their presence" (Cuban, 1992, p.228). Furthermore if we hope to develop students who are critical and creative thinkers and problem-solvers who know how to get things done and are committed to making a better world, teacher development must be aimed at helping them to develop confidence in their own knowledge and judgement while recognizing the benefits that are to be gained from collaborating with others. Educational change implies that we must change the conditions and experiences of teachers in teacher development efforts. This includes giving teachers opportunities to develop their own expertise in planning and enacting the curriculum through critical inquiry and collaboration.

The Master's level course follows two courses - Curriculum Reform in Mathematics and Science and Technology in Education. The Lockheed Martin Academy Scholars who participated in the course are K-8 teachers who are in the first year of the two-year program. They teach in schools that are representative of the diversity of the Central Florida area. The course if team-taught by a mathematics educator and a science educator, the authors' of this paper.

Theoretical Framework for Course

This course emphasizes the constructive nature of learning where theory emerges from practice and the social nature of learning. The research on Complex Instruction demonstrates a positive and critical link between verbal interaction and learning. Groups can trigger multiple ways of interacting, thinking, and finding solutions. Working in groups, the inquiry focuses on the teachers' questions about the complex and problematic world of classroom teaching, as well as experiencing the inquiry approach to learning about mathematics, science, and technology. Our goal is not only to enhance the teaching and learning of mathematics and science but to assist teachers to experience the use of technology to generate real data, to find patterns, and uncover relationships.

The theoretical underpinnings of this course are informed by Dewey's and Piaget's emphases on 'learning by doing', and the active, inquiring kind of education through which students construct meaning in successive phases and develop scientific habits of mind. Our work is also informed by the work of Donald Schon (1987) on reflective practice, and Carr and Kemmis' (1983) work focusing on the action component of the process of teacher development through self-initiated classroom inquiry. Additionally, we rely on Vygotsky's (1978) idea that the most effective learning is that which is in the learner's 'zone of proximal development' or the space between what the learner can manage alone and what he or she can achieve with help.

This course is built upon the cyclic inquiry model. This model provides a framework for teachers to understand the cyclic nature of inquiry, and the importance of the student's role in learning. The inquiry approach is not a specific method, but rather a way of thinking about learning.

Our goal is to design a course to provide experiences and understandings that promote effective, relevant, and content-rich science and mathematics education in the schools. Therefore, emphasis was placed on the processes of inquiry as well as on inquiry into the attitudes and practices that promote student-centered curricula oriented to the construction of knowledge rather than the memorizing of facts. The inquiry cycle was also utilized to inquire about individual classroom practice through action research.

Technology supports the processes of wondering, exploring, and discovering which are central to the inquiry process. The desire and drive to answer questions and to solve problems are characteristic of students who are successfully prepared to enter the workforce of the future. Although learning is a dynamic process, students and teachers are often not afforded opportunities to experience learning in this way. As a result, the vast majority of students and teachers often view mathematics and science as static--a great wealth of facts known only by a few.

Technology affords learning opportunities that situate students in a context where authentic inquiry, investigation, and data collection can take place to provide students and teachers with a more accurate view of the inquiry process. Providing teachers with these authentic experiences has been shown to result in changes in learning environments in their classrooms.

Role of Technology in Inquiry

In designing the curriculum for the course, it was important to keep in mind that the answers to the questions we posed were not the teaching objectives, the teaching objective was to internalize the inquiry process. What teachers did with the questions that were posed was more important than the results of their investigations. To this end, teachers were provided with several opportunities to be engaged in authentic, technology-based, inquiry experiences.

Calculator-based Data Collection Devices

One investigation was to determine the effect of the container on the rate at which boiling water cooled. Students had access to calculator –based data collection devices with probes to measure temperature and graphing calculators to display the data. Students collected several different containers including Styrofoam cups, glass cups, metal pots, and waxed paper cups (which melted and leaked!). Other students compared glass containers of different shapes and sizes. The students placed probes in the containers and poured boiling water into each. The graphs produced from each set of data were compared. The students did not need to interpret all parts of the graphs; they just needed to be sure that they were comparing graphs with the same scale. The technology allowed for the students to collect data with relative ease and to organize the data for comparison. This made the investigations more accessible to students with varying mathematical abilities.

The calculator –based data collection devices were also used to determine the effectiveness of different types of antacids on acid. The students selected several brands of antacids and dropped them into mixtures of water and lemon juice. The students were able to use pH probes to collect data on the speed with which the antacid neutralized the acid using a commercially available calculator program and then compare the graphs displayed on the graphing calculators.

Students used heart rate probes to investigate the effects of exercise on heart rate and motion detectors to look at the height to which different balls bounce. In both cases, the design of the experiment was the focus of the activity. What types of exercise were investigated? Who did the exercising? Did the students compare different people doing the same exercise or the same person exercising in different ways? Were balls with different material make-up compared or were balls of different sizes and/or weight but similar material make-up compared? Once the experiments were designed the students used the calculator-based data collection devices to collect the data and the calculator to display the data. Depending on the type of data that were collected, some students compared graphs and others compared values entered in tables on the graphing calculators.

The calculator-based data collection devices and the graphing calculators were made available to the students, the ways the students chose to use them and the data that were collected were part of the investigation and were left to the discretion of the students.

The World Wide Web

The World Wide Web contains a tremendous amount of data. The Web is a valuable resource for topics to investigate. The students surf the Web looking for questions to pose. This is not the same as searching the Web for specific information. The students pose questions based on the data they happen upon. The topics of questions that have been posed from Web-based investigations have been as diverse as the number of visits to the Ty Beanie Baby site to the density of people viewed from the live camera on the University of Southern California (USC) campus to weather patterns on the NOAA Web site.

For example, the recorded number of visits to the Ty Beanie Baby site changes extremely quickly. One student noticed that in one 15-minute interval, 1500 more visits were recorded. The types of questions posed after visiting this site included: Is there a consistent rate of change in the number of visits over time? What happens when several people visit the site simultaneously? Do more people visit the site on weekends or holidays? Does the company use this data as an indicator of consumers' interest in new releases of Beanie Babies? The investigations of these questions were accessible to the students in the graduate inquiry class as well as to the students' students in grades K-8. The graduate students were able to compare the types of questions that were posed in the graduate course to the types of questions that were posed in K-8 classrooms. This provided a means for students to take the inquiry approach directly back to their schools.

The Web can also be the source of information from which a question may be posed and then other technology can be used to explore the question. For instance, the Nabisco site had a food guide pyramid giving suggested servings for the food groups. Students checked to see if a pyramid would be the most appropriate visual for displaying this information. They sketched and partitioned various polygons using dynamic drawing software. They used the software to determine the area of each of the sections and compared them to the proportions of the serving sizes on the partitioned pyramid. The dynamic nature of the software allowed students to explore several options for visuals of this food guide.

Wendy's Restaurant Web site had a list of its international restaurant locations. Students investigated where on the globe they would be the furthest from a country with a Wendy's restaurant. Other students inquired whether the location would be in an ocean or on land and continued to investigate the question applying different constraints. This topic provided a nice connection to geography.

The live camera on the USC campus provided the basis for several different investigations. A new picture is taken of the same location on the USC campus every minute. Some students looked for trends in movement of people over time while other students looked at ways of measuring and describing the density of people seen in the live shots. While still other students looked at the groupings of the people and if the types of groupings were related to the time of day the picture was taken.

The dynamic nature of the Web makes it difficult to conduct the same investigation using the same data over time. Snapshots of rich sites can be taken so that the contents of the sites will continue to be available for future investigations. However, once the students become comfortable looking at Web sites as possible inquiry sites, they are able to find other sites to use with elementary or middle level students.

Conclusion

There are several important aspects of this course that are being shown to make a significant difference in teacher learning. First, the teachers are not learning just about using calculators and the Web, but rather they are 'learning by doing' and at the same time are being asked to implement their learning in their own classrooms. By embedding new learning into teaching practice and reflecting and dialoging about that learning collaboratively in a community of learners environment, these teachers are having the kinds of professional development experiences that are recommended by current research, and that is being shown to be effective by our own research. These are teachers that are teaching full time and the focus of the class is to translate their learning into their own classrooms, to reflect on what they learn on their experiences in our classroom, and to continue to make ongoing changes and improvements on what they do. In addition, these inquiry experiences are overlaid with their own action research projects based on inquiries into their own teaching practices. The technology-rich environment, which is an integral part of this graduate inquiry course, provides a setting in which teachers can participate in authentic inquiry, incorporate similar inquiry-based experiences in their teaching, and conduct their own research into the effectiveness of their teaching practices.

References

Carr, W. & Kemmis, S. (1986). *Becoming critical: Education, knowledge and action research.* Philadelphia, PA: Falmer.

Cuban, L. (1992). What happens to reforms that last? The case of the junior high school. *American Educational Research Journal*, 29 228.

Elliott, J. (1976-77). Developing hypotheses about classrooms from teachers' practical constructs: An account of the teaching project. *Interchange*, 7(2), 2-22.

Grinder, R. (1981). The "new" science of education: Educational psychology in search of a mission. In F. Farley & N. Gordon (Eds), *Psychology and education: The state of the union*. Berkeley, CA: McCutchan.

Noffke, S.E. (1992). The work and workplace of teachers in action research. *Teaching and Teacher Education,* 8(1), 15-29.

Russell, T., & Munby, H. (Eds.). (1992). *Teachers and teaching: From classroom to reflection*. London: Falmer.

Schon, D. (1983). *The reflective practitioner.* New York, NY: Basic Books.

Schon, D. (1987). *Educating the reflective practitioner*. San Francisco, CA: Jossey-Bass.

Van Manen, M. (1977). Linking ways of knowing with ways of being practical. *Curriculum Inquiry,* 6, 205-228.

Vygotsky, L.S. (1978) *Mind in society*. Cambridge, MA: Harvard University Press.

Audio on the Web:
Enhance On-line Instruction with Digital Audio

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Abstract: People only retain 20% of what they see and 30% of what they hear. But they remember 50% of what they see and hear, and as much as 80% of what they see, hear and do simultaneously (Computer Technology Research, 1993). Internet-based audio and video tools are now used by educators to support instructional, research and administrative activities. Incorporating Web-based multimedia elements such as video, animation and audio into the delivery of on-line course materials can enrich learning by facilitating and encouraging active student participation in the learning process. However, if not designed properly, the addition of audio and other multimedia elements will detract rather than enhance Web-based instruction.

The focus of this paper details the design techniques and strategies educators can employ to record digital audio and add audio clips to their instructional Web pages to enhance their on-line course materials.

Introduction

Adding audio and other multimedia elements such as animation and video to on-line course materials enriches the learning environment and ameliorates knowledge retention by involving students in the learning process. Adding interactive elements to on-line course materials can improve student motivation, promote active rather than passive student participation and increase learner control. Advocates of new multimedia and web-based technologies argue possible benefits of such technologies include increased intrinsic motivation, and the opportunity for students to learn in their own "style" and at their own "pace" (Weber et al. 1999). Effective design techniques and strategies should be employed to ensure digital audio elements enhance the delivery of on-line course materials. The foremost consideration of supplementing on-line course materials with digital audio is to fulfill the criteria of *adding value* to the content of the page. If the audio clip does not augment the content by some means, the audio file is burdening the Web page with additional bandwidth and should be excluded. Digital audio is successfully used to provide sample phonetic, language and music clips; explain examination questions and answers; provide instructions for assignments and supplementary messages to explain Web page content; and archive lecture notes.

Methods of Distributing Digital Audio

Audio files are distributed on the Internet by file downloading or by streaming audio. *File downloading* requires that the complete audio file is downloaded to the user's hard disk before playback can commence. Significant time delays void of user interaction are characteristic of the download method resulting in a potentially higher incidence of aborted user requests. *Streaming audio* differs from downloading in that small packets of the audio file are delivered over the connection with playback commencing as just enough information is received by the browser to keep the download slightly ahead of playback, rather than after the complete file is downloaded.

Audio Server Distribution

Two types of servers distribute audio files on the Internet, a standard HTTP Web server or a special purpose media server. The HTTP protocol enables audio and video content to be streamed from a World Wide Web server. Although a standard HTTP Web server is not as robust or efficient as using a streaming media server, it provides an adequate method for delivering small, short audio clips to a limited number of concurrent users. The preferred method of delivering audio content is to distribute audio files from a dedicated streaming media server. RealNetworks developed streaming media (audio and video) technology, introducing RealAudio in 1994 to address the inherent problems and inflexibility of distributing audio by HTTP Web servers:

1. The Transport Control Protocol (TCP) used by HTTP Web servers to distribute information to Web browsers in small units known as data packets, resends the packet if the server does not receive confirmation that the packet was received without error by the browser. Retransmission of even a small number of data packets significantly increases the download time of an audio file.

2. Web servers distributing audio files were unable to stream live audio broadcasts and did not support interactive user controls such as pause, rewind, or fast-forward through an audio file.

3. Web servers are limited to distributing audio files to a small number of concurrent users at a given time.

RealNetworks developed their own protocol, User Datagram Profile (UDP) and server software RealAudio, designed to address the limitations of distributing audio by HTTP Web servers. UDP resolved the problem of lengthy download times caused by ongoing packet retransmissions. The RealAudio protocol supports synchronous communication between the server and the browser, enabling the user to rewind or fast-forward playback of the audio clip. The RealAudio server was designed to deliver just enough information to keep the audio stream downloading with an additional amount as a buffer to compensate for delays resulting from network congestion. The ability to stream audio enables the server to distribute audio files to a greater number of concurrent users using less resources.

Streaming audio is either broadcast live or from a pre-recorded file. The RealNetworks dedicated media server, RealServer supports *SureStream* technology, the ability to detect and render the correctly *encoded* (converted and compressed) audio file based on the connection speed of the user. An audio file can be encoded for multiple connection speeds such 28K, 56K, or 112K, and the file distributed will depend on the available bandwidth based on the connection speed of the user. Although RealNetworks Server *(http://realnetworks.com/)* is probably the most popular dedicated media server, QuickTime by Apple *(http://www.apple.com/quicktime/)* and Windows Media Audio by Microsoft *(http://www.microsoft.com/windows/windowsmedia)* are other options for streaming audio over the Internet.

Considerations for Distributing Web-based Audio

Before adding audio to supplement on-line course materials, consider whether the sound elements support and enhance the content of the page. Audio requires additional bandwidth, hence it is critical to identify the types of connections of your target audience and design accordingly depending on the connection speed, file format, sound quality, compression scheme, and browser support required for the intended audience.

Connection Speed

The connection speed of your audience will ultimately define the quality, size and download time of the audio file created. *Bandwidth*, measured in Kilobits per second (Kbps), is the amount of data that can be sent through a network connection during a defined period of time. Connection speeds vary from slower speeds of 28.8 Kbps or less, 56 Kbps, to faster connections of 200 Kbps or greater. A compromise is necessary between reaching the largest target audience by creating a lesser quality audio file, or limiting the audience by creating a higher quality audio file. Audio files created for distribution on the Internet may require encoding to a lower sampling rate or bit depth to decrease sound quality and reduce file size and download time.

Digital Audio Formats

Historically, the file format chosen to distribute audio over the Internet depended on the computer platform generating the file. Apple developed *AIFF* for playback on Macintosh, NeXT Computer and Sun Microsystems jointly developed *AU* for UNIX, and Microsoft and IBM jointly developed *WAV* for Windows. There are a myriad of file formats used to distribute audio over the Internet such as MIDI, QuickTime, MPEG, and RealAudio as well as newer media formats such as RealMedia, Shockwave Audio, Flash, and Windows Media.

MIME Support

To play a digital audio file, the appropriate plug-in or helper application that can play the format of the audio file must be installed on the user's system. *Helper* and *plug-in* applications are external or internal applications to the browser that are executed as media elements are invoked from within the Web page. RealMedia, QuickTime, and Windows Media Player are three common applications that play audio files. The browser identifies the plug-in or helper application that can play the audio file based on the file extension such as AU, WAV, AIFF, RA, RM, QT, MOV, AVI, or MP3 by referring to the Multipurpose Internet Mail Extensions (MIME) configuration specified in the browser's preferences settings. The browser and the server must be configured to support the MIME type of the audio element.

Audio Compression

To create an audio file for distribution on the Internet, analog audio data is recorded into a digital format, typically in an uncompressed format such as WAV, AU or AIFF. Before converting to a compressed audio format, it is preferable to start with the best quality "master copy" obtainable in an uncompressed format and then encode the file as RealAudio or RealMedia, QuickTime, MP3 or other compressed format. An *audio codec* (COder/DECoder) is a software scheme that encodes analog audio data and converts it to a binary format for processing on a computer and then decodes the data for playback on analog devices such as speakers or headphones. A number of compression methods are available to encode an audio file into a smaller file format suitable for distribution on the Internet. *Lossy* is a commonly used compression scheme that discards the high and low ends of the audio source file at the expense of quality to achieve a highly reduced file size. RealAudio, MEG Layer III (MP3), QuickTime Qdesign 2, and MS Audio are three popular audio products that provide a number of compression codecs designed for a variety of applications and connection speeds.

Distributing Digital Audio

Distributing digital audio for distribution on the Internet is a four-step process: (1) digitize sound from the source, (2) optimize audio file, (3) encode audio file, (4) publish to Internet.

Digitize Sound from the Source

Sound is recorded from an analog source such as speaking into a microphone, input from a previously recorded cassette or reel-to-reel tape, or from a digital source such as CD, hard disk, or digital audio tape (DAT) using a sound editor. The digital file format generated is typically WAV, AIFF or AU. Record using a high quality sampling rate and bit depth such as CD quality, 44.1 kHz, 16 bit audio, and decrease to a lower level during the encoding step. *Keep a backup of all original high quality source recordings.*

Tips for Recording Audio

To obtain a better sounding audio file, use a good quality microphone and digital interface sound card to help minimize hiss and distortion. Record using a high quality sampling rate, such as CD quality, 44.1 kHz with 16 bit depth resolution and encode to the lowest quality sound needed in the Web page. If using pre-recorded audio files, use the best quality source file available. Experiment using different audio codecs and settings. Reducing the sampling rate is more effective than reducing bit depth to achieving smaller, good quality audio files for Internet distribution. Record in a quiet environment, minimizing room reverberations or reflections by choosing a smaller room, with carpet and soft furniture.

If recording a single sound source such as spoken voice, keep the microphone close to the source and away from the sound of the computer fan. Avoid holding the microphone with your hand. Record speech in mono, and set the balance for all inputs to the center to prevent losing the right input channel frequently discarded by some sound cards when recording in mono mode. Use a pop screen to reduce plosive "P"s and "S"s. Decrease distortion by setting input levels to as close as possible to 0 dB without exceeding 0 dB during the loudest section of the file.

Avoid damaging the computer speakers during playback by setting the volume of the input device (tape recorder, CD player, etc.) to a low level and slowly increase the volume. Set the volume to the half way mark and then change the volume using the device's volume control. If sound cannot be heard, check the operating system recording and playback levels and ensure the *mute* box is not marked for the master volume, line in, line out, microphone, CD and any other connections for the sound card.

Optimize Audio File

The audio file should be edited to improve the quality of the sound file. Empty space at the beginning or end of the file should be deleted to eliminate long pauses. *Normalization* balances the sound wave by maximizing the input level of the loudest peak of the file after recording and should be used if the sound level is too low. Normalize the audio file to –0.5 dB. *Equalization* (EQ) adjusts the high and low tones in the audio file so that bass and treble can be made less or more pronounced.

Encode Audio File

Due to the tremendous size of the sound file generated from recording at a higher quality level, the digital source file must be encoded to compress the file into the appropriate sampling rate and bit depth required to distribute audio over the Internet. The size of the audio file is significantly affected by the sampling rate, bit depth, and the number of channels (mono or stereo). The *sampling rate* is the number of samples or snapshots of sound taken per second. For example, the sampling rate for CD quality audio is 44,100 samples per second. *Bit depth* defines the dynamic resolution of the audio. The greater the number of bits that are used to represent the sampled value, the more accurate the sample will be with respect to the original analog sound wave. Decreasing bit depth to 8 kHz increases distortion and hiss, especially at higher sampling rates. Stereo requires two channels, doubling the file size required for recording in mono. The determining factor regarding the selection of these variables is based upon balancing the sound quality and storage requirement. File size can be decreased most effectively without compromising sound quality by reducing the sampling rate and using one mono channel. The disk space required for one minute of sound varies significantly from 10.5 MB for 16 bit, 2 channel (stereo) CD quality audio to .6 MB for 8 bit, 1 channel (mono) telephone quality audio (Tab. 1).

Sample Rate	Bit Depth	Channels	Disk Space for One minute of Audio
44.1 kHz	16	stereo	10.5 MB
44.1 kHz	16	mono	5.2 MB
44.1 kHz	8	stereo	5.2 MB
44.1 kHz	8	mono	2.6 MB
22.05 kHz	16	stereo	5.2 MB
22.05 kHz	16	mono	2.6 MB
22.05 kHz	8	stereo	2.6 MB
22.05 kHz	8	mono	1.3 MB
11.025 kHz	16	stereo	2.6 MB
11.025 kHz	16	mono	1.3 MB
11.025 kHz	8	stereo	1.3 MB
11.025 kHz	8	mono	.6 MB

Table 1: Storage Requirements for One Minute of Audio

An encoding tool such as *RealProducer* (*http://www.realnetworks.com/developers/index.html*) is used to select a codec based on the bandwidth target (connection speed) and the audio content (music or voice) to compress the original sound file and create a new audio file. If you need a large dynamic range of sound, use 16 bit resolution. If all sounds are about the same volume, 8 bit may be suitable. Full-bodied vocal requires 16 bit resolution. RealNetworks' RealAudio consistently rates highly at generating the best quality speech and music audio clips at various sampling rates (Tab. 2).

	Speech (28Kbps)		Rock Music		Classical Music		Electronic Music	
	Female	Male	28 Kbps	56 Kbps	28 Kbps	56 Kbps	28 Kbps	56 Kbps
a2b	Poor	Fair	Fair	Fair	Poor	Fair	Poor	Poor
Liquid Audio	Fair	Fair	Good	Good	Fair	Excellent	Fair	Good
MP3	Good	Excellent	Poor	Poor	Poor	Poor	Fair	Fair
MS Audio	Excellent	Good	Good	Excellent	Fair	Excellent	Fair	Good
QuickTime	Fair	Fair	Good	Excellent	Good	Good	Fair	Excellent
RealAudio	Excellent	Excellent	Good	Excellent	Good	Excellent	Good	Good

Table 2: Streaming Audio (PC Magazine, 1999)

Publish to the Internet

Audio files are distributed over the Internet by *file downloading* or by *streaming audio*. Irrespective of the method chosen to incorporate an audio file for playback within a Web page, the user's system must have the appropriate plug-in application installed that can play the audio file format, and the server and browser must be configured to support the MIME type of the audio element. Assist users by including a link in your Web page to the vendor Web site where the player can be downloaded.

File Download

The simplest method of adding an audio file to a Web page is to create a link to an audio file. When the user clicks the link, the audio file is downloaded and the player configured to play the file type begins playback once the complete audio file is downloaded.

```
<A HREF="audioclips/filename.ext">Listen to Narrative Audio Clip</A>
```

Streaming Audio

An audio file can be streamed from an HTTP Web server. Within the Web page, a link is established to a text-based metafile with a *RAM* file extension containing the URL of the file. The user clicks on the link in the Web page and the browser downloads the RAM metafile, launches the player and starts streaming the audio file.

Link in Web page: `<A HREF="audioclips/audioclip.ram">Listen to Narrative Audio</A>`
RAM file contents: `HTTP://web.uvic.ca/~bgerth/audioclips/audioclip.rm`

Embedding the Player

A variation on streaming audio is to embed the player into the Web page rather than launching and opening a separate window for the player. The link in the Web page is established with the *embed* command. The *noembed* and *href* tag provide the alternate method for downloading the audio file if the browser does not support the embed tag. The *type* attribute specifies the type of plug-in player to embed in the page.

```
<EMBED SRC="audioclips/audioclip.rpm" type="audio/x-pn-realaudio-plugin"
CONSOLE="Clip1" controls="All" height=125 width=275 AUTOSTART=false
loop=false></EMBED>
<NOEMBED><A HREF="audioclips/audioclip.rm">Listen to Narrative Audio
Clip</A></NOEMBED>
```

The metafile is named with the file extension of *RPM* and contains the URL of the audio file:
`http://web.uvic.ca/~bgerth/audioclips/audioclip.rm`

Background Sound

Setting *autostart* to *true* forces the audio file to begin playing automatically when the page loads and setting *loop* to *true* forces the audio clip to repeat until terminated by the user (not recommended), or *loop* to *X* where *X* represents the integer specifying the number of times to repeat the audio clip.

Copyright Issues

Many Web pages provide sound clips that can be downloaded for use on a Web page, often illegally. Before downloading a sound clip to distribute on your Web page, ensure you are not contravening copyright laws by obtaining permission to use the audio file by the copyright owner. Otherwise, create your own audio clip, find a site that offers free sound clips and has the right to offer them, or obtain permission to use the audio file.

A simple method of protecting your own works is to indicate the intent to copyright by attaching a copyright symbol, the date, your name, and the term *All Rights Reserved* by the link within the Web page to load the file. Audio editing programs such as RealProducer enable the copyright information to be embedded within the audio file and the copyright information is displayed by the media player during playback.

Conclusions

This paper has explored some of the design techniques and strategies for incorporating digital audio into the delivery of on-line course materials. Factors such as the connection speed, the type of fidelity, the file format and the use of compression significantly affect the successful implementation of digital audio on the Internet. Digital audio when carefully prepared and judiciously added, will enrich learning and enhance the delivery of Web-based instruction.

References

Hecht, J.B. (1999). Bleeding on the Edge II: Instructing with Live Audio, Video, and Text over the Internet. *World Conference on the WWW and Internet*, 1999, Association for the Advancement of Computing in Education, Charlottesville, VA. 1290-1291.

Ho, T.I. (1999). Experiences with Real-Time Streaming Audio/video in Delivering Web-based Courses. *World Conference on the WWW and Internet*, 1999, Association for the Advancement of Computing in Education, Charlottesville, VA. 1296-1297.

Krauss, D., Steffanos, G., & Steffanos, M. (1998). *Streaming Audio*. [WWW Document], http://www.skwc.com/WebClass/Task-Sound5.html.

Mudge, S.M. (1999). Deliver Multimedia Teaching Modules via the Internet. *Journal of the Staff and Educational Development Association*, 36 (1), 11-16.

PC Magazine. (1999). *Streaming Audio*. [WWW Document], http://www.zdnet.com/products/stories/reviews/0,4161,2313783,00.html.

RealNetworks, Inc. (1998). *RealProducer User's Guide Version G2*. [WWW Document], http://docs.real.com/docs/produceruserguideg2.pdf.

RealNetworks, Inc. (1998). *RealSystem G2 Production Guide*. [WWW Document], http://docs.real.com/docs/smil/prodguideg2_7.pdf.

Weber, R.K., Schoon, P., & Gonzalez, A.R. (1999). Designing Multimedia and Web-based Units for Technology Integration: Motivation and Student Learning Styles. *World Conference on the WWW and Internet*, 1999, Association for the Advancement of Computing in Education, Charlottesville, VA. 1133-1137.

The Role of Assessment in Online Instruction

Panelists: Robert J. Hall, Texas A&M Univ., USA; G. Donald Allen, Texas A&M Univ., USA; Michael S. Pilant, Texas A&M Univ., USA; R. Arlen Strader, Texas A&M Univ., USA

Abstract: The topic for this panel discussion is how assessment can be used to inform instruction in an asynchronous environment. We will explore how technology can add to our understanding of human learning and performance and how carefully designed web-based supplemental study-aids can impact the relationship between confidence and "classroom" performance as measured by course exams. In that regard, we are interested in questions such as "How will performance and confidence metrics for a web-based course be assessed?" and "How can we determine the rate at which learning is taking place?" It is clear that some kind of assessment strategy is necessary in order to deliver material in the right sequence and at an appropriate rate. In this roundtable discussion, we will focus on four issues:

1) Assessment strategies.
2) Assessment of behavioral variables such as confidence, and motivation.
3) Cognitive foundations of assessment.
4) Practical aspects of implementing assessment strategies.

TRES FACIUNT COLLEGIUM – Paderborn's Collaboration Centred Approach for New Forms of Learning

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Abstract: This paper defines several key requirements for successful cooperative learning, which we have elaborated during the last years with goal to set up new forms of cooperative learning. Without bringing them into a special order, these main design criteria are the integration of synchronous and asynchronous forms of cooperation and the persistence of a learning process, the formation of a common group context or common information room, roles and access rights, annotations and structured chat as well as rooms as places for collaboration.

Key requirements for successful computer supported learning

"My claim is simple: in order to make truly effective groupware, we will need new eyeglasses and methodologies for probing how and why collaborative tools work. Why? After all, isn't our natural tendency to collaborate rather than to work in isolation? Probably yes, but often the more natural something is, the more subtle or unnoticed the mechanisms are which make it fantastic."[1]

Since the beginning of the nineties, in Paderborn, we studied new concepts and solutions to enhance cooperative and active forms of human learning. Spanning from the design of so called learning supportive infrastructures which even includes the set up of learning theatres up to new understandings of human learning the bandwidth of our activities tries to bring new media and cooperative forms of learning into a form of every day viability. Therefore our goal is to develop tools and solutions not only to justify our concept and research goal, but to change our way of learning and teaching with lasting results.

For four years now, the development of our sTeam–"structuring information in a team" approach is in progress.[2] Our idea is to set up an open source project for a framework covering various tools and applications in the field of computer supported cooperative learning. To do so, it is of main importance to develop very detailed concepts and architectures and to get a clear understanding of the functionality and metaphors which might be applied to human forms of cooperative learning. With the aim of achieving a firm understanding of the odds and ends and limitations of computer support in group work, we continuously evaluated and adapted existing solutions out of the field of computer supported cooperative work systems for our particular needs.

Hundreds of software solutions have been developed in the last decades to enhance cooperative work and cooperative learning (for a early overview see (Mandviwalla & Olfman 1994)) but only a few have left the design labs for larger practical use. May be Greenberg is right, stating that the reason might be the concentration of the developers on technical more than on human factors when shaping such systems. "*In summary, groupware for real time collaboration requires careful attention to both technical and human factors. The human factors should drive the design, for there are many requirements and nuances that determine whether a system will support collaboration effectively.*"[3]

The following article outlines several main criteria and design goals for our system which might hopefully serve as key requirements for successful computer supported learning and computer mediated communication. Other surely important criteria apply, such as the flexible support of attributes and various document formats, the allowance of user definable server objects and the overall extensibility and scalability of the server. These requirements will not be further discussed in the course of this article.

Here, we will mainly enlighten our theoretical concepts and design goals and not the selected technical architecture or its implementation. First prototypes exist now for three years and have constantly been redesigned. Currently we are in process of doing a complete technological redesign which facilitates the transformation of the whole project into an open source approach. The upper mentioned proceeding provides us with the time and the

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[1] stated by J.S.Brown at the panel titled "breakthroughs for user acceptance", 1988, see Greif, I., Brown, J.S., Dyson, E., Kapor M., Malone, T. (1988). Computer-supported cooperative work: breakthroughs for user acceptance, *Conference proceedings on Human factors in computing systems*, May 15 - 19, 1988, Washington, USA.

[2] see Hampel, Th. & Selke, H. (1999). Customizing the Web – Two Tools for individual and collaborative use of hypermedia course material, Collis, B., Oliver, R.: *Proceedings of ED-MEDIA 99*. Charlottesville (Va.): Association for the Advancement of Computing in Education, 634–639.

[3] see Greenberg, S. (in press). Real Time Distributed Collaboration. In Partha Dasgupta and Joseph E. Urban (Eds.) *Encyclopedia of Distributed Computing*, Kluwer Academic Publishers.

chance to revise and enhance our fundamental conceptual ideas. The following main requirements reflect this process.

Integration of synchronous and asynchronous forms of cooperation – persistence of the learning process

When trying to categorize different computer supported cooperative work environments it is quite important to look both at technical features and at the even more important underlying concepts and metaphors for cooperative learning and working. During the process of the "proofing the concept" of our prototypes for the sTeam approach, we found ourselves confronted with a series of topics which serve as essential pre-conditions for later design of a successful co-operative learning environment.

Learning at university takes place at different locations such as lecture halls, tutorials, the library, at the students' home, but as well in different learning situations, such as face-to-face meetings or synchronous virtual meetings and of course in asynchronous forms of cooperation. To be successful, tools have to support these different ways of working in groups, we call this a mixture between asynchronous and synchronous forms of cooperation. Another elementary factor for the integration of synchronous and asynchronous forms of communication is the persistency of artefacts, such as all forms of electronic documents and objects, during the process of cooperation. Meaning the environment has to provide persistency for all objects created by learners. Thus, as a basis for cognitive learning the learner must be enabled to create, rearrange, structure and transport learning objects. The abilities provided are called the basics functions of media, the media functions. [4]

Closely related to the media functions and an important aspect for a successful working with different media is the reduction of so called discontinuities in the use of electronic media. Discontinuities appear each time a learner has to switch to a different media while transporting information, e.g. they have to make personal (paper based) notes on an electronic presentation held by the lecturer. These discontinuities in the application of media naturally put an end to any consequent use of computer mediated learning supportive infrastructures. Therefore it seems to be fundamental when shaping infrastructures for cooperative structuring and building of knowledge to adapt learning supportive infrastructure to the behaviour of the learner and not the other way around.

A common information room and group context

When discussing basic concepts of cooperative learning it seems to be essential, that learners form a common information room for the group. Ellis defines this common information space as the common group context (Ellis et al. 1991)[5]. Most systems interpret the common group context as a space, a room. The definition of the metaphor room ranges from a room being a space to arrange documents over a social space for group interactions up to a virtual counterpart of the real world. The latter finds its expression in the so called CVEs (Collaborative Virtual Environments), such as the avatar worlds of DIVE or MASSIVE. [6]. One good example for the idea of mapping natural understandings of our world into behaviours and laws of the virtual world is the structuring of conversations in MASSIVE, where "nimbus" and "focus" of an Avatar defines the range an direction (audience) of its chat[7]. Thus people grouped in geographical proximity form a local chat group. This spatial understanding of a virtual room partly allows learners to interact with objects like they do in the real world—closeness defines semantic relationships between objects, avatars must be in reach of objects when interacting with them. Awareness in all forms–from simple information about people joining a chat session up to complex Avatars (which sometimes have graphical representations) of virtual worlds plays an important role in forming a feeling of being part of a social environment.

Another phenomenon takes place when people interact in rooms, which Bly, Harrison and Irwin [8] experienced in their MediaSpace System. People develop a common feeling of being at home—a space develops into a place —people behave in the social and cultural pattern of the real world. Out of the same reasons players of most MUDs and MOOs develop a feeling of being a virtual community – they develop laws, netiquette and social forms of interaction for their world!

For the further exploration of the concept of learning supportive shared media spaces we set up a few prototypes providing virtual rooms. (Technically speaking we connected document management functionality and a highly

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[4] For a short description of our concept of media functions see: Hampel, T. (2000). Scenarios of a New Dimension of Learning by the Co-operative Structuring of Knowledge, *Proceedings of the World Conference on Educational Multimedia, Hypermedia & Telecommunications*, Bourdeau, J., Heller, R. (Eds.), Montreal, Canada, June 26-July 1, 2000.

[5] *"Many task require an even finer granularity of sharing. What is needed is needed are shared environments, that unobtrusively offer up-to-date group context and explicit notification of each user's actions when appropriate."*

[6] For an overview on CVEs see e.g. Benford, S., Brown, C., Reynard, G., Greenhalgh C. (1996). Shared spaces: transportation, artificiality, and spatiality. *Proceedings of the ACM 1996 conference on Computer supported cooperative work*, November 16 - 20, 1996, Boston USA , 77-86.

[7] see Greenhalgh, C., Benford, S. (1995). MASSIVE: A Collaborative Virtual Environment for Teleconferencing, *ACM Transactions on Computer-Human Interaction*, Vol. 2, No. 3, September 1995, 239-261.

[8] for the notation of *media spaces* see e.g. Bly, S., Harrison, S., Irwin, S. (1993). Media Spaces: Bringing People Together in a Video, Audio and Computing Environment, *Communications of the ACM*, 36(1), January, 1993.

event-oriented communication server.) These rooms are both private working spaces for learners and public group work environments. Learners may easily create personal rooms and rooms are administrated by cooperating learners themselves. We call this idea the concept of self-administration. Our first experiences show, that through the metaphor of rooms learners develop a quite accepted and natural understanding for document- and learning spaces. Semantic relations to other rooms are expressed through doors and exits provide a real world understanding of the structure of the virtual. This does not mean that a door must be represented by an icon of a door or even has to be in three dimensional or virtual reality, just the expression "door to library" forms a correct understanding of the plan of entering a door, leaving the room and the need to have appropriate access rights to do so.

Roles and access rights

Another crucial characteristic for flexible forms of learning in session based environments are social roles. In nearly every of today's learning situations social roles are an central form of structuring the learning process. Let's imagine a typical tutorial situation, where a student presents some findings of a small group and therefore enters the role of a moderator. The moderator structures the flow of the communication, as he/she allows parts of the group to interfere or to suggest different topics to discuss. A moderator may also record or make notes of important contributions for the target discussion. Classical policy systems and access control lists normally comprise only a static definition of access rights and therefore support only static roles in group work. But it is a quite natural process of every face-to-face or virtual meeting situation that flexible changes of roles take place. So systems have to support an easy mechanism for the change of roles during an cooperative learning and working process. (See the concept of dynamic roles in (Edwards 1996)). Our prototypes accomplish this by a very flexible set of access rights which can be specified for every object (e.g. room or document) and can be inherited by parent objects or an master object within the room, or the room itself. Flexible temporal relations between learners and appertaining groups allow the adaptation to different learning situations and open forms of cooperation. A significant factor for people learning in such groups is that the participants in a discussions are aware of the persons joining the discussion and are also aware of the roles the different persons inhabit. For an computer mediated communication it seems essential to support such flexible forms of roles and access rights for documents and learning objects. Our approach of cooperative learning which aims to support face-to-face and all forms of tele-learning situations allows flexible roles through four key requirements: Firstly the easy attachment of person to roles, which is another form of self-administration as a room administrator gives other learners or colleagues temporally access to learning objects. Secondly, the flexible visualization of the roles a person inhabits at a certain time–which may be one form of awareness. And finally the free change of roles and therefore the flexible modification of access rights to documents and learning objects.

Annotations and structured chat

Another idea which smoothly fits into the concept of flexible roles is the flexible usage of annotations and a new form of chat that we call structured chat.

From the very beginning of hypertext and hypermedia systems[9] annotations played an important role in the research on cooperative group work. The simple concept of allowing learners to add personal notes to documents is a crucial pre-condition for the personal structuring of knowledge. Many closed hypertext systems supported various forms of annotations, including access rights on annotations and the differentiation between personal and annotations of the group. Surprisingly not one of the systems developed to be a common success and today's world wide web provides only browser bookmarks as marginal way to personally structure the web.

Our understanding annotations is two-dimensional: The ability to add personal or public information to internal and external resources and the ability to connect communication mechanisms and various media.

The first demand includes the challenging problem of allowing external annotations on every material found on the web. Closed hypertext systems usually provide for several forms of annotations, but the claim to do this also for every media on the web is hard to solve, because of the lack of WWW technology which is not prepared for any annotation mechanism.

Existing solutions use some sort of special annotation server which stores user annotations on web pages in a database modifying the pages on the fly while browsed by the user. (This is necessary out of several reasons, e.g. normal web users are not allowed to modify extraneous web servers.) Existing systems such as CritLink[10] are to be distinguished from our approach. Their software mediator implements the idea of web annotations for everyone but is not part of any cooperative work or learning environment. Out of this reason annotations are sepa-

[9] A Conceptual Framework for the Augmentation of Man's Intellect, Douglas C. Engelbart, Vistas in Information Handling, Howerton and Weeks [Editors], Spartan Books, Washington, D. C., 1963, pp. 1-29, Republished in Computer Supported Cooperative Work: A Book of Readings, Irene Greif [Editor], Morgan Kaufmann Publishers, Inc., San Mateo, CA, 1988, pp. 35-65. Also republished in Organization and Groupware, T. Nishigaki [Ed.], NTT Publishing, 1992.

[10] see the CritSuite website at http://crit.org. Refer this site also for links to other approaches such as Xanadu, CoNote, ComMentor.

rated from any learning scenario in which learners integrate personal learning materials with external web resources. Our demand goes far beyond this approaches: Annotations should be attachable to every page on the web (only a few restrictions apply e.g. when the pages are dynamically created) and annotations are part of the learners' cooperative learning environment. For a period of two years we worked on solutions to implement systems which allow a free combination of internal and external annotations. Our latest prototype allows the learners to annotate most documents of the web. These annotations are integrated in our sTeam system for cooperative learning and are handled as "normal" steam objects. Therefore access rights, all sorts of properties[11] and functionalities to rearrange objects within the learners context may be applied. Parallely, we developed a small prototype which explored concepts of connecting annotations and structured discussions—we call this concept structured chat.

Structured chat—bringing chat into context

The concept of structured chat aims at a the scenario of small groups of learners discussing and working with learning materials. This may take place in a virtual meeting, but also as part of an face-to-face situation during tutorials or lectures. Looking at such a scenario typically several discussion topics appear in parallel during a conversation. Sometimes smaller groups of learners work on a different topic than the rest of the group. Often, chat-statements refer to a much earlier contribution of another learner. In productive sessions, chat contributions refer directly to objects in the context of the group, e.g. documents or web pages. Our experiences show that out of this reasons a classical chat does not work properly. Another reason is, that in traditional chat communication every chat line must follow the earlier statement of another learner.

The concept of structured chat is a combination of classical synchronous chat and a tree widget. Here chat lines may be attached to every object within the learning environment. Every object in the learners context is represented by a branch in the structured chat. In a special area below the tree section learners may enter contributions to previously selected topics of the chat. Simultaneously, chat annotations may be attached to every object and appear in the tree at the section of the corresponding item. In this way each branch of the tree represents related objects and corresponding chat entries and annotations. It generates a persistent collection of related contributions which may be also used by learners who are not engaged in the entire discussion as a repository for questions and answers. If learning objects are grouped or linked (a simple relation may be defined by dragging one object very close beside another one) these objects are arranged on one level within the structured chat. Accordingly documents representing a common learning subject (e.g. documents and web pages describing a criteria of software design) are grouped in spatial proximity, which complements our human capacity for manipulating spatial memories.

Our initial goal regarding the concept of combining chat and annotations is two dimensional: On one hand chat conversation somehow develops the structural quality of an annotation and on the other hand annotations simultaneously inherit the flexibility of an chat. Important for the idea is, that the creation of objects in a room (comparable to an cooperative whiteboard) automatically generates a new subject within the structured chat. This entry may later be deleted, but learners are directly able to contribute to each others actions. (A concept which may also be described as a new form of workspace awareness.) Actions of learners create anchors for the annotation of relevant contributions of other learners. Analogous chat lines within the tree are visualized as annotations on the corresponding objects (may be viewed by the learners by pressing the right mouse button, or used as a tool tip by placing the cursor over the object for a while). In further developments different forms of chat persistency may be implemented. May be it would be a good strategy just to store annotations directly made on objects on the cooperative workspace and not to record every chat statement. It could be also necessary to provide a very informal not persistent chat as a second instrument for learners to communicate.

In addition, we experimented with different design solutions for the visualization of the learners' awareness of each other and their actions. In cooperation with the project group for media design at the University of Münster, we developed a form of awareness visualization which is specially shaped for rather small groups of learners. Here, in a kind of circle, members of a chat are visualized as small coloured dots. The names (or nicknames) of the group members are shown right beside these dots. To illustrate the group activity the distance between the centre of the circle and a learners dot is proportional to their chat activity (e.g. chat statements per ten minutes). With the help of this simple approach we become aware of members actively working on a special subject and it seems easier to contact them or to integrate less involved learners into the conversation. One example for the importance of such information awareness might be that the silence of an online interlocutor may be interpreted as him/her not attending the monitor. A similar "Babble" approach by Erickson (see Erickson et. al. 1999) calls this

[11] sTeam supports an approach of user-definable attributes of learning objects, compare Dourish, P.W. Edwards, W.K., LaMarca, A. Lamping, J. Petersen, K. Salisbury, M., Terry D. B., Thornton J.: Extending Document Management Systems with User-Specific Active Properties, *ACM Transactions on Information Systems*. 18, 2 (Apr. 2000), 140-170.

graphical representation of users and their activities a "social proxy". Their system integrates elements of bulletin board systems and chat. A topics list provides an overview about the ongoing conversation, and a social proxy creates a view on human activity on different channels. The research prototype from Rodenstein and Donath (see Rodenstein & Donath 2000) takes the same direction: A representation of coloured circles in a two-dimensional space provides awareness of users' actions over various audio-channels.

Rooms - Private and public boundaries – modes of cooperation – access rights and self-administration

Another crucial design issue when discussing the design of a computer supported cooperative learning space is the interrelations between personal and group/public workspace. Working with documents means to arrange them. This well known personal process of structuring the document world around us is one of the main forms of building personal cognitive structures and relations between things—just remember the typical "chaotic" forms of working which means arranging documents on everybody's personal desktop at home or office. (Büscher et al. 2000) describes this process quite well: *"We found that manipulating the presence and absence of materials, bringing them into dynamic spatial relations, and referring between them, are not just context or perquisite for doing the work; rather, they are an integral part of accomplishing the work itself."* When transporting this form of individual work into the scenario of group learning our findings of setting up learning supportive infrastructures show that both different modes of cooperation and different boundaries of a working space are necessary to be designed.

Haake and Wilson distinguished three main modes of cooperation: *individual mode, loosely coupled mode* and *tightly coupled mode.* These forms of cooperation were first explored and defined by (Haake & Wilson 1992) working on a collaborative writing tool and we adapted them for the scenario of cooperative learning. The notation of a loosely coupled mode may be described as a form of cooperative working and learning where learners access a common document space, but an appropriate locking of the learning objects takes place when a person makes modifications. This implies that the environment has to provide a form of activity or workspace awareness to recognize the actions of other learners. Tightly coupled modes of cooperation are characterized by their all synchronous, active forms of cooperative learning. Our approach prefers a mixture of individual mode and loosely coupled modes of interaction. In our first prototype individual working and learning is supported through personal workspaces which allow to structure and arrange documents individually. These personal workspaces may be expressed through the metaphor of a learner's private room or in form of a personal workspace beside the group workspace/room.

The public or group workspace adopts the concept of the relaxed "What You See Is What I See (WYSIWIS)" (Stefik et al. 1983) version. Learners do not share a strict meaning an identical view on artefacts and actions of other learners, but a individually generated, relaxed perspective. Note that the separation between individual and group workspace does not intend restriction on interactions between these two spaces. Learners should be able to freely transport objects from their personal working space to group working spaces and vice versa. Therefore a tight coupling between these two spaces is initiated. Taking a more detailed look at the concept of rooms, the metaphor room concerning our approach serves many different functions. First, as mentioned before, it is a natural metaphor for the arrangement and storage of learning artefacts. A room is therefore a space to store, arrange and transport artefacts. Thus rooms define boundaries for the accessibility of the cooperative learning artefacts. Normally access rights for learning objects are derived from the accompanied access rights of the room. A simple metaphor could be a closed room door excluding people who do not belong to a particular group of learners. Secondly also the spatial layout of a room works as a natural boundary for social interactions.

This quality of virtual rooms was shown the first time by various studies about the social interactions in MUDs and MOOs (Becker & Mark 1998). People develop a feeling of being at "their place" within the MUD and thus develop complex rules for social interactions (e.g. netiquette) in the virtual world. Consequently, our prototypes limit a chat to the participants which are virtually present in one room and is even more structured through its content (learning artefacts) regarding our concept of structured chat. As a result, rooms define areas which support different social groupings and simultaneously are boundaries for co-presence of other learners. Thirdly, in comparison to the real physical world, a room can unite both functionality and tools. In such a grouping functionality stands for different activities the room is place and stage for. A room may be described as a discussion or brainstorming room, holding special tools to record a conversation or graphical whiteboard systems to support a creative design process. Other rooms may contain tools for cooperative browsing and for the search of electronic libraries and may therefore be called a library. And last but not least a room could function as a lecture room sharing cooperative presentation- and protocol tools for the learners.

Indeed connections between rooms (called exits in our approach) allow to built semantic structures of rooms. Analogous they represent the social structure of the learning community and should be arranged in a layout reflecting courses and groups of learners.

In summary, one can say, rooms containing tools and persistent learning artefacts may be one of the key concepts for successful cooperative learning processes. Combining our interpretation of necessary access rights and social roles, we came to the logical conclusion of self-administration of these learning rooms. We developed a system of access rights which explicitly defines rights to give away/handle over rights to other learners within the system.

Starting at the point a new learner wants to join a learning group up to the specific adapting of a social role in a discussion process self-administration means that administration is a distributed and constantly applied process of changing access rights and group memberships.

The quality "distributed" serves our demand for social places and boundaries for documents that are administrated completely by the group itself. (This does not imply that there must not be a person in the group holding the predicate of the room administrator, which e.g. could be a tutor or lecturer. However, administration is a distributed process over several persons and groups of learners.)

Conclusions

Research on computer supported co-operation in learning processes is now conducted for more than twenty years. Unfortunately, only a few applications out of the field of computer supported cooperative work made their way into our offices. Today at the universities and schools only common standard web-technology is used to place learning materials (courseware) onto web servers—a one way road of co-operation which leads to isolation. Some people think this isolated learning situation could be eased just by providing bulletin board systems and e-mail to guide a learning process and establish successful connections between learners and teachers. This may be right to a certain degree, but lacks persistency, as long term learning processes as well as the every day viability of the learning materials is not guaranteed. In this article we have intended to elaborate why this deficit can only be solved by the combination of various key concepts, such as the metaphor of places and rooms, awareness components, the integration of synchronous and asynchronous forms of cooperation and communication, and new methods of structuring and through the annotation of learning materials. Therefore the selected infrastructures aim at both situations of cooperation and learning—the support of unanticipated group activities and all the forms of long-term participation.

The system which is currently under development does not claim to solve all existing deficits—it is rather an "open" approach regarding both the concepts and the implementation (source) allowing people to easily join our initiative. We, the developers, will hopefully benefit from the prolific and creative process of the co-operative improvement of concepts and applications.

References:

Becker, B. Mark, G., (1998). Social Conventions in Collaborative Virtual Environments, In: Snowdon, D., Churchill, E., *Proceedings on Collaborative Virtual Environments*, CVE`98, June, 17.-19., Manchester, U.K. 47-55.

Büscher, M., Christensen, M., Grøbæck, K. Krogh, P, Mogensen, P., Shapiro, D., Ørbæck, P. (2000). Collaborative Augmented Reality Environments: Integrating VR, Working Materials, and Distributed Work Spaces, In: Churchill, E., Reddy, M. (Eds.), *Proceedings of the ACM conference on Collaborative Virtual Environments*, San Francisco, CA, USA, September, 10.-12., 2000, 47-56.

Edwards, W.K., (1996). Policies and Roles in Collaborative Applications, In: Ackerman, M.S. (Ed.), *Proceedings of the Conference on Computer Supported Cooperative Work*, November 16.-20., Boston, Massachusetts, USA, 11-20.

Ellis, C.A., Gibbs, S.J. Rein G. (1991). Groupware: some issues and experiences, *Communications of the ACM*, Volume 34, Issue 1 (1991), 39-58.

Erickson, T., Smith, D.N., Kellogg, W.A., Laff, M., Richards, J.T., Bradner, E. (1999). Socially Translucent Systems: Social Proxies, Persistent Conversation, and the Design of "Babble", In: Williams, M.G., Altom, M.W., Ehrlich, K., Newman, W. (Eds.), *Proceedings of the Conference on Human Factors in Computer Systems*, CHI99, Pittsburgh, PA, USA, 72-79.

Haake, J.M. & Wilson, B. (1992). Supporting Collaborative Writing of Hyperdocuments in SEPIA, Turner, J., Kraut, R. (Eds.), *Proceedings of the ACM Conference on Computer Supported Cooperative Work*, October, 31. to November, 4., 1992, Toronto, Canada.

Mandviwalla, M. & Olfman, L. (1994). What do groups need? A proposed set of generic groupware requirements, *ACM Transactions on Computer-Human Interaction*, Volume 1 , Issue 3 (1994), 245-268.

MITRE (2000) The open source Collaborative Virtual Workspace web site, MITRE Corporation, http://cvw.mitre.org/

Rodenstein, R. & Donath, J.S. (2000). Talking In Circles: Designing A Spatially-Grounded Audioconferencing Environment, In: Turner, T., Szwillus, G., Czerwinski, M., Paternò, F. (Eds.), *Proceedings of the Conference on Human Factors in Computer Systems*, CHI2000, The Hague, Amsterdam, 81-87.

Stefik, M., Bobrow, D.G., Foster, G., Lanning, S., Tatar, D. (1987): WYSIWIS Revised: Early Experiences with Multiuser Interfaces, ACM Transactions on Office Information Systems Vol. 5 No. 2, 147-167.

USING STUDENT PROJECTS TO MEET THE INFORMATION NEEDS OF TEACHERS ON THE INTERNET

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Abstract: Teachers in South Africa are confronted with a new educational paradigm and rapid development in information communication technologies. In South Africa there is still a considerable lack of locally developed and relevant educational resources on the Internet. Students from the *Teacher Training College* in Pretoria were involved in a project to develop relevant online learning support material for Afrikaans First Language teachers. Their participation in this project not only empowered them with ICT skills, but also made them possible facilitators of change who can help to disseminate educational technology throughout the entire school system.

The South African education system has changed twice since 1995 from a conventional to a learner-centered outcomes based curriculum. The changing education paradigm created new information needs amongst teachers. Textbooks are outdated and teachers have to implement a new curriculum and adopt new teaching strategies without sufficient learning support materials (Chisholm et al 2000).

The Internet can be a solution to many of the problems educators experience. It can be utilized as an information resource and a tool towards teacher development (Jackson 2000). But, with the South African curriculum still in flux, there is not yet sufficient learning support material for the South African curriculum available on the Internet.

There are only a few initiatives in place online to support educators in South Africa. These are all in English - *one* of the eleven official languages of the country. There is a considerable lack of relevant, locally developed material on the Internet - such as learning support materials and opportunities for teacher development. There is even less information available for teachers of the other minority language groups and subject-specific information for the mother tongue speakers.

At the Pretoria Teacher Training College this huge gap in information provision for Afrikaans First Language Teachers led to a project with benefits for both the students training to become teachers *and* current teachers of this subject. A web site for Afrikaans First Language teachers was started late in 1999 with translations of the new curriculum policy regarding the learning area Language, Literacy and Communication; including descriptions and explanations of the specific outcomes, range statements, performance indicators and assessment criteria for the learning area. The web site was expanded with links to relevant sites, a calendar of activities/ seminars for these teachers and room for contributions from the teachers themselves.

Second year students at the College were given an assignment to prepare outcomes based Afrikaans lessons on an electronic template. They had to save their lesson plans in HTML format. It was edited and hyperlinks to the descriptions of the specific outcomes were made. The first 12 lessons were published in November 1999 on the WWW.

During the 2000 academic year the project was expanded to include more good quality lessons and final year students had to use the Internet as information resource for their lesson plans. They could use any theme/ topic and wonderful language lessons on Aliens, Star Wars and an

Olympic Games for Fairy Tale characters were added to the web site! The students had to activate the URL(s) they used by themselves. Up to November 2000 36 lesson plans were added to the web site.

A questionnaire was given to the participating students to evaluate the strengths and weaknesses of the project. 78,9% of the survey group mentioned that the assignment improved their computer skills. They felt very positive about the fact that their work was published on the Internet and 84% said they would definitely tell others of the project. Of the group that had to use the Internet as an information resource, all said that they would use the Internet again for preparing lessons.

Another project was that of the 3rd year Academic students. They had to research the status quo of Afrikaans on the Internet and did a thorough analysis of the current situation of Afrikaans Literature on the Internet. They had to identify an Afrikaans artist or author of their choice and search for information on them. Their findings made it clear that there is not much information available in this field. For example, a prize-winning South African author - Riana Scheepers - who published ALL nine novels in Afrikaans, was only referred to in a short biography on her publisher's web site - and this in English!

The students were then given an assignment to create a web-based biography with a photograph of their chosen celebrity. The results were amazing. One student claimed to be computer illiterate. Four weeks later she delivered an ultra-modern, high-tech product on CD-ROM! She downloaded Hot Metal 5 from the Internet, mastered it and I quote: *"When everything was done and the CD-ROM produced, I felt very proud of myself and my work. I really learnt a lot... This assignment wasn't just another assignment, but an eye-opener to the world of computers and the Internet"* (Van Schalkwyk 2000).

The benefits of this young project far outweigh the problems encountered. Problems were more of an infrastructural kind that can be solved with better planning in future. To involve student teachers in creating relevant, up-to-date learning support material for teachers on the Internet empowers them with ICT skills. They are investing in their own future as the teachers of tomorrow. They become facilitators of change who can help to disseminate educational technology throughout the entire school system.

For the Afrikaans First Language teachers, there is up-to-date information on the new curriculum and examples of lesson plans in a ready-to-use format. They can download worksheets and access Internet resources with a click of the mouse. Afrikaans language teachers who attended a seminar at the University of Pretoria in September 2000, rated their most important information needs as lesson plans and information on implementing outcomes based education in the classroom. As the web site endeavours to provide in these needs, this project can only benefit all the stakeholders.

References:

CHISHOLM, L. et al. 2000. *A South African Curriculum for the Twenty First Century*. Report of the Review Committee on Curriculum 2005.

JACKSON, G. 2000. Technology for Teacher Support. *TechKnowLogia*, Vol 2(6). [Online]. Available: http://www.techknowlogia.org

VAN SCHALKWYK, L. 2000. *Internet 2000. Unpublished report on Internet assignment*. Pretoria: Teacher training College.

Developing and Teaching a Computer-Mediated Second Language Course in Academic Reading

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Abstract: This paper will describe a new endeavour in the area of distance education: the design and teaching of an e-mail supported academic second language reading comprehension course. The intermediate level course was intended for mature adult learners and implemented at the Open University. The course spans 15 weeks and comprises three kinds of student participation: face to face meetings, e-mail sessions and written assignments. The teaching materials are pre-prepared and include a collection of reading passages; workbooks dealing with nine texts that include approximately 20 questions and relevant teaching points. The course consists of three 3-hour f2f meetings and nine asynchronous e-mail sessions. Students have a week to complete each e-mail assignment and they receive the tutor's feedback within 3-4 days. Student feedback on the course is obtained through a questionnaire.

Distance education (DE) is not a new concept. Applying modern technology to distance learning enhances the advantages that DE is known to have over traditional programs (Holmberg 1995). DE is flexible in terms of its adaptability to students' conditions in time and space and thus provides a platform for independent learning since the student is the deciding factor in when, where and how the learning takes place (Knowles 1975, Mezirow 1981). There are, however, some serious criticisms of DE: the fact that students work completely on their own, that they have impersonal contact with tutors, that the turnaround time for feedback is lengthy, that they do not interact with fellow students, and that, generally, they experience a disheartening feeling of isolation. These disadvantages may explain why drop out rates in distance courses are far higher than in regular programs (Delling 1987). This paper will describe a new endeavour in the area of distance education: the design and teaching of an e-mail supported academic second language reading comprehension course.

Computer-mediated communication (CMC), in its various forms, attempts to compensate for some of the disadvantages of distance learning. Since most CMC distance courses developed to date are, by nature, content rather than process courses, their major advantages are the opportunities they provide for collaborative learning and easy access to information resources (McConnell 1994). In this, CMC reading courses differ from other courses. CMC allows for the adoption of a learner-centred approach so suited to the nature of reading. If we consider reading as a mode of language use, and DE as a mode of language instruction, we encounter striking parallels: the reader (when reading in real-life) and the learner (when learning to read) both function in isolation when interacting with a text. In both cases, discourse is enacted at a distance, a disassociated first person (the author or the instructor) is actively present, and no reciprocity is manifest, within the interactive context. One could, therefore, argue that reading instruction and distance education are particularly well-suited.

Because CMC has the capacity to empower students to direct their own learning to a greater extent than traditional DE courses (White & Weight 2000), it seemed appropriate to utilise it to create a reading course that would offer a more motivating and rewarding medium of instruction to existing face to face (f2f) text based reading programs available at all colleges and universities in Israel. Traditionally, Reading Comprehension programmes rely entirely on pre-defined and pre-produced teaching/learning materials which are predominantly syllabus-writer led in the selection and organisation of the reading texts and the tasks. It is the instructor who controls and promotes the learning. With CMC, on the other hand, it is the learner who mediates and manages his/her own learning through a set of bearings which need to be clearly outlined in the syllabus. Tasks are pre-designed and explicitly shared out in advance, so that all participants know exactly their share of responsibilities, what is expected of them, and when.

The following description is of an e-mail mediated reading course implemented at the Open University. The objective of the course is for students to reach the same level of proficiency as students taking a parallel, traditionally taught course. This is determined by having the students sit for the same mid-term and final examinations taken by all students registered for the course nation-wide.

Participants: In order to make the course manageable for the tutor, the number of participants in a group is limited to 20.

Structure: The course spans 15 weeks and comprises three kinds of student participation: face to face meetings, e-mail sessions and written assignments.

Materials: The teaching materials, which are pre-prepared and handed out to the students, comprise: A collection of reading passages consisting of articles selected on the basis of topic interest and level of difficulty; Workbooks dealing with nine texts, arranged in modules according to test organisation patterns (comparison/contrast, description, cause and result, argument, research). Each text has approximately 20 questions to guide the reading process and relevant teaching points (reading strategies and linguistic features). In addition, the students receive a booklet of cloze exercises to provide additional vocabulary practice for each of the texts and a "Resource Centre" which brings together all the major teaching points dealt with in all modules as a handy reference.

Process: The f2f meetings are three hours long. The initial f2f meeting provides the students with the opportunity to get to know each other, to familiarise themselves with the structure of the course and to understand what their responsibilities are. This meeting serves as a kick-off point for the course and its main focus is to deal with students' queries and technical problems, as well as an introduction to pre-reading activities. The second meeting, a week before the midterm examination, serves to prepare the students for the exam by explaining the format of the exam, and doing a practice examination together in class. The third f2f meeting, at the end of the course, combines a farewell session with tips for the final examination, and a practice exam.

The rest of the course consists of nine asynchronous e-mail sessions. Prior to each e-mail session, students are sent a list of the questions they are assigned by the tutor. The questions deal with pre-reading, close reading and post-reading. Each student is assigned 8-9 questions for each text. The pre- and close-reading questions are rotated among the students so that for each text, the student is assigned questions of a different kind. All the students are assigned identical post-reading questions. The date of submission is mandated in advance as a specific day of each week, and the students have a week to complete each assignment.

The weekly tasks demand active learner engagement rather than passive participation in classroom sessions. The tutor's feedback at the end of each session, which provides correct answers, as well as specific comments regarding language features, useful reading strategies and general and individual feedback relating to students' cognitive and metacognitive awareness, is sent out to all students within 3-4 days and serves as additional English-language reading material. The students were told in advance that they only had to hand in seven of the nine e-mail assignments.

The course described above was designed to suit the needs of mature adult learners who are best motivated when they can choose to study at a time that is most convenient to them; they are actively involved in meaningful tasks; they are given the chance to self-direct their own learning procedures; they can work in ways that suit them best.

On the mid-term and final examinations, the students achieved grades as good as or better than the entire population. Student feedback on the course is obtained through a questionnaire administered at the end of the semester, and includes open and closed questions. In all four groups which have taken the course to date in this format, students' enthusiasm is apparent. They are especially enthusiastic about the close contact they have with the tutors. The tutors seem to enjoy the course as much as the students do.

References

Delling, R.M. (1987). Toward a theory of distance education. *ICDE Bulletin*, 13, 21-25.

Holmberg, B. (1995). *Theory and practice of distance education* (2nd ed.) New York, NY: Routledge Studies in Distance Education.

Knowles, M.T. (1975). *Self-directed learning: A guide for teachers and learners*. Chicago: Follett.

McConnell, D. (1994). *Implementing computer supported cooperative learning*. London: Kogan Page.

Mezirow, J. (1981). A critical theory of adult learning and education. *Adult Education: A Journal of Research and Theory*, 32, 3-24.

White, K.W. & Weight, B.H. (Eds). (2000). *The online teaching guide: A handbook of attitudes*. Needham Height, MA: Allyn and Bacon.

Lessons Learned: School based Reform and its Impact on the Restructuring of a Teacher Preparation Program

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Abstract: The reform in teacher technology integration at our university is based on a school reform project. Thirteen area classrooms were equipped with the latest technology. We were selected to train the teachers to use technology and inquiry-based, student-centered learning. Monthly meetings, training sessions and classroom visits were instituted. Our teachers were eager to learn and returned to their classrooms ready to try the new technology-rich, inquiry-based projects with their students. The result: student scores improved, students' projects became more professional, and the students became empowered by their success. We based our strategies on the success we had with our involvement in the aforementioned school reform and we relied heavily on the thirteen classrooms as observation sites for our preservice teachers. Our success during our first year far exceeded expectations. We are on our way to preparing our students to be the facilitators of technology-enriched, activity-based classrooms of the future.

Background: K12 Technology Integration Initiative

Four years ago the Multimedia Interactive Networked Technologies Project (MINTs) began in 13 classrooms in the St. Louis area. Due to a settlement from Southwestern Bell, money became available to equip these classrooms with the latest in educational technology: one IBM computer for every two students, a teacher's station, scanners, interactive white boards, LCD projectors, color and laser printers and video conferencing capabilities. Each teacher selected for the project also received a laptop computer for home use. The teachers that were selected to teach in these classrooms were not technologically literate. They were, however, willing to try something new.

The timeliness for this type of project has been documented by the report: Technology and the New Professional Teacher: Preparing for the 21st Century Classroom (NCATE, 1998). That report predicted that technology will revolutionize the classroom of the future. When used correctly, technology has a strong potential to facilitate cooperative, inquiry-based learning, support different student learning styles, reinforce positive behavioral and social skills, and model real-world applications. Researchers involved in reform (e.g., Newman, Griffin & Cole, 1989; Pea, 1993; Polman, 1997) have argued that inquiry-oriented instruction is most appropriate because it provides for active engagement by learners, involving rich social interactions in real-world experiences.

The Missouri Research and Education Network (MORENET), a state agency in charge of providing bandwidth to Missouri's schools and public institutions, became the lead agency for the MINTs project. MOREnet offered technical training to the 13 MINTs participants during a weekend meeting at the Lake of the Ozarks. This training covered the basics of using their laptop computer, dial-up features, and email. The University of Missouri-St. Louis was sub-contracted to provide ongoing technical and curriculum support and additional training for the MINTs teachers. Our online discussion list was very active as the teachers shared the web sites they found and were using with their students. They also shared their accomplishments, students' "wow" moments and the ideas that were working in their classrooms. The online discussions and our monthly meetings provided a way to build camaraderie in our group of 13 and bind them together by their shared experiences.

Our plan consisted of monthly meetings of all the MINTs teachers and weekly visits to their classrooms. We also provided two-week training sessions during the summer and held sessions after school and/or on Saturdays. All the teachers attended the MOREnet Technology Conference, held yearly at the Lake of the Ozarks, compliments of MOREnet. The first year they attended, the MINTs teachers found the technology enlightening and interesting and they left excited to use what they had learned. By the second year they found the presentations to be routine and by the third year four of the MINTs teachers presented at the conference.

The success of the MINTs project was not coincidental. Unlike other projects that had failed in the past due to lack of teacher support (Cuban, 1986), we provided ongoing support and training, first in the technological skills needed, then in creating projects that required the use of cooperative, activity-based learning and higher order thinking skills. We held monthly meetings where all the teachers could share their successes and frustrations and receive feedback from their colleagues. We also had a MINTs listserv used for sharing ideas, web sites, classroom success stories and questioning other MINTs teachers regarding a particular problem. The list proved to be very beneficial. A teacher embarking on the creation of a new project could send out a message in the morning to the list asking for advice or web sites and have four or five responses by the afternoon. New sites that proved useful in one classroom and held potential value for other classrooms were quickly shared via the list. The list served to help develop a cohesive group among the MINTs teachers.

Our classroom teachers were not left to their own devices in the classroom after a brief period of instruction. They had continuous training and support, and they knew they had someone to call on at anytime for assistance. Jan Mastin, the MINTs Area Technology and Curriculum coordinator, received many requests to visit classrooms. When the MINTs teachers were introducing a new program or technique, they wanted an extra pair of hands in the room to work one on one with the students. We also had some teachers who were comfortable using certain software, but did not feel expert enough to teach it to their students. Ms. Mastin would visit their classrooms at the teacher's request and demonstrate the needed software.

During the MINTs project we learned that students are quite industrious when learning new technologies; as soon as they learn the basics they are ready to explore more. When they discovered something new, they were eager to use the interactive whiteboard to share what they had just learned with the rest of the class. They were always open to helping their fellow students as well. One of our MINTs teachers had her students hold their hands behind their back when helping another student. That way they had to talk the other student through the problem, improving their communication skills while the other student learned how to carry out the particular task himself.

Overall, the MINTs project did succeed. However, not all of our teachers reached the level of technology enriched, project-based learning for which we had hoped. One teacher in particular never quite believed that project-based learning would result in increased scores on the standardized tests that were required during the fifth grade. This teacher's students used their computers but they could have completed the same tasks using paper, pencil, and textbooks. The students would be working on a project while the teacher sat behind the desk. We suggested that the teacher needed to be monitoring the students as they worked, asking questions and making sure they were on task. He preferred to sit at his desk and grade papers.

Not everyone is cut out to teach in this type of classroom. We found that a teacher must be very flexible, open to new ideas, and acceptable of controlled chaos to succeed in this type of classroom.

As the MINTs Area Technology and Curriculum Coordinator, Ms. Mastin has been working with the MINTs teachers for about two and one half years. This experience became a major influence when it came time to plan our PT3 grant proposal.

A College of Education poised for Technology Integration

The College of Education at the University of Missouri-St. Louis was undergoing a curriculum redesign at the time, grouping courses by three levels and requiring 40 hours of observations in the "Exploration Level" and "Analysis Level" classes. Students would now have the opportunity to observe what a teacher really does in a K-12 classroom before their junior or senior year. Through reflection and class discussions, the preservice teachers would gain a deeper understanding of what it meant to be a classroom teacher. One part of this redesign targeted observations in technology-enriched classrooms.

At that time all of our faculty members had computers in their offices. However, they were mainly used for word processing, email and preparing syllabi and class handouts. Approximately 2% of our faculty members were using email and online discussion groups with their students. About that same percent referred their students to web resources and taught using technology. This lack of technology integration by the rest of the faculty was what we wanted to target in our PT3 proposal. Ms. Mastin had seen firsthand that project-based, technology-enhanced learning could raise students' enthusiasm, increase test scores, improve self-worth and generally improve a student's attitude about school. We wanted our faculty and preservice teachers to be made aware of those outcomes and to become adept at integrating technology in their classrooms.

Dr. Charles Schmitz, who became the Dean of the College of Education in 1996, was a firm believer in the power of technology. Paper copies of "The Dean's Weekly Update" were banished upon his arrival. If there were faculty members who did not use email before his appointment, they began using it soon after. He also envisioned a Technology and Learning Center (TLC) for our College and an Endowed Professorship of Technology Education. With the TLC and the Endowed Professorship funding secured in the spring of 1999, we were poised to begin a comprehensive program of technology training and integration for our faculty. At that time, we applied for a Preparing Tomorrow's Teachers to Use Technology (PT3) grant.

Faculty Teaching Reform through the Support of a PT3 Grant

We planned our grant with great zeal, based primarily on the success and knowledge gained from the school-based reform of the MINTs project. We were convinced that the procedures that worked for the MINTs project would, with some adjustment, work with our faculty, as they began learning about the rewards of technology integration. Our PT3 grant application was approved in September 1999 and our new TLC had its grand opening in March 2000.

Cadres of five full-time and five part-time faculty members were chosen first from the Level I "Exploration" courses. The idea was to begin modeling and teaching technology integration when our students began their education courses. Our professors would teach with technology, but first we had to teach them.

We chose our first cadre members carefully. We wanted people who were not afraid of trying something new and we wanted those faculty members who agreed with the basic principle that the use of technology would improve their students' learning experiences and better prepare them for the classrooms of the 21st century.

At one of the first meetings, participating Cadre I members and the PT3 staff created a list of technology integration options that people could select from to begin using technology in their classes. This approach, of asking our faculty members for their input and ideas, provided them with a sense of control and paved the way for a commitment to carry out their choices. Only later did we realize that there was a lack of accountability in this model.

During the following semester we presented the list of technology integration options to Cadre II members and also had them sign a commitment paper, agreeing to initiate the five items they selected. Posting their syllabus on the web, using email with their students, and holding online, asynchronous discussions were a top priority for everyone. These served the dual purpose of acquainting the instructor with technologies that they may not have used before and requiring their students to do the same. We also encouraged the use of PowerPoint presentations, both for the instructor and the students, posting assignments to the web, and student web page creation for class.

Unlike previous technology integration projects that had failed in the past due to lack of teacher support (Cuban, 1986), our instructors had a lot of support. Small, informal workshops were held in the TLC on numerous technologies; file management, FTP, PowerPoint, HyperStudio, Netscape Composer, and web search techniques. Four of the five faculty members in the first Cadre attended these sessions. The PT3 PI and Project Director were available for one on one meetings with each Cadre member to discuss technical issues or the details of how to incorporate technology into their curriculum that would enhance course content and most benefit students.

During our monthly meetings we invited some of the most successful MINTs teachers to talk about their experiences with technology integration and highlight assignments, student projects and outcomes. At our first meeting we discussed what experiences a preservice teacher needs to fully understand the meaning of technology integration and how this type of learning works in a K-12 classroom. Most of our instructors had no idea that 4^{th}-6^{th} grade students were capable of such sophisticated projects using technology. They left the meeting impressed with what they saw -- the enthusiasm of the MINTs teachers, the student projects and the positive results this type of learning has on test scores and student outcomes.

The MINTs classrooms were used as technology-rich observation sites for our preservice teachers and a guide sheet for observations was provided. We found that the observation sheet was not enough. Some of the MINTs teachers reported that the preservice teachers would visit and just sit in the back of the room. The preservice teachers did not understand why the classroom teacher was not "presenting information" and some of them left thinking that what they had just witnessed was a chaotic, unmanaged classroom where the teacher was not in control. What we apparently had not clearly conveyed is that the classroom structure and management in a technology-enriched classroom is quite different from what our preservice teachers might expect. Most of our students are products of teacher centered classrooms. When faced with the project-based model they did not quite know what to make of it. We needed to make sure our faculty members had a clearer picture of the realities of project-based learning so they could impart that to their students prior to sending them out for their observations. We also needed to convey that the preservice teachers needed to interact with the students in high-tech classrooms. Sitting in the back of the class, watching students work in collaborative groups proved to be a less than enriching experience.

Some Lessons Learned

Coordinating the schedules of classroom teachers with the availability of 300 preservice teachers proved to be a real challenge. The classroom teachers want to be notified by email at least two days before a visit. We are in the process of devising a better system than the one we currently use to accomplish this. One major roadblock is the mindset of our faculty. Some of them do not believe that they can send their students to a high-tech classroom to observe "things you would see in a normal classroom." In one way that may be true. Classroom management in a high-tech environment is not the same as the teacher-driven model that most of our students are used to from their own experience in high school.

One of the professors who teach Level I classes did not really see any reason to change the way he was teaching. He had no desire to use web sites as resources for his class, even if they were presented to him for his use. Correspondence by email or listserve was not an option for him either. He was aghast at the thought of tracking the correspondence of his 40+ students. He did, however, see the possibilities as he listened to the other Cadre members as they talked about and shared their excitement of using listserves and web resources. By the second semester this professor was using web resources in his class.

Our PT3 listserv is not the solidifying resource that it was for the MINTs teachers. Lack of time on the part of the Project Director has prevented the posting of questions to the list and the encouragement of PT3 faculty to share their experiences there.

We had also envisioned a close relationship between our MINTs teachers and our PT3 faculty. All but one of our faculty members has yet to go to a MINTs classroom to observe. The Project Director tried to initiate these visits for Cadre I, but scheduling problems proved to be insurmountable. We see a close relationship between our faculty members and the MINTs teachers as beneficial for both, but we are still trying to devise a way to accomplish that goal.

Time is on our side though. Our successes and near successes have been enlightening. As our Cadre members share their experiences with us, we are envisioning new ways to work with the faculty to bring about a shift to a technology-integrated curriculum.

One top priority is to ensure that our faculty members visit a technology-enriched classroom. Cadre 3 members will take at least one field trip to a high-tech classroom during one of our scheduled meetings. A new assistant will take some of the workload off of Ms. Mastin, and allow more time for her to schedule monthly visits with each faculty member, sit in on some of their classes and spend more time monitoring the listserve so that it becomes an important resource for the PT3 faculty members.

This coming semester we will schedule our panel discussion by technology using teachers early in the semester. We received a lot of positive feedback from the discussion, but we also learned that it would have been even more helpful earlier in the semester.

References

Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920.* New York: Teachers College Press.

National Research Council (1996). *National science education standards.* Washington, DC: National Academy Press.

Newman, D., Griffin, P., & Cole, M. (1989). *The construction zone: Working for cognitive change in school.* New York: Cambridge University Press.

Pea, R.D. (1993). Distributed Multimedia Learning Environments: The Collaborative visualization project. *Communications of the ACM*, 36(5), 60-63.

Polman, J. (1997). *Guiding science expeditions: The design of a learning environment for project-based science.* New York: Teachers College Press.

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Putting the Instructor in Charge: Component Architecture and the Design of a Course Web Site.

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Abstract: This paper describes the "component architecture" of the web and how teachers can use various existing components of the web – plugins, websites, applets, web services etc., to develop complex applications with limited investment of resources. Furthermore, the pieces of independent software units can be coordinated towards a final product that effectively hides the "duct tape" that holds the pieces together. This "mix and match" approach towards developing educational software saves money and time and allows information sharing across activities in an integrated fashion which in turn.

Introduction

One of the most important tasks faced by a teacher is designing the classroom learning environment. Either consciously or instinctively (or a combination thereof), teachers chose the topics that will be covered, they structure the classroom conversations, they assign tasks for students to work on, and they provide tools and resources to students. It can be argued that some of the resistance teachers felt towards technology (specifically computer-based technologies) could have been caused by a feeling of losing control of their classrooms. Until recently, teachers did not have access to technology, could not participate in its design and its integration into their teaching practices.

Introducing Component Architecture and the Web

We believe that we are at a new position now. New technologies (such as the Web) allow teachers to take on a far more proactive role in the design and implementation of new technologies. One concept that we believe is key to teachers becoming designers has been called "the component architecture of the web." That is, using various existing components of the web (plugins, websites, applets, web services etc.) instructors can develop very complex applications with limited investment of resources. Furthermore, the pieces of independent software units can be coordinated towards a final product that effectively hides the "duct tape" that holds the pieces together (Zhao, Mishra, Ferdig, in press). This "mix and match" approach towards developing educational software has two main advantages: (a) it saves money and time; and (b) it presents different functions in an integrated fashion which in turn; (c) allows information sharing across activities.

Teachers as designers

It is our contention that the component architecture of the web allows us to easily, and inexpensively, develop complex, diverse, dynamic, and pedagogically sound web sites. It is for these reasons that we argue for teachers to become designers of their own technological solutions. To support this claim, we describe a web site that was used to support a teacher professional development course taught by the first author. We describe the goals of this undertaking, how existing components of the web were used to meet these goals, and the lessons we learned from this undertaking. We conclude by contrasting our approach with a course web site developed using an existing prepackaged approach offered by Blackboard.com.

Putting the pieces together for a course web site

The web site was designed for use in a graduate educational technology course consisting primarily of in-service teachers (with a few master's students in educational technology). Students in this course worked in design teams to develop computer-based products that would be useful for teaching and learning. To meet the needs of the course, we needed to develop a technology environment that would help us with effectively communicating within project teams, across project teams, and among all class participants, managing projects, providing access to readings, and archiving artifacts developed in the course. Instead of developing or purchasing a large software package, we assembled an efficient environment from mostly free software and existing services on the web. All of these components were integrated into the course web site seamlessly.

The web site included standard course information—the syllabus, readings, pictures of artifacts developed, and powerpoint presentations based on lecture. Beyond these basic resources, the web site employed several other technologies to meet other course needs. The technologies, or components used for the design of the web site were as follows:

Blogger.com: A free web service that allowed the faculty to update and ftp web pages to one part of the web site without having to use any web- or HTML-editing facility.

Egroups.com: A web service for managing mailing lists and threaded discussion groups. Egroups also offered, (a) an archive of all communications; (b) a classlist (with pictures) and contact information; (c) web polls; (d) a group calendar, and (e) 20 MB of web space for archiving files and readings.

Idrive.com: Each student in the class was required to register for an Idrive account. Idrive offers its users 50MB of free web space to upload, save and share files. In addition, Idrive also offers unlimited web space for files that are saved directly off the Internet. This feature is useful to practicing teachers who wish to "file" useful lesson plans and other web sites for future reference.

Apart from the organizational and pragmatic uses of these free services, the course web site also attempted to offer a new way of thinking about learning in today's networked environment. These options were seamlessly integrated into the class site by maintaining all of the course options in one frame while presenting the "outputs" site in the other frame.

The History Channel: The course page linked to the History Channel web site that provided information about "this day in history" and "this day in the history of technology."

Searches via Google, Encyclopedia Britannica and Meriam Webster: To emphasize how information on the web could be easily accessible the course web site has fields that allow students to search Google, Encyclopedia Britannica and Merriam Websters Dictionary.

Lessons learned

We see the development and maintenance of such a system as an ongoing experiment to study and reflect on what is possible using freely available services on the Internet. Some things we have learned are: (a) Users of the system see an integrated web-site and were unaware of how the entire system is cobbled together from what is essentially freeware on the web; (b) One can reinterpret the functionality of software i.e. they can be used in ways and within contexts that were not envisaged by the designer of the original computer program. For instance, Blogger was used to maintain an announcements page. This was not something that Blogger was designed to do but which worked out quite well; (c) Trouble shooting the system is quite easy. If the mailing list does not work for some reason it is because egroups is down, not because there is something wrong with the whole class site. In fact, the loss of one component does not bring down the entire course site; (d) This system gave the instructor much more freedom and flexibility than the system run by the university; (e) Such a system should be within the reach of common teachers financially and technically.

Course web sites using Blackboard.com

We offer a contrast of our component approach with a pre-packaged system such as Blackboard.com. This company offers an integrated web course site development and presentation environment, developed for and by educators. However, Blackboard.com constrains the options the instructor would like to have. For instance having a listserv (which could be accessed just through email), with built-in web archives (as in Egroups) was important to the instructor. However Blackboard.com allows just web based discussion forums which would be hard to access on a slow phone line. Also, the instructor may want to disable certain options available (say, on-line chat). Though Blackboard.com allows instructors to disable online chat it provides no way of removing the chat button from the options. Moreover integrating functionalities such as the web search from within the course site, is not easily done with Blackboard.com. And finally, using Blackboard.com as a solution does not allow students to learn about the messy process of design of through an actual case study—the course site itself.

By constructing this class web site, we not only provided students with tools that made their participation in the class easier, we also gave students an example of how to design and integrate technology into classrooms. Since the main goal of the class was to help teachers integrate technology, the web site was one way to help "lead by example."

References

Zhao, Y., Mishra, P., & Ferdig, R. F. (in press). Putting the pieces together: The power of component architecture and the design of web-based learning environments. Computers in Schools.

Troubleshooting Windows

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Abstract: This information was written to help teachers understand steps that they can take for to keep their equipment running longer and better. It will walk them through steps to see if they can troubleshoot their problem or if they do need to send for help.

Preventative Maintenance

1. *In a low traffic area*-Place computers away from chalk dust or other contaminants, on a sturdy table or countertop. Store power and printer cords away (no entanglements for feet, no accidental unplugging of power or other cords.
2. *Preventative actions for computer hardware and disks*-Avoid exposure to magnetic fields, avoid exposure to static electricity (touch something metal to ground yourself first), void exposure to extreme temperatures (don't leave hardware or disks in an environment where the temperature can fluctuate several degrees either), avoid exposure to liquids or to conditions that could result in condensation on the equipment. Run Scandisk on hard drive and floppies to keep disks in working order. Run Disk Defragmenter on hard drive to ensure fastest storage and data retrieval rates.
3. *Preventative actions during computer use*-Close applications that are running but don't need. This will free up memory. Look at the taskbar and see the number of buttons you have representing programs running or windows opened. If you have more than four buttons present, consider closing some windows, especially if you have less than 32 Megabytes of RAM. Save your work regularly!!! This doesn't prevent "crashes", but it reduces the level of stress within the computer user in case of a crash. If your Windows computer "crashes", press ctrl-alt-delete, then ctrl-escape. It will bring up the start menu allowing you to safely shut down your system. If you have to turn it off without going through the shut down procedure, don't turn if off and on again rapidly. Wait 10-15 second before turning it back on. If your Windows computer shows a window that says it needs to run Scandisk to check for errors on the drive-- let it run and correct the errors—do NOT exit Scandisk before it has completed its procedure.

Keep your system running more smoothly by following just a few steps:
SCANDISK-A Microsoft utility, which acts as a disk analysis and repair tool that checks a drive for errors and corrects any problems that it finds. A Standard SCANDISK should be done *once a week.* A *Thorough SCANDISK* should be done about *once a month.*

⇒ Double click on My Computer.
⇒ Right click on the C drive--choose Properties.
⇒ Click on the Tools tab
⇒ Under the Error Checking Status click the Check Now box
⇒ Click on Thorough, and then make sure there is a check in the box Automatically fix errors, and then choose Start.
⇒ When SCANDISK has completed, results will appear and let you know if it found errors.

DEFRAG-It's a disk defragmenter, which reorganizes the files on a disk to optimize the disk performance. Running Defrag periodically will help your PC run more efficiently and speed up performance.

Correct Shut Down- Close all programs. Click the Start button; choose Shut Down Select one of the options from the Shut Down Windows dialog box. Click Yes.

General Troubleshooting Techniques

1. Check connections - Whenever some component (CPU, mouse, keyboard, monitor, printer, etc.) doesn't work, you should check the connections of that device (e.g., power cord, printer cable, mouse connector wire, keyboard connector wire) and make sure the cords and connectors are securely attached.
2. Try swapping devices to pinpoint the problem. (*CAUTION*: If you haven't done this before, do not attempt it without help from the building technology person or another knowledgeable source) - For a device like a mouse, keyboard, or monitor that doesn't appear to be working, try attaching the device in question to a different computer. For example, a monitor doesn't show a picture. If you attach that monitor to another computer and DO get a picture, you know the problem is not with the monitor, something to do with the computer (such as a bad video card or cord). For school-owned computers, limit your efforts to devices that connect to the outside of the CPU case (don't open the case).
3. Use diagnostic and/or repair software to help pinpoint and possibly correct problems.
   a. Scandisk - this program comes with Windows. It can detect and fix some errors in the way files are written to disks. It can also help free up unusable disk space.
   b. Disk Defragmenter - moves data around on a disk so that files are not "fragmented" (parts of individual files saved in different locations). The process of defragmenting can result in faster file access from disks because the disk drive doesn't have to look at a wide variety of locations on a disk to find and retrieve a file.
   c. Software such as Norton Diagnostics, Norton Disk Doctor, and Conflict Catcher (Conflict Catcher is for Macintosh computers). Use this on your home computer, but not on your school computer without permission and assistance from the Technology Department.

Consult with your school technology person and/or any other qualified personnel (Example: Customer Service Desk)

Correcting Common Problems

When Your Computer "Crashes"

1. DON'T PANIC - it happens to the best of us!
2. On a Windows machine, use the keyboard command Ctrl+Alt+Delete to see if you can bring up the "Close Program" dialog box.
3. If you CAN bring up the "Close Program" box, look for applications listed as "not responding". If there are any, click on their name and click the "End Task" button.

If you CANNOT bring up the "Close Program" box, try using Ctrl+Alt+Delete again to see if you can restart the computer. If that doesn't work, turn the computer off and back on again after 15 seconds, or press the "Reset" button. Realize that, upon restart, Windows will want to run Scandisk. Let it do so!
Press F1- A great Help utility that can walk you through the troubleshooting process.

Error Messages and What They Mean

Mapl DLL Error-Sometimes found when trying to run Netscape. Go to Edit>Preferences>Mail and News. Uncheck the last box that enables the Mapl. Exit and Log off then log back in and Outlook should work.
Save changes?- This usually appears when you close a program and haven't saved the work.
The device is not ready-This message usually means you have forgotten to place the CD or floppy in the drive securely. Just place your CD or disk in the drive and click on Retry.
The item this shortcut refers to has been moved or changed-The shortcut to the original file has been altered on the hard drive or totally removed. Point at the shortcut, right click and choose delete. Find the original file and make a new shortcut.
The disk in the destination drive is full-If your disk if full or Windows knows it won't be able to fit your entire file on the disk; you'll get this message. To fix this problem, just delete a few things from your floppy disk or use another disk.

The specified path is invalid-This message appears when you try to open a program from the Start menu and Windows can't find the file. More than likely, someone's removed the program from the hard drive and forgot to take it off the Start menu. The names and icons on the Start menu are placeholders directing the computer to the original files on the hard drive.
This filename is not valid-You've probably typed a filename that contains one of the forbidden characters: “*/:<>?\| Rename the file and leave out any of these characters.
The file has a resource conflict-This happens when one piece of equipment is trying to use a port of other piece of hardware. Use the Hardware Conflict Troubleshooter. Click on the Start button, and choose Help from the menu. On the Contents tab, double-click on Troubleshooting, then click on the entry labeled “If you have a hardware conflict”. You'll see a dialog box. Click on the appropriate button to get the process started, then follow the detailed instructions.

Desktop Problems

Missing Task bar- Most of us have lost the Task Bar at one time or another. Move your cursor to where it used to be. Did it appear? It may be on Autohide. If not move your cursor further toward the edge. Hold down the left mouse button and try to drag it back into sight.

***A flawed* program**

- √ The icon on the desktop turns black.
- ✓ Your system freezes up. You might be able to move the mouse but nothing happens when you tap the keys or click the mouse. The usual cure is to turn the machine off and back on.
- ✓ The picture on your monitor starts to act up. Windows might refuse to go away, or you'll see dark holes in the background.
- ✓ Everything begins to move at a glacial pace. Save what you can and prepare to restart.
- ✓ You see a bright blue screen with a white error message on it. That generally means something bad. If you're lucky, you can hit the Enter key and get back to work.

You see a Windows dialog box; telling you your application has caused a general protection fault. Click OK and see if you can get back to work. You'll probably lose anything you haven't saved lately.

Mouse and Keyboard problems
Left-handed Users in a right-handed world-From Start go up to the Control Panels. In the Control Panel you will find an icon entitled Mouse. Double click on it and it will give you the choice for right or left-handed.

Troubleshooting a mouse or keyboard freeze

1. Close all applications if possible.
2. Power down the machine.
3. Check the cords.

Disk Space Troubleshooter
This troubleshooter helps you solve problems you may encounter if you run out of disk space.

Empty the Recycle Bin
Use ScanDisk to check for errors that may be using up disk space
Back up unneeded files and remove them from your hard disk
Remove Windows components that you don't use
Create more disk space by using DriveSpace disk compression.

Recovering from a Hang
Press ctrl-alt-delete, then ctrl-escape will bring up the start menu allowing you to safely shut down your system.

Restart Windows
To restart Windows with a full warm boot, select shut down from the Start menu. Click the Restart Computer option, and hold the shift key down while affirming “Yes”.

Peripherals
When Windows starts, it automatically scans your computer for any device without a driver and install drivers as needed. (Plug and Play)
If you think that keeping those old drivers loaded is a good idea in case you need to re-install Windows, you are mistaken. You will have better performance and stability if you use the native Window drivers.

Connect SCSI devices without restarting Windows

Right click on My Computer, and select Properties.
Click the Device Manager tab, and select Computer at the top of the list.
Click on "View Devices By Connection".
Press Refresh. This will take several seconds, but the new device should appear in the list.
If you don't see the new device, choose "View Devices By Connection", find the SCSI card in the list, and expand it out to see all the devices attached to it.

Printers
Troubleshooting steps:

- Is the printer connected to your computer (Check the plugs on either end of the connection, just to be sure.)
- Is the printer plugged in and turned on?
- Does Windows know about your printer? (My Computer-Printers) Did you log on to your computer?
- Is the printer out of paper?
- Are there any lights flashing on the printer's front panel? If there are, try turning the printer on and off to clear its memory and reset it, then try again.
- On the Windows Start menu, click Help. Click the Index tab, and then search for "print troubleshooting." Click Display, and then follow the instructions in the Windows Print Troubleshooter.
- If your Windows printer setup looks correct, check your Word printer settings.

Make sure that the selected printer matches the printer you're using. On the File menu, click Print, and then click the name of the printer you want to use in the Name box.
Make sure the page range you've selected in the Print dialog box corresponds to the pages you want to print.
Does your computer say that it has printed your job but the printer doesn't print?
This may be caused by selecting the wrong port to print from. For instance if you have a network printer and try to print to a local port you will not get any printout. Check by going to the printer folder and highlighting the appropriate printer. Click the right mouse button and check to see if the correct port is selected by clicking on the Details tab.
Is your printer spitting out sheets with strange characters on them?
Go to the Printer folder and check to make sure you are using the correct print driver. Highlight the printer and then right click. Choose Properties and then click on the Details tab. Look to see if the print driver being used is correct. Select the appropriate drive, remove the bad print job. Turn the printer off and back on to clear out the garbage.
Is the printout streaky?
Clean the print cartridge head with alcohol. Let it dry, and place it securely back in the carriage. If this doesn't work, it's probably time for a new cartridge.
Does the paper keep jamming?
Check for small bits of paper in the paper path.
Humidity sometimes causes paper to stick together. Manually separate the pieces of paper and put them back into your printer.

Windows Websites
http://www.aspbc.org/gen/BTSWin95.html
http://www.spintheweb.com/win95.htm
http://www.annoyances.org/win95/
http://www.worldowindows.com/
http://support.microsoft.com/servicedesks/msdn/default.htm
http://support.microsoft.com/support/tshoot/

Moving from a Macintosh to a Windows

Operation/Function	Mac OS	Windows
Major parts of the Desktop/Finder	Hard drive, trash, control panel, Apple Menu, Finder	My Computer, Network Neighborhood, Recycle, Start button and task bar
Mouse Shortcut menu	Ctrl + Mouse Click	Right button Mouse Click - content varies depending on what is selected
Stay open Menus	OS 8 no longer need to hold down mouse button	
Recent Documents	Recent Document List (Apple Menu)	Documents in Start Menu
Configuring/Settings	Control Panel	Settings in Start Menu
Find Files	Find Menu (Apple Menu) OS8 has Sherlock Qualifiers= Starts with, ends with, etc	Find in Start Menu Name, Location, date, contents Wild cards= * and ?
Close Windows, not Applications	Application Menu - Hide, Minimize, Drag to a bottom Tab	Minimize Window, Right click taskbar & "Minimize All"
Close Applications	File & Quit, Apple+Q, Upper Left window button	Upper right window X, File & Close, Alt+F4, Right Click Title Bar and Close
Shut Down & Restart	Special Menu - Shut Down or Restart, or use the keyboard command	Start Menu - Shut Down - Radio button choice, Ctrl+Alt+Del
Programs Running	Application Menu or floating menu	Taskbar buttons, Alt + Tab
Window Manipulation		
Moving	Grab title bar on top of window	Grab title bar on top of window
Resizing	Lower right corner or edge	Lower right corner or sides
Maximizing	Lower Right Corner and Move, Option+Zoom	Middle button in upper right corner or resize
Hiding or Minimizing	Application Menu & Hide Application, Option+Click menu	Left button in upper right corner, Right click on Title bar & choose Minimize
Hard Drive Access	Double click on HD icon on desktop	Double Click on My Computer & then HD icon
Initializing/Formatting Disks	Special - Erase Disk - choose formatting	My Computer - Right Click on Floppy drive - Format
Ejecting a Disk	Drag icon to trash	My Computer - Right Click - Eject Disk or Push the eject button on the drive
File Management -	Double left click drive or folder to open	Double click drive or folder to open
Viewing files in a window	Open window, View - as Icons, as Buttons, as List	Open window, View - Large Icons, Small Icons, List & Details
Copying and Moving files	Open both windows and drag-n-drop, Drag+Option makes a copy	Open both windows and drag-n-drop, Copy/Cut and Paste, Ctrl+Drag makes a copy
Creating Folders	File Menu - New Folder or Ctrl+Click	File - New - Folder or Right Click
Rename	Click on title or Ctrl+Click	Click and hold mouse on title or Right Click and Rename

Working between a Macintosh and Windows computer is possible if you format your disk in DOS and have the same program versions on both computers(example: Word 6 on a Mac can be read by Word 6 on a Windows machine).

<u>End-of-Year Maintenance Windows Computers</u>

Clean up your Hard Drive

√ *If you haven't used the file or document in the past year, delete it.*

1. Double click on "My Documents"
   If it is not on your desktop, double click on "My Computer".

2. Double click on the "C" drive. A list of all your files should appear. Most people default their documents to this folder. If you save to the desktop or to another folder, you will need to go to those locations.

2. To delete an item, right click on the item and select "Delete".
3. To delete multiple items, hold down the "CTRL" key. Click each item you wish to delete. Right click on any one of them and choose "Delete" from the menu that appears.
4. Right click on the "Recycle Bin" (on the desktop) and choose "Delete All". The items are still on your computer until you empty the recycle bin.

Backing up Files

Backing up to the server

1. Double click on "My Computer".
2. Double click on the folder with your username on it. This opens your folder on the server.
3. Locate the documents you wish to back up. Drag the documents to your folder on the server. You are copying the files, not moving them. You will now have them on both the server and the original location.

Backing up to a Floppy Disk

1. Insert a blank disk into the disk drive.
2. Double click on "My Computer".
3. Drag your documents over the icon for the "Floppy Drive".

Cleaning up Microsoft Outlook

1. Open "Outlook".
2. Click on your "Inbox". Hold down the "CTRL" key and click on all items you would like to delete. Click on the black X on your tool bar OR go to the edit menu and choose "Delete" OR right click on the item and choose "Delete". This will delete all the highlighted items at once.
3. Click on the "Sent Items" folder. Follow the above instructions.
4. Right click on the "Deleted Items" folder. Choose the "Empty Deleted Items Folder".

Local Printers (Except for the Epson 740)

√ *Removing cartridges from the Epson 740 destroys them.*

1. Open the printer's cover and remove the print cartridge. Place the cartridges in a ziplock plastic bag. This will help to keep your cartridge from drying out. Don't touch the metal parts.
2. When you return in the fall, put the cartridges back in the printer. You may have to clean the bottom of the cartridge with alcohol if it gets dried out.

Defragment your Hard Drive

1. Double click on "My Computer".
2. Right click on the "C" drive. Choose "Properties".
3. Click on the "Tools" tab.
4. There are three different choices on this window. Click the "Check Now" button for "Error-Checking Status". It takes awhile so don't waste your time watching it.
5. In the "Defragmentation Status" click the "Defragment Now" button. This also takes awhile but improves the efficiency of your computer.

Before you leave for the summer

1. Change your password. Passwords are good for 120 days so it is better to change it now than to try to figure out why you the internet doesn't allow you in after vacation. You may want to write the password down.
2. Unplug cords from the wall and television. (Feel free to color code or label cords so you can reattach everything yourself in the fall.)

   3. Leave the cords attached to your computer. Wind the cords up and secure them with a rubber band or twist-tie.

   4. Cover your computer with a large piece of paper or cloth (not plastic). This helps your computer to stay clean.

5 Although it is best to store the computers in a dry cool environment, that is not always possible. Your principal and Building Technology Specialist can tell you if you need to move your computer to another location.

Dancing with Technology to Teach Technology

Tweed Ross, Kansas State Univ., USA

"Those who cannot hear the music believe the dancer is mad."

Those who believe modern electronic technologies are fundamentally changing the learning of young people are faced with an intractable conundrum. To teach the new technologies to the uninitiated they are relegated to the old practices used in education for some considerable time: lecture, textbook, guided demonstrations, and lab exercises. In short while they believe in discovery learning and constructivist theories they end up using didactic process and behaviorist means. Is there a better way?

Colleges of Education setting about to reform the teaching of the future teachers in the K-12 classrooms of this century would do well to consider how their student learn technologies differently than the professorate. To reinforce the need for new learning strategies spend a Saturday morning at the electronic arcade in the mall and watch juveniles solve complex, action packed, eye-hand exercises for as long as their pocket change lasts.

The College of Education at Kansas State University set about seven years ago to revamp the way it's undergraduate, required, introduction to technology class was taught. Some years earlier the move from bulletin boards, filmstrip, overhead transparencies, and 16mm. projectors had been navigated. The new instructional media course was designed to meet the outline of then current ISTE standards.[1] However, the teaching method was still much the same: regular class meetings, professorial lectures and graduate student supervision of lab assignments followed by paper and pencil tests.

The Dean of the College along with the administrative council recognized this was not good enough and started on a new, ambitious project to "teach technology using technology." The first iteration of this effort was a video based project. This project was produced using a digital video editor. Video tapes were produced for students to watch and work through exercises in their own time frame. There were no established class times and assignments were project based for activities likely to be encountered by beginning teachers.

As new technologies became available to the College of Education and students the course was rewritten into be delivered in a CD-ROM format. As the Internet became an effective part of modern technologies the course was once again revamped to make use of this new resource.[2]

A close reading recognizes that while new asynchronous methods of teaching were employed, the course was still a self-contained course taught essentially by a "technology guru." This guru was responsible for its design, implementation, staffing and supervision. In short, the course was isolated from much of the rest of the pre-service teacher program. Teaching the use of new technologies to undergraduate education majors was the responsibility of the technology person. Technology was something to be learned, not something to be employed. Recently public schools and general experience have provided incoming students with far greater technology. To meet these new abilities of students to "dance with technology," the bar has been raised to higher levels by the NCATE 2000 standards[3] and the new ISTE standards.[4]

These standards, if they are to be incorporated by Colleges of Education, requires that the delivery, implementation and evaluation of a technology component for pre-service teachers no longer remain an isolated course taught by the computer guru. Technology must be integrated into the pre-service program of the college.

> *The unit's conceptual framework(s) reflects the unit's commitment to preparing candidates who are able to use educational technology to help all students learn; it also provides a conceptual understanding of how knowledge, skills and dispositions related to educational and information technology <u>are integrated throughout the curriculum, instruction, field experiences, clinical practice, assessments and evaluations.</u>*

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[1] ISTE (1997). National Standards for Educational Technology
[2] http://Courses.educ.ksu.edu/EDETC318/)
[3] NCATE. (2000). NCATE 2000 Unit Standards
[4] ISTE, (2000). National Education Technology Standards for Teachers.

(NCATE, 2000. Emphasis mine)

On the surface these new standards require several things to occur in relatively short order.

1. Members of the academy responsible for pre-service teaching must model and demonstrate effective technology. This requires that available resources, support, reward and development be readily available.
2. Members of the academy must be able to evaluate pre-service student teaching practice for both the appropriate use and quality of use for technologies. This requires a qualitative understanding of when technology should be used and what how to evaluate and advise others in technology application for teaching.
3. Members of the K-12 community must be prepared to support pre-service teachers in their intern experiences, evaluate technology teaching efforts and cooperate in pre-service teachers' growth and appropriate use for technology.
4. Pre-service teachers must be able to demonstrate that they can appropriately integrate technology into their repertoire of skills for teaching. K-12 schools must search for and hire graduate who can demonstrate these abilities.

At this point is becomes apparent that "those who cannot hear the music" i.e. those who do not have a vision for integrating technology into the teaching skills of pre-service teachers, must think those who do are mad. Therefore it is important that "technology guru" step out of the role of the technologist who knows how to make the tools perform and enters the role of " instructional support" vs. "technical support."

Faculty members must be encouraged to use email, not just to dialog concerning professional papers, but to react with students in a new sense of time and space. Internet applications for course management most evolve from electronic syllabus to interactive vehicles for class presence. PowerPoint presentations need to grow from electronic transparencies to ways for students to constructively collaborate on demonstrations of content. Internet searches and activities change from what is fun and flashy on the web to what has real meaning for constructing a deeper understanding of content.

Colleges of Education must insist that their technology programs not just teach the playing a musical instrument, but how to effectively appreciate the music and join in the dance. Clearly not an easy task, but one made possible if we think of ways to "use technology to teach technology."

Development of English Department of Computer Information Systems as a Way of Worldwide Educational Integration

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Abstract: reforms started in Ukraine caused creation of new speciality "Economic Cybernetics" which combines mathematical modeling and information technologies and is applied in national economy. One of the most important task during Faculty development it is curriculum development. Analysis of Ukrainian post-secondary school curricula showed, that they are oriented on traditional methods and do not consider international experience of training specialists of profile given above. There are a number of potential results, which possible to obtain, the main one consists in the *developing new Faculty*, "English Department of Computer Information Systems". The results of the proposal faculty development may be used as a basis for curricula development by post-secondary schools of Ukraine and other countries, which are going to integrate in the World community.

Introduction

As young independent state, Ukraine started reforms in economy, policy and education and began integration into worldwide international institutes recently. Economy reforms entailed development of enterprises of small and middle business, political and economic reform assisted to stormy development of new information technologies. In connection with that there appeared a need in highly skilled specialists of economic profile, which would have a command of information technologies and methods of their implementation in business-activity. It caused creation of new speciality "Economic Cybernetics" which combines mathematical modeling and information technologies and is applied in national economy. Besides, taking into account swift expansion of Ukraine co-operation with most progressive World countries, appear joint enterprises with allotted capital the employees of which ought to be skilled in information technologies, business, and also to have education, in accordance with World standards.

Curricula Development as a Main Task of the Faculty Development

One of the most important task during any Faculty development it is development of the curriculum. Analysis of Ukrainian post-secondary school curricula showed, that they are oriented on traditional methods and do not consider international experience of training specialists of profile given above. That's why the development of new curricula for speciality "Economic Cybernetics" according Western Universities Standards is an actual and important problem, and Institute of Computer Information Technologies (ICIT) of Ternopil Academy of National Economy carries it out. Analysis showed that the popular two specialities "Business Information Systems" (West Europe) and "Management Information Systems" (USA) are the most closed relative to "Economic Cybernetics". Therefore ICIT has started with some partners from West Europe together to develop new BIS's curriculum. The main result of collaboration, which can be obtain, lies in the *developing new Faculty*, "English Department of Computer Information Systems" consisting of ICIT where all subjects will taught in English (similar department has been successfully functioning in TU Sofia, Bulgaria since 1995).

Potential Results

There are a number of potential results, which possible to obtain:

- Assisting to reform system of post-secondary education in Ukraine;
- Widen co-operation of the Department with business-structures (specially with those dealing with international business and computer technologies);
- Increasing the co-operation of workers of post-secondary school with universities of different World regions.

Moreover, as for the Western Countries the obtained results allow to:

- Enrich the Western Partners by experience elements and activity peculiarities of post-secondary school in Ukraine and post Soviet Union countries;
- Increase prestige of countries and post-secondary schools participating;
- Widen the co-operation of western countries as well as Western and Eastern Countries;
- Assist the unification of World market of labor resources that is important in period of world integration.

Conclusions

The results of the proposal Faculty development may be used by post-secondary schools of Ukraine (and other countries, which are going to integrate in the World community) as a basis for curricula development for Business Information Systems as well as for other similar specialities and branches. Thus the principals of post-secondary school system of Ukraine and other post Soviet Union countries are similar, the obtained results can be adapted to national peculiarities.

References

A. Melnyk, A. Sachenko, P. Stolyarchuk, L. Sopilnyk, O. Salo. (2000). Computer Education in Ukrainian Universities: Problems and Perspectives. *Proceedings of Interdisciplinary Conference on Electrical, Electronics & Computer Engineering in the Third Millenium.* Davos (Switzerland) 10-15 September.

A.Sachenko, I.Gibson. (1993). The Teaching of Electronic Engineering - Related Subjects in the Ukraine. *Int. J. Elect. Enging. Educ.*, Vol.30, p.28-32. (Manchester U.P., Great Britain).

A. Sachenko, I. Tkachenko, A. Voronova. (1997). About valuation of quality of curricula structure in training of specialists and masters. *Proceedings of international scientific conference "Problems of economic integration of Ukraine in European Community: microeconomics aspect"*, Yalta-Foros, Ukraine, 23-25 September, pp. 202-203.

Applying Social Learning Theory to the Teaching of Technology Skills: An Interactive Approach

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Abstract: Advanced technology has a relatively short life span before it substantially changes; this is especially true of computers and information technology. Acquiring skills that are well developed and flexible will allow students to adapt to the rapid changes and innovations in technologically advanced environments. As the demands of teaching have changed over time educators have examined a variety of approaches in order to make the process of computer and technology education as efficient as possible. Albert Bandura's Social Learning Theory offers both concepts and techniques which can aid the professional educator in optimizing classroom instruction in technology and computer skills. Bandura's descriptions of the learning process and mechanisms by which they operate are especially well suited to the teaching of computer and technology skills. Techniques and theory from this approach are applicable to almost any level of education from grade school to college.

Introduction

The impact of technology on the process of modern life is undeniable. In the past two decades we have experienced the development and dissemination of a new form of mass and interpersonal communication, namely the Internet. The Internet, made possible by affordable advanced computer technology, is quickly becoming a staple of education, businesses, public administration, and private life. The same advances which drive the Internet are also revolutionizing many traditional areas of human endeavor; this impact is certainly felt in all levels of education from preschool to the college/university arena. Changes in elementary, secondary and higher education with respect to technology are rapid and widespread. Computers as teaching tools provide access to staggering amounts of information. Modern audio/visual aids, including cable televison, digital recording and imagery, and satellite broadcasting can produce phenomenal lesson plans and bring the individual student into direct contact with experiences that would have only been abstract concepts even twenty or thirty years ago. Education at all levels is beginning to focus more and more on the student's acquisition of relevant technology skills both in and out of the classroom; these same advances which facilitate the process of education will also be the tools of many trades and vocations awaiting the prospective graduates.

The Dynamic Nature of Technology Skills

Advanced technology, unlike most aspects of education, has a relatively short life span before it substantially changes; this is especially true of computers and information technology. As of this writing the one gigahertz microprocessor is now commonly available from many computer manufacturers; just five years ago the most advanced processor was less than a tenth of this speed and the platform to which it was attached could not handle streaming audio or interactive video without prohibitively expensive modifications. By the time this article reaches publication the one gigahertz microprocessor likely will be found in budget computers and will no longer be state of the art technology. Operating systems, word processing programs, and other software packages are functionally reinvented every three to five years. To use these tools to their maximum advantage requires a degree of multitasking from the learner. They must first learn the basics of the device or the software package and while they are learning this they must also adapt to any real changes in the software or hardware which impacts the capacity for output, how it is put into operation, and exactly what its new, expanded capabilities may be. The dynamic nature of technology places added demands on the instructor; unlike course content in history, philosophy, or mathematics the substance of a college level computer science course or an elementary level internet familiarization program can change dramatically in just a few months. This can present special challenges and complications to educators who strive to offer students the most current topic related information and experiences.

The next logical consideration is one of maximal efficiency; how can we, as educators at different levels, facilitate the development of technology skills in students and also ensure the flexibility of those skills so the student can adapt to these rapid, major changes? One possible solution lies in Albert Bandura's Social Learning Theory. Bandura's Social Learning Theory can be seen as an update and an expansion of Skinner's Radical Behaviorism. Bandura essentially saw Behaviorism as sound but incomplete (Hjelle & Ziegler, 1992); he postulated that there were other learning processes operating in humans that have been ignored or undiscovered in behavior theory. Behavior theorists demonstrated that external reward and/or punishment was necessary for the acquisition, maintenance, and modification of behavior. Bandura noted that while the behaviorist description of learning was accurate, people also learn in the absence of external reinforcement or punishment. Bandura described the processes of vicarious learning which involve observation, reading, oral communication, and social interactions with others. Much of the behavior we display, according to Bandura, actually is the result of learning by example or by observation.

Social Learning Theory

Bandura postulated that people have the ability to preserve experiences acquired via the observational process by generating mental imagery and through verbal representations. Through our ability to predict future consequences we can anticipate when this behavior or skill may be needed in the future. This gives us the ability to problem solve without the need for laborious trial and error learning. The experience is remembered and is translated into new behavior patterns. These patterns serve as a guide for future action.

Exactly how this learning occurs in Social Learning Theory is depicted in a specific, linear process. The individual attends to a new behavior or skill (Attention), the individual codes the experience into long term memory (Retention), the individual uses the new behavior in the future (Motor Reproduction) and when the individual predicts the future need for the behavior they are ready to use it (Motivational Process).

The skills acquisition process of Social Learning Theory is easily adapted to the teaching of technology skills, especially computer and software skills, to students of all ages. As long as the task is approached in a systematic manner, including an assessment of the student's current skill set, the student's level of development is functionally irrelevant. The application of the new skills will likely reflect where the student is on the various relatively common developmental scales and this application should broaden as the student develops and matures.

One of the major advantages of Bandura's theory is its inclusiveness. It does not refute the power of reinforcement based procedures or the efficacy of reward systems in learning, especially in the classroom. Social Learning Theory includes the time tested procedures of reinforcement based learning but expands on them with the procedures of Observational Learning. In essence, Observational Learning processes, when used with reinforcement, can dramatically increase the outcome and efficacy of instruction. Observational Learning includes reinforcement but is not dependent on it.

Observational Learning is especially applicable for the teaching of technology skills to children in grade school or young adults in college. It effectively removes one of the shortcomings of reinforcement based instruction, namely the integration of several tasks which are conceptually very different. Teaching a grade school child how to use the internet, for example, involves both simple, concrete motor skills and more abstract conceptual abilities. The simple mechanics of using a dial up adaptor and an internet browser are different from conducting a subject relevant search for a school assignment. Instead of looking at a total task as a series of steps in which each step is reinforced until the whole is acquired (chaining) or rewarding successive approximations to the target behavior (shaping), Social Learning Theory's principle of Observational Learning and Learning via Modeling provides an avenue to effectively teach a total task without having to break the task down into equal steps. Technology skills, especially software skills, may prove to be very difficult to break into steps for a purely behavioral approach to applications education. Reinforcement still plays an important role in the Social Learning Theory approach but it is subsequent to skill acquisition; the process by which skills are acquired may initially have little to do with overt reward. Instead reward is viewed as that which maintains the skills and makes future use of the skills attractive to the individual. Bandura also argued that success itself is rewarding; a student who learns to use a computer is likely to continue to do so because using the computer is "fun", or because the student's interaction with the computer is itself the reward.

As individuals learn by observing others and attempting to duplicate observed performance they form opinions about their own ability to successfully execute a skill. Bandura's concept of Self Efficacy acts as a mediating variable in observational learning. Self Efficacy is essentially the individuals' subjective belief in their own ability to complete a task or successfully engage in an activity. Persons with high degrees of personal self efficacy display confidence and willingness to try new things. Self Efficacy can be seen as operating in both a specific (general skill, a particular activity) and a general (large undertaking, life itself) context.

The development of positive Self Efficacy is managed by several factors. The most powerful is the performance accomplishment; effectively individuals raise their own self appraisal of their ability to successfully execute the skill with each rewarding application of the desired ability. Verbal encouragement can also be a very powerful motivator, especially for children and adolescents with whom the teacher/instructor has good rapport. Peer models who are very similar to the student can also raise self efficacy when the student sees someone comparable successfully execute a task such as operating a computer or applying software to solve a problem.

The Social Learning Theory model is one of a number of interacting components. The Observational Processes of attention, retention, motor reproduction and motivation for future skills use essentially describes the basics of learning. Reinforcement acts as the cement which crystalizes information acquisition and makes the individual more likely to engage in the skills in the future. Self efficacy also mediates the individual's likelihood of approaching tasks which require the new skill. Learning in a social context can help develop and maximize efficacy achievement in students through performance accomplishments, verbal persuasion, and vicarious reward.

Applying Social Learning Theory

The application of Social Learning Theory does not require special modifications to the environment as the majority of the processes emerge from the social context itself. Social Learning Theory is very flexible and can be applied in almost any area of traditional education. Focal points for the efficacy of this approach stem from observable behavior demonstrated by a model for the student and a context in which the student can mimic the model's behavior and receive feedback from others. The behavior, or skill, which is modeled should be practiced in a number of different settings and with a future focus in mind. Competition between individuals is discouraged as the social experience of learning is important to the vicarious process. The attention/retention/motor reproduction/motivation model of learning is coupled with special attention to the student's Self Efficacy. This model includes reinforcement at various stages and assumes that students will engage in behaviors because they are both rewarding, in that they allow them to solve problems and gain reinforcement, and because they are reinforcing in and of themselves.

Promoting the generality of a skill is less of a social process but it still requires the attention and motivation components of Bandura's model. Generality is important in that a student is more likely to apply a skill if they can see (predict) its utility in a number of different situations. To apply a skill to abstract problems a student has to be able to conceptualize the problem in the future sense and see how the skill helps the student solve the problem. An example would be using a computer to make a sign which lists a car for sale, using a computer to print a newsletter or a bulletin to avoid costly printer's fees, developing one's own greeting cards, keeping a digital record of valuable property on disc, scanning important documents for safekeeping, electronic banking or business, and so on. Teachers are in a unique position to help students learn how to apply technology skills in the broadest sense; they not only have their own experience but also that of each student in the classroom. The social learning model allows for verbal representations of ideas to be shared among students and for vicarious modeling to take place in a 360 degree context.

Modeling

Modeling is an important aspect of Social Learning Theory and is already present in most aspects of traditional education; the teacher/instructor/professor is a model for the student. Modeling can be maximized by recruiting students as models as well and by establishing controls over the social context in which skills are displayed. The following example involves using modeling and social context control in teaching basic computer operations to elementary school students.

The instructor demonstrates the basic operation of a personal computer to a small group of students who will later become models themselves. She turns the computer on, creates a user name and password for herself, checks the computer for errors using a basic utility program, and then demonstrates how to use the basic functions of the PC. She then supervises each student as they complete each step of the operation: turning on the power, creating their own personal identity, and so on. The students then work as a group to complete a basic assignment involving the newly acquired skills. After this small group of students has demonstrated basic competency in computer operation she then familiarizes them with the basics of a word processing software package. This small group of students is now ready to act as models for a larger class.

In class the instructor assigns a number of students to each student model, effectively forming small groups with their own access to a PC. The instructor then takes the class through the prepared lesson in basic computer skills; she models the behavior in front of the class and directs the class' attention to the student models in each group (attention process). The student models then demonstrate each step as the instructor describes it. After a complete cycle of the skill the student models then assist each member of their group in duplicating the instructor's performance while other group members watch (retention process/motor reproduction). The instructor moves from group to group and provides supervision. The student models and the instructor provide encouragement and suggestions to the students learning the skills; the instructor also provides praise to the student models (verbal persuasion, reinforcement).

After the students have acquired basic skills, the instructor and the student models demonstrate problem solving and apply the skills to a certain task, such as installing a simple program or running a virus scan. The instructor then provides each student model with a list of tasks to be completed by the group using the new skills. The student model supervises the group members as they each in turn use the new skills to complete an assigned task (retention/motor reproduction/motivational process) on the group computer. The other group members are encouraged by the model to provide verbal support for the student currently applying skills but not to give them answers outright. The student model can stop the exercise and demonstrate the required behavior as needed to refresh the memory of group members.

After the basic skill set is present in all class members the student models are trained in the next set of cogent operations such as using a word processing program or connecting to the internet and establishing an E-mail address. The process then repeats itself with the new skills being presented to the class to build on the old ones and the student models serving to reinforce the instructor's efforts.

Self Efficacy

Student Self Efficacy is very important in the acquisition of new skills. Students who appear to be "technology resistant" likely have a negative belief about their ability to succeed, despite the assurances of an instructor. Student self efficacy can be bolstered by using the same process as above except more care must be taken in establishing the social context. Pairing the student with a model who appears to be very similar to the student in question is useful. The student can make positive vicarious comparisons between the self and the model. Verbal persuasion from peers is often more encouraging than the same encouragement from an authority figure such as an instructor; this is especially true of students in the elementary through high school range. Peer models can encourage a student to try a simple exercise with the new skill (positive peer pressure/verbal persuasion) and provide praise when they successfully complete the task (performance accomplishment). The peer model then reminds the student of how easily they completed the last task and provides them with the next. The peer model makes sure the student understands that the new task incorporates the previous skills with a few extra steps or some variations. Once the student is able to demonstrate the behavior of interest on demand a further useful approach is to get the student to demonstrate the skills for other students, effectively turning the student into a model.

The effects of performance accomplishment and social reward on the student models is pronounced. The student models likely receive great benefit from teaching others. This is due to the attention/retention process they have to display in the course of learning the skill and the motor reproduction involved in demonstrating it repeatedly for new students. The models also already have the motivational process in play; they know while learning the skills for the first time that they will be using them in the future to teach other students.

Promoting Generality of the Skill

After a certain set of skills has been acquired by the learner it is very useful to challenge the students to develop personalized ways of using the skills. This personalization encourages generality of the skill, or the likelihood that the student will use the skill to solve problems and complete activities which are not directly related to the context in which the skills were learned. For example a student learns to use a popular word processing package, photo editing software, and develops the skills necessary to operate a PC and connect to the internet. The student, a college sophomore in a computer course, now types all of his term papers using the word processor and searches the internet for humorous stories to send his friends via E-mail. The student is challenged by the instructor to apply all of these skills to their favorite hobby.

Within the social context the instructor can challenge the group, including the student model, to develop a group specific project which incorporates all of the desired skills. Each group member has input into the process and is required to demonstrate how they used their skills in the creation of the final project. Another project to encourage the generality of skills is to ask each student to demonstrate a set number of distinct operations using all or some of the skills under development. Exactly what those operations are would be left up to the individual but they would have to meet a set criteria. An example would be using the word processor to keep up with homework, develop an accounting sheet for budgeting purposes, and making a sign or a banner which runs the length of the paper. This approach, along with verbal encouragement and a demonstration from peer models, can help a student find more abstract (and more general) applications for their skills.

Generality is also promoted outside of the classroom. The instructor can give assignments to the students to find uses for the new skills at home or at work and to at least hypothetically demonstrate the use of the new skills (motivational process, motor reproduction).

Emphasize Cooperation

When students are competing they not only tend to work in isolation but they also tend to avoid sharing information and providing encouragement to others; this is true of elementary students and college students alike. The pitfalls of cooperative work among students include no assurance that the individual has actually met the standards of evaluation for the course and that a few individuals in the group may be completing the majority of the work. The benefits of the social cooperative approach include constant feedback from other group members (especially when the group includes a peer model), peer support and encouragement, and a number of different sources of observational learning. The negative aspects can be controlled by encouraging group effort and participation in learning and demonstrating the tasks while evaluating each student's participation on an individual level. This evaluation would include the peer model. The instructor would establish the skills to be learned by the students and inform the students how each person will be evaluated by the instructor (motivational process). The peer model and the instructor demonstrate the skill so each person has the opportunity to observe and duplicate the model's performance (motor reproduction). The individual student is then required to participate in a practice evaluation with the other group members providing encouragement but no direct assistance. Each step is reinforced by the group and the peer model (efficacy) as it is successfully completed. Students who display difficulty in acquiring the skill during the practice evaluation may receive more direct instruction from the peer model and the instructor. A second practice evaluation is attempted without peer support; after this evaluation is completed each group member practices the skills while waiting their turn for the actual evaluation.

The social context in which cooperation occurs is not much different from that of competition; the difference lies in the emphasis placed by the instructor (the primary model). Cooperation itself is a skill which is useful outside of the educational arena, especially where technology skills are concerned. This should be emphasized when the instruction is taking place; it provides a basis for the student to imagine a future using these skills in an occupation or recreational setting. For example software developers, journalists, music producers, and engineers are all dependent on technology for their vocations and rarely do they work on projects outside of a team environment. In using a Social Learning approach to the teaching of technology skills the students not only learn the skills in question but also learn how to apply them outside of the strict context of the educational setting and how to act as part of a team, a skill which will be necessary in the pursuit of a career dependent on computer technology.

Conclusion

Bandura's theory has tapped a number of different processes which relate to human learning. These processes include the demonstrated efficacy of reinforcement/punishment based learning espoused by traditional behaviorists and the previously ignored vicarious/observational processes which tend to occur in the absence of reinforcement. Bandura's theory is a flexible approach which adapts well to many settings and is especially well suited to the teaching of technology skills. Social Learning Theory also includes the subjective component of Self Efficacy. Self Efficacy is not only important but it may explain why some students appear to be resistant to learning technology skills. The social context also helps students prepare for future team-oriented work environments; software designers, engineers, editors, journalists, and many other professionals rely not only on advanced technology but on team contributions to the completion of a project. Computer technology, software design and capabilities, and media technology all progress and change at a rapid pace. The social learning perspective not only helps students focus on the future and prepare for potential changes but also provides them with skills necessary to acquire new information and update old skills with maximal efficiency. The model of attention/retention/motor reproduction/motivation, coupled with opportunities for the individual student to develop and demonstrate Self Efficacy, can be very powerful tools for helping learners acquire and apply technology skills.

References

Bandura, A. (1989a). Social Cognitive Theory. In R. Vasta (Ed.), *Annuals of Child Development.* (Vol. 60, p. 1-60). Greenwich, CT: JAI Press.

Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory.* Englewood Cliffs, NJ: Prentice Hall.

Hjelle, L. & Ziegler, D. (1992). *Personality Theories.* McGraw-Hill: New York

Applying Rogerian Theory to Technology Resistant Students

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Abstract: This paper proposes ways of helping technology resistant (TR) students in terms of Carl Rogers' theories. In this view, students are motivated by the single, unitary motive of actualizing—maintaining or enhancing their lives to their fullest potential. Resistance to technology is defined in terms of incongruence among the Real Self, the Ideal Self, and the technological task to be learned. Suggestions using Rogerian principles are given to assist educators in working with technology resistant students.

Introduction

The theories of Carl Rogers do not find much application in the various applied disciplines of education because of the preference for more learning oriented approaches. However, it appears Rogerian principles and methods may well be suited for facilitating the acquisition of technology skills in the modern classroom, especially with the so-called technology resistant (TR) students who otherwise demonstrate adequate performance to overcome resistance toward learning technology skills. As the world progresses through the computer and the mass media revolution, technology skills are rapidly becoming a required skill set of the modern student. Students who have no computer or technology skills may find themselves at a disadvantage educationally and occupationally. Many students have difficulty acquiring computer and technology skills, especially when their access to computers outside of the learning environment is limited. Children, whether very young, the adolescent high school student, or the young adult leaving for college, learn most of their attitudes towards the processes of life from their parents. Trying to help a student overcome a counter-productive belief about the self or the self's abilities, especially about technology, can be a source of frustration. Instructors and educators at all levels have certainly experienced frustration with otherwise good students when confronting the statement "I just can't do math." This self-statement not a statement of incompetence but rather a self-expression of one's own beliefs about the self as the person understands it. Such self-statements lead to internal beliefs about the self's ability to operate in the world. These beliefs, in turn, impact the individual's future perceptions and behavior. The same statement regarding computers in the place of math is no different. For example, an elementary student who uses the self-statement "I can't understand computers" is actually making an assessment about his or her own ability to interact in any situation where computers are important. This leads the person to seek situations that are more congruent with his or her perceived strengths. Fortunately, such a self-attitude concerning computers is easier to correct than math. This is because technology skills, for the most part, are hands-on and concrete, at least initially. Math is also highly structured and sequenced but is abstract in the extreme and is almost entirely conceptual. A Rogerian approach can quickly get to the heart of the matter: the conflict between the individual's assessment of his or her abilities and the individual's perceived requirements of the skill.

Students, from grade school to college level, can display TR in a number of ways. These students have the capacity to learn the skills but are just not learning them. Resistance can take the form of quitting easily and becoming quickly frustrated when presented with a technology oriented task. Resistance can be simply avoidance of anything related to a particular theme, such as the internet, media technology, or computers in general. Some students may display apprehension of the device or its applications. Others may insist that the problem has little to do with technology but instead internalize the problem and insist that they do not the necessary requirements to learn the skills. These problems are most likely simple self-concept dilemmas.

Self Concept and Learning

Self-concept is a key element in Rogerian theory. It is basically composed of two parts: the Real Self and the Ideal Self. The Real Self is the person's subjective, phenomenological, interpretation of how he or she is right now. Because reality is subjective and is interpreted differently by all who view it, the student's perception may be very different from that of the educator. The Ideal Self is the personalized, hypothetical "perfect" self of the student. This is the goal to which the student aspires to become, and the metaphysical yardstick by which everything the person does now is measured. Any disagreement between the Real and the Ideal Selves, or between the Real Self and the person's assessment of the task at hand will cause problems. Human nature is growth oriented, or actualizing. The Actualizing Tendency is the tendency to maximize experiences and develop perceived strengths and talents as they relate to the Ideal Self. The Actualizing Tendency can be blocked or frustrated by social pressure, outside influences, and any situation that places conditions of worth upon the student.

Educators can overcome TR in otherwise capable students by applying a fundamental method of communicating and problem solving. Many educators who enjoy good rapport with their students may already apply some of these techniques in a general sense. These techniques begin with a one-on-one dialogue with the student away from other social influences. The components of this dialogue consist of empathy, communicating unconditional positive regard, understanding of both the individual and the problem, and a firm willingness to actively seek a resolution *with* the student, not *for* the student. Empathy is best communicated through simple statements and nonverbal communication. Coupled with eye contact and open body posture, such statements can help students feel that the educator understands their feelings. Unconditional positive regard for the student can be communicated by showing respect for the person and his or her ability to learn, and by avoiding criticism of a student (even if deserved). Focus on the student as a person, not just a learner. This does not mean that the educator has to accept everything that the student does, just that the student is a person with his or her own feelings, fears, and dreams of the future. Statements such as "I think you're all right" communicate this regard. Once the educator has a sense of the student as a person they can begin trying to understand the nature of the problem. Understanding the person as well as the problem will lead to the most effective solutions. Ask students general questions about what they think of the task and if it is important to them. Communicate that there is no wrong answer but that these skills are important.

Many otherwise good students can have a difficult experience in acquiring technology and computer skills. These students may appear to be motivated, frustrated, confused, or even hostile. It is possible that the students themselves are not disrupting the process for its own sake but rather have difficultly in conceptualizing their role as learners and consumers of technology and related skills. The theories of Carl Rogers may have a solution for educators who are trying to reach a TR student. Rogerian theory centers upon the person and how that person perceives others, the environment, and the self. Using Rogerian techniques and principles the educator can approach a student, even one who is actively resistant, and find mutual solutions which not only will aid the student in overcoming TR but will also serve to reinforce and maintain positive rapport between the educator and the student.

Remote-Control Computing

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Abstract: This interactive session presents remote-control computing from the perspective of the educator. If you have ever taught a class where your students use software at home, or have ever had the need to access your office computer files from home, then remote-control computing is for you. Remote-control computing software allows you to connect to remote computers from your computer, and control those systems as if you were right there in front of them. You can take over the remote system and provide problem solving assistance, upload and download files, and even change system parameters and re-boot. And it works over the Internet! In this interactive session, participants will gain an understanding of what remote-control computing is, who the major players in the industry are, and how educators can use it. Session attendees will also see remote-control computing software in operation, performing tasks in the academic environment.

Introduction

As a computer technology instructor, I teach classes in which students use software that they run at home or in a lab remote from me. Often they will have problems that are difficult to resolve over the phone, via email, or even in a classroom discussion. In fact, some problems are nearly impossible to solve without seeing the actual conditions surrounding them. If only I could be there with the student to help...

Have you ever been working on a project at home, only to discover that you need a file from your office computer or access to a campus information system? Wouldn't it be nice to be able to handle this without driving out to work?

Remote-control computing

Remote-control computing refers to the ability of one computer system to control another computer system from a remote location. It is implemented over a network using software that resides on both computers. One system acts as the Host (or server) and the other system as the Guest (or remote controller). The guest system takes control of the host system.

There are many software packages that provide some level of remote-control processing capability. Generally, they are categorized into two groups: consumer-oriented remote control and enterprise system remote control (Fratto, 2000). The marketplace is fast and furious, with products refreshed quarterly with new features and functionality (Doherty, 2000). Enterprise remote-control products have the highest level of functionality and are the focus of this paper.

The role of remote-control computing in the academic environment

Student Assistance / Distance Learning

Many problems students have when using a software product can be resolved when they occur, by taking over control of the students' computers using the remote-control capability of the software. This allows you to connect to their computers (using a number of different connection options) and control the systems as if you were right there. You can run the software, confirm input requirements, check output, etc., and in fact, try anything you would do if you were sitting at their keyboard. This certainly beats troubleshooting through a conversation over the phone, or sending software files back and forth via the Internet.

Administration

Remote-control computing also allows you to link to your office computer and access other systems on the campus intranet. This includes applications on network servers and other operating system platforms. For example, I've used it to register students on the internal campus registration system from my home computer.

Telecommuting

It's very handy for administrators and faculty who need to access work files at home as they telecommute or put in those extra hours sometimes required to get the job done. You can even transfer files - interactively sending and receiving data or programs that may assist with your project or problem resolution activities.

Research

The ability to share computer-controlled research equipment is enhanced by remote-control software. The Oak Ridge National Laboratory uses remote-control software at its High Temperature Materials Laboratory to allow researches from across the country to use a million-dollar electron microscope (Krause, 2000). Even if we don't have million dollar pieces of equipment, the ability to remotely monitor and control research processes is valuable to most of us.

Remote-control computing software

As stated earlier, there are many players in the remote-control software marketplace. Many of the consumer-oriented products are available as Freeware or Shareware. These products provide some level of remote-control and/or file transfer capability, but generally do not contain all of the features and functions required by the enterprise system user. For those interested, a table identifying many of these systems and their capabilities can be downloaded from the Internet (Winfiles, 1998).

The following table consists of a number of the more robust enterprise system remote-control software packages.

Software Package Name	Developer
Carbon Copy	Compaq Computer Corporation
ControlIT	Computer Associates International
CoSession Remote	Artisoft
Laplink	Traveling Software
NetOP Remote Control for Windows	Cross Tec Corporation
PcAnywhere	Symantec Corporation
PCDuo	Vector Networks
Proxy	Funk Software
ReachOut Enterprise	Stac Software
Timbuktu Pro	Netopia
VNC	Oracle Research Laboratory

Table 1: Enterprise System Remote-Control Software

Features & Functions

The features and functions of these software packages fall into the following categories:

Remote control capabilities: what you can do/control on the host machine. This describes the extent to which the software can recognize and utilize the hardware and software components on the host (Doherty, 2000). This might range from limited capabilities to run programs on the host computer all the way to being able to run programs on any network server attached to the host.

Connectivity: the options for connecting the guest system to the host system. Most remote-control software products offer multiple connectivity options that may include: direct connect (cabled serial or parallel ports), modem to modem, LAN, WAN, Internet, and wireless infrared. Most systems utilize TCP/IP communications.

Supported operating systems: the operating environments supported by the software. Most of the packages support only the Microsoft Windows environments, although VNC and Timbuktu support Apple MacIntosh, and VNC also supports Unix.

File Transfer: the ability to transfer files and programs between the guest and host systems. Features of this capability include the ability to handle long file names, drag and drop transfer functions, the ability to synchronize files so that they are the same on both systems, and the ability to continue interrupted file transfers.

Security: this includes password protection of the guest and host systems, encryption of data transmissions, virus protection, and host system screen blanking and keyboard locking to prevent an onlooker from observing confidential processing (Robinson, 1998).

Printer redirection: the ability to print at both the guest and host locations.

Chat: the ability to conduct a PC chat with a user at the host site during the remote-control session.

Drive mapping: the ability to map the disk drives from the host system to the remote system so that the remote system may use the files and programs located on them as if they were local disk drives.

Product Ranking

In my research, I was able to find three different organizations that have tested and ranked some, though not all, of the remote-control software packages listed in the table above. The test criteria was similar in all three organizations; focusing on performance in terms of screen refresh and file transfer speeds, security features, remote-control functionality, and ease of use.

The comparison done by Network Computing concentrated on solutions that offered operating system and network integration, advanced security options, and enhanced network installation capabilities (Fratto, 2000). The News-Times Computer News focused on security and connectivity, as well as remote-control functionality (Robinson, 1998). Smart Computing looked at file transfer features, security, and chat capability in addition to remote-control ability (DePasquale, 1996). All three organizations were unanimous in selecting Symantec's pcAnywhere product as their remote-control product of choice.

pcAnywhere

Supported hardware & software platforms

Designed for the PC architecture, Symantec's pcAnywhere was one of the first remote-control software products available. While the current product level (pcAnywhere 32) was developed for Windows/9X, Windows NT, Windows 2000 and Windows ME environments, it is backwards compatible to Windows 3.1 and DOS (DePasquale, 1996).

Connection options

pcAnywhere can be configured to connect via modem, serial port, parallel port, infrared connection, ISDN connection, and several network protocols including TCP/IP, Novell and netBIOS. Access over the Internet is achieved by using the TCP/IP protocol over a dial-up or dedicated connection to an Internet Service Provider.

Security features

Security is a primary consideration when you run a remote-control host on a critical system, especially if it is networked to other systems on campus. You can setup passwords at both the host and guest system to protect the configuration data from being viewed or modified by unauthorized people (Rockett, 1999). Several levels of data encryption can be invoked to protect data transferred between the systems. You can even blank the host screen and lock the keyboard and mouse so that people present at the host site cannot observe confidential information.

File transfer

pcAnywhere provides a File Manager window of files and directories for both the guest and host systems. You can drag and drop, select a group of files or directories to transfer, and synchronize (or clone) files between systems. Files are compressed for transmission and transfers can be restarted from where they left off if the connection temporarily drops.

Miscellaneous functions

Drive mapping, virus checking, and interactive chat between the guest and host systems are also supported by pcAnywhere.

Demonstration

During the interactive session, features and functions of pcAnywhere will be presented to demonstrate how the educator might use this remote-control computing tool.

Software Installation

The minimum system requirements to run pcAnywhere are:

486sx 25MHz processor or higher
16 MB of RAM (20 recommended)
32 MB of hard disk space
VGA video minimum
Windows 95/98, Windows NT Workstation and Server 4.0
CD-ROM drive

Installation is very simple and can be accomplished in just a few minutes. Just load the distribution CD into your drive and select "Install Software". An installation wizard is loaded that guides you through the process. Documentation and technical manuals are also included on the distribution CD.

Host Setup & Operation

For the demonstration, a host system will be setup to allow remote control over the Internet. To create a host environment, start the pcAnywhere program, and then click on the "Be a Host PC" tool bar icon. Next double-click on the "Add Be a Host PC Item" icon to start a wizard to guide you through the process. The first thing you must enter is a name for this host session. Next, select the connection option you want to use. Since this is for an Internet connection, you select TCP/IP. That's all there is to it. The wizard will ask if you want to start the session immediately. It will also add an icon to the "Be a Host PC" folder and you can select it whenever you want to start the session.

In order to link to this session for remote control, the guest computer will need to know the TCP/IP address of the host computer. To get the TCP/IP address, connect to the Internet through your Internet Service Provider (ISP), and then start your pcAnywhere host session. The TCP/IP address will be displayed on the pcAnywhere window.

Remote Setup & Operation

To create a guest environment to control a host session over the Internet, start the pcAnwhere program, and then click on the "Remote Control" tool bar icon. Next double-click on the "Add Remote Control Item" to start a wizard to guide you through this process. The first thing you must enter is a name for the remote-control session. Next, select the connection option you want to use. Again, since this is for an Internet connection, you select TCP/IP. This window also asks you for the name of the computer running the host session. Leave it blank and end the wizard without starting the session.

Now right-click on the remote-control icon you just created and select "Properties" from the menu list. Click on the settings tab and enter the TCP/IP address of the host computer into the "Network Host PC to control or IP address" field provided. Click on "OK" and you're ready to start your remote-control session. To start it up, connect to the Internet through your ISP, then start pcAnywhere. The systems should connect in just a few seconds.

Security

Passwords can be entered for the guest and host sessions that will restrict the ability to view or modify the configuration of the sessions and to prevent unauthorized people from starting the sessions. This is done by selecting the "Protect Item" tab from the session properties dialog window. Simply enter the password and select the level of security wanted.

The keyboard and mouse of the host or remote system can be disabled from the settings tab, and data encryption levels are selected from the security options tab. You can also blank the host screen from the security options tab.

The host session also allows you to set up a folder of authorized callers and the passwords required for them to gain access to the host system. This is done from the callers tab. This is where you also configure what resources a given user has access to on the host.

Remote-Control

Once the guest and host systems are communicating, you can begin remote control operations immediately. You can literally do anything a local user could do (provided it isn't restricted by the security options), including linking to networks and other equipment connected to the computer.

File transfer

While you're in remote-control mode, you can begin file transfer activities by clicking on the "Load file transfer" icon in the pcAnywhere tool list. This starts the pcAnywhere File Manager window that allows you to navigate through the files on both systems, including network drives. To send a file, select it from one of the navigation windows and press the Send button. You can also select groups of files and folders to transfer. Other feature will be demonstrated as time permits.

Academic Simulation

The interactive session will include the simulation of student assistance and administrative uses for pcAnywhere to demonstrate how it can become a useful component of our information system resources.

Conclusions

Remote-Control computing has a place in the software portfolio of the academic user. It has many uses in the areas of student assistance, administration, research, and telecommuting. As our information systems become more network centric, and we look at using Internet technologies to deliver education, we must develop skills at using tools that can help us provide better support and assistance to our students. Remote-control computing can help us provide this support and be more productive at our administrative tasks.

References

DePasquale, E. (1996). Remote Control Software: Extending The Boundaries Of Your Office -- Guide Series: Computing Basics, September, 1996, Vol. 4, Issue 9

Doherty, S. (2000). Remote Control Saves Steps [63 paragraphs]. Network Computing [On-line]. Available: http://www.nwc.com/1102/1102f3.html [2000, Nov 7].

Doherty, S. (2000). PC Duo 5.03: Remote Control Takes Hold of the Enterprise [11 paragraphs]. Network Computing [On-line]. Available: http://www.nwc.com/1114/1114sp3.html [2000, Nov 26].

Fratto, M. (2000). Take Charge Of Enterprise Resources With Eight Remote-Control Solutions [62 paragraphs]. Network Computing [On-line]. Available: http://www.networkcomputing.com [2000, Nov 26].

Krause C. (1998). From a Distance: Remote Operation of Research Equipment. *ORNL Review*, v30n3-4.

Robinson, P. (1998). Computing by Remote Control [35 paragraphs]. TheNews-Times Computer News [On-line]. Available: http://www.newstimes.com/archive98/apr2998/cph.htm [2000, Oct 27].

Rocket, W. (1999). Symantec pcAnywhere 9.0 Is Just Right for Control Freaks [17 paragraphs]. Network Computing [On-line]. Available: http://www.nwc.com/1023/1023sp3.html [2000, Nov 14].

Winfiles (1998). Windows 95/98 Remote Computing Tools. [42 paragraphs]. Winfiles.com [On-line]. Available: http://winfiles.cnet.com/apps/98/remote.html [2000, Oct 27].

The Use of Instructional Technology to Enhance Teaching Outcomes on Site and at a Distance

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Abstract: Constant changes in technology are a major threat to the survival of traditional education systems. Instructional technology (IT) has to become a major component to the educational system to help teachers effectively and efficiently integrate new media in their teaching. Several factors such as a greater demand for technological learner graduates, the teaching of knowledge for distant learners and a more effective delivery of the curriculum influence the use of IT in academic institutions. The author of this article will present a practical framework to help faculty and academic staff to incorporate IT into the teaching process.

Introduction

Ample computer and Web-based resources, technologies, and media installed in several academic institutions (Schools, Colleges, and Universities) are not used either efficiently or effectively to enhance teaching on site or at remote locations. On one hand, teachers use very little computer resources and instructional technology in their teaching. Methods of instruction do not include the use of Web-based and computer resources. In several situations, development programs for faculty fail to incorporate modern technologies as resources for instructional units. On the other hand, educational budget cuts and a greater demand for technological learner graduates force higher educational systems to incorporate instructional technology in the curriculum. Morrison (1999) focuses on the challenge that learners needed to be well prepared to face new highly-technical skilled jobs in a world market where the professional knowledge base is rapidly changing. The author mentions that these students should be able to use information and communication technology tools competently.

The objective of this paper is to describe the factors influencing the incorporation of IT in Schools, Colleges and Universities, to present a framework for integrating IT in the teaching process, and to examine the use of a Web-based instructional model (WBIM) with sound instructional design principles.

An assessment of the factors influencing the use of IT in academic institutions

Due to external factors such as education and government policy, education systems have to do more with less resources (budget cuts in education), and a greater demand for technological learner graduates require teachers to use modern media to create teaching prototypes and deliver the course contents. Internal factors such as better network and communication infrastructures, wide installation of computers on the campus, pressure by the learner body for incorporating modern media in teaching. However, several barriers as Garland (1995) describes in his paper are major factors to be considered by the instructional technologist for the diffusion and adoption of IT: individuals including cultural traditions, lack of knowledge, cost issues, infrastructure (if cost savings do not justify major changes in the infrastructure), and user acceptance. The author mentions that

> "the culture developed within an institution can act as a barrier to change, ...the difficulty encountered with transplanting the open classroom approach from Great Britain to United States during the 1960s is a good example of this (p. 254).

Jacobsen (1998) points out in his paper that academic institutions have great difficulty in integrating computer technology for teaching and learning in higher education. He also mentions that many faculties are highly motivated to integrate computer into the teaching process, but schools provide poor financial and technical support for the use of technological media. The literature describes several barriers that are impediments to integrating technology in the curriculum: lack of time to develop instruction that uses technology; lack of computer resources in the classroom and no connectivity to the Internet; old classrooms without new technological media; poor technical support for the incorporation of computer and Internet resources to the curriculum; inadequate financial support for computer and Internet integration in the creation of open learning prototypes and its delivery; too few computers for the number of learners; inadequate training for staff and faculty; inadequate financial and technical support for the development of instructional uses of Internet services and computers; poor planning and lack of coordination of computer and internet resource usage in the curriculum; and poor assessment and control of the computer-mediated resources uses in the classroom and at a distance

A framework for integrating IT in the teaching process

Over time, the teaching environment evolved from a closed traditional classroom to a open virtual classroom. The field of technology has evolved from an information technology era to a communication-networking technology environment where teachers and learners can exchange ideas and knowledge. Figure 1 presents the technologies that are needed to support teaching and learning in higher education. With the introduction of new media and technology for learning and teaching, academic institutions have begun to enrich their once impersonal lecture classes using E-mail, discussion groups, and personal Web pages (Perrone, Repenning, Spencer, and Ambach, 1997). However, institutions will have to be cognizant of the pros and cons of instructional technology used in the curriculum.

Kurshan (1990) states that telecommunications must become a part of daily classroom activities. A practical framework must exist for incorporating IT into the curriculum. First, the academic institutions have to implement an efficient network infrastructure (LANs and WANs) to support the communication infrastructure as shown in Figure 1. If these infrastructures are not working properly in synergy, the faculty will not be able to develop effective open learning systems. Academic institutions have to create computer services centres (Web help desks) and instructional technology centres to support teachers in the development of open teaching prototypes (St-Pierre, 1998). Several academic institutions have a network to store and deliver distance-learning courses. The teachers should use the Web server on the Internet to store and deliver teaching materials and services to the learners.

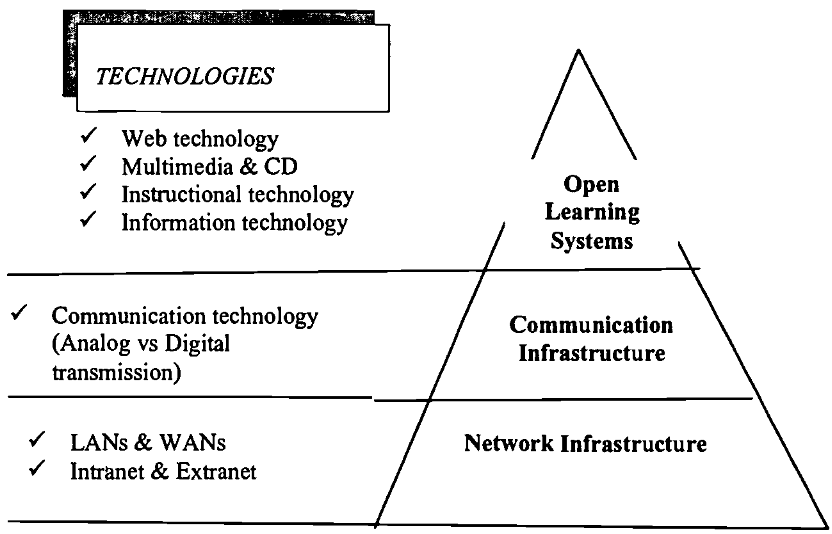

Figure 1: The technologies in support of teaching and learning

The use of a Web-based instructional model for teaching and learning

Crossman (1997) and Rossner & Stockley (1997) see the Web as an instructional technology tool comprised of a variety of media with the potential to carry substantial information to a great number of people all over the world. In their research, Shaw and Gaines (1996) experimented with the application of the Web to undergraduate collaborative learning and the development of special-purpose tools supporting the learning process via the Web. With the constantly increasing popularity of the Internet, distance learning becomes available to everyone. The Web could become an effective delivery system for the courses on site and at a distance. Academic institutions should establish incentives to encourage the teachers to use the Web technology for creating open learning systems as shown in Figure 2.

Modern Web communication media such as Web bulletin board, chats, e-mail, Web audio and videoconference systems present a good communication platform to exchange ideas, homework, and course materials for the teachers and the learners. There are several Web authoring tools on the Web, such as WebCT, Lotus Learning Space and the Blackboard, that help teachers to design open teaching prototypes. Butler (1997), using a multiple-case study, builds several Web-open teaching prototypes, and views the Web as an educational tool for bringing outside knowledge into the classroom and opening the classroom to the world.

OPEN LEARNING SYSTEMS

- E-mail
- Listserv & bulletin board
- Chats (text, sound & video)
- Search engines
- Java, CGI and VB scripts
- Imaging technology
- Sound and video clips
- HTML Web pages and PDF Web pages
- Web authoring tools
- Others (virtual reality, electronic commerce, .XML,.)

Figure 2: The use of Web technology for creating open learning systems

The use of sound instructional design principles for Web-based teaching models

Ritchie and Hoffman (1997) feel the Web, with its constant change in technology, provides a dynamic platform wherein sound instructional design principles could be incorporated to present teachers and learners with a more intuitive, interactive, and easy-to-use medium. Teachers could create maps to guide the learners through their learning paths. Online delivery using the Web is a means of fully augmenting or replacing other methods of teaching and learning. Mediated forms of delivery using the Web make it easy to update dynamic, constantly changing information. A well-designed Web-based instruction provides an efficient delivery medium for the teacher and an attractive content for the learner on site and at remote.

A list of instructional design principles should be considered while the teacher is developing Web-based teaching prototypes (St-Pierre, Bettin, Dilliger, & Ferraro, 1999). The instructional designer should introduce sound design in the Web-based learning prototype such as a good navigation structure to help the learner to navigate nicely the Web course without being frustrated. He/she should insert images to attract the learner to key components of the learning prototype such as course objectives, course materials, online tests and assignments. The Web course should clearly identify learning objectives early in the course and define precisely what is expected from the course. The open learning prototype should include learning and discussion activities to involve the learner actively in the learning process. Guidance and quick feedback such as a help function and interactive forms could guide the learner to a more appropriate learning path.

Online tests should exist to assess the students' learning and to assure that the learners have integrated the desired knowledge. The open learning prototype should provide communication media to allow the student to exchange ideas with his/her peers and the teacher. Technical and moral support is a necessary ingredient for distance learners so he/she will be encouraged to complete the course.

During the design of a Web-based learning system, instructional strategies need to be diverse and robust. For example, a distance course needed to be supported by online materials with the learners, collaborative technological media, such as videoconferencing, and communication media, such as e-mail, for a better learning environment. The strategy will move away from the traditional rule-based, procedure-oriented mode to a more dynamic, interactive learning mode. In designing a Web-based open teaching course for distance education, a set of criteria have to be defined for its success and effectiveness: enhances student-to-student and faculty-to-student communication, encourages students-share perspectives, enables student-centered teaching approaches, accommodates varied learning styles, provides opportunities for exploration and discovery, promote additional rehearsal time, provides 24/7 accessibility to course materials, provides just-in-time methods to assess and evaluate student progress, and adds pedagogical benefits such as providing self-testing (Porter, 1997; Pahal & St-Pierre, 1999). The author developed web-based instructional models that meet the above criteria (StPierre, 2000).

The author of this article believes that Web media and technology should be used simultaneously in the teaching and learning processes, i.e. there should be equilibrium between the left-hand-side (teaching) and the right-hand side (learning) of the equation with respect to the uses of Web resources in the curriculum. If the teachers were using Web media in the delivery of course contents, the learners should be learning how to integrate these tools into their learning process and vice versa. The technological delivery platform for the curriculum is ineffective if the learners are frequent users of Web resources and technology in their learning process; whereas, teachers do not know how to integrate these media into their teaching process. Based on the author's experience in using technology in teaching for several years, the author firmly believes that Web media and technology have to be in equilibrium if the institution wants to effectively deliver the curriculum. For instance, Athabasca University, located in Edmonton, Alberta, offers a Lotus notes environment where teachers and students use the same media and technology to do collaborative work. Surveys showed that Athabasca University rank among the best distance education schools in business that promote learning outcomes and provide rich learning experiences with asynchronous learning media such as bulletin boards and database discussions.

Conclusion

IT plays an important role in educational systems as it brings new media and technologies to the teaching world. Continuous changes in technology create major changes in educational systems, and IT has to evolve to help teachers bring new teaching media and instructional strategies in the classroom to deliver the curriculum (Salisburry, 1996). Teachers have to learn these new media to enhance the teaching process.

Young learners are brought up in a multimedia environment and they expect to find a similar learning environment when they come to institutes of higher education. The field of instructional technology is evolving, especially due to the change in multimedia (CD-ROM), Web, networking, and communication technology. We are living in a communication age and open learning systems will dominate traditional classrooms. The Web teaching tools and services now available such as Bulletin Boards, chat rooms, Web pages, listserv, e-mail, etc., are present in this society and will be more effective than the old methods for many aspects of teaching.

In conclusion, IT will play an important role in the 21st century with the advent of new media and technology, and a younger teaching body that will be motivated to work in an open-learning environment. Distributed knowledge database will be available to any learner at any time as educational systems will promote the development of sound instructional teaching systems. E-commerce will promote the development of electronic education malls where teachers and students can communicate and interact using University-based telelearning approaches (Langenback & Bodenforf, 2000). The teacher will play the role of a facilitator and/or a mentor in several teaching instances.

References

Butler, B. S. (1997). Using the Web to support classroom-based education conclusions from a multiple-case study. In B. H. Khan (Eds.). Web-Based Instruction (pp. 417-423). Englewood Cliffs, NJ: Educational Technology.

Crossman, D. M. (1997). The evolution of the Web as an emerging instructional tool. In B. H. Khan (Eds.). Web-Based Instruction (pp. 19-23). Englewood Cliffs, NJ: Educational Technology.

Garland, K. P. (1995). Diffusion and adoption of instructional technology. In Anglin, G. J. (Eds.). Instructional Technology: Past, Present and Future (pp.253-257). Englewood, CO: Libraries Unlimited.

Jacobsen, D.M. (1998). Adoption patterns of faculty who integrate computer technology for teaching and learning in higher education. Proceedings of the ED-MEDIA AND ED-TELECOM 98: World Conference on educational Multimedia and Hypermedia & World Conference on Educational Telecommunications. Freiburg, Germany, June 20-25, 1998.

Kurshan, B. (1990, March). Educational telecommunication connections for the classroom - part 1. The Computing Teacher. 30-35.

Langenback, C. & Bodendorf, F. (2000, September). The electronic education mall: A virtual service center for distance learning. International Journal of Electronic Commerce. [On-line Web page]. Available HTTP: http://www.cba.bgsu.edu/ijec/v4n2/p005.html

Morrison, J. L. (1999, February). Transforming the role of students and teachers in the information age. [On-line Web page]. Available HTTP: http://horizon.unc.edu/horizon/online/html/

Pahal, D. & St-Pierre, A. (1999). Distance delivery on the Internet platform. Presentation at the Sunrise Session, Nova Southeastern University: Fort Lauderdale, Fl.

Perrone, C., Repenning, A., Spencer, S. & Ambach, J. (1997). Computers in the classroom: Moving from tool to medium. Conversation, Vol.2 (3), 1-13. [On-line Web page]. Available HTTP: http://www.usc.edu/dept/annenberg/vol2/issue3/perrone.html.

Porter, L.A. (1997). Virtual classroom - Distance Learning with the Internet. New York: John Wiley & Sons Inc.

Ritchie, D. C. & Hoffman, B. (1997). Incorporating instructional design principles with the Web. In B. H. Khan (Eds.). Web-Based Instruction (pp. 135-138). Englewood Cliffs, NJ: Educational Technology.

Rossner, V. & Stockley, D. (1997). Institutional perspectives on organizing and delivering Web-based instruction. In B. H. Khan (Eds.). Web-Based Instruction (pp. 333-336). Englewood Cliffs, NJ: Educational Technology.

Shaw, M. L. G. & Gaines, B. R. (1996). Experience with the learning Web. In P. Carlson & F. Makedon (Eds.). Proceedings of ED-TELECOM 96 : World Conference on educational telecommunications. pp. 320-325. Charlottesville, VA: Association for the Advancement of Computing in Education.

Salisbury, D. F. (1996). Five technologies for educational change: Systems thinking, systems design, quality science, change management, instructional technology. Englewood Cliffs, NJ: Educational Technology Publications

St-Pierre, A. (1998, December). A proposal for an instructional technology and media center for distance educators. [On-line Web page]. Available HTTP: http://www.magnet.ca/stpierre/research/center.html

St-Pierre, A., Bettin, A., Dillinger, L., & Ferraro, S. (1999). Applying system design principles to the design of web-based training systems. WebNet Journal. July-September.

St-Pierre, A. (2000). A Web-instructional model for a business data communication course. Department of Decision Sciences & Management Information Systems, Concordia University, Montreal: Canada.

How On-Line Collaborative Study Improve Human Cognition
A perspective on the evolution of modern education

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Abstract: This paper is a research to investigate the growth of Internet which will give rise to new adventure of teaching and learning strategies in the decade to come. A series of more recent education approaches that come into play will be examined by addressing their advantages versus shortcomings to identifying why they have come to contribute the collaborative study method and how they are taking shape in the new education trend. The principle of "Collaborative Study" and how it fits appropriately and closely into the modern network media revolution will be demonstrated and explained. Virtual Learning and developing highly effective human cognition techniques through investigative problem solving, thinking and creativity are the major components that will assist the success of Collaborative Study and in fact new ideas in education. This research also brings teaching and learning to a higher level by exploring collaborative study and modeling it as the future education template to be deployed countrywide in Taiwan.

Introduction

The idea of Open Study in this context is to tailor the instructional materials and methods to individual who undertakes the study. The nature of Open Study consists of the following features: Great emphasis on individualism; Learning by exploring subjects of interest; Learning through getting in touch with real world problems; A wider domain of teachers and professions; Student-dominated teaching-learning process in contrast to instructor-dominated.

The arrival of on-line or Web-based Information retrieval in learning the environment also opens the possibility of fulfilling Open Study. While the idea of Open Study is beginning to take shape in modern education practice, the Summer Hill School in England has blazed the trails in this new area. Students are the center of the school and they can also determine the content of what they can study and the way of life in the school f(Van Vliet, 1999). Students' creativity should never be hindered by the heavy, century-long pedagogy and rules (Khan, 1997). Another example in a Japanese primary school also reveals that real world problems are amongst the best materials to use for instruction purposes, and organizing instructional and curricula should accommodate differences between students. Through this combination of features, Open Study sets forward a clear image for developing a new education strategy: *Student-oriented; Problem-Solving, and Creativity-Enhancing.*

The Internet provides an ideal setting for Open Study by its nature of being individual-orientated and irrespective of time and space. Despite the fact that adopting the Internet as a major channel and media is currently favored by most educational practitioners, there are still some limitations to be overcome by Open Education's developing community before the approach can become mainstream in Taiwan. For instance: The Fear from Parents, Bridging the gap between open education Curriculum and Current School Curriculum, Lack of Measurement of Study Performance, Parental Guidance and Control and The Need to be more Convincing.

Findings

The idea of collaborative study will let learners be equally and mutually treated and respected and thus this, in turn, pushes learners to become more willing to carry out study in this specially catered environment. The gain is mutual and this provides a fearless environment that is rarely sought in conventional schooling (Barron & Ivers, 1998). "Collaborative Study" is achieved by grouping and sharing topics of interests. Collaborative Study has been identified the most effective approach among individual tutoring, studying by competition and collaborative study that are currently deployed by many primary schools and high schools in Taiwan. In fact, this study method can also promote student awareness and participation in community and social skills. Highly Effective Cognition technique is essential to collaborative study. The job of any teacher/instructor is to clearly identify and rectify what students need most (Forcier, 1999). However, in the virtual learning world, teachers and students are altogether taking up the roles of learners and students in fact need to be able to know what to grab as their highest priority. In the interests of developing individualism of value and practice, the collaborative study aims to bring students to the upper level of the pyramid of human cognition.

Unresolved problems will often stimulate the creation and persistence of human's thinking capability. The term "Problem" which is different from "Question", has the following distinctive characteristics (1) More than two variants exist in a special manner and relation; (2) the relation between variants can stimulate seeking a solution to the problem or exploring the "how" and the "why" of the concerned topics. There are various levels of study in which learners might receive a problem in different ways (Drake, 1967). Organizing highly effective levels in study complexity and exploration requires clear distinction of the purposes of study and its relationship and coherence in context.

The government in Taiwan is looking at how to best qualify teachers in primary and high school systems to be able to adapt to new thought and technology. Meanwhile, government has been aware of the consequence resulting from the training of most teachers in the fundamental school system. Invention can be difficult because most teachers were not themselves trained in such a way. Providing new channels and media of education for adult learners and teachers becomes the responsibility of national education policy.

Taking a psychological perspective of Internet communities, the problem arising from over-indulgence of on-line resources and improper relationship between information provider / service provider can harm people enjoying the education through surfing the Net. In implementation of study on the network webbed by the Internet communities, education practitioners have to be very aware of the danger caused by negative aspects of the Internet. Developing high quality of human cognition through developing creativity poses a contrasting revolution to the long tradition in Taiwan where more focus is on memorizing skill and less focus on realizing the significance of how to think. The first step toward the cultivation of thinking capability in school is Knowledge. These changes in form of knowledge in modern society will have significant meaning and raise new questions in education: how to define knowledge, how to best capture the knowledge and how best to make use of it. Psychologically, creativity is based on a fundamental mastering of the subject of interest and then carrying out certain levels of exploration and taking risks of desired proportion. This involves a thinking process in which an in-depth understanding of required "Knowledge" is essential (Drake, 1967). Thinking, by the definition in psychology, is a process of mental activity. There are two types of thinking, one related to the situation where the learners stay and another one related to the cause-effect.

Problem-solving and Collaborative study can enhance the outcome of study by giving more freedom to the student, creating a better opportunity of demonstrating both teachers' and learners' inventions, evoking study by virtually placing students under real-world constraints and environment and emphasizing an active study approach. Therefore, Problem-solving and Collaborative study open a window in introducing new ideas of education.

Conclusion

Teachers in this age should learn to adapt to new technologies and models of teaching and learning, particularly in this age of rapid technical advance. The enormous potential of applying the Internet into education community will extend both teachers' and students' creative skills that are required in changing society. High quality study must be assisted by advanced skills and mental training strategies, such as those discussed in this article. Education policy-makers should also examine many possible ideas and aspects of knowledge to clearly see what society is heading for.

References

Barron, A and Ivers, K. (1998). *The Internet and instruction: activities and ideas.* Englewood, Colo.: Libraries Unlimited

Khan, B. (1997). *Web-based instruction.* Englewood Cliffs, N.J. : Educational Technology Publications

Drake, W. (1967). *Intellectual foundations of modern education.* Columbus, Ohio, C. E. Merrill Books.

Van Vliet, L. (1999). *Media skills for middle schools : strategies for library media specialists and teachers.* Englewood, Colo. : Libraries Unlimited.

Forcier, R. (1999). *The computer as an educational tool : productivity and problem solving.* Upper Saddle River, N.J. : Merrill.

Impact of Technology on Student Socialization in the Classroom

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Abstract: The use of technology and computer mediated communication is changing the lives of students in the classroom. Research is beginning to emerge examining the effects that technology is having on the social behavior and adjustment of students. Computers and technology are influencing the interactions between teachers and students, as well as other interactions in a student's life. Research is sparse at this time as to the effects of this new form of communicating, however, it appears that it can have many positive as well as negative impacts on students development and adjustment. The use of technology appears to down play the importance of social contact and may lead many students to not develop the necessary social skills to function in the world. This article exams the impact that technology may have on educators will be cognizant of the potential social and developmental pitfalls that can occur when blindly implementing technology into the educational process.

Introduction

The use of computer mediated communication continues to grow in today's society and the impact of this new technology is just beginning to be investigated. Scholars and technologists believe that advances in technology and computers are altering people's lives in numerous ways (Atewell & Rule, 1984; King & Kraemer, 1995). Although, most researchers would agree that technology is changing the lives of people, the question still remains open to what extent the use of these technologies is influencing student's academic achievement and social development. Research is beginning to emerge examining the effects that technology is having on the social behavior and adjustment of students. The extent and influence of technology on student development will remain an open debate for years to come. This article reviews some of the more pertinent findings and thoughts on the influence of technology on student development.

By 1998, roughly 40% of all U.S. homes owned a personal computer; about one third of these homes had access to the Internet, with these numbers increasing on a daily basis (Anderson, Bikson, Law, & Mitchell, 1995; Attewell & Rule, 1984; King & Kraemer, 1995). It can be assumed that as households increase there exposure to technology, students living in those households will be increasingly exposed to and use technology. With these technologies the availability of alternative modes of interacting and spending leisure time has changed. Individuals and students may be spending more time interacting with technology than in more traditional activities. Internet, e-mail, and chat rooms have become a major form of communication and social interaction for millions of individuals in general and students in particular. Although the Internet has many uses (communication, commerce, information source, etc.) the dominant use for most people is interpersonal communication (Kraut, Mukhopadhyay, Szczypula, Kiesler, & Scherlis, 1998). With personal computers becoming an integral aspect of our lives, researchers are questioning whether computers, Internet, e-mail and chat rooms are enhancing or hindering individual's personal wellness and social involvement (Kraut, et al., 1998). There is little question that online relating will increasingly become a major way in which teachers and students interact on a daily basis in the classroom. In addition students at home are spending a great deal of time on computers, Internet, E-mail, chat rooms and playing games like "Dungeons and Dragons". The extensive and continued use of computers in the classroom, at home and in the world may be becoming a problem for students and society in general as students and individuals spend more time interacting with technology and not each other.

Computers and technology have become an important and integral aspect of student's education. Teacher-student interactions, student friendships, family relationships and students socialization is being influenced by technology. Researchers differ as to whether technology is a positive tool with the power to change schools and revolutionize students' learning or a force that can undermine students' education and social development. Lepper & Gurtner (1989) indicated that the potential positive effects of computers on students' growth pertain to using the computers as personal tutors, multipurpose tools, and the motivational and social effects of computers. Research has consistently demonstrated that the effects of computer assisted instruction is generally positive. In fact, the effects are more positive with programs involving tutorials rather than drill and practice, with younger rather than older students, and with lower ability than average or unselected populations (Lepper & Gurtner, 1989). For learning, computers are excellent mediums for students facilitating an open-ended, exploratory and experiential learning environment. Collins (1986) found that computers are helpful in particular for improving adolescents' writing and communication skills.

Impact of Technology on Student Development

Additionally, research has appeared indicating that computer use has a positive influence on student's development. Lepper (1985) believes that computers make learning more internally motivating. Other computer advocates believe that computers make learning more fun, increased computer use in school will add to increased student cooperation, collaboration as well as increased intellectual discussion among students (Becker & Sterling, 1987).

Some of the possible negative effects of computers on student growth in the classroom pertain to regimentation and dehumanization of the classroom and shaping of the curriculum. While some students may prefer to work alone, and learn while progressing at their own pace others students may rely on social interaction and cooperation to learn and may need guidance by the teacher (Malcom, 1988).

In the classroom setting, students interact with students, teachers and administrators on a daily basis. They learn that many real world relationships begin with face-to-face (FTF) contact. In FTF interaction students make quick judgements based on physical attributes and other observable qualities while beginning a relationship. This has been the traditional way of initiating relationships for many years and will continue to be important in the future. With the use of computers in the classroom or at home, electronic relating offers a different format of interaction compared to FTF contact. Use of these new technologies may lead to a decrease in social contact as students spend more and more time on computers in school and home and less time with other individuals. The reliance on technological mediated communication may not allow students to develop and practice the socialization skills that will be necessary for future success. Early research investigating the importance of social contact (Gove & Geerken, 1977) found that when people have more social contact, they are happier and healthier. Currently, some researchers argue that the Internet is already causing students to become socially isolated as they spend hours in front of their computer communicating with other Internet users in the evenings and all day during school hours (Stoll, 1995; Turkle, 1996) and not in physical social contact with others. Time spent at the computer prevents many students from physical activities, social interaction, and outside activities. In addition, for some students staying up all night on line, in chat rooms, or playing games prevents them from getting necessary sleep and some cases not completing homework or interacting with friends or family. Clearly, technological and communicational advances are continually influencing society in general. However, due to the personal nature of some of these technologies and ease of access, the impact on education processes, students' socialization and development appears to be greatly influenced.

Current Evidence and Theory

The research to date on the impact of computer and Internet use on social relations is spare. However, some theoretical positions have been posited concerning the use of electronic mediated communication in forming social relationships and the potential effects of this new relating style. It is possible that negative or positive effects of the Internet may be related to the balance of strong or weak ties that people can generate and maintain with others (Kraut, et al., 1998). The Internet potentially reduces the importance of physical contact in developing and maintaining networks of strong ties due to the fact that communication via the Internet does not depend on the distance between parties. This may have severe consequences for students, as part of the education process is not only academic learning, but also learning many of the social skills that will be needed in life. With educators relying more and more on technology and distance education, it may be decreasing the opportunity for students to interact with others (students and teachers) in a personal way which leads to the development of appropriate socialization skills. With electronic relating becoming very appealing to some individuals (Schnarch, 1997) as a way of relating and gaining support without the risk of FTF interaction, students and individuals may be forgoing experiences that would lead to the development of appropriate social skills that will be needed in the future.

As computer technology and the Internet infiltrate every aspect of student's lives and as a possible negative consequence of technology and computers, marriage and family therapists are encountering clinical cases in which these technologies are having a serious impact. Many clients are involved in Internet usage, and cyber-dating/relating as an everyday part of communicating and developing a social network on the computer, while in some cases ignoring their friends, families and significant others.

Evidence is supporting possibly a new type of clinical disorder that will impact society, namely "Computer/Internet Addiction" (Young, 1996). This addiction refers to students and individuals who spend the majority of their time interacting with computer technology and using the Internet for a variety of purposes, while not spending time in more traditional social and recreational activities. These students and individuals would appear to have a preoccupation with the use of the computer and Internet as a centralized activity in their life. Based on current data, "Computer/Internet Addiction" and online relating will continue to increase and become a major way in which individuals and/or students interact or not interact and function on a daily basis. It may also be construed that this is leading to greater social and civic disengagement, which will have an even greater effect on individuals in society.

Griffiths (1997) in reviewing the available data on "Computer/Internet Addiction" stated that it is an area worthy of further research. Specifically, "Computer/Internet Addiction" research need to focus on its effects on students. In response, investigations of this phenomenon have found a specific personality type that tends to become addicted to the Internet. Shotton (1991) found that predominantly object-oriented males are more likely to become addicted to the computer and Internet. This addictive personality type was investigated and described by Hybels (1995). He suggested that the typical addict is a teenager, usually male, with little social life and self-confidence. Internet relating and relationships offer lonely or emotionally isolated people the opportunity to talk easily and conveniently to strangers instead of being open with themselves about their difficulties in relationship development (Shaw, 1997). Clearly, the introduction of technology into the classroom and educational endeavors may be providing students who are in need of help with social relations, an opportunity to fulfill some basic needs for relating. While at the same time ignoring the potential impact that this may have on their long term development.

Conclusion

Currently, the impact of computers and Internet usage on individual's, their relationships and families are difficult to evaluate. Based on the recent influx of clinical cases with a computer/Internet-related concern it has become apparent that this is an emerging area of concern and research. Clearly, the question is still out on whether computer and Internet use in general has a negative or positive impact on individuals, students, their relationships or other aspects of development. It is possible that the influx of technology may have both positive and negative effects and by only examining the issues can we develop and implement technology in a way that will have the most benefit while keeping the potential negative effects to a minimum. It is clear that technology can be implemented in a manner that does eliminate many of the traditional roles of the educational process, which include the learning of social rules and relationship development. It is hoped that educators will be cognizant of the potential social and development pitfalls that can occur when blindly implementing technology into the educational process. By being aware of these pitfalls, educators can better devise technological rich learning environments that meet the needs of the whole student and not just the students academic needs.

References

Anderson, R.H., Bikson, T.K., Law, S.A., & Mitchell, B.M. (1995). *Universal access to e-mail: Feasibility and societal implications.* Santa Clara, California: Wiley and Sons.

Attewell, P., & Rule, J. (1984). Computing and organizations: What we know and what we don't know. *Communication of the ACM*, 27, 1184-1192.

Becker,H. J. & Sterling, C.W.(187). Equity in school computer use: National data and neglected considerations. *Journal of Educational Computing Research,* 3,289-311.

Collins, A. (1986). Teaching reading and writing with personal computers. In J. Oransanu (Ed.), *A decade of reading research: Implications for practice.* Hillsdale, NJ: Erlbaum.

Griffiths, M. (1997). Psychology of computer use: XLIII Some comments on "addictive use of the Internet by Young". *Psychological Reports*, 80, 81-82.

Gove, W.R., & Geerken, M.R. (1977). The effect of children and employment on the mental health of married men and women. *Social Forces*, 56, 66-76.

Hybels, S. (1995). Terminal Addiction. *Internet and Comms Today.* No. 4, May Issue.

King, J.C., & Kraemer, K.L. (1995). Information infrastructure, national policy, and global competitiveness. *Information Infrastructure and Policy*, 4, 5-28.

Kruat, R., Mukhopadhyay, T, Szczpula, J., Kiesler, S., & Scherlis, W. (1998). Communication and information: Alternative uses of the Internet in households. In *Proceedings of the CHI 98*: New York: ACM.

Lepper, M.R., & Gurtner, J. (1989). Children and computers: Approaching the twenty-first century. *American Psychologist*, 44, 170-178.

Lepper, M. R. (1985). Microcomputers in education: Motivational and social issues. *American Psychologists,* 40, 1-18.

Malcom, S.M. (1988). Technology in 2020: Educating a diverse population. In R.S. Nickerson & P. P. Zodhiates(eds), *Technology in education: Looking toward 2020*, Hillsdale, NJ:Erlbaum.

Schnarch, D. (1997). Sex, intimacy, and the Internet. *Sex Education and Therapy Journal*, 22, 15-20.

Shaw, J. (1997). Treatment rationale for Internet infidelity. *Sex Education and Therapy*, 22, 1-14.

Shotton, M. (1991). The costs and benefits of "computer addiction." *Behavior and Information Technology*, 10, 219-230.

Stoll, C. (1995). *Silicon snake oil.* New York: Doubleday.

Turkle, S. (1996). Virtuality and its discontents: Searching for community in cyberspace. *The American Prospect*, 24, 50-57.

Young, K.S. (1996). Psychology of computer use: XL. Addictive use of the Internet: A case that breaks stereotype. *Psychological Reports*, 79, 899-902.

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