Keynote Speaker

Michael Zastrocky, Vice President and Research Director for Academic Strategies at Gartner Inc., has more than 30 years of diverse experience in higher education. Before joining Gartner, he was a faculty member at several universities, assistant dean, chief information officer, and served as vice president of CAUSE , the international association for managing and using information resources in higher education from 1989-1995 (now EDUCAUSE). He has served as a consultant for a number of colleges and universities and was a vice president of the Kaludis Consulting Group . He has delivered many keynote addresses around the globe and has served as a faculty member for numerous institutes and seminars. He has been widely published on a variety of technology planning and management topics. He is also a trustee for several higher education institutions.

Dr. Zastrocky earned a bachelor's degree from Regis University, master's degree from the University of Denver, and a doctor of education degree from the University of Northern Colorado.

Pre-conference Workshops

Pre-conference Workshop 1
A Gentle Introduction to Visual Basic .NET
Presented by: Deborah Dunn and Dennis Lingerfelt, Stephen F. Austin State University

Learn what Visual Basic .NET is all about. Many schools are beginning to use Visual Basic .NET to teach programming for business applications. This full day, hands-on workshop will provide an introduction to Visual Basic.NET. Some of the topics to be included in the workshop are: getting started with VB .NET and the development environment, designing and working with Windows forms applications, Visual Basic language fundamentals, developing object-oriented applications, and testing and debugging your application.
Attendees will learn to quickly and easily create sophisticated business applications for the end user. Emphasis will be on a well-designed interface and well-designed, readable code. The workshop format will include sample applications with additional exercises provided for further practice.

About the Presenter: Dr. Deborah Dunn received her Ph.D. in Computer Science at Texas A&M University. She taught Computer Science courses at Tusculum College for seven years. During her tenure at Tusculum, she was Department Chair of the Computer Science/Computer Information Systems program, and was also the Division Director for Business Administration and Computer Science for two years. She is completing her second year in the Computer Science Department at Stephen F. Austin State University.

Dennis Lingerfelt received his B.A. in Computer Science and Math at Tusculum College. He is currently pursuing an M.S. in Computer Science and is a Research Assistant in the Department of Computer Science at Stephen F. Austin State University.

Pre-conference Workshop 2
Making Presentations with Vegas Video
Presented by: Janet Hurn, Miami University
Nancy Thibeault, Sinclair Community College
Cheryl Reindl-Johnson, Nova Southeastern University

Learn to make professional looking educational videos quickly and easily using Sonic Foundry's Vegas Video. This software makes it easy to add video, stills, PowerPoint slides, music, and narration to your presentations. You can save it in many formats to distribute via the Internet, on computer, CD, DVD, or VHS. In this workshop you will take some video, capture it to the computer, edit your presentation, and show your finished project. We will help you every step of the way.

About the Presenters: Janet E. Hurn is currently a senior physics instructor for the Middletown campus of Miami University. She has her Bachelors in Physics and Master of Arts in Teaching from Miami University. She has always pursued innovative ways to integrate technology into the classroom. Janet also has experience delivering Web based courses. In addition she is a volunteer Captain and Training Coordinator for the Fairfield Township Fire Department.

Nancy Thibeault is the Director of Distance Learning and Instructional Support at Sinclair Community College in Dayton, Ohio. She has over 20 years experience in higher education. She has previously served as a full-time faculty member, department chair, and director of computer services. She has a Master of Science degree in Computer Science and Engineering from Wright State University, and is currently pursuing her Ph.D. in Computer Technology in Education at Nova Southeastern University.

Cheryl Reindl-Johnson has previously worked as Director of Evening Programs at Wilmington College and Program Manager for Business and Industry at Miami Middletown. She holds a Masters degree in English from Miami University and is currently completing her doctoral dissertation "Computerized Teaching Assistants in the Distance Learning Classroom" to fulfill requirements for a Ph.D. in Computer Technology in Education at Nova Southeastern University.

Pre-conference Workshop 3
Effective Development and Distribution of Streaming Multimedia in Education
Presented by: Robert W. Mainhart, James Gerraughty, and Dawna Knee, Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA) at Saint Francis University

Concisely defined, "streaming media" is moving video and/or audio transmitted over the Internet for immediate viewing/listening by an end user. We approach streaming media from a broader perspective. We will discuss and demonstrate the various hardware and software packages used to develop and distribute video and audio content across campus or across the Internet, when you can "roll your own" and when leave the work to the experts. We will also report on how streaming media is being utilized and delivered in a variety of courses and to audiences of varying levels of computer literacy and connectivity. What is the future of online multimedia content, especially with the emergence of Internet 2, particularly in the delivery of health care and health care

education? And we'll look ahead to the role of technology in healthcare and education over the next decade.

About the Presenters: Robert W. Mainhart serves as the Electronic Classroom/Video Production Manager for the Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA) at Saint Francis University, Loretto, Pennsylvania. He has more than 25 years of professional experience in the television and radio broadcast industry and is well versed in video production and distribution via video conferencing, streaming, and physical media. He also manages a suite of prototype electronic classrooms used in the testing of educational technology tools and modalities. He is co-author of Bringing The Museum To The Classroom: An Innovative Videoconferencing Prototype, published in 2000 by the International Visual Literacy Association.

James F. Gerraughty serves as Production Coordinator for CERMUSA. His primary functions are to assist in the development, production, and evaluation of various distance learning prototypes and projects. His previous experiences include working as an associate producer for WPSX-TV as well as a graphic artist for AccuWeather. Mr. Gerraughty received a Bachelor of Arts in Telecommunications from the Pennsylvania State University in 1998 and is currently working on his MBA from Saint Francis University.

Dawna Knee serves as Technology Coordinator for CERMUSA. She is responsible for providing technical support concerning the development and maintenance of CERMUSA's various Telemedicine project prototypes. Prior to her employment at CERMUSA, Dawna spent 8 years with Keystone Financial providing computer networking and information technology services. Dawna is a 1992 graduate of Computer Learning Network with a degree in Computer Technology Systems Operations. In addition, she is presently pursuing a bachelors degree in Computer Systems Management from Saint Francis University.

Pre-conference Workshop 4
Planning for Mobile Computing for Higher Ed
Presented by: Michael Zastrocky, Vice President and Research Director for Academic Strategies at Gartner, Inc.

In this workshop, attendees will address major planning issues for mobile computing including: What will be the major innovations in the device landscape? Which mobile platforms are the best bets for the future? What strategies are best to select and implement the highest ROI handheld applications? How will 802.11 technologies evolve, and what will be the best deployment approaches for WLANs? How should institutions plan for security in a wireless world? Attendees will also hear case studies of campus implementations and implications for campus network management."

About the Presenter: (See Keynote Speaker description above)

Strategic Planning at a Small College - Executive Overview

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In 1994, Baldwin-Wallace College produced a Strategic Plan for Information Technology. This plan mandated changes in the influx of technology, the structure of IT, and technology committees. The published plan included the organizational structure of the College, a SWOT analysis (strengths, weaknesses, opportunities, and threats), ten proposed strategies with accompanying initiatives, specifications for campus networks and systems, an equipment inventory, and various appendices. As a result of the plan an Information Technology Strategic Planning Committee (ITSPC) was formed. The ITSPC met regularly and technology issues were discussed; however, the plan was not reviewed annually or updated.

In 1999, the College began a strategic planning process for the entire institution. By October 2000, a plan was approved by the Board of Trustees and then presented to all campus constituencies. More than one of the initiatives specified in the College's strategic plan related to changes and improvements in the area of information technology.

Late in 2001, the President appointed ITSPC as the steering committee that would begin work on redrafting a strategic plan for information technology, thereby addressing the defined goals of the College's plan. The previous IT plan was reviewed, a preliminary time schedule was set, and a suggested course of action was determined. It was agreed that first and foremost, the Baldwin-Wallace College Strategic Plan needed to be the starting point to address issues mandated there. Furthermore, the plan needed to be linked with financial initiatives and priorities, with choices made based on how placement of resources would enhance the educational program at the College.

The first official meeting of the steering committee was held on December 18, 2001. A decision was made that the IT Office Manager would attend all meetings relating to the Strategic Plan to document minutes, coordinate data, and assist in the writing process. The second matter at hand was the small group vs. large group concept in strategic planning. The steering committee felt that it would serve in a capacity of gathering information, establishing goals, and steering the process. A larger group, called the Strategic Plan Task Force, would be created with representation from all areas of the College to offer a broad campus perspective.

The steering committee presented a list of possible Task Force members to the President who then created the Task Force, adding two College trustees to the group. The Task Force participants would eventually be broken into smaller focus groups to concentrate on specific areas or topics. It was determined that the Task Force would meet on a monthly basis with duties assigned between meetings. The steering committee would meet bi-weekly to monitor progress.

One lingering consideration was whether or not to hire a consultant familiar with the strategic planning process to assist with the task at hand. This option worked out very well during the 1994 Strategic Plan by giving it structure, as well as an outside, non-biased perspective. An outside consultant, Linda Fleit, President of Edutech International, was engaged to oversee the project and lead the kickoff meeting.

On January 18, 2002, the first official meeting of the Information Technology Strategic Plan Task Force has held. The President started the meeting by thanking the Task Force members for their interest and participation. The consultant made a presentation to the Task Force, outlining the strategic planning process, correct SWOT analysis procedures, how to develop strategies and initiatives, avoiding pitfalls, and how to strive for balance.

Following the meeting, a charge was given to each Task Force member to go back to his or her area on campus and form a focus group(s) comprised of other users from that department or division, perform a SWOT analysis, and gather data. Members were given five weeks to perform this task and submit the results to the steering committee. To assist in the process, a member of the steering committee led each of the focus group sessions in order to facilitate discussion. (Note: the Director of IT was not present at any focus group sessions in order to guarantee open and honest communication regarding technology issues on campus.)

All data submitted to the steering committee was combined and sorted by SWOT category. Patterns emerged with regard to specific topics. These broad topics were identified as the primary areas of analysis, which would ultimately lead to the development of strategies for the plan. The areas of analysis identified were:

- Campus-wide Training and Faculty Development
- Delivery of Information Services
- Coordination of Systems
- Internal and External Web Usage
- Adopting Newer Technologies
- Academic Assimilation of Technology
- IT Resource Procurement

The steering committee determined that separate sub-committees could best examine these areas. Each Task Force member was assigned to participate on one of the seven sub-committees and a group leader was chosen. Each sub-committee was provided with a comprehensive list of the data collected on that topic. The charge to the sub-committee was to analyze the data, identify most frequently listed issues or areas of serious need, and begin to formulate strategies to address these needs.

The Task Force reconvened on a monthly basis to share progress and keep on track. Attempts were made to identify any area that had been inadvertently omitted. At each meeting, the work presented by each group was discussed and suggestions for modification and revision were offered and implemented. An internal IT strategic plan website was also created to post documents and updates for review by committee members.

By May 2002, each group had narrowed its focus to one global strategy that most appropriately encompassed that area of concern. At this time, the groups were asked to begin developing initiatives that would support the strategy. Due to the academic calendar, the groups were given until the end of August to complete this task, with the Task Force scheduled to meet again in early September 2002. In the months of September and October, the sub-committees worked on finalizing initiatives and adding rationale for each. An eighth area was added which addressed implementation of the plan, regular updates to the plan, and monitoring both internal and external events related to information technology.

By November 2002, a draft document of the Strategic Plan was ready and made available to the campus. Divisional academic meetings were held to review the plan and gain additional faculty input. The plan was presented and discussed at the Student Senate meeting and other student groups were contacted with regard to their comments and concerns. Three open forum sessions, led by the President, were held in December and were open to all faculty and staff members.

Upon completion of these public presentations, the final draft of the plan was prepared. A budget was created to forecast expenditures that were outside the normal IT costs. In late January 2003, it was presented to the Task Force and received approval for submission to the President's Council and the Board of Trustees in early March.

Web Accessibility – Does Your Web Site Make the Grade?

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Abstract

Web sites today should meet Web accessibility guidelines to comply with a host of regulations and guidelines for people with disabilities. Recent estimates state that 20% of the U.S. population has a disability and that 10% of the on-line population is disabled. Our aging population also experiences similar issues. This session will help you assure your Web site is in compliance with current regulations and guidelines by reviewing the Web Accessibility Initiative (WAI), the Web Content Accessibility Guidelines (WCAG), and the U.S. Section 508 requirements. Software to evaluate Web accessibility will be reviewed and demonstrated. Best practices, recent initiatives and current developments in Web accessibility will be discussed. This session will benefit faculty, staff, and administration in teaching and evaluating Web accessibility.

Introduction

What do you use the Web for? Getting the news, shopping, entertainment, classroom education, searching the library or other resources for information, job searching, government services, and civic participation? As these methods become more prevalent, they may become the only way to access the information or service. For example, can you find information in a library without using a computer, and in many cases, a Web site? What if you had a disability that prevented you from seeing the Web site, or hearing the video/audio on a Web site? Could you still function?

The Internet has facilitated the use of many great tools for the disabled, such as text to speech synthesizer software programs used by the blind. However, many challenges still exist for the disabled in using the Web, such as the use of a mouse, the use of graphics and video, etc.

The percentage of people with disabilities in most populations is 20%. Not all of this group would be hampered by their disability in using the Web (for example, if their legs were paralyzed). However, we are still dealing with a significant number, estimated at 10% of the population, who may have difficulty using the Web. This translates to 750 million people worldwide, and 55 million Americans.

iCan states that people with disabilities have a discretionary income of more than $188 billion. On-line businesses could be overlooking a large percentage of their customer base if they ignore the disabled. Government agencies, schools and universities may be breaking the law if they do not provide ways for this segment of the population to access their Web site. As our population ages, they will need accommodations similar to those with disabilities to use the Web effectively.

The disabilities we are concerned with fall into four categories: Visual (blindness, low vision, color-blindness), Hearing, Motor or Physical (inability to use a mouse, slow response time, limited fine motor control), and Cognitive (learning disabilities, distractibility, inability to remember or focus).

Guidelines

"The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect." – Tim Berners-Lee, W3C Director and inventor of the World Wide Web.

W3C, or World Wide Web Consortium, is an international, vendor-neutral consortium with over 400 members. Their goal is to promote the evolution, interoperability, and universality of the Web. W3C has three host sites: MIT (North America), ERCIM (Europe) and Keio University (Asia). They have outreach offices in eleven countries and function with four domains: Architecture, Interaction, Technology and Society, and the Web Accessibility Initiative (WAI).

The WAI domain operates in all three host sites and is sponsored by government agencies (including the U.S. Department of Education) and business (including Microsoft, IBM, SAP, and others). They also work with disability organizations, accessibility research centers, and schools and universities. Representatives from these constituencies have worked together to:

1. Ensure Web technologies support accessibility.
2. Develop accessibility guidelines.
3. Improve tools to evaluate and repair Web accessibility.
4. Develop material for education and outreach.
5. Coordinate with research and development.

WAI has developed four different guidelines to address needs 1 – 5 above. They are:

1. Web Content Accessibility Guidelines 1.0 (WCAG 1.) Note that WCAG 2.0 is in working draft 11 as of March 2004; W3C/WAI advises to continue to use the 1.0 version as it finishes its public comment and review work.
2. Authoring Tool Accessibility Guidelines 1.0 (ATAG 1.0).
3. User Agent Accessibility Guidelines 1.0 (UAAG 1.0).
4. XML Accessibility Guidelines (XAG).

WCAG 1.0 explains how to create accessible Web sites, offers general guidelines, lists three priority levels, and provides extensive supporting resources (checklist, techniques, FAQ, fact sheet, curriculum, quick tips, etc.).

The WCAG 1.0 guideline provides three priority levels and corresponding conformance levels as listed in the table below. Sites which comply with these levels may use WAI logos on the site to show conformance.

Priority	Description	Conformance Level	Logo
One	Developer **must** satisfy or some groups of people will be unable to access information.	Single A	
Two	Developer **should** satisfy or it will be difficult to access information.	Double A	
Three	Developer **may** satisfy or some people will find it difficult to access information.	Triple A	

Quick Tips for Accessibility

The complete list of Web accessibility guidelines and checklist can be found at www.w2.org/wai. This is a summary list of what you can do to make your site accessible.

Web Page Feature	Accessibility Tip
Images and animations	Use the **alt** attribute to describe the function of each visual.
Image maps	Use the client-side **map** and text for hotspots.
Multimedia	Provide captioning and transcripts of audio, and descriptions of video.
Hypertext links	Use text that makes sense when read out of context. Avoid "Click here".
Page organization.	Use headings, lists, and consistent structure. Use **cascading style sheets** for layout and style whenever possible.
Graphs and charts	Summarize or use the longdesc attribute.
Scripts, applets, and plug-ins.	Provide alternative content in case active features are inaccessible or unsupported.
Frames.	Use the noframes element and meaningful titles.
Tables.	Make line-by-line reading easy. Summarize.
Check your work.	Validate.

Regulations

Regulations in the U.S. are guided by four legislative acts:

Act	Section	Agency Responsible
Telecommunications Act of 1996	255	FCC
Rehabilitation Act	504	Department of Justice and Department of Education
Rehabilitation Act	508	Department of Justice Access Board General Services Administration
Americans with Disabilities Act		U.S. Department of Justice

The regulations dealing with Web accessibility are usually referred to as Section 508, which refers to the Electronic and Information Technology Accessibility Standards, as amended to the Rehabilitation Act in December of 2000. The standards apply to Federal Web sites but not to private sector Web sites, unless a site is provided under contract to a Federal agency.

The criteria set forth in the standards are based on the WAI Guidelines (see above). Verbal tags, identification of graphics and format devices (like frames) are necessary so that they can be translated or provided to disabled users. This table relates the Section 508 guidelines to W3C's WCAG Checkpoints, and HTML coding techniques.

Section 1194.22 Paragraph (508)	WCAG 1.0 Checkpoint	WAI Coding Technique
a	1.1	Text Equivalents.
b	1.4	Multimedia equivalents.
c	2.1	Content not color dependent.
d	6.1	Content readable without CSS.
e	1.2	Text links for server-side maps.
f	9.1	Use client-side image maps.
g	5.1	Identify columns and rows in data tables.
h	5.2	Identify columns and rows in multilevel tables.
i	12.1	Identify frames with titles.
j	7.1	Avoid screen flicker.
k	11.4	Create alternative pages.
l	6.3, 6.4, 6.5	Functional text for scripts.
m	11.1 and 11.3	Provide links to accessible plug-ins and applets.
n	9.4, 9.5, 12.3, and 12.4	Make forms accessible.
o	6.2	Skip repetitive navigation links.
p		Provide alerts for times responses.

Guideline k suggests an alternative page be developed if the page cannot be made accessible. Most organizations would try to avoid this option, and comply by addressing items a – j on their Web sites.

Software

Software is available to help you determine if your Web site is accessible. Many products are now available. One of the initial products is Bobby™ which was developed by the Center for Applied Special Technology (CAST) and then acquired by Watchfire Corporation in 2002. Bobby 5.0 is a "comprehensive Web accessibility desktop testing tool designed to help expose barriers to accessibility and encourage compliance with existing accessibility guidelines, including Section 508 of the U.S. Rehabilitation Act and the W3C's WCAG." (Watchfire Corporation, 2004).

The Bobby client performs over 90 accessibility checks as it spiders though a Web site. It can test local Web pages, as well as pages behind your company's firewall. The Bobby client is sold for $299. An Online Bobby free evaluation tool is available at http://bobby.watchfire.com/bobby/html/en/index.jsp . It is limited in that only one page at a time can be evaluated, and the page must be published on the Web.

Bobby cannot evaluate all of the guidelines automatically, so some Priority 1 items must be reviewed manually. For example, reviewing scripts to be sure the information and links in a script are available by other means to users with browsers that do not handle scripts.

Web pages/sites that have been reviewed and conform to the Priority 1 items may use the Bobby 508 approved logo. This status is equivalent to Conformance Level A for W3C's WCAG. Bobby provides 14 guidelines, which are summarized below.

Guideline	Description
1	Provide equivalent alternatives to auditory and visual content.
2	Don't rely on color alone.
3	Use markup and style sheets properly.
4	Clarify natural language usage.
5	Create tables that transform gracefully
6	Ensure that pages featuring new technologies transform gracefully
7	Ensure user control of time sensitive content changes.
8	Ensure direct accessibility of embedded user interfaces.
9	Design for device independence.
10	Use interim solutions.
11	Use W3C technologies and guidelines.
12	Provide context and orientation information.
13.	Provide clear navigation mechanisms.
14.	Ensure that documents are clear and simple.

Current Developments

W3C's WAI group is working on Release 2.0 of the Web Content Accessibility Guidelines. In addition, other organizations are developing software that will analyze Web sites for accessibility, and help correct the HTML code to make the site meet the accessibility guidelines.

Conclusion

Access to Web sites that are published and open to all should be available to all, including disabled users, senior citizens, users with slow modems, and others who struggle to use the Web. Consistent and focused criteria are apparent in the WAI's recommendations via the WCAG, the Section 508 requirements, the recommendations of vendors such as Bobby's parent Watchfire, and IBM.

Many tools and resources are available to test your Web site's accessibility. Complying with the Web Accessibility guidelines set forth by W3C's WAI group will help assure that your site is accessible.

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Developing On-Line and CD-Based Learning Modules Utilizing Camtasia – Quick and Dirty

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Abstract

I have enjoyed conference sessions that teach me about new pedagogical tools I might employ upon returning to my campus. I therefore always try to incorporate new tools I learn about in paper sessions that I conduct. I have been looking for the capability to "record" both voice and classroom activity without the heavy learning curve often associated with such capabilities. Utilizing an actual "studio" to produce and distribute presentations often imposes a sizable time commitment, unless you are Cecil B. DeMill. PowerPoint allows for the creation of "narrated" slide shows, but it is a bit cumbersome and the resulting product is usually not as "natural" nor as effective as a "live" presentation. The distribution of such a product via the web or on a CD can also be challenging for the less experienced user. This session will introduce users to Camtasia™, a piece of software that is: • Inexpensive • Easy for a non-computer science user to learn its "basics" • Useful to those wishing to produce multimedia learning modules • Capable of more advanced features once the user is more experienced We will discuss the necessary/advisable hardware, the appropriate computer skills, and we will see some typical examples of modules which have been developed utilizing this software. We will also demonstrate how to use Camtasia™ to create such modules during the paper session.

Note: This paper was not available when the proceedings went to print. The author will provide more printed material at the session or make it available via the web.

Digital Ink for Online Teaching

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Reading with a pencil in hand to mark-up a book or article, scribbling questions and notes (along with rude drawings in some cases) in the margins of a committee meeting agenda, marking a student's essay with a red pen—all of these are everyday activities for most faculty. It is hard to say exactly how much of what we do can be defined as reading or writing because we are always engaging in both, simultaneously and seamlessly. But our behavior suddenly changes when we sit down in front of a PC. Suddenly, reading and writing become discrete activities, separated from one another both mentally and technologically. The screen is for reading. The keyboard is for writing. But what if there were a way to integrate reading and writing on the computer. What kinds of hardware and software would we need?

The idea of integrating the reading of print with scribal input has had a large place in the short history of modern computing. We can easily find it in Vannevar Bush's celebrated article, "As We May Think," which appeared in the Atlantic Monthly in 1945, just at the end of World War II. Bush described his vision of a desk-sized,

"…future device for individual use, which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, "memex" will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility… it is primarily the piece of furniture at which he works. On the top are … screens, on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers.[There] is a transparent platen. On this are placed longhand notes, photographs, memoranda, all sorts of things. Any given book of his library can thus be called up and consulted with far greater facility than if it were taken from a shelf. As he has several projection positions, he can leave one item in position while he calls up another. He can add marginal notes and comments, … and *it could even be arranged so that he can do this by a stylus*" [our emphasis].

When Alan Kay presented his vision of a portable "Dynabook," some twenty-five years later, he had the widest range of users in mind, not simply the desk-bound scientists, scholars and bureaucrats that Bush had envisioned for his device. Although it is unclear whether Kay intended to include a stylus as one of the tools for his portable Dynabook mode of ubiquitous computing, he has been quoted as saying that his guiding metaphor was a computer as natural to use as "pencil and paper." (Kay 2001)

Many attempts to introduce stylus or "pen" input and digital ink followed during the succeeding thirty years between the Dynabook and the present. One such experiment took place at The College of Staten Island during the early 1990s and involved the use of a "Telepad," a very early version of the tablet PC. In this project, an outstanding student in an advanced mathematics course used the Telepad to transcribe her class lecture notes, which were simultaneously displayed on a large monitor where they could be seen by a deaf student who would otherwise have been unable to follow the instructor's lecture. Due to the relatively low power, small memory capacity, and short battery life of technology available at the time, the experiment lapsed, but not before it demonstrated the value of applying pen input and graphic ink to assistive technology.

During the past decade, researchers at Intel, Microsoft and Xerox, including Gene Golovcinsky, Catherine C. Marshall and Bill Schilit, among others, have been working to actualize their vision of "XLibris," which they describe as a "reading appliance" combining both hardware and software components. In an article, "As We May Read," whose title echoes the title of Bush's famous paper, they present their aim of creating an environment that will "allow people to work on electronic documents much as they would on paper." (Schilit 1999) As described in a number of published articles and conference presentations, XLibris takes into account such demands of "real world" reading and writing as the ability to retrieve and view multiple documents simultaneously, the opportunity to make free form, graphic annotations anywhere on a document, as well as the freedom to move seamlessly between reading and writing.

Up to now, we have been speaking about "visions." Neither the Memex, nor Kay's Dynabook (not to be confused with the Toshiba product of the same name), nor the XLibris are available in stores. You can't buy them from vendors over the internet or even find them on e-Bay!

Now, let's move from vision to reality. After many premature announcements, the technology for pen input and digital ink annotation of electronic documents does finally exist in a wide variety of "off the shelf" products across a broad range of hardware and software platforms. During the past year, a group of colleagues at The College of Staten Island, City University of New York, has been actively exploring what is available to support teaching on the college level.

It is possible to conceive of many situations in which the capacity to combine keyboard and pen input would be desirable for teaching faculty, especially in disciplines where the standard typewriter keyboard does not contain the signs or symbols that are needed to express and communicate content. Mathematical notation and non-alphabetic (character) languages are obvious examples of this. Academic subjects, such as chemistry and physics, which often demand both free form drawings and text within the same document are further examples. But there is one situation in which faculty across the full range of disciplines can all benefit from: the use of pen input and digital ink—marking and responding to student written work.

When we began teaching online, we quickly discovered the absence of a satisfactory technology for marking student written work that would even approach the traditional red pencil in terms of ease of use. Marking essays by keyboard was a much more labor-intensive process. Further, it didn't permit us to write comments "in between the lines" of a student essay, or use proofreader's symbols. And although there were ingenious features in our word-processing software for embedding comments and highlighting or colorizing text, the process of annotation and

commentary by keyboard and mouse was far less intuitive than with pencil and paper. Indeed, as Bill Schilit has remarked, "It is hard to improve on paper and pen."(2001)

In fact, we found that many online instructors at our university had responded to the problem by choosing to collect essays on paper instead of downloading them from a "drop box" and continuing to mark them in the traditional manner. Those who had attempted to mark papers and give students feedback electronically complained about the additional burden of work required. And some even confessed that they had stopped "line marking" altogether!

Personal Digital Assistants (PDAs) were the first widely used computer hardware device to support the use of a stylus and digital ink as a regular feature. With one notable exception—E-Notate--an inexpensive ($50) program developed by a British company which allows a Palm OS PDA to be used as a graphic tablet for use with a PC to annotate Microsoft Word documents, little attention has been given to the use of PDAs as annotation tools.

The improved graphic tablets that have come on the market during the past few years provide an inexpensive way to equip standard desktop or portable PCs with pen input and digital ink capability. We have worked with them extensively over the course of a year at The College of Staten Island (CSI) with support from the Center for Excellence in Learning Technologies (CELT), which spearheads faculty development.

In terms of hardware, a very wide range of alternatives is available from small, "no-name" tablets costing less than $50 to the $1800 Wacom Cintiq, which is basically an LCD monitor that allows pen input on its surface. We experimented with two tablets, an AceCAD Flair (5"x3.75") and a Wacom Intuous2 (6"x8"). The Wacom was clearly the superior of the two, with a far better software driver, pen and writing surface. The price difference was dramatic. The AceCAD retails for about $35, while the Wacom costs around $270. (Since these are niche products--mainly used in the graphic arts industry--their prices do not generally reflect price declines of other PC peripherals).

The surface of the Wacom Intuous2 line is sufficiently well-mapped to the computer screen (PC or MAC) that the user quickly learns to use the stylus as a more precise mouse for launching and controlling a wide variety of applications as well as a pen for writing which then appears on the screen. The tablets connect easily to any desktop or laptop machine via a USB port. They also fit easily into a briefcase along side a laptop PC if portability is desired.

We found two excellent software programs for graphic annotation of documents using graphic tablets: Adobe Acrobat and Meander's Annotator. Acrobat has the advantage of working across platforms (PC and MAC), whereas Annotator allows annotations to be saved within Word documents and opened by users of virtually any version of the software without the need for a viewer.

Acrobat is sufficiently well-known that it probably needs no introduction here. Suffice it to say that it is a full-featured, highly complex, relatively expensive program that can be adapted to many different purposes. However, it has the disadvantage that when students submit their essays in a standard wordprocessor format, their files must be converted ("printed") to Acrobat's

Portable Document Format (PDF) before being marked. Further, students must download a viewer in order to view the marked essays.

Meander's Annotator is simple, single-focus program that retails for less than $25 for a single user license and requires very little computer memory. We found it highly functional for our purpose and very easy to master and use. The manufacturer, located in Shanghai, China, has also been very responsive to our suggestions for improvements to the product. For example, a major limitation of graphic annotation software up to now has been that annotations are not anchored to text. After we called this issue to the attention of the manufacturer, the software has been up-graded so that annotations are now anchored to some extent.

Once downloaded from the internet, Annotator appears within Word along with other tool bars at the top of the screen. Using the stylus as a mouse, it is possibly to select from a range of options in terms of line width and color. Annotator's cursor, a simple dot about the size of a period, seems more intuitive and natural than the corresponding feature of competing programs. Erasing, another area where the software has recently been upgraded, is relatively intuitive and easy.

During the Spring, 2004 semester, several tablet PCs (Hewlett-Packard TC1100) were made available to selected faculty members at CSI for the purpose of evaluating their use for online teaching. We have continued to use both Acrobat and Annotator for marking up student papers, the choice of software being dictated by the students' choice of word-processing software.

The primary requirement for any type of computer-based scribal input device is that it mimic pa-per and pen as closely as possible. Generally speaking, we have found the experience of marking essays using the TC1100 more closely approximates paper and pen than the Intuous2. Although the tablet PC's pen is less pressure-sensitive, hand-eye coordination is much easier in the tablet environment where one can literally write on top of the student's text while maintaining the illu-sion of holding the manuscript in one's hands.

One cannot claim, however, that marking an essay with a stylus on the TC1100 totally mimics writing with a pen on paper. For one thing, the small size of the tablet PC screen makes it diffi-cult to work in portrait mode if the essay under consideration requires extensive marking and an-notation. When the text is enlarged to the point where it is easy for a teacher with standard-sized handwriting to write between lines of a double-spaced essay and circle or underline individual letters, however, an entire horizontal line of print cannot be viewed all at once. Switching to landscape mode makes entire lines visible, but reduces the total display to about half of a type-written page at any one time. This necessitates a good deal of scrolling and makes it difficult to perceive the impact of each individual page of the manuscript, taken as a whole. As noted by Schilit and his colleagues (1999), "fixed page layout" is an important support for reading printed documents and this feature is sacrificed when the students' essays are viewed in landscape mode.

The ease with which a tablet PC can held and written on, plus the fact that it connects wirelessly to the internet, truly makes it possible for an instructor who is teaching online courses to download and mark student written work anytime/anywhere.

We anticipate making further use of the tablet PC's annotation features in online teaching within the near future. For example, online instructors often present reading assignments in the form of PDF files posted on their websites. Using the full Adobe Acrobat program, they can now mark-up such documents to facilitate students' reading and draw their attention to key points. Similarly, Meander's Annotator can be used to annotate Power Point slides, Excel spreadsheets or other MS Office programs.

Although today's scribal input and digital ink do not yet quite fulfill the vision that Vannevar Bush shared with his readers in 1954, we feel that the day is rapidly approaching when users will be able to move as seamlessly between stylus and keyboard as they now do between keyboard and pencil.

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Information Literacy and Technology Across the Curriculum

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Abstract

Responding to an initiative in the university's revised core curriculum to address life-long learning skills, a collaborative effort involving parties from the Library and Information Technologies was formed resulting in a program for faculty entitled *Information Literacy and Technology Across the Curriculum.* The purpose of the program, which consists of a semester-long series of workshops, is to assist faculty in the development of class assignments and projects for their students that utilize both information literacy and technology skills. After a successful pilot run involving volunteer faculty members, the program is now designed to accommodate approximately fifteen faculty members for the semester sessions. This paper will describe the format of the program, the resources made available, the exercises employed and some surprising results!

Background – Information Technologies

For several years, faculty met on a regular basis to discuss, review and recommend technologies to enhance the learning experience. A special group named the Faculty Advisory Committee on Technology Services (FACTS) was formally acknowledged by the Vice President of Academic Affairs with a volunteer membership of about twelve persons. This group prototyped teacher station configurations and their use, analyzed remedial and reinforcing software for students, and drafted, discussed and recommended computer use policies, among other items. In fact, as a result of the FACTS group prototype session with teacher station configurations, which consists of a cabinet, a computer, a video cassette recorder, a document camera, an Internet connection, a projection unit, a projection screen and a cable television feed, the university was awarded a $100,000 grant to install five teacher station configuration classrooms for educational use.

Although great strides were made in the adaptation of technology by certain faculty for their courses, the faculty at large and thus, the majority of students in their courses, were not engaged in using technology as part of their learning experience. When faculty members were provided surveys to express their reaction to presentations by their peers in the use of technology in their classes, only one-third of the faculty even submitted their responses. Even incentive programs met with modest success. When the undergraduate dean offered the use of laptop computers for faculty who participated in a workshop on *WebCT,* the course management system selected by

the university, fewer than a dozen faculty members attended the training sessions and utilized the course software. The feeling was that perhaps there was only a certain subset of faculty members who were ever going to be willing to incorporate some measure of technology in either their teaching or in their assignments for students.

Background - Library

The library staff was also experiencing a frustration with their outreach efforts to faculty. Newsletters were published to promote materials and services. Each semester the reference staff would offer informational workshops for faculty on topics such as Internet searching and evaluation, highlights of the new, shared consortium catalog and interlibrary loan, demonstrations of a specific database, e-reserves and a number of others. There was limited attendance. The staff was coming to the same conclusion as the IT office that perhaps there *was* only a certain subset of faculty members that could be reached.

A Change in Direction

More vigorous steps were needed to overcome this inertia. In the summer of 2002, a new graduate dean was chosen and one of her first steps was to revamp many of the graduate courses, particular the courses offered for distance learning, so that they utilized the *WebCT* course management system. An intense effort began with a core set of faculty members and staff to revise the course delivery system from a correspondence format to a self-paced or interactive model, with *WebCT* as the central technical component. Within a semester's time, the first courses using *WebCT* were being offered to students in the graduate extension studies program.

To penetrate the core structure of the learning environment, an even stronger action would be required from the faculty regarding the use of technology and information literacy in the academic program. The University announcement of the creation of a new core curriculum was greeted in the library with optimism. During the core development process the Reference department librarians submitted a proposal that an information literacy component based on national standards be integrated into the curriculum. The Association of College and Research Libraries (ACRL) had developed nationally recognized standards for information literacy. (http://www.ala.org/ala/acrl/acrlstandards/informationliteracycompetency.htm)

Information literacy is defined as a set of information and knowledge age skills that enable an individual to recognize when information is needed and then to have the ability to locate, evaluate, utilize and effectively communicate that information.
The standards define the information literate student as one who:

1. Determines the nature and extent of the information needed;
2. Accesses needed information effectively and efficiently;
3. Evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system;
4. Individually or as a member of a group, uses information effectively to accomplish a specific purpose;
5. Understands many of the economic, legal, social issues surrounding the use of information and accesses and uses information ethically and legally.

As mentioned above, these information literacy skills are key components of life-long learning. The goal of graduating students who have information literacy competencies is reflected in the **mission** of our university which includes the following component.

> *The university, through teaching and research, prepares men and women for responsible lives by imparting and expanding knowledge,* ***developing skills*** *and cultivating enduring values. Through liberal arts and professional programs, students develop their abilities for thinking clearly and creatively, enhance their capability for sound judgment, and prepare for the challenge of* ***learning throughout their lives****.*

These skills are critical in dealing with an increasingly broad array of information technologies, tools, and resources. An information literate graduate will utilize these skills in their professional, civic and personal lives as they provide a framework for life-long learning.

One result of the library proposal to the core curriculum committee involved opportunities to integrate information literacy concepts into the New Student Seminar classes that every freshman is required to take. Another was the opportunity to work collaboratively with the IT office to create the professional development workshop for faculty that is the subject of this paper.

The faculty issued the following important statement in the fall of 2002.

> "*We, the faculty and administration of Salve Regina University, are committed to preparing our students for the future; that is, for a world that will continually change and yet remain constant in many ways. A crucially important way to prepare students for this changing world is by helping them discover that they can overcome these future challenges with a lifetime of learning and curiosity about the world.*"
>
> - Faculty Memo, September, 2002

In their efforts to revise the core curriculum of our university so that they are aligned with the education needs of the new millennium, the faculty embraced the concept of teaching life-long learning skills to our students. One of the key components in life-long learning was the use of writing, information literacy and technology skills, not just by a few interested parties, but by parties across the curriculum.

> "*To help students utilize skills that are essential for lifelong learning by giving them opportunities to practice these skills across the curriculum.*"
>
> - Faculty Memo, September, 2002

Formulation of the ILTAC Program

The mandate had been stated. It now was a matter of developing the proper facility to operationalize the stated directive. Early on, the emphasis by Library and IT staff was to develop a program that we thought was appropriate for the faculty. In other words, we (the Library and IT staff) would teach the faculty what we thought was important for them to know with regard to

information literacy and technology skills. We soon realized, however, that this would be a fruitless venture.

After several weeks of effort conducting research and reading articles on similar programs at other institutions, we finally realized that rather than tell the faculty what they should know regarding information literacy and technology skills, we should ask them what they thought their colleagues should know and, therefore, what their students should know.

Two steps were taken to solicit faculty input on the Information Literacy and Technology Across the Curriculum (ILTAC) program. The first step was to distribute a survey soliciting faculty response to questions addressing:

- the faculty's input on what relevant skills they thought were important for their students to know.
- the faculty's use of information literacy and technology skills in their courses
- the faculty's expectations of their students in these skill areas, and
- the faculty's satisfaction with the level of competence their students demonstrated in these skills, for example: formulating a manageable topic, finding appropriate materials for research assignments and student use of technology.

The survey served to actually introduce the idea of information literacy to some faculty who may not have been familiar with the term. It also generated information on the current level of integration of these concepts and the perceived need for them. After these results were compiled and summarized, they were shared with the Faculty Development Committee. It was mentioned that there was a noticeable difference between what ILTAC skills faculty require from students for their courses and what skills the students actually practice; further, those teachers who did incorporate ILTAC skills in their assignments were willing to share their 'best practices' with their colleagues, given the appropriate forum.

The second step was to invite members of the FACTS committee and the Faculty Development Committee to participate in the first workshop series on Information Literacy and Technology Across the Curriculum (ILTAC). This action would provide valuable information and feedback from key faculty representatives if our efforts were to take root with the faculty at large. Our hope was that the participating faculty in this pilot workshop and each subsequent one would be contributing to the content of the course as much as possible.

Format of the Pilot Program

The pilot program participants met six times over the course of the Spring Semester 2003. These were very much developmental sessions and notes were taken on a flip chart to focus the discussion and capture the feedback.

Dr. Scott Kennedy, Head of Research and Information Services at the University of Connecticut, was invited to speak to the group on the progress his institution had made in incorporating information literacy and technology across the curriculum. Dr. Kennedy gave specific suggestions on:

- Developing learning outcomes
- Articulating the program and objectives in common language
- Keeping the program focused and finite (and being satisfied with progress in small increments)
- Determining how the learning outcomes will be assessed

There was a lively exchange with the ILTAC participants who came away from the session with a new appreciation that academic institutions large and small, were grappling with the challenges of preparing their students for the information age. Several highlights pertaining to information literacy and technology across the curriculum (ILTAC) from the pilot program were noted.

- ILTAC should take the form of awareness and topic review rather than significant "hands on" activity.
- Each participant would be expected to create an assignment, syllabus, website, and other materials which included information literacy and technology concepts and skills.
- Each participant would be expected to share what she created with the group in some form of presentation.
- These assignments would be collected and made available to all participants of the program, past, current and future.
- A *WebCT* course would be developed that would contain these assignments as well as other content relevant to the workshops.
- Individual knowledge and skills enhancement would be supported by offering a subscription to the *ElementK* portfolio of online tutorials to each of the participants.
- Each workshop would incorporate one aspect of information literacy or technology as a focus. A member of the faculty with an expertise in the focus area would be invited to lead the discussion during the second meeting. The questions for online discussion would also be related to that topic. (Plagiarism and accrediting standards have been the topics so far.)
- An assessment survey would be taken at the end of each semester.

In summary, based on the results of the faculty survey and the pilot run of the ILTAC workshop, the Library and IT staff learned from the faculty several essential lessons. It is important to have an understanding of an 'information literate' person and an appreciation of information literacy and technology skills across the curriculum, as opposed to a singular separate course. To adapt techniques to one's course, an accessible supply of 'best practices' would be of value. Finally, to put closure on the overall effort, it was critical to have available guidelines for creating student assignments, and just as importantly, for evaluating and assessing student work.

WebCT Entry for the ILTAC Program

Below is a view of the ILTAC *WebCT* main page with content listed for each segment; this entry is accessible by any person who has participated in the ILTAC program.

Best Practices

Assignments and Course syllabi from a variety of disciplines including Chemistry, Management, Politics, Psychology, English, Philosophy, Math, Information Systems, and International Relations

Readings

The ILTAC course syllabus and various readings concerning information literacy and technology concepts (see bibliography)

ILTAC Resources

Links to ILTAC examples from other universities with similar projects, plagiarism resources, New England Association of Schools and Colleges links and the TILT tutorial.

Faculty Web pages

Chemistry, Psychology and Politics

Minutes

From all sessions

Discussions

This semester participants were required to respond to a posted topic.

Surprising Results

The dynamics generated in having a small group of faculty from different disciplines participating in a new learning environment cannot be understated. This effect is evident in many ways. Faculty members who have not recently assigned research papers to their students were very interested in new methods and facilities in conducting research; they did not hesitate to express their openness to learning the newest techniques. In some instances when the faculty member was doing his or her doctoral research several years prior, the use of the Internet and modern word processing tools was not as prevalent as today. These professors were very appreciative in learning about the use of web-based search techniques to obtain numerous references that might satisfy their interest. From a different perspective, they were surprised by the tempting ease in copying written material off a web site and passing it along as one's own work.

The use of web-based discussion groups by faculty in their courses was of value to a variety of teachers. For example, when the professor of International Relations demonstrated his use of *WebCT* discussion groups for his graduate-level course, the professor from Philosophy thought that this technique would be adaptable to her classes; she noted that when providing a statement or question pertinent to the philosophy topic at hand, her students would be able to ponder a response in a quiet setting rather than try to compete for an opportunity to voice a quick response in the classroom setting. When the class actually met, she intended to briefly review the various responses already posted in the discussion group site and thus enable her students to delve into more serious discussion while in the class.

Several faculty freely shared their use of other ILTAC techniques. For example, the Political Science professor shared the methodology that she provides her students in obtaining information on a chosen topic. She outlined in detail the instructions that she provides her students in following the navigational path through numerous web links until arriving at the desired target site; these instructions provided a basis for future assignments in which the professor could provide less and less instruction while expecting the student to pick up more and more of the research work. On a different note, the History professor shared his example of using word processing for students to submit milestone drafts of their work so that he could better guide their thought processes and writing styles in subsequent drafts. Finally, the Chemistry professor shared his use of *WebCT* for assigning quizzes for his students to take before coming to class; he noted that the level of expectation in being prepared for class was raised to such a degree that when he occasionally would have technical difficulty or not enough time to post a quiz on the *WebCT* site, his students were disappointed that they were not able to take the quiz before class!!

The atmosphere in the class encouraged faculty to share their ideas regardless of their level of using the ILTAC skills. In the first meetings of the workshops, faculty less inclined to utilize ILTAC techniques in their assignments seemed somewhat intimidated in participating in the discussions. As time went on, however, they realized that the important step is to start somewhere and then build on that experience. By noticing several of their colleagues in a similar position, it shored up their own courage to demonstrate their ideas without the fear of being embarrassed. They seemed to understand that modest attempts in incorporating ILTAC skills in their work and assignments were better than no attempts at all; further, they realized that with the help of supportive colleagues and available resources, their progress proceeded at a faster pace than they thought possible.

During the workshops, the faculty participants were made aware of resources pertaining to ILTAC skills that were available on campus. The university's *WebCT* administrator addressed the group during one of the sessions to describe the features of *WebCT* and the procedures for creating a course site using *WebCT*. The university's IT director described the use of a web-based skills training facility, *ElementK*, for which each faculty member was subscribed; *ElementK* provides self-paced and instructor-led programs in a variety of technical applications, particularly the Microsoft *Office* applications. A sheet of available staff in the Library and the University Computer Lab was also provided; this information included names, areas of expertise, telephone extension and email addresses. Some faculty noted that they were unaware that such a wealth of resources was available for them to utilize.

Opportunities for Improvement

Each iteration of the ILTAC workshop program provides opportunities for improvement in the operation of the series. Because of the supportive technology made available in a personal way to faculty, certain authentication (username and password) procedures were not always successful; this result caused various degrees of frustration for participants in trying to do their assignments for the workshop using *WebCT* or *Element K*. The lesson learned by this experience is to establish and simulate access provisions for each participant well before the item is utilized in the workshop. It was also noted that due to the schedule of the workshop which paralleled the

semester schedule, faculty were not always able to complete their assignments because of commitments to students in the classes they were teaching. The lesson learned by this experience is to have the faculty start their assignments earlier in the workshop schedule. Finally, because of the embryonic nature of the program, there is only limited information obtained regarding the effect of the program on the actual work that the students are completing. The full cycle of the process consists of faculty incorporating ILTAC skills into assignments that the students complete and for which they will be assessed according to predefined rubrics. The longevity of the program needs to be further extended for the fruits of the faculty efforts to be fairly evaluated.

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Proactive Decision Making: Collecting on the Promises of Technology

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Abstract

"It is more difficult to move an object that is completely at rest than it is to guide one that is already in motion." Institutions today are monitoring indicators that communicate the health of the institution. What if you could be proactively alerted when one of your health indicators is below an acceptable level? What if you could drill-down to find the reasons for the change? Jenzabar's Executive Dashboards are helping institutions do just that. We utilize a wide range of tools and systems, some that you may already have, to analyze your business, measure progress against your goals, and enable access to the data to provide insights into specific actions that can be taken to get back on-target or drive continuous process improvement. Each dashboard is designed to display information and alerts relevant to your current goals, and it can evolve as your objectives change.

Note: This session is a software demonstration and no paper is expected. The presenter will provide handouts at the conference or via the web or email.

Distance Education as a Catalyst for Change in Higher Education

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Abstract

Whereas distance education was formerly on the periphery of education and in the realm of institutions with questionable academic credentials, it has been gradually gaining acceptance, is becoming mainstreamed, and is being embraced by traditional universities. The use of distance technologies is challenging the traditional structures of higher education institutions and it has been predicted that distance education technologies will precipitate changes in existing organizational models. This is not an unexpected outcome, as changes in technology precipitate changes in work relationships and in the way output is produced. The exact form that universities of the future will take in response to these changes is uncertain.

This paper discusses distance education in the light of the challenges that it poses to higher education and its role as a driver of structural and cultural change. Emergent models and possible future directions will also be explored. The primary focus of this paper will be online or Internet based distance education.

Introduction

Every aspect of society, including higher education, is being transformed by technology (Groves & Zemel, 2000; O'Sullivan, 2000). As computers become more powerful, the Internet is becoming the principal method of delivering distance education (DE) (Hoffman, 2002). Web-based DE courses are becoming more popular (Hoffman). During the 1980s, higher education institutions invested billions of dollars in computer technology (Hirschbuhl & Faseyitan, 1994). Moreover, over the last decade, the average institution has doubled its investment in information technology services (Office of Higher Education, 2001). The incorporation of technology has been identified as being an important consideration for higher education (Dusick, 1998). As Wagschal (1998) contends, the "explosion" of the worldwide web and advances in digital technology over the past two decades has led to distance education becoming a 'buzz-word' in academia. Whereas distance education was formerly on the periphery of education and the realm of a few institutions with questionable academic credentials, it has been gradually winning acceptance, has now become mainstreamed, and is being embraced by more traditional universities (McNeil, 1990; Wagschal, 1998). Universities are thus finding themselves to be in an increasingly competitive environment (Timmons, 2002), which requires that administrators make decisions crucial to sustaining their institutions' competitive advantage (Reid, 1999). The challenge is to formulate policies that allow for the integration of IT while enabling flexibility in response to a constantly

changing environment (Kemelgor, Johnson & Srinivasan, 2000; Reid, 1999). This requires visionary leadership focused on the achievement of results (Timmons, 2002).

Sifonis and Goldberg (1996) suggested that business technology systems are often underutilized or ignored, reducing actual productivity gains. The literature indicates that is likely to be the case in higher education as well. For example, according to Hirschbuhl and Faseyitan (1994), faculty use of computers for instructional purposes has not kept pace with institutional increases in technology investments. Furthermore, it has been suggested that education lags behind most other enterprises in technology adoption (Edirisooriya, 2000). This suggests a need to identify and address factors and variables that might influence IT use. One manner in which IT is being increasingly utilized in higher education, and with which this paper is primarily concerned is distance education (DE).

Distance education, as has been noted, is a form of IT. Therefore, issues relevant to IT in general pertain to DE. As such, the first part of this paper contains a discussion of technology in education. This is followed by a discussion of technology, in particular Internet-based distance education technologies, and the challenges that they present to the leadership of higher education institutions. An overview of current and emergent models of distance education and their implications for institutions follows.

Technology in Education

Technology has been defined as "a design for instrumental action that reduces the uncertainty in the cause-effect relationship involved in achieving a desired outcome" (Rogers, 2003, p. 13). This definition views technology not as physical or electronic tools but as means for accomplishing goals. As Tornatzky and Fleischer (1990) noted, technological innovation involves the introduction of knowledge-derived tools and devices, which extend the interaction of humans with their environment. Technological innovations imply information and can therefore potentially reduce uncertainty (which implies unpredictability and lack of information) (Rogers, 2003). Computers are particularly suited for the role of reducing uncertainty in that they are tools for managing and directing the flow of information (Jacobsen, 2000).

Tornatzky and Fleischer (1990) have described technology as tools or systems, which humans use to transform their environments. Rapid developments in information technology are, therefore, transforming society (Guideira, 2000). It has been suggested that institutions that fail to adopt or support these changes in technology will be ill prepared to function in current and future environments (McClure, 1997). Citing Landlow (1996), Nyiri (1997) observed that throughout time, educational institutions have been created using existing or contemporary information technologies. As technologies change, therefore, so do (and must) educational institutions.

All technologies comprise both a physical (hardware) component and a social/behavioral component, which are inseparable (Tornatzky & Fleischer, 1990). In order to understand technologies, the roles, incentives, skills and behaviors that influence how they are used must first be understood, i.e., the social context must be understood (Tornatzky & Fleischer, 1990). Within this framework, technology is regarded as existing within the context of human social constructions (O'Sullivan, 2000). As such, technology's importance consists of both its characteristics and the

social processes and behaviors that determine the manner and extent of usage (O'Sullivan). This conceptualization embodies both deterministic and utopian assumptions of technology as outlined in O'Sullivan's Mutual Influence Model. This model recognizes that:

> Educators can use the ways in which technology can affect interaction and information processing to reshape the educational process. These changes can improve, or undermine educational goals. The technology's characteristics are important considerations, but the applications that educators develop will ultimately determine whether the uses are beneficial or not. (p.57)

This viewpoint suggests that the importance of technology in education should be determined by its effectiveness in facilitating the accomplishment of educational goals. Groves and Zemel (2000) cautioned against institutions using computer delivery systems as ends in themselves, but rather thought that they ought to be valued for their contribution in facilitating teaching and learning. Similarly, Williams (2002) counsels against the rush to use technologies for their own sake.

As the focus of learning in higher education moves from being teacher centered to learner centered, technology is being used as both a driver and a tool in the process of increasing student involvement (Rutherford, & Grana, 1995). Furthermore, as information and the speed with and sources from which it can be obtained continue to increase, the concept of information literacy is seemingly replacing that of critical thinking (Rutherford, & Grana). Consequently, it is necessary for educational institutions to equip themselves with and formulate effective educational approaches that capitalize on state of the art technology that meet the needs of students in the information age (Heath, 1996). This poses a dilemma for both institutions and faculty. Institutions have to decide which technologies to invest in, how much technology to invest in, and at what cost, while faculty try to determine which sources of information should be accessed and what technologies they need for accessing them. Additionally, the systems and structures, which facilitate the effective use of DE technologies, need to be assed and structured accordingly.

The Challenges of Distance Education

Information technologies are undergoing rapid evolution and significantly changing modes of collecting, manipulating and storing knowledge (Duderstadt, 1997). One such class of technologies, Internet-based technology, is changing the way in which universities deliver knowledge through connectivity and increased accessibility (Kemelgor, Johnson & Srinivasan, 2000). Prescott (1997) claimed that the Internet differs from previous technological innovations in that it is "extraordinarily dynamic" and diffusing more rapidly. According to Hannon (1999), academia was the birthplace of the Internet and it has since progressed in parallel with developments in intellectual history and pedagogical theory. Many of the Internet's innovations have originated in higher education (Cookson, 2000) and the Internet in turn has also impacted scholarship and teaching practices (Groves & Zemel, 2000).

The key to successful leadership in distance education derives from leaders' ability to understand the environment in which universities are operating, having sound planning and instituting methods for assessing the effectiveness of initiatives (Timmons, 2002). Human organizations (such as

higher education institutions) are complex systems with multifarious structures, operating in even more complex environments (Fuqua & Kurplus, 1993). Baldridge and Deal (as cited in Hanna, 1998) contend that the external environment of universities serves as a powerful force for internal change. This has been evidenced by a growing demand for increased accessibility, convenience, and lower cost from learners contributing to the drive toward distance education (Hanna, 1998). As access to the Internet has become easier and cheaper, courses delivered via this medium have increased (Lane, 1997). The rapid growth of DE is creating pressure for faculty to participate in and deliver effective online courses (Reisman, Dear, & Edge, 2001). Legislators and administrators are also increasing pressure for educators to adopt and implement distance-learning technologies (Winsboro, 2002). Distance education is increasingly being viewed by many higher education institutions as an avenue whereby they can expand course offerings and meet the needs of an increasingly diverse and dispersed student population (Montgomery, 1999).

Much attention and research in distance education has focused on student and faculty problems and issues, largely ignoring management and administrative issues. However, as Stata (as cited in Cobbenhaegen, 2000) noted, the primary hindrances to progress are not to product and process innovation but management innovation required to take full advantage of technologies. Cobbenhaegen (2000) suggested that in addition to technology development and transfer, organizations need to be aware of the importance of developing an organization's knowledge of innovations required for long-term organizational survival. As Rogers (2003) noted adopting a technological innovation is not passive, rather most adopters tend reinvent or adapt innovations to fit their particular situations. Innovations are also more likely to be sustained if reinvention is possible than when it is not (Rogers).

This suggests that if distance education is to be sustainable, institutions must adapt distance education technology to suit their particular situations. Additionally, they will be required to adapt their institutions to accommodate distance learning. In determining which areas need to be adapted or changed in response to the requirements of distance education, it is essential to identify those elements most important to successful DE systems.

Reid (1999) identified structural, systems, producer, and user issues as important (workplace specific) considerations in developing university strategies for online education. At the systems level, it was suggested that issues of cost efficiency and product functionality were prime concerns (Reid, 1999) and university administrators should seek to make the best possible use of their institution's resources (Reid, 1999). The high cost of technology infrastructures render budget allocation and investment considerations crucial administrative issues (Duderstadt, 1997). Producer issues that need to be addressed are the roles of subject and application developers (Reid, 1999). It is imperative that these two groups be monitored in order to ensure that online teaching materials comply with curriculum standards, are sustainable, and are provided with adequate technical and professional support (Reid, 1999).

The users of online course delivery systems consist of faculty, students, administrators, technicians, and other stakeholders (Reid, 1999). Despite the apparent importance of individuals in the adoption process, one cannot consider the individual in isolation. Senge (1990) reasoned that an understanding of individual behavior within an organization requires looking beyond individuals

to organizational structures. Higher education leaders should therefore consider the potential influences of their policies on the individual faculty. Senge posited that structure influences behavior such that different individuals placed within the same structures have a tendency to produce similar results or qualitative behavior patterns. This occurs because organizational structures generate responses from individuals (Senge). One of the structural realities of introducing new technologies is that it requires systematic infrastructure and appropriate training and support to ensure that it will be used effectively (Groves & Zemel, 2000). As such, the leadership of higher education institutions needs to address systemic issues related to faculty adoption or participation in distance education. Among these issues are tradition, consensus, governance, roles, and responsibilities (Cookson, 2000). Moreover, policies and procedures, rewards and incentives for merit, promotion and tenure, and intellectual property rights, as well as faculty development should be addressed (Cookson, 2000).

Distance education is thought to offer advantages for administrators, faculty, and students. It allows institutions to significantly increase their enrollment without the added cost of erecting new buildings, thereby representing cost savings (Portway & Lane, 1997). It offers the opportunity for faculty to reach a wider audience and broadens the concept of "community of scholars" (Eisenberg, 1998). It also allows faculty to teach at times convenient to them, unhampered by the limitations of physical space (Eisenberg, 1998). Additionally, DE provides access to higher education for underserved segments of the population (Freberg, Floyd & Marr, 1995). Via distance learning, institutions can cater to students who are either unwilling or unable to attend conventional classes (McNeil, 1990). It provides access to education for students whose geographical location, family responsibilities, or work schedules might be incompatible with traditional classroom instruction (Hoffman, 2002; Reasons, 1999). Other push factors driving the expansion of distance education initiatives are the shift to lifelong learning and the changing demographics of students engaged in higher education (Portway & Lane, 1997).

Despite its promises, however, distance education is not without its detractors. Valentine (2002) identified numerous factors as posing problems for distance education. Among them were quality of instruction, cost effectiveness, misuses of technology, role of technicians, problems with equipment, attitudes toward DL, student concerns and, instructor concerns. According to Dhanarajan (2001), DE has failed to live up to its promise to provide greater access. He noted that despite the apparent accessibility created by the Internet, populations that have traditionally been underserved continue to be so. He also suggested that a lack of adequate or directed resources has resulted in poor product, delivery, and support services for DE. In addition, Dhanarajan (2001) cautioned against the naiveté of regarding new technologies as the panacea for educational deprivation around the globe.

Changes in work relationships in turn imply changes in structure, which governs the performance of organizational roles. In the context of distance education, a need to reconsider and possibly alter existing structures exists. Reviewing the literature on drivers for change, Kemelgor, Johnson and Srinivasan (2000) observed that a wide variety of factors were identified as being drivers of change. However, they identified three common themes as being relevant to educational change: technological drivers, competitive drivers, and workplace drivers (Kemelgor, Johnson & Srinivasan). Using the Internet for instruction and DE were among identified technological drivers of change (Kemelgor, Johnson, & Srinivasan).

However, these authors suggested that the exact form that universities of the future will take in response to these changes is uncertain. Moreover, currently existing frameworks offer no universal solutions to the issue facing DE implementation. Barabasi (2002) suggested that traditional thinking of organizations as linear and mechanistic with simple cause and effect relationships might be responsible for the failure of organizational change efforts (such as DE implementation). Moreover, as Sifonis and Goldberg (1996) observed, traditional Lewininan models of unfreezing, change and refreezing are inapplicable in situations of rapid and constant change. Suggesting that organizations, especially with respect to technological innovations, require dynamic planning and a recognition that changes in technology leadership and governance impact one another.

Emergent Organizational Forms

It has been predicted that distance-learning technologies will precipitate changes in the structures and organizational models of higher education institutions (Dhanarajan, 1998; Hanna, 1998; Latchem & Hanna, 2002; Reid, 1999). However, these authors all suggested that the exact form that universities of the future will take in response to these changes is uncertain. What is known, however, is that the use of distance technologies is challenging the traditional structures of universities. This is not an unexpected outcome, as changes in technology precipitate changes in work relationships and in the way output is produced (Connor & Lake, 1994). This implies changes in structure, which governs the performance of organizational roles. In the context of distance education, it suggests a need to reconsider and possibly alter existing structures. Hanna (1998) identified seven emerging models for Internet based learning in higher education. The emergent and existing organizational models identified by Hanna as higher education's response to distance education technologies were extended traditional universities, for profit adult-centered universities, distance education/technology-based universities, corporate universities, university/industry strategic alliances, degree/certification competency-based universities, and global multinational universities. The following discussion will examine the application of some of these models in higher education.

The Virtual University

The development of Internet technologies has made it possible to deliver education independent of location, but with the possibility of synchronous delivery and interactivity between students and between students and faculty (Hanna, 1998). Capitalizing on these technologies, online or virtual universities have emerged outside the realm of tradition universities. These institutions are operated entirely online and are based on the philosophy that the campus goes to the student rather than the reverse (Hanna). Greenhill (1998) suggested that virtual organizations differ from traditional organizations in the manner in which communication takes place and in that, traditional organizations try to minimize discrepancies in time and space in order to maintain stability and consensus, whereas such discrepancies are integral to virtual organizations. He posited that organizations try to impose conventional practices in a realm which differs in these respects are failing to utilize the full potential of the virtual environment. Greenhill further suggested that traditional rules, structures and administrative procedures, are less applicable in a virtual environ-

ment, which is more fluid and adaptable. Thus organizations are likely to assume more flexible, non-linear and adaptable structures if they are to operate effectively in cyberspace.

Is the virtual institution the model that all higher education institutions will adopt in the future? The answer to this is unclear but an examination of some of these universities might provide an indication of what to expect in the future. Perhaps most prominent among virtual universities is the British Open University. They claim to have 22% of all part-time higher education students in Britain as well as thousands of students in Europe and around the world. Other successful online institutions include Jones International University, Virtual Online University, California Coast University, and Walden University. Perhaps because of the success of institutions such as theses, some envision the demise of the traditional residential universities and see the virtual university as the wave of the future (Eisenberg, 1998). However, this is yet to be seen. For example, not all ventures in online universities have been successful. Most notably, the United States Open University (USOU), which was modeled after the British Open University, ceased operations in June 2002 citing insufficient revenues and inadequate enrollments (Arnone, 2002). Further analysis of the differences between the two institutions however, revealed that these were probably not the only factors responsible for differences in success between them. The British version is accredited, has national name recognition and British students may be eligible for financial aid and funding. The USOU on the other hand lacked accreditation and name recognition. Furthermore, students attending the USOU could not obtain federal aid or tuition reimbursement from their employers (Arnone, 2002). It is thus, apparent that there were structural and procedural factors. Therefore, the problems faced by online programs might go beyond cost. Even though costs cannot be discounted as being an unimportant factor, it is expected that as the cost of technology decreases, so also will the cost of administering online programs (Arsham, nd). This suggests a need for institutions to carefully consider factors other than cost when venturing into the arena of the virtual university.

Extended Traditional Universities

Many virtual institutions are for-profit operations. In response to the virtual university, many traditional (and non-profit) institutions are embarking on hybrid online programs or extended traditional programs which Hanna (1998) defined as extended traditional universities. In this model, traditional universities operate as the parent organization to a 'virtual program' serving a non-traditional, geographically dispersed student body. Though part of an existing institution, these institutions differ from the parent institution in philosophy, mission, governance, and productivity outcomes (Hanna). Here again the success of these programs has been mixed. According to Mangan (2001), a 2000 American Association of Collegiate Schools of Business (AACSB) survey of 320 business schools found that only 2.5 % of MBA students were enrolled in online programs, which fell short of the predicted 10%. However, some institutions are realizing that returns are falling below expected levels. Consequently, many are either scaling down or getting rid of their Internet based programs (Mangan, 2001). As an example, we can examine the case of State University of New York (SUNY). In February this year (2002), after only 18 months in operation, SUNY's School of Management announced its decision to get rid of its web-based MBA program. The problem was that only 35 students had enrolled whereas the university had estimated enrollments of 1,000 students. Why was enrollment so low? In order to have students enroll in a program, they need to be aware of the existence of the program. However, due to cost

constraints, university administrators had decided not to market the course aggressively. They had realized that the program was expensive to administer. For in addition to hardware and software expenditure, the courses were found to be very labor intensive, requiring instructors, graduate assistants, technical personnel, and course designers (Mangan, 2002). One would have assumed that before embarking on the venture, an established institution such as SUNY would have conducted feasibility studies and cost-benefit analyses. The problem here was not necessarily poor planning but partly due to a corporate sponsor not following through with promised funds. This points to another mammoth issue - that of corporate sponsorship of public educational institutions. Examination of this issue however, is beyond the scope of this paper.

It might appear from the preceding examples that online education does not provide an adequate return on investment and might therefore likely cease to exist. On the other hand, data seems to indicate that online programs are on the rise. One could speculate however, that if these ventures prove to be unsuccessful institutions will abandon them. Conventional wisdom however, might suggest that as internet use is on the rise in other spheres of society it will continue to be so in education also.

For Profit Adult Centered Institutions

In response to increasing demand for continuing education, for profit educational institutions and private businesses are reaching out to adult learners (Hanna, 1998; Sperling 1998) as are traditional post-secondary institutions. Distance education is one medium that is being used to achieve this objective. However, as Sperling observed, the rigidities of traditional institutions make them less competitive in this arena. Moreover, the for-profit institutions focus on bottom-line results and achieve this by expanding their course offerings and their locations. They also are more likely to alter their operations in response to changing technologies and demands. The University of Phoenix, which was founded in 1976, is a pioneer in adult centered distance education (UOP; Sperling, 1998). They operate from multiple physical locations across the United States and yet maintain a very strong online degree program. In this sense, they may also be considered to be a hybrid institution. This author posits that a reason why an institution such as UOP is successful in DE is its conception of the distance learner. While traditional distance learning adopted by traditional institutions tend to see the distance learner as one who is physically remote, Ohler (1991) hypothesized that the paradigm of the distance learner as one who is physically separated from the instructor and other students might not be wholly accurate. His conception of distance education is of "dispersed or decentralized learners who are… networked to form new learning communities" (p.25).He posited that individuals engage in distance learning for reasons other than geographical remoteness. He suggested that the distance could be cultural or psychological. By adopting multiple methods of distance education, for-profit institutions appear to be adopting this paradigm (though possibly unaware of it). The implication is that higher education administrators need to identify reasons why individuals select distance education as the medium for interaction and address the attending cultural and systemic issues such as the type of 'distant' learner that they are catering to.

Conclusions

The distinction between the various proposed or existing models of distance education is in some cases blurred, and it is uncertain which models will be predominant in the future. However, it is evident that universities and institutions of higher education are being challenged to examine their existing modus operandi and adjust their operations, philosophies, and structures accordingly. This author posits that in the foreseeable future, various models will continue to exist in parallel. What accounts for the difference between successful and unsuccessful online programs? When comparing institutions that are wholly web-based, the British and American Open Universities could provide some answers.

This study has revealed that the application of some models have been more successful in some institutions than in others. Since this is a relatively new arena for most higher education institutions, further studies are needed to examine the issues that lead to successful and unsuccessful programs and models. The key to organizational success according to Sifonis and Goldberg (1996) is long-range planning, holistic thinking, openness to change, and information technology integration (p.41). However, they stop short of specific prescriptions for implementing theses requirements.

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Internet Resources

The (British) Open University: http://www.open.ac.uk/

The University of Phoenix: http://www.phoenix.edu/

Increasing the Interest of Elementary Age Students in Computer Science though Day Camps

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Introduction

Computer Science and related majors have seen a decrease in enrollment across the country in recent years. While there are several theories behind why this may be the case, as educators in many areas of computing and information technology, this is a trend we should attempt to reverse. While it is true that many children are "computer literate", their knowledge of subjects actually relating to the computing sciences is often limited. We feel that exposing younger children (those of elementary school age) to computing topics may help to increase their interest in these subjects as they mature. Thus, they may be more likely to choose computing majors when they go to college.

At the start of the 2003-2004 academic year, the officers of our local ACM (Association for Computing Machinery) student chapter "brain stormed" for ideas as to how we could expand the visibility of our organization on campus and in the surrounding community. Several of our group members had worked in the past with regional and national organizations that provide educational science camps [1, 2] for gifted youth. After a few hours of conversation, we decided that we could indeed conduct a similar event on our campus for local elementary and middle school age children. The planning of this event became the class project of our Senior Seminar course, taught by the first author. The students who were in this course are the remaining authors of this paper.

While initially a primary purpose of the camps was to raise funds for our ACM student chapter, we quickly learned that there were tremendous benefits of this activity beyond financial. Our students found that preparing courses and teaching what they know to young children is a great way to strengthen their own knowledge about their subjects. The positive feedback we received, from the camp participants and their parents, was very good for our group and our college. This was one of the most positive experiences that any of us have been involved with in higher education, and would make an exceptional activity for students and faculty at any college or univer-

sity. The rest of this paper discusses the specifics of our camps, including the content of the courses and how we advertised in the community.

Our First Day Camp

Our first camp was organized as a two-day workshop, which took place October 23rd and 24th, of 2003. The dates for these workshops corresponded with two "Teacher's In-Service" days in the local school system, so the participants were off from school. Campers were charged $10 per day for attendance, which included lunch. We were able to solicit free food from several local restaurants with which to feed the campers. Practically all of the equipment we needed was freely available for our use at the college, which kept our overhead costs low. Obviously, if you were to need to purchase equipment for the camps (like the LEGO Mindstorm kits), the cost for attendance may need to be higher. Our college is in a rather economically disadvantaged county, so we did not want attendance fees to be prohibitive. On the other hand, we were afraid that if we charged too little, parents would "unload" their kids on us just so they would not have to find a babysitter on these days. We wanted kids at our camps who wanted to be there. We feel the $10 charge worked out quite well.

Several Computer Science majors visited a nearby elementary school to advertise our camps and hand out registration flyers. They were able to visit classes briefly and talk about some of the things we would be doing in the courses. We also invited the children of faculty and staff at Hanover College. A total of 20 children (between the ages of 7 and 12) attended at least one session of our camps, and most attended all sessions both days). Each day, the children participated in two 3-hour courses on one of the following topics: Robotics, Computer Hardware, Virtual Reality, and Web Programming. The schedule for our camp is shown below.

Computer Science Camps		
Time	***Thursday- Oct. 23***	***Friday-Oct. 24***
8:30 am	Registration	Registration
9:00am	***Session 1*** Robotics Computer Hardware	***Session 1*** Robotics Computer Hardware
12 Noon	LUNCH	LUNCH
1:00pm	***Session 2*** Virtual Reality Web Programming	***Session 2*** Virtual Reality Web Programming
4:00pm	Pick-up	Pick-up

We arranged the schedule such that students could attend both days to take part in each course that was offered.

Course Curricula

For the most part, the college students designed their own curriculum for the courses, attempting to present the material at a level understandable and entertaining to the camp participants. The following is a brief description of the content for each course.

Robotics

This course began with a discussion of the general characteristics of robots and robotic systems. Students were made aware that we encounter robots around us in many forms every day. Participants were then introduced to the LEGO Mindstorm Robotics Invention Systems [3]. Groups of 2 to 4 worked together to design, build, and program a robot to compete in a contest against the other workshop participants. The visual programming language that comes with the LEGO Mindstorm kits is very appropriate for this age level, and the campers seemed extremely excited about learning this interface.

The final challenge for the students required building a robot that could push four empty soda cans out of a square indicated with heavy black tape. The Mindstorm kits come with light sensors to help the robots distinguish between light and dark surfaces. For a three-hour course, there was definitely enough content to keep the campers busy the entire time. Most groups really needed to be helped along in order to make the contest deadline at the end of the class. Figure 1 shows some campers hard at work on their robots (left) and the final challenge (right).

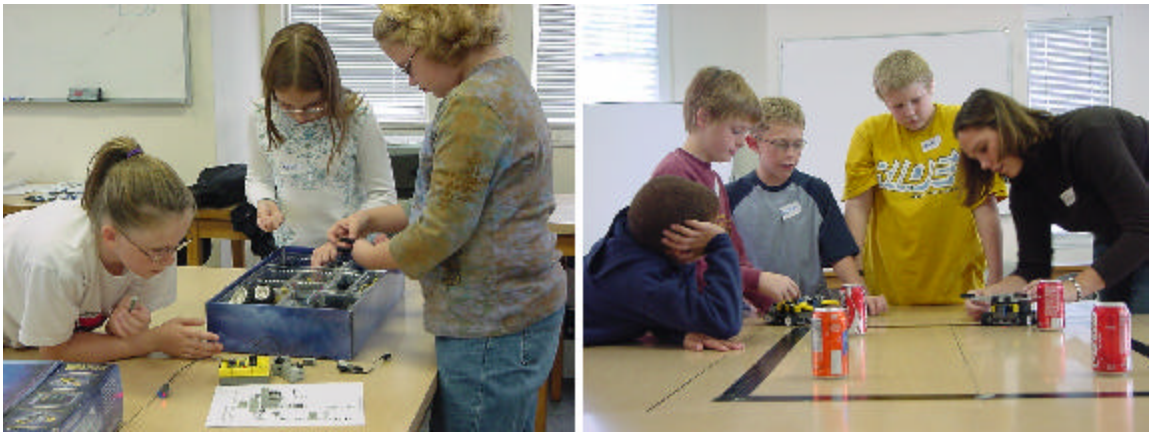

Figure 1

Computer Hardware

In this course, students were taught the basics of binary number representations and computer hardware. We began by explaining the significance of binary numbers to computer processing. The campers were then taught how to count in binary and we had each of them write their age in binary on the board. Some of them initially did not want to try this, so we bribed them with candy bars! It was amazing how effective this particular form of positive reinforcement can be with children of this age.

Next, we briefly explained the significance of binary numbers to digital logic. Students then worked in groups to build a computer from spare parts. As each major component of the computer was discussed, we added it to the machines. Students discovered (at least some of) the reasons for an operating system when we tried to boot the machines and were not successful. Windows NT was then installed. We also briefly discussed the need for device drivers in response to why the resolution on the monitors seemed so "funny".

Of the courses we offered at the camps, this was the one whose effectiveness was most difficult to determine. Each group had a college student working with them to tell the participants how to assemble the machines at each step of the way. Since we did not have any means of evaluating the student's own abilities, we were not able to assess how much they learned. We also had a difficult time filling the whole three hours with material for this course. Most of the campers ended up playing games on their computer for the last twenty minutes (which they seemed perfectly happy to do). Figure 2 shows the course instructors explaining various computer components to the students (left) and some of the campers building a computer with an instructor (right).

Figure 2

Virtual Reality

The Virtual Reality (VR) course began with a discussion of the components of a virtual reality system. Students learned that the distinguishing factor between VR and most video games is the level of immersion provided by a VR environment and that this "enhanced" immersion is typically accomplished through stereo projection. We convinced the students that their sense of depth perception was due primarily to the fact that they have two eyes, and showed them that each eyes perceives the world differently by having them focus on at object and look at it with one eye open at a time. Various techniques for performing stereo projection were then explained.

We had constructed a passive stereo VR environment at Hanover College for an unrelated project [4] that allows users to view 3D images while wearing special polarized glasses. We took advantage of the availability of this equipment for our camps. The students viewed several 3D applications and then competed against each other in a virtual "solar system scavenger hunt." The campers were split into two teams and given a list of questions whose answers could be as-

certained by "flying" around outer space in our makeshift simulator. Teams alternated between planning sessions on where they would need to travel to answer various questions, and actually using the simulator.

Initially, the campers seemed quite captivated by the stereo images and the space simulation. Their enjoyment seemed to wane, however, during the times when they were supposed to plan while the other team was taking its turn in the simulator. We also tried letting the students "pilot" the application themselves, which turned problematic when it became obvious that we did not have enough time for every student to have a turn. Some of them just wanted to fly around and did not care about answering the questions, which made the more competitive campers quite upset. In hindsight, it would have been better if we had just piloted the application ourselves. Figure 3 shows the students and teachers in our VR simulator viewing the solar system application.

Figure 3

Web Programming

The first time that we taught this course, we began by jumping straight into HTML programming. Later, we decided that the students would appreciate some background information, so we added a discussion of computer networks and the Internet. Participants were also taught at a high level about client/server computing and how a web server works. The structure of an HTML document and its tags were discussed, and students were shown how to put text and graphics into their web page, along with how to change text and background colors. Students also learned to construct links to other web pages.

During the second half of the course, students learned the basics Flash MX. Flash topics included layers, objects, animation and "motion tweening", as well as the creation and publication of movie clips. Participants were allowed to construct their own web pages, which were later saved to disk so that the campers could take them home. Figure 4 shows the students learning about Flash MX from one of the instructors.

This course actually contained the greatest amount of freedom for the students to experiment and design their own creation. Filling the time was not much of a problem for this session, as most

of the students enjoyed having an opportunity to create a web page that they could take home. In fact, the students wished we had given them more time to work on their web pages.

Figure 4

Evaluation of the Camps

Overall, we felt the camps were very successful. Many parents told us later how much their children enjoyed the time they spent with us. We had the campers fill out a very simple anonymous exit survey upon completion of each course, consisting of the following question, "Has this workshop improved your interest in computers and Computer Science?" A total of 56 surveys were submitted and **all** answered, "yes", to the question. While we feel that some of the kids may have answered affirmatively just to please us, the unanimously positive response does reflect well on the quality of the experience for those students who attended.

Ideally, we would like to check back with our camp participants sometime in the future to see what, if any, impact these workshops may have had on their academic interests. The local elementary school has several computing courses, but does not really further any of the topics we introduced. Our hope is that we provided enough information to peak their interest in technology, so that they will pursue these topics when given further opportunities.

More Camps

The first series of camps went so well, we decided to offer a camp again in a weekend format. On February 7th, 2004 (a Saturday) we offered our second camp. The two major adjustments to the schedule were that we reduced session lengths to two-hours and we did not offer computer hardware the second time around. We decided upon evaluation of the first camp that the robotics class could use more time – so it was expanded to 4 hours (covering both the morning and afternoon sessions). Under the "new" format, students had to choose either all day of robotics or web programming then virtual reality. The computer hardware course was dropped largely because the spare computers we had been using for the camps were "reclaimed" by our academic computing department. The schedule for camp number two is shown below.

Computer Science Camps	
Time	*Saturday, February 7th*
9:30 am	Registration
10:00am	***Session 1*** Robotics Web Programming
12 Noon	LUNCH
1:00pm	***Session 2*** Robotics (continued) Virtual Reality
3:00pm	Pick-up

The two-hour time blocks for courses seemed to work out very well. We observed during our first camp, that many of the students became easily distracted and inattentive during the last hour of the sessions. Shortening the courses really helped. On a day off from school, four hours of learning is probably all you can expect from most elementary age children.

Suggestions for Camp Implementation

There are many possibilities for sessions at day camps such as the ones we have described here. The best advice we could probably give is to do what works best for you. Our virtual reality sessions, for example, take quite a bit of technical expertise and may not be feasible for many institutions. Other topics, however, such as Visual Basic programming, computing literacy, or even networking, could easily be substituted in its place and make for a great session. The important thing is to teach what interests you, and what you can use to inspire the children's interest.

When designing your sessions, make sure you come up with lots of activities for the participants to do. Children will listen attentively for about 15 minutes, and then they get bored if they are not doing something active. Remember, that they are giving up their weekend or break to be with you, so they want to do something interesting! Allow them to learn by doing. We also found that arranging some sort of competition seems to work well for getting the kids motivated. When they felt like they were working for a prize, the children seemed to get more intent on the project they were supposed to do.

Remember to be flexible and patient. Elementary age children are not like college students. Try to make things fair, be prepared for children to cry over seeming insignificant events, make sure you know how to contact their parents, and try to make them be nice to each other. If you can, group the children with others of similar age - they seem to work better with peers than with those from different grades. Older children tend to boss the younger ones around, which can make the camp experience unpleasant.

Our final piece of advice is to get the children's home address when they register. Our initial registration forms had only a space for their name and contact phone number. As we began to prepare for a third camp with courses designed specifically for the children who had come before, we realized that we did not know how to mail invitations to them.

With some hard work, you can put on a great event at your institution. The college students will get just as much out of preparing and leading a camp as the children you have come. The best way to get kids interested in technology is to introduce it to them when they are young. These kinds of camps are a great way to do just that.

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Technology Planning Strategies

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Abstract

Effective planning strategies drive achievement of an overall technology goal to increase **access** to electronic information in real time in order to increase **efficiency**, productivity, and communication across campus. Planning relies on providing access, 'Anytime Anywhere' to student information, calendar, email, course management tools, and the Intranet to improve services and support to students, faculty, and staff.

Eight strategies form the framework of our plan.
1) **Student** services drive project priorities.
2) **Administrative** support leads to technology innovation.
3) **Teamwork** builds on collaborative decision-making.
4) **Innovation** relies on informed research.
5) **Adaptations** evolve as technology changes.
6) **Standards** determine purchasing.
7) **Projects** are phased-in according to specified timelines.
8) **Communication** promotes successful implementation.

Planning is initiated, explored, and promoted through members of the Technology Learning Roundtable, Academic and Administrative departments, and Information Technology Services. Implementation and maintenance of a highly reliable technology enriched campus focuses on resources, training, support, innovation, and communication.

Introduction

This paper describes technology planning strategies implemented at a small school. These strategies are explained in relationship to the goals and objectives of the Technology Plan. Input from various college areas is important to achieve successful outcomes. Planning is key to the implementation and maintenance of a highly reliable technology enriched campus. The focus areas of strategic planning are: resources, training, support, innovation, and communication.

"Strategic Technology Issues: A Checklist for Liberal Arts Colleges" emerged from a 1995 EDUCOM workshop where Clarke was among the eighty colleges represented. The workshop was lead by Dr. Martin Ringle, CTO, Reed College (recent recipient of the 2003 EDUCAUSE Leadership in the Profession award). Workshop attendees focused on the impact of new technologies and financial priorities of liberal arts and small colleges. The checklist still valid today can be found at http://www.reed.edu/pcw. The questions remain the same but different answers have evolved.

Technology Planning Strategies

There are eight strategies guiding our technology planning process:

1) **Student services drive project priorities.** Every effort is made to meet student needs. These needs include anytime anywhere access, seamless services, and smart classrooms where faculty engage students in interactive learning.

2) **Administrative support leads to technology innovation.** The Clarke community recognizes the value of technology as a tool, the competency of the Information Technology service area, and the need for replacement cycles.

3. **Teamwork builds on collaborative decision-making.** Planning, decisions, and implementation are accomplished with input from various campus groups. Project-based teams help in the decision-making process and participate in the implementation of decisions. A team approach is key to the implementation and continued support of Datatel, Clarke's ERP (Enterprise Resource Planning) solution. Datatel's integrated information management solution assists in efficient operations and best leverage of resources enterprise-wide. Additional team implementations include the campus card system and a collaborative email and calendaring system.

4) **Innovation relies on informed research.** The Technology Learning Roundtable committee along with the Information Technology Service area gathers information on new technologies and processes from listservs, conferences, webcasts, scholarly research journals, vendor demonstrations, online demos, and peer networking.

5) **Adaptations evolve as technology changes.** As plans are designed and implementation is carried forward ongoing changes are made to produce a stronger project. As a result of innovation and investigation final products produced are enhanced.

6) **Standards determine purchasing.** Hardware and software purchases that adhere to common standards produce better support and training for users as well as aid in efficient deployment. Standardized operating systems allow maximizing time and talents of support service staff.

7) **Projects are phased-in according to specified timelines.** This acquisition and implementation approach allows for manageable project timelines and regulated monetary expenditures.

8) **Communication promotes successful implementation.** Technology plans and implementation are communicated through multiple venues. Faculty forums, committee representation, newsletters, presentations, and the web are vehicles for communicating with the Clarke community.

These planning strategies assist us in achieving our overall technology goal to increase access to electronic data for retrieval of up-to-date information to increase efficiency, productivity, and communication. Key words are access, up-to-date, and efficiency. The Clarke Intranet and web facilitate Anytime, Anyplace access for students to schedule classes, register, view grades and transcripts, pay bills, utilize campus calendar, and email. Enabling access for our faculty and staff help them better support the students and work more efficiently.

Overall Technology Goal and Objectives

The overall goal is to increase access to electronic information in real time resulting in increased efficiency, productivity, and communication.

Objective 1: Increase the use of the Internet for teaching, student recruitment, public relations, database information, and dissemination of e-forms. Our vehicle for access is the Internet and Clarke Intranet.

Implementation of Web tools include;

- WebCT as the standard online course management tool,
- My Info for web access to student information for students, faculty and staff,
- GroupWise for collaborative email, calendar, and document sharing,
- Intranet portal to access campus news, electronic forms, My Mail, My Info and My WebCT,
- Clarke website for student recruitment and information dissemination for our alumni and the community.

Objective 2: Support new administrative software initiatives.

Administrative initiatives include Datatel's WebAdvisor (My Info) for new and continuing web access to information database systems for students, faculty, staff, and alumni. Software releases and upgrades are applied regularly; the graphical user interface is the most current version. Work continues on enhancing reporting for all areas. Admission representatives use mobile tools such as Personal Digital Assistants (PDA) to download prospective contact information; a GroupWise "Hit-the-Road" feature is being piloted by counselors to explore the advantages of this feature.

Objective 3: Support the campus-wide technology plan.

- Work within limited financial resources and seek additional funding.
- Continue to inform budget planning and communication with individual departments.
- Support the current Title III student assessment and student success grant.
- Continue to update the detailed projected five-year campus technology budget.

Input

Input from three main college sources is important to successful outcomes.

- The **Technology Learning Roundtable** (TLR) is a campus technology advisory committee. This committee originated over ten years ago and has moved from initial planning for what a networked campus should be by placing a computer on everyone's desk to current issues of course delivery enhancements, ubiquitous access, and classroom building renovation.

- **Academic and Administrative departments** submit a three year technology budget request yearly to Information Technology Services area. This information is translated into capital

budget based on how it fits in with the campus wide technology plan. New projects are implemented through departmental requests.

- The centralized **Information Technology Services** area promotes, demos, and pilots technologies to change and improve the way services are delivered and work processes are enhanced. The roll-out of collaborative communication software, Novell GroupWise, is a recent example of this approach. This area also studies new advances in technology through consultation with the TLR. Technology is adopted as a tool to reduce barriers for students, faculty, and staff not to simply acquire technology. One example of this approach was the decision not to promote a "laptop university" due to the fact that it was not the right fit for Clarke. Future policies may introduce the right type of wireless mobile and teaching access that fits the Clarke campus.

Implementation

The implementation and maintenance of a highly reliable technology enriched campus focuses on resources, training, support, innovation, and communication.

- **Resources** necessary to provide a state-of-the-art learning and teaching environment to facilitate student success are identified, resources obtained, and usage policies written. Computers, servers, printers, and network infrastructure are on a 3-4 year replacement cycle. Software is regularly upgraded to "proven" versions.

- **Training** and educational opportunities promoting the use of technology throughout the learning environment are identified and offered. Faculty training is accomplished through faculty development workshops and one-on-one guidance in the Technology Education Center. Staff training, including Information Technology, utilize in-house training, consulting, and self-study as a means of keeping up-to-date in particular applications. As budget monies become available off-site training will be offered.

- **Support** is available appropriate to technology needs throughout the learning environment. The Information Technology Services area and the Technology Specialists are available during working hours.

- **Innovation** relies on informed research. Innovative technologies currently being investigated are in the areas of blended courses, wireless technologies, electronic collaboration, electronic portfolios, and seamless integration of services.

- **Communication** concerning the use of technology is promoted and facilitated through the use of campus focus groups, faculty forums, brown bag luncheons, general staff meetings, and presentations to administrators and various departments.

Conclusion

To aid in the planning process the following issues are considered using guidelines noted in Ringle's report "Strategic Technology Issues: A Checklist for Liberal Arts Colleges" (http://www.reed.edu/pcw).

- Evaluate technology investments by how well they serve the institutional mission
- Use of the Internet to its full potential for teaching, student recruitment, campus information, public relations, and other purposes
- Make provisions to enable easy electronic communication with our students as well as with alumni, parents, prospective students, and scholars at other institutions
- Prepare faculty to take advantage of curricular opportunities provided by the web, multimedia, and other new technologies
- Explore consortia or collaborative relationships with other colleges and businesses to provide technology and information resources in the most cost-effective ways
- Assure campus-wide policy providing ethical and legal guidelines for the use of technologies such as the Internet, e-mail, peer-to-peer file sharing, and the Internet
- Address copyright and licensing issues as we broaden electronic access to resources such as library materials
- Assure a policy exists to cover ownership and/or royalties for electronic materials produced by faculty or other members of the college community, along with appropriate recognition of achievement during the promotion and tenure process
- Assure institution-wide policy for allocating, upgrading, and replacing computer equipment

You've Got Mail! Managing a Campus-wide eMail Migration

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Abstract

In early 2003, DePauw University recognized the need to upgrade their existing email system, which was rapidly exceeding its capacity. The decision was made to convert the entire campus to Novell's GroupWise solution for email. This presentation will focus on the options considered as well as some of the issues involved, and then discuss the planning and implementation of a campus-wide email migration. We will look at the conclusions that were reached at the completion of the project, as well as some of the perils and problems encountered along the way. This discussion would benefit anyone considering a major software migration or upgrade on their campus.

Background

DePauw University is a private, residential, undergraduate liberal arts college located in Greencastle, Indiana. We have an enrollment of just over 2300 students, and 800 faculty and staff members.

Technology Resources and 361°

A $20 million grant of distinction from the Lilly Endowment supports information fluency and pervasive computing initiatives through DePauw's 361° programs. Special programs for faculty members and students improve expertise in using computers, electronic information and digital technologies. Workshops, IT fluency certification, and on- and off-campus internships are open to all students. There is campus-wide Internet and network access with a data port for each student in residence. 300 public computers and a 24-hour lab assure students access. More than half of all classrooms are equipped for multimedia and Web-based presentations. Campus-wide wireless Internet access is in its pilot stages.

One of the most exciting aspects of 361° is the Information Technology Associates Program (ITAP), which provides DePauw students with an unparalleled opportunity to link a liberal arts education with technology know-how through four years of on-campus internships with a wide range of information technologies.

The Project

The Problem:

In April, 2003, an email was sent to DePauw email users, explaining why the campus was experiencing a problem with the existing email system. An excerpt from that email follows:

Originally the WebMail server was installed to provide a way for faculty/staff/students to access e-mail from home or anywhere off-campus. The number of users has grown steadily as many people have adopted this as their standard way to use e-mail. Through the fall and winter, we would routinely see 800-900 users. In late February and early March, for reasons unknown, the number of users spiked to 1500-2000! The WebMail server has trouble handling this many concurrent users and the mail cluster has trouble with the constant manipulating of mail required by the WebMail (IMAP) system. The result is that when we reach 1500 users, additional users are refused, response on the WebMail server becomes slow, and mail often acts "funny".

So, there are really two problems:
1) The WebMail server is not large enough to handle the large number of users who are trying to use WebMail as their mail software.
2) The mail server (where mail is stored) is having difficulty handling the number of WebMail (IMAP) users trying to store, compose, delete and send mail via this server.

In addition to the Webmail server, users were receiving email through a number of POP (Post Office Protocol) email programs, such as Netscape and Microsoft Outlook. The technical support staff was required to provide support on all of these different email tools.

The Solution:

A committee from the Information Services staff at DePauw began to evaluate email solutions that would provide greater usability and reliability. The committee included members from the Network Services group, Technical Support, and Purchasing, as well as IS management. After considering several email programs, including Outlook and Netscape, the committee chose to implement Novell's GroupWise as a campus-wide email solution. Several factors were weighed in this decision. Among them were: the reliability and scalability of GroupWise; the security options which it provided; additional built-in features, such as calendaring and instant messaging; and a full-featured, web-accessible client.

Once a decision was made, we formed the TigerMail (our nickname for GroupWise at DePauw) Taskforce to plan and implement a complete email migration process for the entire campus. The first step was to procure the new hardware that would house the GroupWise software. DePauw purchased a new server array that would meet the current need, as well as provide plenty of room for future growth.

Because the server hardware arrived later than planned, we were unable to have GroupWise installed and fully functional by the time that our Fall Semester began. That forced us to consider how best to implement the rollout of the new email client while faculty and students were fully engaged in their normal daily routines. Thus, the initial plan was designed to move sectors of the

campus population efficiently, while at the same time minimizing interruptions. We would begin by creating a pilot program to test our implementation procedures, and once we verified these procedures, we would migrate the entire student body to GroupWise during their Fall Break, at the end of October. After the students were completely switched, we would begin a new pilot program for faculty and staff. When faculty and staff returned to campus in January, during DePauw's mid-semester term known as Winter Term, they would migrate to GroupWise then. The original goal was to have the entire campus migrated to GroupWise by February.

Once the server was in place and the software installed, we were ready to begin the first phase of our implementation, the pilot phase. We chose to include in our pilot program the ITAP students, as they were technically savvy, and were a small enough group (approximately one hundred students) to test the program effectively without risk of overloading the server.

After the pilot group had tested the Web Access server, we were ready to move the remainder of our students (over 2000) to GroupWise. We sent emails to the students a few weeks before the move, and offered basic training sessions on the new email system. Because the majority of our students had previously been using Webmail, we did not offer them the desktop client, feeling they would be comfortable using a web-based system. When the students returned from Fall Break, we offered additional training on how to convert their existing email to GroupWise. As a result of testing and our initial pilot program, the email taskforce determined that we needed a utility to enable us to easily convert existing email, whatever its original format, into GroupWise. After negotiation with the vendor, we were able to obtain a campus license for UniAccess from ComAxis Technology. This allowed us an automated way to copy email.

As we continued to offer support to our students, we began to identify academic departments that might be willing to participate in our pilot program, along with our IS staff. We had already determined that we wanted to migrate our administrative staff as entire departments, rather than individually. We felt this would provide for greater continuity, as well as making user support more manageable. The original goal was to set up a schedule to work with academic departments this way, as well.

Before we could begin to schedule our staff and faculty members to migrate their email, we needed to collect a great deal of demographic information from them regarding their current email habits. Part of our email taskforce was given the task of creating a survey that we could send out to our entire faculty and staff, and then translate into a database that would allow us to determine when and how to migrate everyone's email. Some of the information necessary included issues such as current email tool (or tools) being used, whether email was retrieved via POP or IMAP, and whether PDA's were being used to access calendar or contact information. Once this information was assembled and collated into a huge database of email habits - sorted by department - we were able to begin the process of scheduling email migrations for our administrative departments. After looking at the database information, we determined that it would be nearly impossible to connect with an entire academic department at one time. As we rapidly approached the end of Fall Semester and the year, we reached the decision at that time to handle faculty conversions individually. We would attempt to work them in between the scheduled staff departments.

We ended the Fall Semester with all active students moved to GroupWise, as well as our Information Services staff, and part of the Computer Science department, who had volunteered to be early adopters. We returned in January with an extremely aggressive schedule to migrate all of our administrative staff during the month. We assembled a team, comprised primarily of technical support staff and technicians, to work with the various staff groups. We had also developed a precise procedure for migrating an individual's email from their existing system to GroupWise. The process went something like this: after determining what email the client used and what they needed to copy into the new system, we would use UniAccess to copy their email folders, and address books if needed, into GroupWise. We would then install the GroupWise client on their system, and offer a brief tutorial on how to use the GroupWise client.

After migrating email for a few of the smaller departments, however, we realized our planned schedule had been overly ambitious. While our procedure functioned very well (once everyone on the migration team learned it), we had seriously under-estimated the amount of time necessary to move mail and properly ensure everything functioned correctly. We had established email quotas for the entire campus: students were given a quota of 50MB of email on the server, and staff and faculty members had 100MB. While these limits seemed reasonable to the taskforce, and were in line with other institutions of our size, they seemed somewhat unrealistic for most of our campus. Because the majority of our staff and faculty members had been using a POP-based email system, there had been no limit to how much email they could keep on their local system. Almost everyone had more than 100MB of email, and many had amounts ranging from 400 – 700MB of mail. Fortunately, early in the migration process, we had become familiar with GroupWise's archiving option, which allows a user to move email from the server back to a local drive. While this solved most of our users' issue with the quota, it still took a good deal of time to copy their existing mail to the server into folders which GroupWise recognized. Then we had to archive the email until they were under their quota.

As we began to implement our campus-wide migration, the TigerMail taskforce gave way to a Rollout Team, which met on a daily basis to determine which departments and which individuals were being migrated, discuss any new issues which might have been encountered, and decide responsibilities for each team member for the day. Because all of our team members had other responsibilities, including installing new systems for faculty and staff and providing technical support for the entire campus, this amounted to an immense juggling act, pulling the team together and figuring out who could go where. Thus, as the month of January wore on, we were faced with the reality that we could not realistically migrate all of the remaining users before the beginning of our Spring Semester. The senior members of the rollout team met, and after looking at the progress made and considering several options, produced a revised, less ambitious schedule for the remaining departments. The new schedule would spread the remaining administrative departments through February and March, with the new goal to have everyone on campus moved to GroupWise by April 1st. This schedule allowed our technicians more time to devote to keeping the campus up and running, and allowed us to work with all faculty and staff as their schedules permitted.

We proceeded on the new schedule throughout February. While the administrative departments were fairly close to our updated schedule, we were having more difficulty scheduling our faculty to meet one-on-one to migrate their email accounts. By mid-February we had successfully mi-

grated over half of our administrative departments, but had moved only 25% of our faculty. Again, the rollout team discussed our options, and it was decided to move the remaining faculty all at once, in a similar fashion to the way the students had been moved. An announcement was emailed to the entire campus, additional training sessions on the new email client were offered, and on March 3rd, the remaining faculty members were migrated to GroupWise. Of course, there are always exceptions. We offered an extension on the email move for those who needed special accommodations until April 7th, but only a few users chose to wait. Thus, between Fall Break and Spring Break, we had managed to move almost the entire DePauw campus to GroupWise.

In conclusion, email has become the primary means of communication for many on our campuses today, and it is one of the most vital applications users have on their computers. Moving an entire campus, even one of DePauw's size, to a new email system is an enormous undertaking. A migration like this requires careful consideration and planning, as well as huge amounts of resources, including people, time, and money. One of the most positive, and perhaps unforeseen, impacts of our email migration was the strengthening of relationships within different areas of our IS department, as well as with other groups on campus. Our team really came together to pull off what at times seemed to be an insurmountable task.

Lessons Learned (*or* What would we do differently?)

- Just switch everyone at once! Don't spread it out over a prolonged period.
- 100MB quota may be adequate for the "average" user, but there are users who will need more than the basic amount.

Obstacles

- Lack of a viable Macintosh client
- Users who want to continue using their existing clients
- Time conflicts within and without the team
- Synchronizing calendars and PDAs

Next Steps

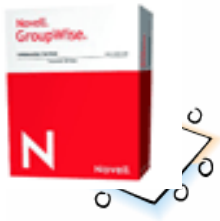
- Macintosh client rollout – we need to work hard to regain the faith of our Mac community on campus
- Investigate best practices for GroupWise – work with key departments and clients
- Communicate effective uses of the new client, including the fundamental skills (message management, shared folders, calendaring, etc.)

TigerMail Implementation Plan

DEPAUW
UNCOMMON SUCCESS

TARGET

STAGES/TASKS



August	October	January-	Summer '04
• Install Servers	• Move All Students	• Move Faculty and Staff	• Roll-out instant messaging
• Launch Student Email Pilot	• Launch Staff & Faculty Pilot	• Roll-out Campus Calendaring	• Roll-out additional features
• Define Policies	• Staff & Faculty Training	• Roll-out iFolder	• Continue Training
• Begin Communication Blitz		• Continue Training	
• Student Training (ITAP, RAs)			

SUCCESS FACTORS

- *Systems Arrival*
- *Effective Communication*
- *Timely Deployment*
- *Successful Conversion*
- *User Satisfaction*

HIGH RELIABILITY

HIGH PERFORMANCE

PRIMARY OBJECTIVES

OBJECTIVE
• Enhanced email

INTEGRATED

OBJECTIVE
• Anti-spam & Anti-virus

STANDARDS BASED

TigerMail

OBJECTIVE
• Local Instant Messaging

EASE OF USE

OBJECTIVE
• Calendaring

OTHER OBJECTIVES

COST EFFECTIVE

SCALEABLE

CHALLENGES

- Training
- Address Book Conversions
- Message Migrations
- Client Satisfaction
- Systems Configuration

Utilizing a CMS to Facilitate Computer Science Instruction

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Abstract

Course Management Systems are becoming increasingly accepted as an effective and efficient method of course delivery. Often they are used as the principal means of web-based course delivery. In addition, many institutions are utilizing CMSs to more economically handle large sections of particular courses. However, CMSs can also be used as a valuable tool for supplementing face-to-face course instruction. Although we have used a CMS extensively in large sections of lower-level courses, we have not, until now, made a concentrated effort at examining the effect of using a CMS in our upper-level computer science programming courses. This paper will focus on the pedagogical uses of a CMS and the specific aspects of a CMS that seem to either contribute to or detract from student learning. We also explore the features we would like to employ in the future that may increase student motivation and success for our computer science students.

Introduction

As educators, we are (or at least should be) focused on the process of student learning. We should be developing innovative ways to teach students *how* to learn, not just using technology as an alternate method of supplying the same information to students. With this in mind, we have begun to examine the ways in which a course management system can be utilized, and perhaps exploited, to complement face-to-face instruction, with the ultimate goal being an improvement in student learning through enhanced problem-solving skills. One of the components of the course management system that we are especially interested in, because we believe it is an essential part of the learning process, is the set of tools available to promote communication among students, as well as with the instructor. This feature, if utilized effectively, can promote collaborative learning, and thus, enhance critical thinking skills [4].

Background

A number of studies, including our own, have been performed to determine the effect of extensive use of technology enhancements in higher education settings [3, 5, 6, 7, 9, 10]. The studies vary from trying to determine if CMSs can be used to reduce costs to more effectively dealing with large lecture courses. A study at UC Berkeley was conducted to determine the effect of technology enhancements in large sections of Chemistry 1A, with the goal being to determine if

the use of a CMS affected the course cost [6]. Faculty members at a number of institutions are viewing CMSs as a means to deal with large lecture classes more effectively and determine if the use of a CMS might impact student motivation and success [3, 7]. And finally, more and more computer science departments are experimenting with CMSs in the large introductory computer science courses [9].

Our research began in two arenas. The first was that of a large lecture-based computer science course taught primarily for business majors. The second was that of a beginning programming course. The primary purpose of our prior research was to determine if and how student success is affected by a CMS [5].

We have since extended our research to include an examination of utilizing a CMS in our upper-level computer science programming courses. We wanted to determine if there were specific pedagogical methodologies that could be employed around the use of a CMS which might either contribute to or detract from student learning. If the use of a CMS proves to be successful, we want to explore the specific features that did in fact seem to increase student motivation, problem-solving skills, and success of our computer science students.

Research Methods

The study was conducted using three classes. The first course, CSC 121, is an introductory course which is required for all business majors. The typical student profile is primarily freshman, pre-business majors with little or no computer experience. This course has utilized WebCT for several years with some positive results [5]. The second course, CSC 241, is the Data Structures course which is taken by all Computer Science and Computer Information Systems majors. It is typically the 3rd, 4th, or 5th computer science course taken in the curriculum. In addition to using the system hosting WebCT, the students develop programs and submit them on a Linux system. The third course, CSC 321, is the Programming Methods for Business Applications course, which has, in the past, been taught using COBOL. As a result of recent curriculum revisions, the course was taught this semester using Visual Basic .NET, so the students were working in an entirely new environment. Despite the fact that the language itself is new to the students, they are junior-level computer science majors, therefore were expected to be well-versed in problem-solving methods and programming language constructs.

As a result of previous studies, we noted that it would be useful to administer some type of pre-course/end-of-course survey [5]. The purpose of the pre-course survey is to give some indication as to the level of computer literacy each student possesses, some idea of their work habits in terms of school work, and a measure of their familiarity and attitude regarding online and technology-enhanced courses. We also conducted an end-of-course survey to determine whether the use of WebCT in the curriculum had changed student attitudes and responses to any of the factors.

The Survey

The pre-course survey was administered during the first week of classes. Students were asked to participate in an anonymous online survey using WebCT. The WebCT survey tool was utilized because the instructor could determine who responded to the survey but could not attribute responses to a specific student. The students were advised of the way a survey in WebCT works and were informed that the survey counted as a quiz – full credit if they took the survey, no credit if they did not take the survey. Of the 79 students enrolled in CSC 121, 74 responded to the survey. The CSC 241 class had 25 students enrolled, 24 of whom responded, and the CSC 321 class, consisting of 23 students, had 100% participation in the survey. The total participation rate for the pre-course survey was over 95%. This in itself is quite impressive, given the fact that a number of these students had never before used a course management system.

Questions on the surveys were designed and may be categorized according to the type of information we were trying gain. We wanted to get an idea of the computer background of the students, so the questions included "How would you rate your computer skills?", "Have you ever used WebCT before?", and "Have you ever used other online course enhancements or course management systems?".

From past experience, we know that many students have previously used some type of course management system so it is becoming quite common for them to anticipate instructor use of WebCT. In order to gain insight into this, we asked questions such as "Did you look at the WebCT site for this course prior to the first class meeting?" and "If you did access the site for this course prior to the first day of class, what pages did you access?".

In an attempt to determine whether the use of a course management system might actually increase student motivation and learning, we posed several questions regarding the features of a CMS. This was done in an attempt to determine if and how specific features might be exploited. Questions included "Given your choice, when would you work on assignments?", "Having online access to assignments would [help or make little difference in my work habits]", and "How much would you use chat room, discussion forum, and e-mail features if they were available to you?" We also posed a question to determine the preferred work environment (work, home, or either) of the students.

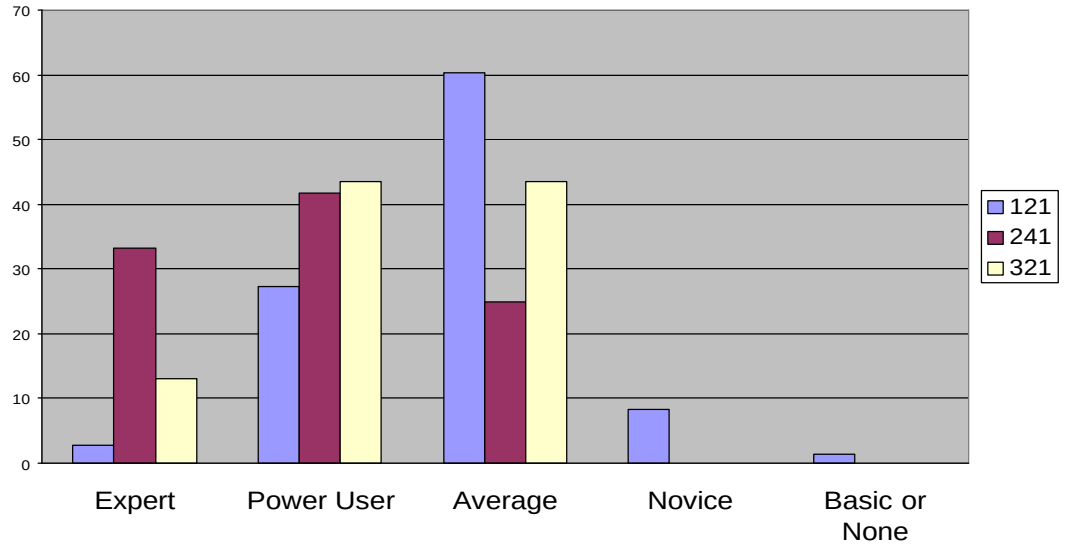
Results of Pre-Course Survey

There is such a strong trend in business toward technology today that, more and more, students graduating from college will be hard-pressed to find a job that does not involve technology in some form or fashion. To this end, the use of information technology in education is growing dramatically [1, 11]. One of the survey questions was directed at measuring the students' level of computer literacy. Of course, the measure was the student's perceived level of computer literacy, so the results were somewhat interesting. Figure 1 represents the results of the survey question regarding computer literacy.

It is interesting to note that the CSC 241 students actually rank their computer skills higher (75% expert or power user) than those of the CSC 321 students (56.5% expert or power user). The stu-

dents who ranked themselves as novice or below were all enrolled in the CSC 121 course (9.5% of the class).

Figure 1. Computer Skill Rating By Class

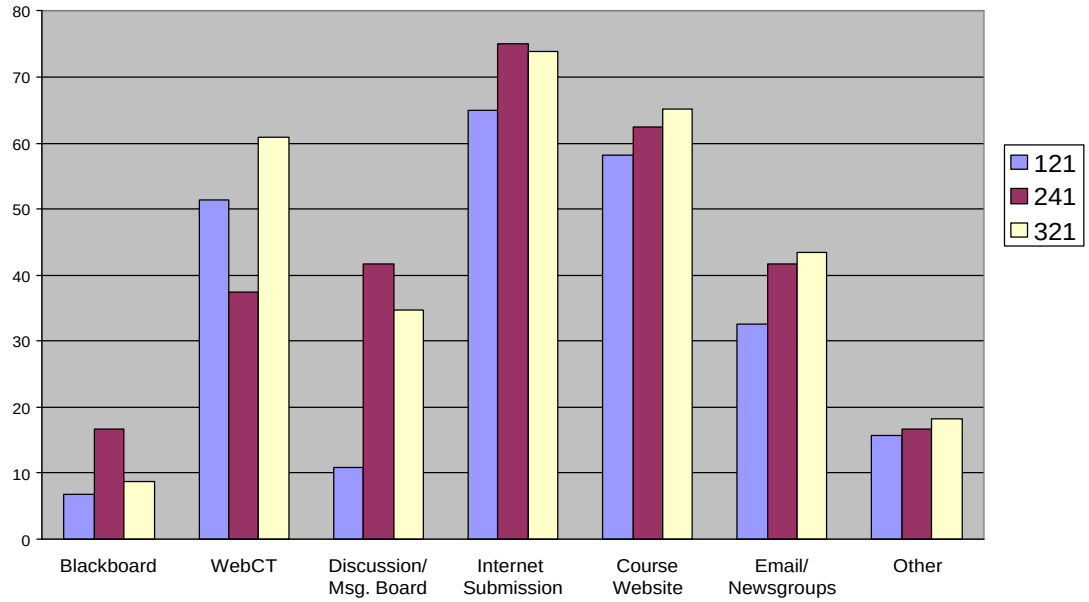


Based on the increased use of technology in the classroom, we wanted to quantify the degree of use of course management systems and/or some form of online course enhancements. Figure 2 represents an overview of the level of online use students have experienced in the classroom. The students were asked to select any and all of the course enhancements that they had utilized in previous courses.

It is apparent from the results that students at all levels are accustomed to some form of online submission process. Over 55% of the students have accessed a course website and a high percentage of students have used WebCT prior to the current course. A smaller percentage of students have utilized discussion forums, chat groups, and e-mail specific to a particular course.

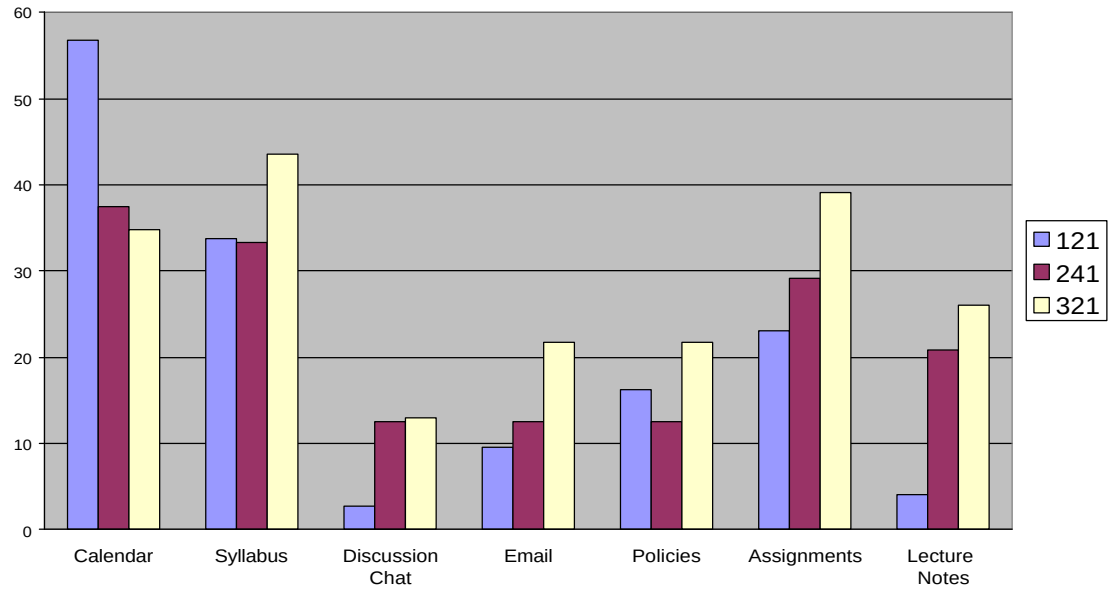
Given those results, it is interesting to note the number of students actually accessing the course material via WebCT prior to the start of the semester. The students were asked to indicate which pages, if any, they visited prior to the first day of class. Approximately 30% of the students overall visited the course site prior to the first day of class. Of the CSC 121 students, 37.5% visited the site; of the CSC 241 students, 20.8% visited the site; and of the CSC 321 students, 34.8% visited the site.

Figure 2. Online Course Enhancements/CMS Used



Of those students who visited the course site prior to the first day of classes, the majority of them visited the course syllabus and calendar (see Figure 3). Almost 40% of the CSC 321 students who accessed the course site also accessed the assignments page.

Figure 3. Course Pages Accessed Prior to First Day

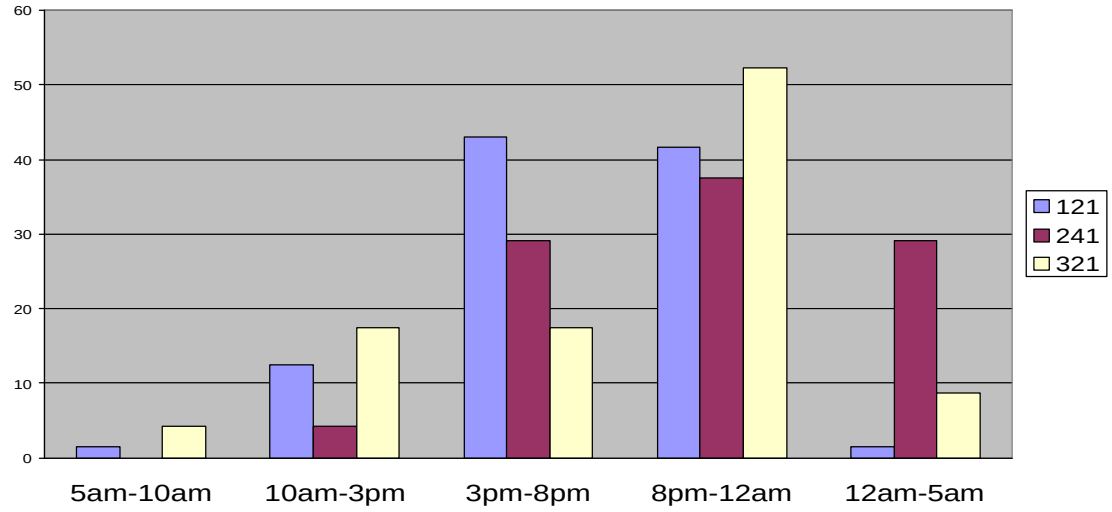


The final set of questions was designed to give some indication as to how the features of a CMS might be utilized more effectively in order to enhance student success in the course. Not surpris-

ingly, a large percentage of students (CSC 121 – 79.1%, CSC 241 – 79.2%, CSC 321 – 73.9%) indicated that they felt having online access to assignments would allow them to keep up with due dates, budget time, and be a more effective student. In general (and again, not surprisingly), the majority of students work on assignments between the hours of 3:00 p.m. and 5:00 a.m. Figure 4 shows the distribution of times when students prefer to work on assignments.

These statistics, for obvious reasons, have an effect on the student responses in terms of where they prefer to work on assignments. Over 50% of the students in the CSC 121 and CSC 241 classes prefer to work on assignments at home, with approximately 37% in each class stating that they could work either in the lab or at home. Of the CSC 321 students, 30% (the highest percentage in all classes) preferred to work in the lab. This may be attributed to the fact that the more advanced computer science students have learned the benefits of collaborative learning. The remaining students either preferred to work at home or could work either in the lab or at home.

Figure 4. When Students Prefer to Work on Assignments

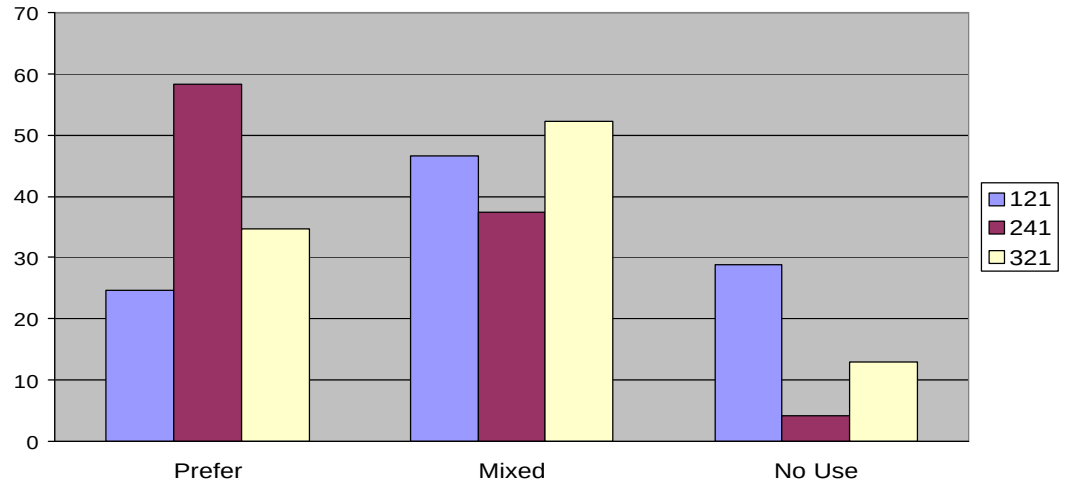


We were extremely interested in the students' opinion as to how much they would use chat room, discussion forum, and e-mail features if they were available. The results, shown in Figure 5, indicate that the majority of the CSC 241 students (58%) actually prefer online tools versus face-to-face or telephone communication. An average number of students (CSC 121 – 45.9%, CSC 121 – 37.5%, CSC 321 – 52.2%) thought they would probably use them but would prefer to talk to a person. The remaining students stated that they would not use the tools unless required for the class.

How WebCT is Utilized in Various Courses

In all of the courses, WebCT was used for distribution of course syllabus and policies, calendar postings, posting of assignments, student submission of assignments, online quizzes (to a limited extent), posting of grades, discussion groups, chat, and e-mail. The CSC 121 students utilized both student web pages and student presentations for a web page development exercise.

Figure 5. Student Opinion of Online Communications Compared to Face-To-Face Communications



The use of WebCT also varied to some degree in the CSC 241 and CSC 321 courses which are taken by the Computer Science and Computer Information Systems majors. One of the differences involved the posting of lecture material. Both course sites contained pages of course information material in the form of lecture presentations. The students were able to access the notes prior to class in order to study and better prepare for the class.

Another difference in the course sites is a result of the fact that program development for the Data Structures course was on a separate Linux system. In a prior study [5], students in the programming course were sometimes confused by the programming assignments being posted on the WebCT assignments page. This page indicates whether or not a particular assignment has been submitted. Since students were submitting programs on a different system, the WebCT assignment always displayed a 'Not Submitted' message. To avoid confusion, the programming assignments are now placed on a separate content module page. Therefore the students can obtain the assignment online, but more easily recognize the fact that some assignments are submitted via WebCT, while others are submitted on the Linux machine.

Results of End-of-Course Survey

The post-course survey was administered a month prior to the end of classes. Again, students were asked to participate in an anonymous online survey using WebCT. The students were informed that the survey counted as a bonus quiz – extra quiz credit if they took the survey, no penalty if they did not take the survey. Of the 75 students remaining enrolled in CSC 121, 58 responded to the survey. The CSC 241 class had 17 students remaining enrolled, 13 of whom responded, and the CSC 321 class, consisting of 23 students, had 22 students participate in the survey. The total participation rate for the end-of-course survey was almost 89%. Not as impressive as the pre-course survey participation but still quite good in terms of voluntary participation.

The questions on the survey were designed to mimic most of the pre-course survey questions. We eliminated the questions regarding computer background. We focused, instead, on the ways in which the use of WebCT may have enhanced student motivation, participation, and success in the course.

One of the surprises of this study is that the chat room, discussion forum, and e-mail features were not used as extensively by students as they had been in the past. Less than 15% of the students in each class used the communication tools more than face-to-face or telephone communication. We would like to develop an environment in which the students and the instructor effectively use the communication tools to assist in problem clarification, critical thinking, testing and debugging, and general problem solving. The students should also use it as a forum for sharing ideas and planning study sessions.

The majority of the students (CSC 121 – 91.4%, CSC 241 – 76.6%, CSC 321 – 90.9%) would rather look up grades on WebCT as opposed to getting them from the instructor. The statistics are not as high (CSC 121 – 36.2%, CSC 241 – 46.2%, CSC 321 – 40.9%) for students desiring to get course information, such as syllabus, notes, and assignments, from WebCT rather than having them distributed in class. However, several said that it depends on what is being distributed (CSC 121 – 46.6%, CSC 241 – 38.5%, CSC 321 – 40.9%).

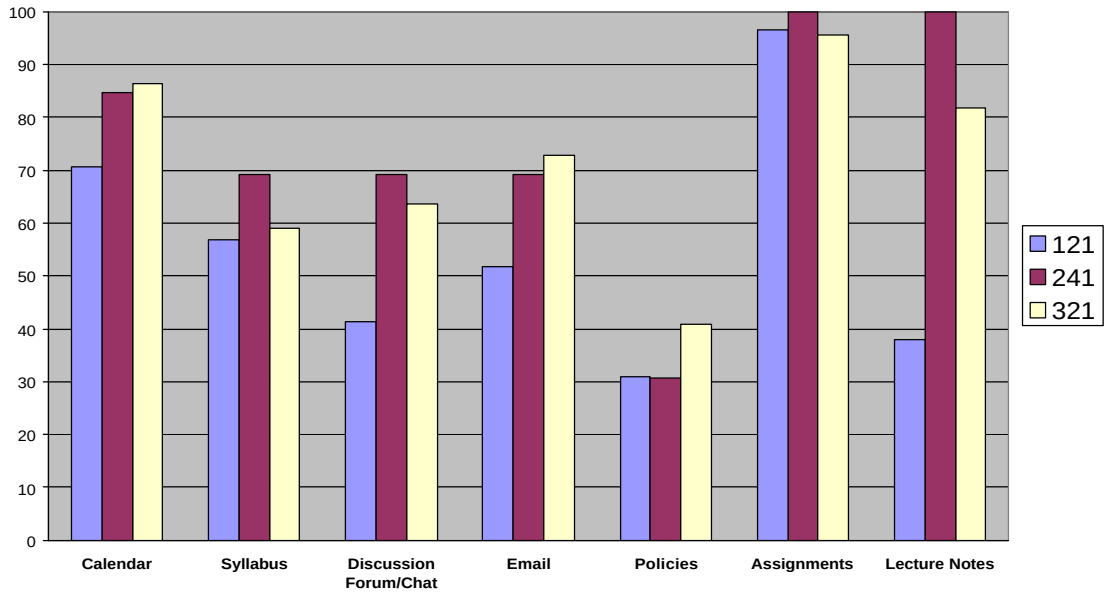
As in the pre-course survey, the students were asked to indicate which pages, if any, they visited during the class. Figure 6 presents the results of the survey and illustrates that almost all of the students accessed the assignments (we can only hope that the remaining obtained a copy from a friend!). In those courses where lecture notes were available, a majority of the students accessed those notes. As indicated earlier, less than the number expected actually utilized the communication tools.

Finally, the students were asked if they will now check courses prior to the first day of class to determine if WebCT is being used by the instructor. A surprising number said no (CSC 121 – 19%, CSC 241 – 15.4%, CSC 321 – 22.7%), while a fairly significant number said it depends on the class (CSC 121 – 25.9%, CSC 241 – 30.8%, CSC 321 – 40.9%).

Opinions on WebCT in the Classroom

One of the common concerns expressed by educators is that use of a CMS actually demands more time (from both students and instructor) than was required before enhancement [2, 8]. With this is mind, we have begun to develop a plan that, in addition to using WebCT for the "normal" course management functions, focuses on utilizing WebCT as an "information sharing" type of resource.

Figure 6. Pages Accessed During the Course



We have also examined the advantages and disadvantages from both the faculty and the student perspective to determine if the use of a course management system is an effective tool for promoting student learning. Our findings are that, in general, students seem to acclimate fairly quickly to the environment. There is a relatively short learning curve, and students seem to enjoy using WebCT, as supported by our survey results.

From the faculty perspective, there are both advantages and disadvantages. The development time, especially for a new web-based course, tends to be higher initially. This concern has been expressed repeatedly by many researchers [2, 8]. However, as the faculty member becomes more accustomed to the system itself, this development time may decrease, even for new courses. We have gone from a department in which 2 faculty members (less than 20%) use WebCT to one in which 6 (over 50%) are using it to some degree. The advantages of using WebCT may include less grading time, less administrative time (especially in those courses taught previously), and more personal interaction with students utilizing e-mail and the discussion forum. We have also noticed assignment submission rates as high as, and sometimes higher than, those of non-WebCT courses [5]. In general, the advantages seem to outweigh the disadvantages for both students and faculty.

Current Assessment and Future Plans

There are a number of items we would like to address in the future. We would like to continue the pre-course/end-of-course survey over a period of time to determine if our findings remain consistent. Additionally, we would like to further examine our findings and establish a plan for utilizing WebCT in our courses such that we may further enhance the problem-solving and critical thinking skills of our students. We will continue to use WebCT in our courses as we believe

that, used appropriately, it can in fact be used to enhance (not just supplement) teaching methodology and thus improve student motivation and learning.

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Collaborative Initiatives within an Information Technology Organization

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Introduction

This document outlines in a very broad sense one institution's interpretation of collaborative relationships within the IT department. Franklin College has a small support organization that handles most IT support issues. Because of the size of the organization, size of the school, and ultimately the size of the IT budget, Franklin College has been creative in the ways IT support is handled.

Organizationally, the IT department uses collaboration decision making techniques within the group to handle issues ranging from long term planning, application development and processes based on daily support. This document will explain the collaboration process, discuss the organizational structure, and highlight ways to promote institutional, departmental and personal growth for Information Technology members.

The Three Faces of Information Technology Support

Franklin College is a small Liberal Arts Institution just south of the metropolitan Indianapolis area. Franklin has always been known for strong residential academic programs. Franklin has limited distance education initiatives and community education programs under way. For the most part, traditional classes, at times blended (combination of online and seat) rule at Franklin College. Franklin College maintains a large number of media rich classrooms, a video conferencing facility and a small percentage of faculty utilizing advanced technology in their classrooms. Currently, Franklin College has 25% of classrooms deemed "Smart Classroom" outfitted with permanently mounted dvd/vhs players, projection and sound equipment.

In addition to the media rich classrooms, Franklin College will have all meeting and academic spaces in our wireless network by the fall of 2004. This wireless network will be open to all faculty, staff and students. Visitors will be able to access the wireless network for web browsing purposes after a simple registration process.
In total, there are 12 members of the Information Technology Support team. Those 12 people cover all Information Technology support services. In the last two years, the IT department has expanded to include the following components:

- Networking Support
- Networking Security Support
- Web Application Support
- Telecommunications

- Residential Computing support
- Administrative Systems Support
- Helpdesk
- Academic Computing Support
- Teaching and Learning Support
- Copy Shop Services

The areas listed here are the primary areas covered in the IT department. We also have one support/clerical person and one Director. In order to cover each of these areas with the limited number of staff available, there has been a need to work as a close knit collaborative group. Many people wear multiple hats, and are called on in various roles dependent on the situation and project.

Marilyn Bedford is the Training and Development consultant for the Human Resources Department of Indiana University Purdue University in Indianapolis. Marilyn defines collaboration as a process for "solving complex, systematic problems, making decisions that affect people from many constituencies and generating creative ideas. Collaboration is based on philosophy that respects and values individual perspectives as they work together equally with commitment to advance common good."(Bedford) According to David Chrislip's book Collaborative Leadership, "The premise of collaboration is when you bring the appropriate people together in constructive ways with good information they will create authentic visions and strategies for addressing the shared concerns of the organization and community." (Chrislip)

Based on the definitions listed above, and the fact that we have identified more IT areas to cover than we have people, members of the IT department fulfill many different roles at different times. The IT department has adopted a very open attitude in dealing with change. Change is often created by or embraced by the IT department. In the last 4 years, we have organized and reorganized 3 separate times to accommodate institutional, departmental and individual member's strengths and talents.

Currently, we have identified three broad areas of support forming teams to accomplish the goals in each of those respective areas. Academic computing, Administrative computing, and networking and infrastructure support represent the over arching themes within the department. Individual team members work from a general job description on a day to day basis. As mentioned before, reorganization occurs often within the department but **always** with the support of the collective collaborative team (the IT department) – more about that later! Members of the IT department "float" into and out of those three teams depending on current projects and initiatives. For instance, the Telecommunications Administrator, who happens to also be the Audio Visual coordinator may be at any given time participating in a Networking project as well as an Academic computing project on two separate initiatives. Another example might be the Network Security Administrator also writes administrative software applications. At any given time, he may be participating in a Networking/infrastructure project as well as an Administrative support initiative. In each of these areas, one team member acts as a team leader, overseeing a bulk of the projects in their area. Listed below is a breakdown of what is included in the three areas of support.

Academic Technology Support

The Team Leader holds a title of Collaborative Technology Administrator. Services that occur in this area include:

- Hardware Support for faculty
- Software support for Faculty
- Instructional Technology Support
- Video Conferencing
- Lab software support
- Course Management support
- A/V Support

Administrative Technology Support

The team leader for this area holds the job title of Administrative Systems Analyst. Support in this area includes:

- Administrative Systems
- Transaction Systems
- Application Development
- Hardware Support (occurs in all three areas)
- Helpdesk (occurs in all three areas)

Networking and Infrastructure Support

The team leader for this area holds the job title of Network Administrator. Support in this area includes:

- Network support
- Network Security Support
- Telecommunications
- Copier/Printer Support
- Residential Computing

Information Technology Organizational Model – How to make it all fit?

As a manager of this kind of fluid organization, it feels as if that old saying "herding cats" is truly a common practice. The biggest managerial challenge for the Franklin College IT department is staying focused on the long term goals and steering the group to those ends. From the inside of this team, the work assigned to and volunteered for by team members makes sense. I can imagine from the outside, it would appear as if the IT department moves as an amebic organism. The relationship between the IT department and the rest of campus is based on a level of respect and perceived competency for the IT group.

The collaborative principles including equality and trust are practiced and visited often within the IT department. There is a delicate balance at times to make sure all perspectives are represented. The trust within the department is based on the fact that everyone has something to contribute, and not one of us is as smart as all of us together.

After all that, please note there are times where collaboration is not appropriate. In an emergency situation, or when there is little time to decide, full blown collaboration is not the best decision making style. Even when collaboration cannot be used, one of the benefits of using a collaborative model, is the team members know intimately strengths and weakness of each member. Team members can find answers and solicit assistance when needed.

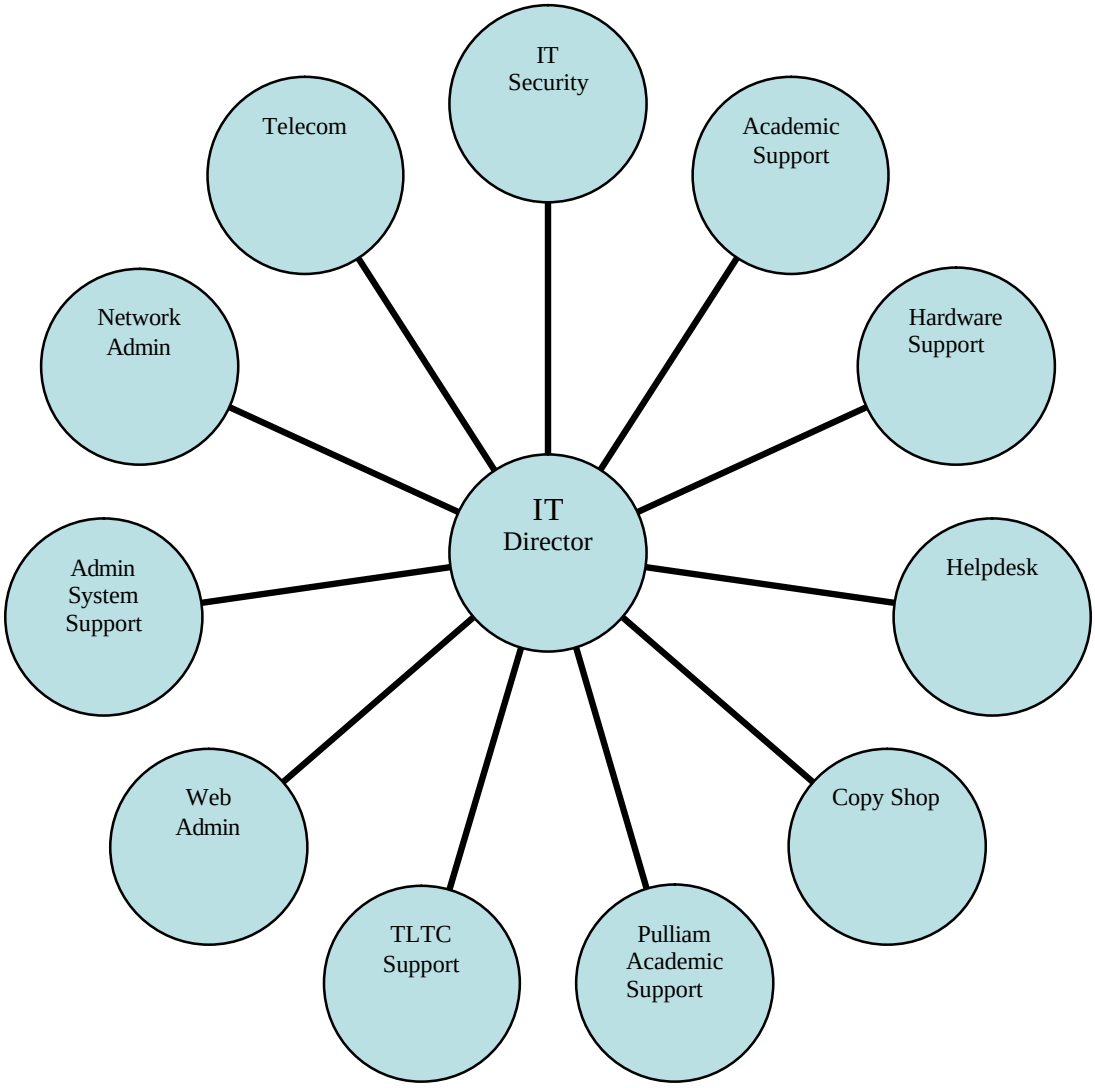
Management Model

The role of the IT director at Franklin College (among other things) is to foster an environment of open communication among the team. Communication, communication, communication….The IT Director is responsible for providing the resources and the group authority for projects. Many times the IT Director is the one who ultimately has positional power within the group, can reward and in the worst case, coerce. In all cases where collaboration is used to solve problems, the IT team knows the leader has (good or bad) final responsibility for the decision.

In times where collaboration is not appropriate, it is the responsibility of the IT Director to inform the team (usually in an informal manner) that other decision making styles will be used. Consultative and Executive decisions must be used when appropriate. Each team member participates from a Consultative perspective to the IT Director and other team members when called upon to do that.

Organizational Model

The IT department is a very flat organization. As has been suggested throughout this discussion, team members don different hats as is dictated by current projects. Often, team members perform the role of "project manager" eliciting the help and support from other IT staff people. Each team member reports directly to the IT Director, in theory fostering a feeling of equality among the group. The following is a pictorial representation of the Organizational structure.



Balancing Institutional, Departmental and Personal Growth

As stated earlier, the key to collaborative successful teams is communication. The IT department is very intentional about how communication happens formally within the group. The IT department meets one time per week on Tuesday mornings for 1 hour. This is an opportunity for the entire group to come together and help solve problems. It is referred to as the "problem" meeting. Each member gets a chance to share current problems or challenges where they need to assistance of other IT team members. Discussions occur within that hour with the entire group.

On Thursday mornings, the IT department meets for 1 hour. This meeting is set aside for long term planning involving the entire group, policy discussions, or specifically designated agenda items suggested by the Director or other group members. In some instances, small groups are established for this time to talk in the three broad support areas. The agendas for the small groups are established by the Director.

On Friday mornings, each team member meets with the Director privately for 15-30 minutes to give an update on current projects and generally "check-in". This way the individual team members have a voice in the overall process.

Sound like a lot of meetings? It is. We also have 2 retreats (a summer canoe trip) and a winter planning day. Both retreats are off campus and involve social relaxed time. The times the department spends together does not necessarily mean we "like" each other, although it does mean we are forced in some ways to communicate. This type of communication elicits buy-in and understanding among the group.

Training and Personnel Considerations

There is a delicate balance in this model. It is imperative the organization is deliberate in making sure personal growth and interests are met. In order for the group to function in such a fluid environment, each team member must always feel their contributions are valued. If the team members feel they need to be retrained, retooled and refreshed in their skills, training should be provided. As a leader in this type of group, it is imperative the collaborative team recognized every effort will be made to "pay attention to" the individual first, but sometimes departmental needs, then ultimately institutional needs may sometimes take precedents over individual. The attitude where "individuals matter" seems to motivate team members to give over and above when necessary.

Each team member is expected to attend one conference or training session to learn a new skill every year. Those conferences and training opportunities vary by location and content. Each team member is also expected to participate in campus committees. Many IT team members serve on search committees, staff elected committees and panels for student projects. This involvement (which could in fact be more) forces the IT department to look outward to the rest of the campus rather than only focusing on departmental issues.

Conclusion

In as much as this seems like a very complex model, but dealing with people is a complex endeavor. Franklin College is committed to serving our faculty staff and students. The IT organization is lean. The structure of the organization is efficient with the overall goal of meeting the needs of the Institution, department and individual team member. There is an understanding among the department that the order of priority changes as the needs change. The IT department has grown by 2 people in the last 18 months, and will grow by 2 more as we bring on a technology rich Student Center and a "One Card" this summer. The IT department has enjoyed a low level of turn over within the department. This model has worked for the number of team members currently employed and I suspect will work for a slightly larger group.

Change is welcomed, embraced and met from the Franklin College IT department.

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Library Tools for Connecting with the Curriculum

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Abstract

Serving as liaison librarians at the department level, the authors discuss strategies for integrating library and online resources with the curriculum. Examples of technology-based capabilities range from current awareness services, e-reserves, and journal finding applications to smart linking functions that can be built into library catalogs, licensed databases, course syllabi, and tailored research guides. Attendees will be able to increase student engagement with learning resources by using their institution's library tools more effectively, and by requesting librarian assistance to employ these functions in online research guides and course syllabi.

Introduction

In this era of accountability and cost effectiveness coupled with assessing student outcomes, this paper explores what classroom faculty and librarians can do to more effectively engage students with learning resources. This exploration is envisioned as the first step in understanding how new technologies are changing the ways university and college librarians and classroom faculty are responding to the expectations and needs of learners for on-demand access to library and licensed resources. Enhanced library service and course management capabilities for providing multiple points of access to resources and user-initiated library services, such as current awareness, inter-library loan, and electronic reserves, are increasingly built on advances in linking technologies.

Linking technologies allow librarians and classroom faculty to map library resources to the curriculum and structure the learning process to accomplish learning objectives in a fashion that facilitates student contact with library and other resources. Accordingly, one of the first tasks to be accomplished is to identify the topic(s) to be researched and the types of resources to be used, i.e., journals, newspapers, reserves, reference collection, circulating books, government documents, and online databases. For example, a professor may provide students with a list of suggested or preferred professional journals

that the articles must be found. If the intent is for the student to efficiently locate the journals to be searched, then the traditional journal title list could be constructed as a web page with appropriate links. The types of links provided could range from library catalog entries to online sources including full text/image databases covering each of the journal titles, as well as links to electronic journals when applicable.

Developing or providing multiple entry points into the world of learning and library resources provides an excellent opportunity for librarians and classroom faculty to assess their efforts in guiding information retrieval. With a focus on the course and its research requirements, classroom faculty and librarians can customize online course syllabi and research guides to facilitate learning specific research skills – navigating a myriad of online content, locating and obtaining print sources, and evaluating what they find. For example, Brenda Reeb and Susan Gibbons (2004) suggest that tailoring research guides to meet student research needs ". . . at a course level are more in line with how undergraduate students approach library research" (p.123). Thus, with a renewed emphasis on course research requirements, librarians and classroom faculty can create a customized approach for learning research skills in support of selected courses.

The Need to Link to the Source or as Close as Possible to the Source

A primary aspect of information literacy is the ability to use the best information available for a given purpose, leading librarians and teaching faculty to the realization that students often do not possess the skills to locate the information needed and that they tend to rely on whatever is easily obtainable unless specifically directed to appropriate sources. In general, college students feel somewhat confident in using computers and searching for information on the Internet. All too often, however, students do not know how to find the information that they really should use and are content to rely on whatever they find online. Students often tend be "technologically savvy" but not necessarily information literate and often mistakenly believe that technical savvy is the equivalent of information literacy (Brown, Murphy, & Mark, 2003). Students want to find information quickly, preferably with a single search, without having to read lots of instructions, decide which source to search, or drill through multiple sites.

Librarians, while trying to keep pace with changing technology, are concerned with the ability of students to obtain the best information, realizing that our complicated web pages are in direct competition with search engines such as Google, Yahoo and others that tempt our students with a single search box that will find results for almost anything they type into it. Not being information savvy, students reaching a fairly low frustration level in seeking information through the library channel, all too often resort to the simpler route. Our job as librarians and classroom faculty is to ensure that students know when it is appropriate to do a Google or Yahoo search, and when it is preferred to look for information in a scholarly publication. And further, students need to be able to evaluate the quality of the information obtained whether from the web or a database purchased by the library.

Even those of us who have been librarians or classroom faculty for a while and have completed our education requirements before the development of the Web, realize how complicated the issues of information literacy and research are for present day students. While on the surface conducting research in the current information environment seems easier than in the past, the sheer volume of in-

formation and number of choices make the process more complicated than in a strictly print research environment.

An example of how complicated locating the best information for a particular purpose can be is locating the full text of an article referenced in a database. First of all, the student must decide which database is the logical first choice for the information needed. Another big problem we have found in web usability testing is students often do not understand what a database is and how to select the one most appropriate for their research topic, according to Bede Mitchell, Dean of the Library and University Librarian, Georgia Southern University (personal communication, April 20, 2004). After successfully navigating through the maze of databases and locating relevant article citations, the student must determine how to locate the complete article. Until recent technological developments, students had to check multiple sources to determine the availability of an article. For example, a student with a citation might miss the fact that the entire text is available in the very database in which he or she is searching because all databases do not have the same look and feel. Some databases show an obvious link to the full text while others require drilling through multiple layers or even linking to another site. After determining that indeed the article is not available, there is the possibility that the article is available in another database that must also be searched. Indeed, if no online full text is available, there could be print holdings in the library collection that necessitate a search of the library catalog. And if no holdings are located online or in the library collection, there is the option of filling out a request for an inter-library loan, which of course means that the article will not be available to use for the assignment due tomorrow. It is no wonder that the Google search box begins to look like the best solution to many students.

A-Z Lists and SFX

Librarians not only play a role in helping students to develop information literacy, but also attempt to organize information to simplify retrieval of the desired information. Fortunately as technology advances, librarians have access to new tools that are making the job of organizing information more efficient. Gradually, information resources are becoming integrated so that the information seeker has fewer resources to check and fewer places to look to find the information needed. Such tools include A-Z listings of journal titles with online links to the source of the information, direct links to databases and journal titles, and new linking software tools such as SFX which incorporates context sensitive linking technology allowing librarians to connect information from multiple databases or providers (Walker, 2002). While these tools do not necessarily increase information literacy, they do increase the likelihood that students will find reliable information and not bypass the expensive and quality resources provided by the institution. In the long run, will it not serve the purpose of information literacy if students are actually using appropriate resources because they are easier to access?

Software for the creation of A-Z journal locator lists is available from a number of vendors. While this software does not provide the seamless access to information for which we are striving, it certainly heads us in the right direction. A student with a citation can check the A-Z listing to find all the locations of the journal without checking multiple databases. Such listings generally include links to search the library catalog and to submit an interlibrary loan form as well. Many libraries are adding linking tools such as SFX so that a citation located in one database will link to other databases and even the library catalog.

A-Z listings for databases are also useful tools for students as well, particularly when local holdings and those available through consortia are integrated. In Georgia, all types of libraries have access to a statewide collection of resources called GALILEO, which stands for **G**eorgi**A LI**brary **LE**arning **O**nline. For several years, libraries maintained local database listings on their respective web pages and a link to the GALILEO resources. Only recently could a library integrate local databases into the GALILEO listing or provide direct links to GALILEO titles from the local listing. The existence of two resource lists is a barrier for students who do not care how resources are funded but are only interested in how easily they can locate the information that they need. The flexibility of integrating local resources with the GALILEO listing or of doing just the opposite and creating "express" links to GALILEO resources from institution level sites gives many options for librarians and teaching faculty alike for customizing research interfaces and assignments in order to link directly to the resource needed for a particular purpose by students.

The library catalog can also be enhanced to make electronically available information easier to locate by the addition of direct links added to library records so that electronic material can be accessed from the catalog without the necessity of consulting a separate list or web page in addition to checking the catalog. Links can be created directly to many databases and journal titles, depending on the licensing arrangements for a particular resource.

The Link to Information Literacy

New linking technologies can be utilized by classroom faculty as well as librarians, not only for their own research needs, but in creating assignments for students that make information easier to access, promote the use of appropriate information and enhance information literacy. If librarians and teaching faculty begin to think like students, the realization occurs that students tend to think in terms of one specific course or assignment. Thus, providing students with the traditional bibliography of library resources useful for the discipline is not much help to them, particularly for those students who have not developed information literacy skills. However, if librarians and faculty provide "bibliographies" or guides with direct links to resources related to specific courses or assignments, students will have a greater chance of locating and using appropriate information (Reeb & Gibbons, 2004). Librarians and classroom faculty can become partners in this endeavor with librarians assisting classroom faculty in determining resources available, and how best to link them whether through a web site, a course management tool such as WebCT, an A-Z listing of journal titles or research databases, or the library catalog since many resources have restrictions on their use and require the use of a proxy server or other mechanism to ensure that only authorized users gain access.

By targeting specific information needs and linking to the source or as close as possible to the source, students can be assured of accessing appropriate information and decrease their reliance on search engines as the sole source of information. Although it is not possible to make searching for information as simple as students perceive it to be with an online search engine, customizing access to information based on specific information needs can certainly enhance efforts to increase student literacy. Linking to the source or as close as possible to the resource, on the part of both librarians and classroom faculty, will better serve students in locating the information that they need and in turn increasing their information literacy skills.

"My OPAC," PURLs, and "Library LookUp" Features and Capabilities

Once librarians and faculty have determined the resources necessary for courses being taught and how best to link those resources to a web site, course management tool, or library catalog, further steps can be taken to make syllabi, bibliographies, and other resource materials more useful to the students by using "My OPAC," PURLs, and/or "Library LookUp".

First, teaching faculty and students using the library catalog at their institution may have options to set their preferences, save searches, and/or select items to be placed in a shopping cart. These features may be found in the catalog under a name similar to "My OPAC". One feature of "My OPAC" is to log into "Your Account". This allows faculty and students to find out how many books they have checked out, when those books are due, any fines/fees, and any book requests made. Once logged into their account, faculty and students are able to define the kind of search they would like as their default (i.e., keyword or exact search), tell how many results to display a screen at a time (i.e., 10, 15, 20, etc.), and tell which databases to search after searching the catalog for the same topic.

Another feature of "My OPAC" is the faculty or students' option to save any searches conducted. Once a search has been saved, the faculty member or student can decide how often to have results emailed to him/her. Additionally (s)he can specify whether all results from the saved search should be emailed or just new results if any are found. This allows the faculty and student to keep abreast of all new books and periodicals that arrive in the library on a regular basis.

The last feature of "My OPAC" is similar to "my shopping cart " found on online stores such as Amazon.com or Barnesandnoble.com. Some libraries may have this feature disabled; nonetheless, it is still an option to those who do have this feature enabled. This feature allows faculty and students to peruse through the results found in the library catalog after conducting a search and any items of particular interest may be selected to be placed in their cart. After perusing the entire results list, faculty and students may go to their shopping cart to print, email, or save those results of interest so they may check them out or save the information for later research.

Secondly, classroom faculty and librarians may conduct searches in the library catalog, and any results they find may be included in syllabi or bibliographies as an active link if these items are placed on a web site, course reserves section of the library catalog, or course management tool (i.e., WebCT). The advantage to performing such searches, known as persistent uniform resource locators or PURLs, include re-executing saved searches, facilitating research on complex topics, and creating current bibliographies of library holdings. Every time a search is performed by clicking on the text that is linked to the PURL, results on a specific topic in books, periodicals, recordings, etc. will be found. PURLs are more up-to-date and accurate than bookmarks because bookmarks die quicker for various reasons. Similar to saved searches in "My OPAC", PURLs can be performed one time, once a week, or monthly depending on the faculty or students' preference and assignment according to the assigned course requirement (Davidson, 1998; Online Computer Learning Center, 1995).

Lastly, John Udell has created a bookmarklet using JavaScript. This bookmarklet, called "Library LookUp," is installed onto an Internet browser toolbar. After searching online bookstores

(i.e., Amazon.com or Barnesandnoble.com) for a particular item and clicking on that item for additional information, faculty and students can search for this same item in their library catalog to find out if the item is owned and if so, whether it is available for checkout. "Library LookUp" searches an item by a single ISBN or multi-ISBN using any of the following online catalog systems: Innovative, Voyager, iPac, DRA, or Talis (Udell, 2004a). Pre-created bookmarklets have been created for numerous institutions using one of the named online catalog systems. If an institution is not listed, then instructions are provided for how to create a bookmarklet for that institution (Udell, 2004b). This is useful for faculty and students because (1) they will not have to purchase the item if they do not desire to do so, and (2) if the item is not in the library collection, they may request it utilizing the library's inter-library loan or document delivery service.

Electronic Reserves (e-reserves)

Introduced in the past decade, the electronic reserves system of web-based college and university library catalogs is growing in popularity among classroom faculty and students. The purpose of e-reserves systems are twofold: (1) to provide efficient access to required and recommended course materials in electronic form on the web, and (2) to ensure that all authorized users have access to the material. Although e-reserves practices for digitizing content, obtaining copyright permission, and remote access vary by institution, common features of e-reserves systems include the use of drop-down menus for access by instructor, department or course title, the capability to link to related content, campus access through IP recognition, and remote access to support distance learners.

Current Awareness Services

Also, growing in popularity among faculty are current awareness services that provide tables of contents and citation alerts by email as journals are published. Current awareness services are a "useful tool for identifying target journals to send a manuscript for publication, reviewing the literature, as well as covering journals not received" (Nelson & Fernekes, 2002). To initiate tables of contents alerts or citation alerts, a faculty member creates a list of journal titles or a list of keywords/subjects, respectively. An initial keyword/subject search of a current awareness database typically results in a baseline search that can be saved or emailed by registered users. These services can range from a single publisher's listings to comprehensive databases covering many publishers. Common features of current awareness services licensed by libraries include access to catalog entries and journal titles received by the library in print and online with links to full-text, electronic journals and tables of contents, as well as articles for sale. Complementing this capability is another library service called inter-library loan and document delivery to obtain content not owned or licensed by the library for authorized users.

Conclusion

The cumulative effect of implementing these technologies and a focus on assessment of student outcomes driven by accreditation has resulted in efforts to better serve our constituencies as measured by institutional effectiveness. Through the use of linking technologies and collaboration, library tools can become navigational features that transform online course syllabi and subject guides into tailored research guides, reserve items into electronic reserves, and current

awareness alerting services into faculty and graduate student research tools. The use of linking technologies also serves to strengthen the development of information literacy skills in the disciplines, and offers opportunities for assessment of student learning outcomes related to research and information literacy. Lastly, it improves delivery of content for distance learning courses and online components of traditional classroom instruction.

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Assessment Methodology in Technical Courses

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Abstract

Columbus State Community College is committed to assessment (measurement) of student achievement of academic outcomes. This process addresses the issues of what each student needs to learn in his or her program of study and if each student is learning what they need to learn. The assessment program at Columbus State Community College has four specific and interrelated purposes:

1. to improve student academic achievement;
2. to improve teaching strategies;
3. to document successes and identify opportunities for program improvement;
4. to provide evidence for institutional effectiveness.

The Computer Information Technology (CIT) department at Columbus State is actively engaged in studying and implementing "best practices" in assessing students in technical programs. Responding to workforce needs requires that our students are evaluated according to the specific standards currently in use in their particular field.

This presentation will discuss assessment practices beneficial to technical programs such as ours and will focus on standardized assessment practices such as program rubrics, quizzes, tests, and assignments, as well as the meta-cognitive techniques of student self assessment, minute papers, etc

Assessment in Technical Courses

Assessment in the college classroom is a difficult task. In addition to the outcomes that need to be measured in each class, our department has identified several formative and summative outcomes we would like our graduates to achieve, and our college has identified general education outcomes that need to be considered, as well.
If you take all of these outcomes and then add a complex theory of learning styles, such as David Lazear's concept of multiple intelligences, the task of assessing necessary outcomes appropriately becomes weighty.

How do you take all of these learning styles into consideration when overlaid on all the outcomes to be measured? We are left with the task of employing a variety of tools that will accurately measure how well our students have learned the specific material for each class, as well achieved

the more global outcomes required by our department and the college. Some tools, like the rubric, are geared toward accurate advertisement and evaluation of certain competencies. Others, such as a one minute paper, or journal, are geared toward more self awareness and understanding of what one knows or is learning. Below are some assessment methods—our "toolkit" that can be used in a variety of technical classes and for many different learning styles

Rubrics

According to the teachervision.fen.com site, a rubric is a "scoring guide that seeks to evaluate a student's performance based on the sum of a full range of criteria rather than a single numerical score." A good rubric takes the guesswork and subjectivity out of grading. In computer programming courses, a rubric looks for the presence of specific aspects of a good program. Is the logic sound, is there documentation, are variables defined correctly, and does it work? These concepts can all be woven into a good rubric. But what is a good rubric? Below is an example:

CPT262 CLIENT/SERVER SYSTEMS
LAB 1 GRADESHEET

NAME _____

	Points Possible	Student Score
File System diagram	_____	_____
OU diagram	_____	_____
Create container	_____	_____
Create users	_____	_____
Login scripts	_____	_____
Home directories	_____	_____
Assign rights	_____	_____
NDS security	_____	_____

This rubric helps teachers measure specific desired results and lets the student know just what was correct and what was missed. In addition, a Rubric should be given to a student when the assignment is made, so that the student knows what will be expected.

Peer Review

Having students review each other is another useful tool in assessment. Our final project course uses peer review to get an inside view of what students thought of their team members contribution to the project. This review is weighted in such a way that it can increase or decrease a student's score by one grade letter.

ATTENDANCE: Out of 100, rate this individual's attendance _____

PARTICIPATION: Based on 100, rate this individual's participation in the team activities.

_____ Do responses make logical sense?

_____ Is the student verbally participating?

QUALITY: Based on 100, rate this individual's quality of written work _____

(Appropriate format used, is spelling correct, is it legible/formalized, and is it applicable?)

COMPLETION: Based on 100 rate the individual's preparedness for meetings and group activities

_____ Assignments completed on time?

_____ Member was prepared for meetings
(assigned reading, agenda, etc.)

TEAMWORK: Based on 100, rate this individual's willingness to work with your team _____

Highest Possible Score 700, this individual's total score: _____

COMMENTS (Required):

Traditional Tests and Quizzes

Regular written tests are the staple in most classes. These tools allow the teacher to ascertain what the students are learning. But a good written test is a challenge. Tests can and should include a variety of methods, i.e., multiple choice questions, essay questions, true/false questions, the dreaded fill-in the blank, and reproducing lab work. As technical teachers, we sometimes bypass questions that measure what we are teaching, because they become difficult tests to grade. We must be sure we include those components from our courses, that actually measure what we've been teaching.

A non-traditional spin on tests and quizzes that help to accomplish this goal are weekly, non-graded "quick quizzes" that a teacher can use to make sure the students are staying current with their reading and understanding the main concepts therein. These quizzes are not anxiety producing since they are not graded and have the added benefit of acting as a study guide to larger, graded exams.

Below is an excerpt of a quick quiz used in PC Operating Systems:

Quick Quiz (Chap 11)

1. In Windows 9x, disk compression works by creating a special file called a _____
   Answer:

2. A temporary storage area in the RAM for data being read from or written to a hard drive is known as a _____.
   Answer:

3. In making backups using the child, parent, grandparent method, how often is the grandparent backup made?
   Answer:

4. Creating a replica of a hard drive so that the drive can be used on a new computer is known as _____.
   Answer:

5. What does RAID stand for?
   Answer

Another example of a testing method is the following, used in a Networking class:

Essay question: (5 pts)

Compare and contrast Novell and Windows 2000 in the way they create users, assign security and profile the user. Which do you prefer? Support your answer.

That same test includes the following types of questions:

Repeaters work at the _____ OSI layer.

a. DATA LINK
b. APPLICATION
c. PRESENTATION
d. PHYSICAL

On a(n) _____ network, all workstations must wait until they have control of the token packet to use the network.

True/False Users may have rights to directories but not individual files on a NetWare LAN.

_____ PRESENTATION	a. bits, circuit boards and cables
_____ SESSION	b. routing information
_____ PHYSICAL	c. creation of a connection
_____ TRANSPORT	d. end to end checking
_____ NETWORK	e. encryption, compression of data

Labs

What would a computer class be without labs? Lab assignments show us day to day how well students are "getting it." We don't have to wait until a mid-term (5 or 6 weeks into the quarter) to evaluate student progress. This is the best part of teaching programming: those "aha" moments when you see it all coming together.

When asked what they most want to see from their students, most teachers will say the ability to take what they've been given and use it in another way. That's the satisfaction of watching students work through lab projects. They take the pieces you've given them and put them together to solve a problem.

Below is an excerpt from a programming lab:

Programming 1

Lab Exercise #3 – Adjusted Gross Pay Report, utilizing MP, DP, and ROUNDING

Management has decided to adjust the Rate of Pay for employees who work either 2nd or 3rd shift. Those employees who work 1st shift will not receive any increase at all. The following table summarizes:

SHIFT	RATE OF PAY
1	No Increase
2	10%
3	12%

INPUT: Input consists of the 80 byte fixed unblocked disk file. The file layout is the same as Lab 1 and Lab 2.

OUTPUT: Create a report listing the Employee Name, Employee ID, Shift Code, Hours Worked, Rate of Pay, Gross Pay, Adjusted Rate of Pay and Adjusted Gross Pay for each employee.

These hands on assessment methods really help those students who can visualize a problem, but may have trouble logically deciphering the same concepts on a multiple choice exam.

One Minute Papers

A discussion on assessment would be incomplete without recognizing the importance of meta-cognition and use of meta-cognitive techniques in assessment. Essentially, meta-cognition is the learner being able to stand outside himself and objectively know what he knows. In other words, the learner should be able to understand what he didn't know before, and how that vacuum was filled with the appropriate knowledge, skills and/or attitudes to form a complete comprehension. Also, it may be that learner is on the road to understanding, but should see the path before him in order to realize what his next steps should be.

One of the best tools in promoting meta-cognition is the "One-Minute Paper," as suggested by Angelo and Cross. A one minute paper is used during the last few minutes of class and helps students to identify the concepts they're struggling with. The assignment is simple: Have students use half a sheet of paper and write 2 things: the most important thing they learned today, and the thing they understood least today. It helps them to clarify what they need to know (meta-cognition), and the things that will help you as a teacher understand what you need to better emphasize.

Journals

Journaling helps students build that meta-cognitive road map to success. The key to journaling is that consistent effort by the student and feedback by the instructor is crucial if the student is to buy into it. At least weekly, progress must be mapped by the instructor, with constructive and appropriate statements to the student to provide for additional reflection. The downside to this is that more time is needed by the instructor and student to be able to make this successful, even though the technical aspects of the course need to be covered.

Group Work

The best tool I've found for helping students to understand technical material is group work. I do not use it at the beginning of the quarter, but about half way through when I know the various abilities or liabilities, and what personalities are at work in the class. I don't let students pick

their own groups, but group them according to my perception of what each needs to get from the whole

The group size should be limited to three to enable students to contribute equally. Each person is told what the lab will consist of, and it's up to each member of the group to decipher the problem and decide what he or she will contribute. The group lab is generally based on a homework assignment they've been given the class before, so students are highly motivated to contribute Groupings are for the class period only and likely are different in subsequent class periods. After the work of the group is completed, the class is reconvened and each group's project is critiqued in a non threatening manner by the class and instructor. Bonus points are given for the group lab on an equal basis. Real world problems are given for students to apply logic problem solving. An example of a group work problem is below:

Chapter 2 In Class Exercise:

In groups assigned by the instructor, come up with flowchart and pseudo code solutions for the following example

You need to clean the floor! You have to have certain equipment (e.g. mop, broom, dustpan) and cleaning product (MopnGlo or whatever). We are going to assume that all equipment necessary is available, but you need to check and see if cleaning product is available. If it is, you can use it. If not, you will either borrow some from the neighbor OR go to the store and buy some. You need to clean the floor in the right order. Each use of the mop is defined as 5 strokes. You need to check after each mop use if the floor is finished. If it is, you have to see if it passes inspection. (Your spouse, significant other, or very intrusive aunt will inspect the floor. If that person does not deem it clean, you must do it again) If the floor is not finished, you have to see if the mop needs rinsed. Then you use mop again. You keep up in this fashion until the floor is finished. When the floor has passed inspection, clean your equipment and put away supplies and equipment, and enjoy a beverage of your choice!

Conclusion

Our main goal in this presentation is to offer our colleagues useful, understandable and tangible tools in helping students succeed. We will be offering examples of our work throughout this presentation and encourage other faculty to call on us to discuss whatever practices may need clarification.

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Portable and Mobile Classroom (PortMoC)

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Abstract

The Portable and Mobile Classroom (PortMoC) began as an idea to bring Internet connectivity to places where there was no connectivity for education and healthcare, but still make the connection reasonably sustainable in terms of cost and manpower. Through trial and error and several research iterations, Saint Francis University's Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA) finally settled upon a tow-behind-style trailer combining a small form factor with a satellite dish, self-contained power and IP distribution, and 802.11b standard laptop computers. The PortMoC has gone through several iterations, including physical vehicles. However, the research approach has been the same: Does this technology work as we intended and is it a viable means to education? CERMUSA has surveyed the technology, such as upload/download speeds and laptop Internet connections, and is looking to roll this out into real-world situations. As it stands currently, the average download speed is 385 Kbs and the upload speed is 14 Kbs, with 8 laptops receiving separate low-bandwidth video streams. Items for future research and discussion are: Is it possible to raise the download/upload speeds for the benefit of the students while keeping the costs down? What applications are appropriate to use in the PortMoC environment?

Background

The PortMoC began as a method for providing electronic classrooms in any remote area. Early in the design of this prototype the targeted group for testing was the Human Resources Management & Industrial Relations (HRM/IR) program at Saint Francis University. This graduate program operates concurrently at three geographically separated sites in Pennsylvania: Loretto, Harrisburg, and Pittsburgh. The program had found it difficult to find electronic classrooms in these areas. CERMUSA had hoped to develop an inexpensive method of turning any room into a video teleconference capable classroom thereby allowing HRM/IR to use any available educational space. It was soon determined that the necessary bandwidth for quality videoconferencing would be excessively high and not a sustainable method.

The next phase was to create a connection to the Internet using a vehicle and use video streaming software to create the interactivity between the students and teacher. The satellite was purchased in 2002 and placed on the CERMUSA ambulance for testing. OptiStreams was contracted to provide the Internet connectivity. LearnLinc software was purchased as the e-learning suite of choice.

The current iteration of the PortMoC consists of a HaulMark brand trailer outfitted with the technology needed to connect a remote classroom with the Internet. Testing is currently in pro-

gress to determine what level of Internet interaction is feasible through the bandwidth allotted from the Internet connection.

Materials and Methods

Materials used:

The primary piece of equipment in the PortMoC prototype is the trailer. As stated before, it is a HaulMark brand trailer that weighs in at approximately 3400 pounds with all the equipment. Figure 1 shows a concept picture that was altered to display the PortMoC trailer. Figures 2 and 3 show exterior views of the trailer from different angles and that can be towed with a vehicle with an appropriate towing and engine package. Figures 4 and 5 show the interior of the trailer, and the computer and network switch, respectively.

Figure 1: The concept of the PortMoC

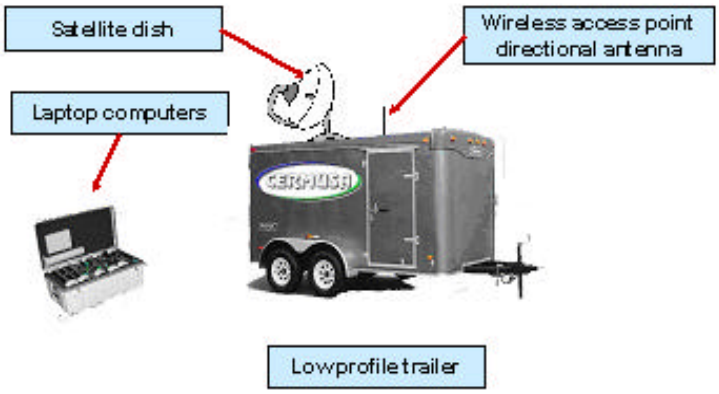

Figure 2: Trailer at the ready

Figure 3: Trailer parked at a location

Figure 4: Interior layout of the trailer

Figure 5: The satellite control unit and computer network switch

To deliver the Internet connection from the trailer to a classroom, the trailer needs to be connected to the Internet. To achieve this, we use a MotoSat satellite dish mounted to the top of the trailer which made the connection to our satellite Internet service provider, OptiStreams. The satellite dish is controlled by a rack-mounted computer located within the trailer. This computer is outfitted with all of the necessary software applications needed to control the satellite dish and have it connect to the Internet.

Once the computer within the trailer is connected to the Internet, the next step is to link the laptops located within the classroom to the Internet connection. This is achieved through a series of standard Ethernet equipment and wireless 802.11 links. First, the computer within the trailer is configured to act as a DHCP server to hand out IP addresses to all clients that connect to the network. This computer is then connected to a 3Com Ethernet switch located in the rack through a standard Category 5 wire. To create the wireless link between the building and the trailer, we use Proxim's Wireless Outdoor Router equipment. The "base" station is located within the trailer and connected to the 3Com switch, again using a standard Category 5 wire. An antenna, either directional or omni-directional depending upon the geography between the classroom and the trailer, is connected to the base station using standard LMR-400 cabling. These antennas are located on the exterior of the trailer and can be aimed in the general direction of the classroom. Through the use of these antennas, the trailer can be located up to 500 feet away from the classroom and still deliver a suitable signal.

The "remote" wireless outdoor station is placed near a window with line-of-sight to the trailer. If needed, an antenna is attached to this wireless router as well. Proxim software is installed on one of the classroom laptops which display the signal strength between the trailer and the classroom. This software is used to locate the optimum position of the remote wireless router within the classroom to locate the best possible signal.

The remote wireless outdoor station also doubles as an 802.11b access point. Classroom laptops equipped with wireless radios connect with the access point which in turn provides connection to the LAN originating within the trailer. The connection to the wireless network varies in speeds from 1 to 11 Megabits (Mbs) per second, depending upon the distance from the laptop to the access point.

The costs associated with the construction of this prototype were approximately $40,000. Monthly satellite connection fees and fuel for the generator are approximately $390/month.

Methods:

The methods used by CERMUSA to collect the data are to measure the average upload and download speeds on the satellite and the number of laptop computers using and interacting with the bandwidth doled out by the wireless network. At the time of this writing, two tests have been run, with several more planned. The following sections explain the testing procedure for the two areas. In addition, the PortMoC trailer will be doing these tests in various locations in the Cambria and Blair Counties of Pennsylvania to ensure proper connectivity in different environments and to give the trailer a "road test."

Satellite download:

A pair of Internet-based speed tests has proven reliable to gauge the connection speed. In the experiment, two were used to give a general idea. Both tests were run at the same time to ensure no differences based on time. A double bandwidth test was run at the start of the test sessions to get a baseline for the day. Then, as computers were added to the network and interacting with predetermined and distinct video clips from CERMUSA's Weapons of Mass Destruction (WMD) Prototype, the bandwidth was tested again and recorded.

The reasoning behind testing the bandwidth with regard to the number of computers on the PortMoC network is to see the amount of bandwidth available to students and other users of the trailer. With this information, CERMUSA can match appropriate current instructional media and future productions of instructional media that would be used in this prototype. It also gives us a benchmark should we upgrade the satellite to a unit with higher throughput.

Computer tests:

The computers are set up in the location to be tested. Current computer tests are interacting solely with the Windows Media files within the WMD prototype. Once underway with the satellite tests, CERMUSA will test further computer/Internet interaction. Testers will go to websites, interact with them to a depth of three layers, and then they will be surveyed on the response time. The testing of response time and quickness of information retrieval is important to learning via the web and other computer-based training.

These computer tests measure what can be reasonably viewed on a computer or computers within the PortMoC network. If the satellite connection is only downloading 200 Kbs, a computer wouldn't be able to load and stream a 500 Kbs Windows Media file. The bandwidth would be stripped out and also block any other computers utilizing the PortMoC network from receiving data. Thus, testing various commercial and educational websites, with their differing levels of data to be pushed through, while on the satellite downlink gives us another perspective on the capabilities of the PortMoC.

Results of the Research

Past results using the ambulance and the WMD prototype showed that there is promise with this modality of connectivity. However, the Windows Media clips that are the keystone of that prototype were encoded in such a way that they could be downloaded on a 16 Kbs dial-up modem speed. This was done to conserve the already limited bandwidth in rural areas and in areas where cell phone modems are used.

Initial testing of the PortMoC began in 2002. Findings from the testing are presented in Table 1:

Table 1

Date	Avg. Download/Upload (in Kbs)	Location	Notes
10/31/2002	92.1/28.4	Rural Loretto (1.5 mi from Saint Francis University (SFU) campus)	Cloudy weather
11/01/2002	76.8/11.9	Rural Loretto	Cloudy weather with drizzle
11/05/2002	54.5/28.9	Miners Hospital, Hastings, PA	Difficulty setting room up due to it being at the center of the building.
11/22/2002	76.8/21.2	SFU Library 2nd floor	Cloudy weather

WMD training took place in the second half of 2003. The PortMoC, in its ambulance iteration, was used to provide the connectivity and laptop usage to the various fire departments that participated in the research. Findings regarding connectivity time and speed are presented in Table 2:

Table 2

Date	Location	# of Laptops	Time Connected	Notes
06/20/2003	Colver Fire Hall, Colver, PA	0	N/A	Site survey and pre-testing. No laptops deployed.
06/21/2003	Colver Fire Hall, Colver, PA	4	6 hours	No problems reported
07/14/2003	Cresson Fire Hall, Cresson, PA	8	6 hours	Site survey and class in the same day. No problems reported.
09/22/2003	Lilly Fire Hall, Lilly, PA	0	N/A	Site survey and pre-testing.
09/23/2003 & 09/24/2003	Lilly Fire Hall, Lilly, PA		6 hours	Stayed connected
10/06/2003	West End Ambulance Co., Johnstown, PA	0	N/A	Site survey and pre-testing.
10/07/2003 & 10/14/2003	West End Ambulance Co., Johnstown, PA		10/07: 6 Hours. 10/14: See notes.	No problems reported on the 7th. Storms on the 14th caused signal failure and class was cancelled.

In the final test of the PortMoC as an ambulance, it was brought down to provide connectivity for a Master's level course in Business Communication. In addition to basic site and connec-

tivity testing, LearnLinc learning software was tested within the PortMoC infrastructure. LearnLinc has an audio interface that allows an instructor to lecture virtually to the students. This would be one of the primary items tested.

In the preliminary testing on October 17, 2003, twenty-two laptops were set up in and around the second floor of the SFU library with LearnLinc, the PortMoC was beaming the signal in from the parking lot, and the instructor was seated at his desk running the class via LearnLinc on his computer, which was connected to the CERMUSA LAN. Findings were that LearnLinc worked, albeit with a small delay in the audio.

The actual class which took place in Johnstown, Pennsylvania on October 20 wasn't as successful. Twenty-two student laptops, plus the one the instructor was using in a separate room, were all receiving the same lecture and running the LearnLinc program. The bandwidth was stripped fairly quickly, and LearnLinc on the lower bandwidth satellite connection was not a suitable test, as it interfered with the instruction of class. However, this is research and it was fortunate that CERMUSA was able to find limitations on the connectivity of the PortMoC.

Current testing has been done primarily at the in terms of the current tests, one key piece of data showed that as computers are added to the network, the available bandwidth to both current and additional computers on the network decreases. Table 3 shows the upload and download speeds taken from two separate sites: PC Pit Stop (http://www.pcpitstop.com) is #1 and DSL reports (http://www.dslreports.com) is #2.

Table 3

Speed Up (Kbs) #1:	Speed Down (Kbs) #1:	Speed Up (Kbs) #2:	Speed Down (Kbs) #2:	# of laptops	Time tested:	Notes:
28	748	15	674	0	09:48	Initial setup
-2	303	8	614	1	10:02	WMD video
-2	362	20	716	2	10:41	WMD video x2
22	396	13	730	3	10:51	WMD video x3
25	337	18	240	4	11:00	WMD video x4
-2	326	16	207	5	11:09	WMD video x5 & virus updates
14	227	12	141	6	11:17	WMD video x6
11	131			7	11:25	WMD video x7
9	186	11	164	8	11:35	WMD video x8

The computers, as currently tested, have been pulling in Windows Media files residing in the WMD prototype. Up to the writing of this report, eight laptops have been tested. As shown in Table 3, all eight laptops were streaming eight different WMD clips without problems. In addition, virus updates on several of the laptops were executed while the streams were running.

Conclusions/Discussions/Lessons Learned

CERMUSA is finding that the PortMoC, in its current configuration, is a reliable means of providing education in a low- to medium-bandwidth situation. It is a viable means of bringing Internet and computer-based education to areas where connectivity is poor or non-existent. However, several questions have come up during the research:

- How can we get more bandwidth, but keep the overall prototype sustainable?
- What are appropriate ways of using the prototype?

To answer the first question, more bandwidth is needed. The table regarding satellite download/upload speed demonstrates this. One note with computer connections is that the connection is only as fast as its slowest part. Whether the connection is being used for a single unit, such as a video teleconference presentation or for a classroom setting (multiple computers), the upload speed needs to be more in line with the download speed, especially to facilitate 2-way communication. Newer satellite dish models are boasting a 700 Kbs/300 Kbs download/upload speed. Although the upload speed is only half that of the download, the connection is faster overall and would support higher-bandwidth needs.

So what's the hold up? Get more bandwidth. However, this raises the costs. Current cost estimates on the dish that was mentioned would raise the monthly connection fees from $300/month to $1000/month. Add into that the cost of purchasing the dish and one can see that we have gone from a $40,000-to-build, $390/month-to-run mobile classroom to a $60,000-to-build, $1100/month to run.

The second question is more of an outlook on the future. The PortMoC was designed to be versatile, but sometimes, a chalkboard and lecturer is all you need to get the point across. This situation presented itself clearly with the Johnstown class in Fall 2003. While LearnLinc is a viable education tool, the use of LearnLinc in the classroom wasn't truly appropriate. LearnLinc was designed to bring students and faculty together from differing physical locations. In the Fall 2003 class test, all of the students were in the same room and the instructor and students were sharing the same lower bandwidth. Bandwidth issues aside, this application of LearnLinc and the subsequent application of the PortMoC was not entirely appropriate for the education of the students. Fortunately, this was done in a research arena and was reported and CERMUSA can use this data in the future.

What applications are appropriate for the PortMoC in its current configuration? This author would have to say most websites, web-based Course Management Tools, low-bandwidth streaming media, and audio conference calls. With higher bandwidth potentially available, video teleconferencing, higher-quality streaming, and Internet 2 access could be possible and bring a new level of collaboration to students in areas where Internet connection is poor.

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What Else Can You Do With Your Course Management System?

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Abstract

Besides distance education, hybrid courses, and course enhancement, what else can you do with your course management system? Hampden-Sydney College has been stretching its basic level Blackboard system to fill a variety of needs. This presentation will start with a demonstration to showcase some of these uses such as engaging incoming freshmen prior to their first semester, facilitating faculty colleague evaluation, training library student assistants, and enhancing departmental collaboration. The demonstration will be followed by an open discussion to brainstorm other possible uses of a course management system.

Introduction/Background

Hampden-Sydney College is a four-year traditional liberal arts college for men located on a 660-acre campus in rural southside Virginia. Founded in 1775, H-SC is the tenth oldest college in the country. The mission of the College is "to form good men and good citizens in an atmosphere of sound learning."

Hampden-Sydney men are traditional aged and reside on the campus. Enrollment is kept at approximately 1000 students. The College has no distance education program.

With a faculty of around 100 members, the College is able to keep class sizes small. In addition to this student/faculty ratio of 10:1, a large percentage of the faculty elect to live on campus, which means that there is great interaction between the students and the faculty.

Blackboard was acquired in May of 2000 as a means to enhance and broaden the already existing high level of communication between students and faculty. It adds yet another layer of support to the traditional classroom experience found at H-SC.

Currently over 50 percent of the faculty actively use Blackboard to supplement their classroom teaching. In addition, of all classes offered each semester, over 60 percent has a Blackboard component.

Expanded Use

As with any course management system when it becomes an integral part of campus life, it is inevitable that we would look to find other uses for it beyond the classroom. Moreover, the

monetary commitment had already been made as well as the time consuming and emotional effort of training faculty and students to use and rely upon it. Therefore, practicality dictated that we look to stretch our course management system to meet other needs.

Incoming Freshmen

The incoming freshmen class was a likely place to expand our use of Blackboard. We had a two-fold mission in working with this group. First, we wanted to find a way to get this population accustomed to using Blackboard and its features before starting classes so that they were comfortable with the system when required to use it.

Second, in an effort to increase the retention of students, we thought it best to have them use Blackboard during the summer before they arrive. The idea is to begin the bonding process to the College as early as possible. Also, through the discussion boards, we try to establish communication between advisees so that they can begin conversation prior to arrival. This way the new students get to know other students before they arrive on campus for the fall semester.

Freshmen are sent an information packet by the Dean of Academic Success when they are assigned a faculty advisor. In the packet, each student receives a letter informing him of his Blackboard username and password. He is encouraged to visit the Blackboard site to create a short web page about himself as well as to find out more information about the College, his advisor, and the other advisees.

The basic information in each course is the same. There are discussion questions to stimulate conversation about what they expect of the College, what they are doing over the summer, and what items they think they should bring with them. Welcome messages from the President and upper administrative staff is included.

Each advisor is then free to customize his or her course. They can post a picture of themselves and some biographical information. They add additional discussion questions and include documents that they have developed to help their advisees adjust to college life. Each advisor has a peer advisor who is set up with the same authorization in Blackboard as the advisor so that the he can also load material and monitor discussions.

At the core of each course is the series of pictorial tours of the College. These were designed with the input of freshmen in their first semester. The tours show places on campus that freshmen need to know when they first arrive.

Campus Tours include:

Library	a detailed look at each floor, including classrooms.
Health Center	a look at the facility and the staff as well as services provided.
Dining Hall	shows various dining areas, the cafeteria line, and ground floor pub.
Classroom Buildings	a few sample classrooms from each building.
Security Office	photos of officers and discussion of services.
Computing Center	a look at the computer lab, the PC repair area, and the help

	desk.
Support Services (Writing Center, International Studies, Academic Counselor,)	for each there are photos of the staff and the facility.
College Church	a look at the church and its classroom facilities as well as a greeting from the pastor.
Athletic Facilities	each gym and outdoor sports area is depicted.
Dean of Students	the Dean, his staff and their services.
Fraternities	a view of each house and its charge.
Fire Department	the facility and its student volunteers.

For each week during the summer, one new tour is made available. This helps to keep students interested in the course and give them yet another reason to check in often as the summer progresses.

Faculty Colleague Evaluation

When faculty are being assessed for contract renewal, tenure, or promotion, all members of the faculty are given the opportunity to voice their opinions. These opinions are kept anonymous; therefore, email is not an option for soliciting them. Paper responses have been the traditional means for receiving these comments. However, in an effort to reduce paperwork for faculty and encourage greater participation in the assessment process, colleague evaluations have been moved to Blackboard. Faculty log on to a course set up specifically for them to use to submit their comments on their colleagues who are under review. With the move to this electronic format, there has been an increased number of faculty submitting comments.

Library Student Assistants

Because the library is operated solely by student assistants for forty hours each week, there has always been a manual and resource guide available to them. However, with Blackboard in place, moving this essential information to an easily accessible electronic format seemed logical. The Blackboard format adds a level of comfort for our students who generally prefer electronic resources over print and also allows for timelier updating and a greater ease of communication among the assistants and between the assistants and the supervisors.

To create the course, the parts of the existing paper manual that were not already in an electronic format were either scanned or re-keyed and then loaded into Blackboard. Student assistants were assigned to this task.

Blackboard features make the enhanced electronic version of the manual far superior to the print. They include:

Staff Information: We include pictures, phone numbers and areas of responsibility for all librarians and staff as well as student assistants.

Announcements: This allows us to quickly pass information on to the student assistants. For example, we can easily post notices concerning problems with thecompact shelving, weather related emergencies, timecard deadlines, or a sudden rush of students from a par-

ticular professor. In addition, announcements can be recycled from semester to semester as events re-occur.

Statistics: We can see who is using the material and when. If they are viewing a certain document repeatedly it; signals us that we many need to have more training in that area.

Future areas of development include the use of online quizzes to test students on the various parts of their library assignments and the use of video to show opening and closing procedures as well as other complex tasks such as barcoding or creating patron records.

A by-product of this course is that it has started to become a repository for all library procedures. All librarians and staff have access to this course and often make use of it when they are responsible for opening the library on snow days or during other emergencies. In addition, as new librarians or staff members are hired, they are referred to this course as a resource for learning the daily operations of the library.

The major downside of the reliance on this resource is that, of course, it is not available during power failures. Therefore, the procedures for power failures are still kept in print format.

Departmental Communication

Before Blackboard, if an academic department wanted to share ideas or conduct a conversation electronically they were limited to email. However, with Blackboard departmental communication has become more enhanced. Two departments on campus currently make extensive of use of Blackboard for departmental communication – Rhetoric and Western Culture.

The Rhetoric Department was the first to explore Blackboard as a mean of sharing and enhancing departmental communication. They were in the midst of developing their first wireless classroom and needed to share ideas on everything from tables and chairs to software and teaching styles. With Blackboard, they had one place to collect URLs for various elements of their new classroom that all members of the department could view and comment upon. They created group pages where those assigned to developing a teaching workshop could easily communicate that was separate from the general discussions. They also could post proposed syllabi changes and solicit their colleagues' opinions. In general, they had one place where all members of the department could go to share ideas and express opinions knowing that only their departmental colleagues had access.

The Western Culture department is composed of faculty members from all other departments on campus. As they are not a formal department, they have taken a different tract with their community Blackboard course. They use it as a repository for classroom resources. Maps are posted that everyone has access to and can use as necessary in their teaching. Since the three levels of classes offered in this department are sequential and each level has a core set of material that must be covered, each professor has the discretion of selecting any other material that they wish their class to study. Therefore, on their common Blackboard course, faculty share syllabi so that all members of the department know what the others are teaching. They also have resources available based on the specific time periods and subjects covered in the three semester sequence.

These resources can be URLs or notes provided from local campus experts such as art historians, renaissance history scholars, or Shakespeare experts.

Future Growth Areas

As Blackboard use across the College continues to grow and as students have become accustomed to using Blackboard for their classes, they request its use in more areas of their campus life. Future areas that appear to be ready for extended Blackboard use include the following:

Clubs

The Bicycle Club, the Men's Chorus, the Pep Band, and the Pre-Health Society are just a few of the clubs that already have a presence on Blackboard. They use these courses to communicate with members and plan events. The Men's Chorus, for example, records their practice sessions and posts these audio files for all the members to evaluate.

Student Honors Projects

Similar to Masters' thesis committees, students doing honor's projects have several faculty members on a committee to oversee this work. Honors' students have begun to request Blackboard space where all the members of their committee can access research material and rough drafts and engage in online discussion about the project and its progress.

Student Senate

The newly elected president of the Student Senate (whose class is the first to have had the use of Blackboard since their freshman year) has just requested space on Blackboard for the Student Senate. He envisions a space where all students will be able to have access to Senate documents and a means of easy communication with their Senate representative.

Faculty Research

Faculty are beginning to explore the use of Blackboard as a tool in their professional research. With its survey feature, Blackboard can be used to assess any population. It can be a repository for collaborative projects, and it can be used to develop assessment measures for current and future students.

Conclusion

We have become comfortable with our course management system – Blackboard – in the classroom but have only just begun to tap into its potential outside the classroom. Blackboard is here to stay on campus. Now that student and faculty alike have come to rely on it, why not look to see what other uses we can make of it? What's next? Ideas anyone?

Enhancing Teaching using MATLAB Add-ins for Excel

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Introduction

In this paper I will illustrate how to extend the capabilities of Microsoft Excel spreadsheets with add-ins created by MATLAB. Excel provides a broad array of fundamental tools but often comes up short when more sophisticated scenarios are involved. To overcome this short-coming of Excel while retaining its ease of use, I will describe how MATLAB's Excel-Builder converts MATLAB functions into Excel macros. The add-ins can be freely distributed and operate solely from Excel. To demonstrate the utility of add-ins, I will describe a project that I am currently working on in Excel that could be enhanced with the add-ins to carry out more sophisticated scenarios. The project deals with the question of when a person approaching retirement age should begin accepting social security.

Mathwork's Excel-Builder

MATLAB is a powerful software suite that is popular in mathematics, the sciences, and especially in economics and engineering/technical programs. Comparable products are Gauss, Mathmatica, and SAS although these products do not have the ability to create stand-alone add-ins as does MATLAB. I would envision that the type of project that will be discussed in this paper would be most useful for a discipline (or school) where the emphasis is not on programming. Engineering programs typically expect their students to interact directly with MATLAB and thus do not need the add-in capabilities. In my discipline of economics, many professors will have been introduced to this program in graduate school for computational models. Those who continue to work with the program in their research will find a new area to apply and hone their programming skills. At the same time, students who are interested in computational issues can have an indirect access to much more powerful and interesting programs.

MATLAB has specific 'toolboxes' devoted to programs in statistics, mathematics, genetics, and various engineering areas among many more. A professor teaching an introductory statistics class can easily run into the need for a more advanced function than in provided in Excel. For example, she may want to generate multivariate data that is correlated across several variables. A savvy professor (who remembers Cholesky decompositions) with a lot of time on their hands (an afternoon) could program this into Excel using Visual Basic. I suspect most of us we take the easier path of converting the MATLAB function to an add-in. This might take 15 minutes for someone who is familiar with the Excel-Builder.

The software is not inexpensive as a student version of MATLAB costs around $100 and the Excel-Builder retails for $500 although academic discounts are available (including a free 30-day trial on all MATLAB software for professors). Many schools will already have the core program and could add the peripheral programs with a reasonable amount of extra cost. In general a site

license should not be mandatory as it is unlikely that more than one user would need the Excel-Builder component at any one time.

For specific instructions and examples of the necessary steps to use the Excel-Builder, I refer the interested reader to the Mathworks site (www.mathworks.com). A free, downloadable pdf file contains the manual and the site also gives some fascinating applications in finance and other areas. The learning curve is rather steep for moderate to difficult applications (some include designing an graphical user interface using Visual Basic) but the simpler applications of converting a single m-file to an Excel add-in are not overly complicated to master. It took me an afternoon to figure out the fundamental steps.

The Dilemma: When to accept social security?

Each year the Social Security Administration sends a statement to individuals detailing their work and salary history. Additionally it includes a summary of the benefits of social security including how much your social security checks will be once you decide to accept and other items such as your benefits if you become disabled or your survivor benefits. The project that I have been recently working with for a class, asks the question, "When should I begin to accept social security checks?" Most people abide by one of two general approaches. The first follows the principal that 'a bird in the hand is worth two in the bush'. They take early retirement (although they could continue to work) at 62. There are some obvious benefits to accepting ASAP as this strategy will dominate for individuals who are 'cash-constrained' (e.g. they have little or no wage income) and/or have a relatively short life-expectancy. If you are only going to live into your early 70's, it may be worth it to draw a smaller payment for a decade rather than a larger check but only for a few years. This points out an important aspect of social security that, unlike private pensions, it is a defined benefit program not a defined contribution program. When you die your family will receive a "special one-time death benefit of $255". All future payments are forfeited!

A second strategy is the patient one – wait until 70 to receive your maximum size checks. Each year the SSA bumps up the check size for all ages of retirement but this merely reflects a cost-of-living allowance (COLA) that covers inflation. In contrast the person who can hold off on receiving social security receives a check that is roughly twice that of the person who retired at age 62. They receive this fatter check the remainder of their lifetime. The person who does not need extra income in their 60's and expects to live beyond the average life-expectancy due to good health, genes, lifestyle, or luck benefits for the patient strategy.

A third strategy (the one I favor) is to wait until full retirement age to begin benefits. The real hit in taking benefits before this is that prior to the year of full retirement your benefit levels are reduced $1 for every $2 you received in wage income above $11,280 (2002 level). It doesn't take a high-paying job to entirely cancel your social security benefit. Of course, if you have a low-paying or part-time job this problem will not arise. Even in the year of your retirement, you can only make $30,000 before your benefit is reduced $1 for every $3 you are above this limit.

Scenarios in Excel Spreadsheets

In the study I focus on a married couple who file their taxes jointly and are of the same age. Other living arrangements are easily analyzed within this framework. I begin with a barebones Federal Income Tax 1040 form:

		<65, w/oSS	<65, w/SS	65+, w/o SS	65+, w/ SS
Line	Description				
7	**Wages, salaries, tips**	**50000**	**50000**	**50000**	**50000**
8a	Taxable Interest	0	0	0	0
9a	Ordinary dividends	0	0	0	0
15b	Taxable IRA distributions	0	0	0	0
16b	Taxable Pensions and annuities	0	0	0	0
20b	Taxable Social Security benefits	0	22213	0	22213
34	Adjusted Gross Income	50000	72213	50000	72213
37	Itemized or standard deduction	9500	9500	11400	11400
38	AGI – deduction	40500	62713	38600	60813
39	Exemptions deduction	6100	6100	6100	6100
40	Taxable Income	34400	56613	32500	54713
41	**Federal Income Tax**	**4460**	**7792**	**4175**	**7507**

I have included only those lines that are most prominent in the analysis. [Please consult your tax accountant of financial advisor for a complete analysis!] The cells are formula-based such that by changing the first wage & salary cell, all other cells are automatically updated. Social security benefits are not income + one-half of the social-security benefit is less than $32,000 per year. The maximum taxable amount is 85% of the benefit that is attained when income + one-half the social security benefit reaches $44,000.

Part of the motivation of this study was based on my father approaching his early 60's and thinking about when to receive social security. There are a multitude of issues ranging from the purely tax issues to the complex lifestyle changes that can accompany the move from the workforce to living room. The next page lays out the three general scenarios – early retirement at age 62, normal retirement (65 years, 8 months for some one born in 1941) and 'late retirement' at age 70.

Retirement age #1 = 62										
Age	62	63	64	65	66	67	68	69	70	71+
Work Income	$50,000	$50,000	$50,000	$50,000	$50,000	$25,000	$25,000	$25,000	$25,000	$0
SS Benefits (gross)	$14,544	$14,544	$14,544	$14,544	$14,544	$14,544	$14,544	$14,544	$14,544	$14,544
Reduction of SS benefits due to work income	-$14,544	-$14,544	-$14,544	$0	$0	$0	$0	$0	$0	$0
SS Benefits (net)	$0	$0	$0	$14,544	$14,544	$14,544	$14,544	$14,544	$14,544	$14,544
Federal Tax w/o SS benefits	$4,460	$4,460	$4,460	$4,175	$4,175	$750	$750	$750	$750	$0
Federal Tax w/ SS benefits	$4,460	$4,460	$4,460	$6,029	$6,029	$764	$764	$764	$764	$0
Additional taxes due to SS benefits	$0	$0	$0	-$1,854	-$1,854	-$14	-$14	-$14	-$14	$0
Retirement age #2 = 65.67										
Age	62	63	64	65	66	67	68	69	70	71+
Work Income	$50,000	$50,000	$50,000	$50,000	$50,000	$25,000	$25,000	$25,000	$25,000	$0
SS Benefits (gross)	$0	$0	$0	$6,556	$19,668	$19,668	$19,668	$19,668	$19,668	$19,668
Reduction of SS benefits due to work income	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SS Benefits (net)	$0	$0	$0	$6,556	$19,668	$19,668	$19,668	$19,668	$19,668	$19,668
Federal Tax w/o SS benefits	$4,460	$4,460	$4,460	$4,175	$4,175	$750	$750	$750	$750	$0
Federal Tax w/ SS benefits	NA	NA	NA	$5,011	$6,683	$892	$892	$892	$892	$0
Additional taxes due to SS benefits	NA	NA	NA	-$836	-$2,508	-$142	-$142	-$142	-$142	$0
Retirement age #3 = 70										
Age	62	63	64	65	66	67	68	69	70	71+
Work Income	$50,000	$50,000	$50,000	$50,000	$50,000	$25,000	$25,000	$25,000	$25,000	$0
SS Benefits (gross)	$0	$0	$0	$0	$0	$0	$0	$0	$26,148	$26,148
Reduction of SS benefits due to work income	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
SS Benefits (net)	$0	$0	$0	$0	$0	$0	$0	$0	$26,148	$26,148
Federal Tax w/o SS benefits	$4,460	$4,460	$4,460	$4,175	$4,175	$750	$750	$750	$750	$0
Federal Tax w/ SS benefits	NA	NA	NA	NA	NA	NA	NA	NA	$1,054	$0
Additional taxes due to SS benefits	NA	NA	NA	NA	NA	NA	NA	NA	-$304	$0

The user can enter the age they are (or are interested in studying) and the benefit levels provided by the SSA in the annual statement ($1212, $1639, and $2179 per month respectively for this individual). The Excel spreadsheet then calculates the gross SS check less penalty for wage income before full-retirement age and adds any extra tax liability occurring due to the extra support provided by social security.

It turns out the early retirement for this person is not a good idea as they make enough income working full-time to completely cancel their social security benefit. It thus appears that anyone earning more than around $40K should not take early-retirement. Waiting until full-retirement age avoids this issue completely which is the intent (I believe) of the law. The patient retiree who continues to work is rewarded with a $26,148 annual salary from age 70 until their death. Note that I have stated all dollar amounts in real terms (e.g. I have assumed inflation will be zero over this decade). In practice we will, of course, have some inflation but the COLA will offset this to retain the same buying power of the checks.

To get at the core of the timing issue I have calculated the cumulative SS payments less any tax disadvantage for the three scenarios.

Age	Retire @ 62	Retire @65.67	Retire @ 70
62	$0	0	0
63	$0	0	0
64	$0	0	0
65	$12,690	$5,720	0
66	$25,380	$22,880	0
67	$39,910	$42,406	0
68	$54,440	$61,932	0
69	$68,970	$81,458	0
70	$83,500	$100,984	$25,844
71	$98,044	$120,652	$51,992
72	$112,588	$140,320	$78,140
73	$127,132	$159,988	$104,288
74	$141,676	$179,656	$130,436
75	$156,220	$199,324	$156,584
76	$170,764	$218,992	$182,732
77	$185,308	$238,660	$208,880
78	$199,852	$258,328	$235,028
79	$214,396	$277,996	$261,176
80	$228,940	$297,664	$287,324
81	$243,484	$317,332	$313,472
82	$258,028	$337,000	$339,620
83	$272,572	$356,668	$365,768
84	$287,116	$376,336	$391,916
85	$301,660	$396,004	$418,064

Note that the first scenario dominates for only a few years (up to age 66). Retiring at 65 years, 8 months proves to be the best option all the way up to age 82. This looks only at non-compounded amounts; if the person valued having the money earlier rather than later a growth factor will push the middle-scenario into the mid-80's range before the patient-strategy catches up.

Extensions using MATLAB's Excel-Builder

The current model is able to provide significant insight into the retirement timing decision. However other simulations would be fruitful to explore that go beyond Excel's capabilities. For example, it is of interest for a person to know the distribution of the total payouts depending on the probabilities of survival to various ages. The SSA publishes a life-table that could be used to generate random 'end-of-life' scenarios with associated payouts. We could then address questions such as "How often could I expect to live to 90+ and enjoy the higher checks associated with 'late-retirement'?"

Currently I am working on implementing this and other extensions into the model. I would be more than willing to send the Excel file and the related MATLAB add-ins as they are developed. Please contact me for more information or any suggestions you have to better address the retirement timing dilemma.

Too Much Information – Too Much Apprehension

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Abstract

The information age along with the exponential increase in information technology has brought an unexpected amount of information. The endeavor to sort and extract a meaning from the massive amount of data has become a challenging task to many educators and managers.

This research is an attempt to collect the most common suggestions to reduce the stress related to informational overload. Informational overload can be a major source of stress and often confusion. Some facts concerning informational overload are discussed. Further, it invites the reader to explore some of the advance features found in major search engines such as Google.com, Yahoo.com and Mamma.com. Understanding Boolean search and utilizing advance searches can alleviate the problem associated with informational glut. Finally, by being aware of the problems caused by informational excess, a learner is headed to a more manageable and a more productive learning environment.

Introduction and Problem Statement

Information overload is intuitively noticeable in our daily lives. Walking any street, we can hardly measure the amount of information we are exposed to. Information hits us from all directions, newspapers, television, voice mail, cellular phones, email, electronic memos, and the World Wide Web, to name a few. This increase in information, combined with the factor of change in many aspects of our lives, can lead to an unhealthy effect. Heylighen (1999) noted, "People exposed to the rapid changes of modern life may develop a state of helplessness and inadequacy."

The amount of information doubles every few years and the process of managing such incredible amounts of information is not adequate to prevent the negative impacts caused by information overload. While the amount of information increases at an exponential rate, we still have the same number of hours every day. Krill (2000) stated that information overload is a "condition [that] results from having a rapid rate of growth in the amount of information available, while days remain 24 hours long and our brains remain in roughly the same state of development as they were when cavemen communicated by scrawling messages in stone."

The workplace has become a "complex knowledge environment" caused by flow of information delivered by misunderstood technological advances (Kirsh, 2001). The author continues by stating that the workplace is filled with multitasking, disturbance, and an unmanageable amount of information. Kirsh adds, "The effects of this cognitive overload at a social level is tension with colleagues, loss of job satisfaction, and strained personal relationships."

This research studies the background of the information overload problem. The reviewed literatures show evidence of the negative impacts of dealing with such huge amount of information. It examines some of the symptoms associated with information overload and produces a list of suggestions to deal with it.

Problem Background

Change has struck our daily lives in unmanageable ways. Managing change, if it can be managed, is a tedious task. The only way we can cope with the impact of change on our societal, economical, educational, environmental, and technological lives is to deal with the effects not the cause. The change will take place regardless.

Advances in technology have made data and information widely available. Adams (2003) referred to McGovern who stated that fast processors and cheap storage media resulted in an enormous amount of data and information. Further, by the urge to create more and establish more, the result was a "glut situation." To illustrate his point, Adams also referred to Shenk who named the case of information overabundance as "information obesity."

What makes dealing with information overload a difficult issue is the nature of the problem itself. The subjectivity of the matter and lack of finding concrete ways of dealing with information overload have caused a lack of understanding and resulted in informational anxiety. Heylighen addressed this issue by stating that "change, complexity and information overload are abstract phenomena which are difficult to grasp. Therefore, few people have as yet understood that they contribute to the anxiety they feel." What makes the matter even more challenging is what Wurman (2001) stated. Wurman showed that every new technology is introduced with the hope of replacing an old one, but what happened is the "new" technology will be added to the existing list of others and the "old" and the competing one will "adapt."

Review of Literature

This section defines information overload, shows evidence of the negative impact of informational overload, discusses some of the symptoms associated with it, and states some of the statistics available regarding the amount of data and information accumulated each year.

Defining information overload

Nelson (2001) defines information overload as the incapability to obtain a form of knowledge from a massive amount of information for one reason or another. By referring to Wurman, Welson elucidates his point by noting that information overload can take place for one of these reasons:

1. Not understanding the existing information
2. Feeling inundated by the need to absorb huge amounts of information
3. Not knowing if the needed information exists or not
4. Not knowing where to obtain the information
5. Knowing where the information is but have no access privilege.

Evidence of information overload

Kirsh (2001) referred to a study that investigated the impact of information overload in several countries. The study surveyed 1,313 lower, middle, and top managers in the U.S., U.K, Australia, Hong Kong, and Singapore. The study showed the following results:

1. Two thirds of the managers complained about existing tension between them and other colleagues, and their job satisfaction was decreased as a result of information overload.
2. One third of the managers reported health problems related to stress and this figure jumped to 43% among top managers.
3. Two thirds (62%) stated that their personal relationships suffered as a result of information overload.
4. Of all the managers, 43% felt that important decisions were delayed and their ability to make decisions was affected as a result of dealing with excessive amounts of information.
5. Of all the managers, 44% felt that cost of "collating information exceeded its value."

Symptoms of information overload

There are some symptoms for information overload that we should watch for when they take place. According to an article titled "Avoiding information overload," the author warned us by stating that information should be used to empower the employees, and should not be a source of stress. When employees suffer from information overload, they have the following symptoms:

1. "Increasing the perceived workload"
2. Feeling incapable of dealing with information they do not understand fully
3. Confusion is created as a result of "blurring the edges of role responsibility"

Data, data and more data

Mullen (2004) stated if we were already overwhelmed by how much information available, we would even be more besieged. Mullen added that it would take us only two years to double the information we collected throughout our history.

In the executive summary for a study done at Berkeley University to measure how much information we accumulate every year, some of the findings are:

1. "Print, film, magnetic, and optical storage media produced about 5 exabytes of new information in 2002." Out of this much information, 92% was stored in magnetic media such as hard disks. To visualize how much information there is in an exabyte, we need to raise 10 to the power of 18. To explain further the size of five exabytes, the summary stated that it would take us 10 terabytes (1012) to store the 19 million books and the additional printed materials at the Library of Congress. Doing the math, five exabytes will require a half million libraries as big as the Library of Congress to store this much information as print materials.
2. The summary stated that "the United States produces about 40% of the world's new stored information, including 33% of the world's new printed information, 30% of the world's new film titles, 40% of the world's information stored on optical media, and about 50% of the information stored on magnetic media."

3. The summary stated that between 1999 and 2002, there was an increase of 30% in the amount of information yearly. The summary discussed in detail every type of media. It stated how information has been stored in each type. Any reader who is interested in finding out more about storage and how much is available in each medium would find the summary extremely interesting.

Purpose of the Study

The purpose of the study is to assist the reader in understanding information overload. This paper defines information overload, states some of the symptoms associated with information overload, and attempts to show the evidence for such trend. This study should help administrators or managers to realize the negative impact of information overload and invite them to deal with the problem in a productive and humane approach. The steps to deal with information overload in this paper should provide the reader with hints that can alleviate the harmful impacts resulting from dealing with the overwhelming and uncontrollable amount of information.

Dealing with Information Overload

This section discusses the difference among data, information and knowledge, shows the importance of thinking versus relying completely on technology, invites the readers to get only information they need and no more, looks at technology as a tool to deliver the solution instead of the solution, shows the value of library, invites the readers to learn Boolean operators and finally examines two search engines.

Know the difference between data, information and knowledge

Data are raw facts without any meaning until they are processed into a meaningful outcome: information. Numbers, figures and images can be classified as data. Information on the other hand has meaning. When we apply a set of rules, mostly found in a program such as database, we acquire information. Therefore, information is processed data. Knowledge is processed information. When we apply an information processor to information, the end result is knowledge. The information processor is affected by many factors. These can include qualitative data such as insight, beliefs, experience, judgment, and perception, to name a few (Hijazi and Kelly, 2003). From a technological point of view, data mining is defined as the process of sifting through massive amounts of information to extract awareness or add meaning (Williams and Sawyer, 2003).

Users, when they have the choice, should always seek knowledge. If meaning is there, an open gate to understanding will exist. Bostock (2002) takes us a step higher by focusing on the nature of knowledge by asking interesting questions. Bostock asks, “How much do we really know about knowledge?” What’s the meaning of meaning?” and “What does the word ‘mean’ mean?” Further, in dealing with methodologies such as knowledge management or trying to understand how intelligent agents work, essential questions rise and invite us to examine how we take things for granted.

Think and think frequently

Those silent moments with yourself trying to visualize a solution or attempting to formulate a procedure are necessary to establish your uniqueness in the mad race of dealing with information. The same practice can lead you challenge and sharpen your mental ability to deal with the negative impact of information overload. De Bono stated that:

Thinking is now becoming more important than information - because we are no longer short of information. Thinking is needed to create value from information. Information has a high value if you specifically need that information to fill a gap. If not, then information has a general value, but this is actually quite low. More and more information may make you a better informed and more interesting person to talk to, but that is all.

Get only what you need

Once we obtain what is needed to solve our immediate problem, we need to stop searching for additional information. Similar to the excessive use of fertilizers that leads to polluting rivers and seas and diets too rich in calories that cause health problems, the overabundance of substandard information can result in an unconstructive outcome (HeyLighen, 1999). The author discussed the concept of "overshooting" where people continue to seek more information even though their needs are met. Further, in the past, information was considered a rare issue and the attempt to have more of it was considered a good activity. That is why some people still feel the need to intellectually overindulge themselves by finding additional information.

Don't treat your computer as a "technological messiah"

Postman (1990) eloquently used the expression "technological messiah" in his speech at a meeting of the German Informatics Society (Gesellschaft fuer Informatik). Postman knew that computer technology is an integrated part of the modern machinery. As a result, he did not warn us about using the computer, however, he discussed the mistake of relying on the computer to solve problems that only we can deal with. Postman asked about the nature of information we need to improve our relationship with our spouses or what information we need to alleviate hunger in Ethiopia. Postman believed none of the problems that cause us difficulties have anything to do with the type of information we obtain from a computer and "the computer and its information cannot answer any of the fundamental questions we need to address to make our lives more meaningful and humane."

Visit your local library for assistance

You can save many hours doing research by using the library server (Winkle, 1998). No matter how technologically advanced we are, technology will never replace the need for human contact. Most, if not all, librarians are positive people and find an incredible amount of satisfaction helping people. When it comes to finding a book, an article, or even a website, your library staff can be of great help.

Organize your life without full reliance on technology

We are all guilty of a lack of organization in our lives. Initially, the concept of organization itself has nothing to do with technology. If you cannot know which paper is important to keep and which one to discard, then having a fast computer will not provide you with the answer. It is incorrectly assumed that your life will be organized by the use of technology (McGovern, 2002). Further the writer stated, "One of the biggest mistakes you can make is to assume that technology will organize your life. If you don't learn the skills of organization, then technology will overload your life."

Invest some time to learn the Boolean operators

Most of the search engines have advanced searches where the features found in these sections are based on Boolean operators: AND, OR, and NOT. Winkle (1998) indicated that it is a good idea to learn Boolean terms since this will reduce the number of unrelated returned websites. The three operators work as follows:

1) AND. AND is a limiting Boolean operator. With AND, both keywords (it could be a phrase) must be presented before a hit is found. For example, if the search is asking for information overload and technology, then both keywords must exist in the web site. Nothing will be returned if only one of the keywords exist.
2) OR. OR is an inclusive Boolean operator. With OR, both or one of the keywords must exist before a web site is returned. If the website includes Information overload and technology, the search engine will return the website. Further, if only information overload exists without technology, the search engine will return a hit. Similarly, if only technology exists without information overload, the search engine will still return a website. The danger with using OR is that the number of the returned sites can be overwhelming.
3) NOT. NOT is an exclusive Boolean operator. With NOT, one of the keywords can be excluded completely. For example, if a user excludes technology from the search, the search engine will return only websites that have no mention of technology but have the phrase information overload.

Know your search engine

Knowing how to use a search engine effectively can alleviate the problem of information overload. The use of Boolean (logical) operators can facilitate a search. Further, knowing how to use AND, OR, and NOT can limit, include, or exclude the number of the returned websites. This subsection will discuss three search engines, Google.com, Yahoo.com and Mamma.com.

Google.com. Let's take a look at Google.com. When I asked a group of my students, "How many of you know that you can search a specific domain in the WWW?" Very few students knew that Google.com has that feature, found in the advanced option. What does searching by domain mean, anyway? When users needs to search only educational websites, they need to select the domain ".edu."

Just like most of the powerful search engines, Google.com utilizes Boolean search for limiting, including, and excluding keywords from a search. If we examine its advanced section, we find the following options:

1) "With all of the words." Listing key words using this option will return web sites with the selected words, but no guarantee that these words will be within a reasonable proximity to each other. In that sense, this feature corresponds to the use of the logical operation "and" where all keywords are found, but there is no guarantee that the users will find exactly what they need.
2) "With the exact phrase." This option is more precise since the returned hits should include the exact wording of the search. This will guarantee that the keywords are adjacent in the text.
3) "With at least one of the words." This option applies to the logical operator "or." The returned website will include at least one of the keywords or all of them. This option of searching is very inclusive and it will return unrelated websites. it should be used when the research includes keywords pertaining to a rare subject.
4) "Without the words." This option applies the logical operator "not." It works on excluding all the keywords typed within this option.

A user can use all the above options combined, however, a search strategy is required before typing the keywords. To effectively use a search strategy is to consider the use of additional powerful parameters for further refining the search. These include:

1) Language. A user can limit their findings to a specific.
2) File format. A user can choose from the following file formats:
   a) MS Word
   b) Ms Excel
   c) MS PowerPoint
   d) Postscript
   e) Adobe .pfd
   f) Rich Text Format

   A user can choose documents written by others and saved in MS Word format. PowerPoint format is helpful to retrieve a previously written presentation about a specific topic. The additional option is that a user can exclude a specific format and return all the websites with the other format. For instance, if users want the contents of a website with all the formats except MS Excel, they can choose the option "Don't" instead of "Only" to exclude an MS Excel format from being returned.

3) Date. Users can specify a certain period of time where the returned web pages have been updated last month, the past three months, a year ago, or anytime. This is a helpful option if users want to obtain data within a certain time frame.
4) Domain. This is very powerful feature where users can search by domain only. If users want to find reliable materials, users can access websites from educational sites by choosing ".edu." Similarly, users can choose ".com" for commercial sites, ".gov" for governmental locations, ".org" for non-profit organizations, and any other domain.
5) Returning keywords when they occur in one of the following places:
   a) "Anywhere in the page"
   b) "In the title of the page"

c) "In the URL [address] of the page"
d) "In links to the page"
e) "In the text of the page"

This feature definitely refines a search strategy even further. For example, users will know for sure if the returned page has something to do with search if the keywords are part of the title of the page.

6) Safe Search. This feature is useful if users want to prevent all the adult websites from being returned. Users can apply this feature to the image search too.

Yahoo.com. This search engine is one of the biggest search engine around. Similar to Google.com it has advanced features. Yahoo implements the use of Boolean search and it gives the options to users to choose the file formats. In the option "Update," Yahoo.com gives users the options of searching for documents that have been updated in the last three months, six months, a year ago, or anytime. Yahoo.com has SafeSearch Filter similar to Google.com. Also users can turn on additional features found in the "preferences." Similar to Google.com, Yahoo.com provides the user with the options of choosing a country or a specific language.

Mamma.com. This search engine is a small but yet a very powerful one. Mamma.com is a comprehensive search engine. This is also referred to as a "meta-search." Clickquick.com notes that Mamma.com is a meta-search engine "that pools results from many of the other leading search engines into one ranking of sites. The main advantage of this type of system is that it creates a much more thorough search than any one engine can provide on its own."

Mamma.com supports advanced search features by the use of quotations for exact text, minus sign for exclusion and plus sign for inclusion. It allows one to select by a specific search engine. Two of the engines are Google.com and MSN.com. Further, Mamma.com allows users to set their preference by reducing adult contents, highlighting search terms, opening the returned results in new windows, and the number of displayed results per page. Of course, just like Google.com, there are features available with additional advanced options. In a final note, Mamma.com is a neat and powerful meta-search engine that meets most people's need for informational retrieval.

The Importance of the Study

This study attempts to show the impact of information overload on us as educators, administrators, managers, and knowledge workers in general. The most notable contribution of this study is its suggestive steps in dealing with such phenomena. Also, this study provides some steps to help deal with information overload. Everyone has their unique situation that calls for local examination. The main benefit of the study is first to acknowledge the subjectivity of information overload. The second benefit is to see that even technology has been extremely helpful in automating our lives by making our jobs easier and faster. It also can produce a negative result in our lives by allowing us to collect unfiltered and an incredible amount of information. Finally, this study shows that unless we organize our environment, data, and the way we disseminate information, technology will be of little help.

Conclusion

This study found that information overload is a lasting phenomenon and a serious one that we need to manage. After defining and evidencing information overload in our daily practices, this research explored the negative impacts and the symptoms associated with it. The statistics shown in this study show the alarming rate of information explosion in our daily lives.

Information technology has changed our lives, practices, and the way we communicate in many positive ways. However, it also allows us to produce a gigantic amount of information that usually leads to confusion, interruptions and stress.

Finally, information overload is a subjective issue and it is hard to find a solution that deals with it as a process. Therefore, this study comes with a list of suggestions to deal this significant issue. Most of the suggestions call for the human component to be the center of any technological environment. The need to ease the overwhelming and negative feeling created by information overload should mostly be looked at with our human rules, not the machine's. The machine produces informative reports, quicker computation, and faster reports, but it cannot supply the type of information, within our local and imperfect parameters, that we need to use to enjoy a memorable afternoon with our children.

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Creative Problem-Solving Software and Portals

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Abstract

The available research dealing with information technology and creativity has been limited. There is an obvious need to explore this area. Fortunately there is some available software and portals that have undertaken this important topic.

This research starts by discussing the value of information technology as a major input to sustain and maintain a creative working environment. Further this research explores the significance of creativity as a competitive factor. In reviewing the available software, this research talks about the main features of some common creativity software. These include ThoughtPath, as a creative thinking software, and Ideafisher as a major brainstorming. Further, two major and invaluable portals are explored and their main features are pinpointed. These include im-boot.org and Brint.com. Educators and administrators should find this research essential in understanding and applying the practices or creativity in their strategic or tactical planning.

Introduction and Problem Statement

This research explores with the establishment of creative problem solving by using technological advances mostly found in creative software and portals. According to a discussion from the Artificial Intelligence Warehouse titled Computer and Creativity: Debate About a Fundamental Problem to AI, the author stated that there are two types of creativities. The first type is the problem solving creativity technique that solves a problem in a unique and appropriate manner. The second type is the artistic creativity, "which doesn't really solves a physical problem but rather produces something (like a novel or painting) out of nothing that is novel and appealing in an aesthetic sense." This study focuses on the first type of creativity where software and portals contribute to the process of finding a solution.

The Problem Background

Creativity and innovation are prerequisite to the survival in the business world. Companies have responded to economical pressure and increased competition by encouraging innovation and creativity to accomplish any business success (Mauzy, from Managing Personal Creativity). The author added that a study made by U.S. Department of Labor and conducted by Ernst & Young with the Harvard and Wharton business schools, 85% of U.S. businesses were involved in creating innovative programs at their workplace. These programs included management training in how to hold group procedures, guide teams to generate ideas and choose to implement the ones

with potential. Mauzy continued by noting that companies have varying degrees of success in implementing their creativity programs. To help companies accomplish their goal in establishing an innovation program is to encourage individual creativity. Mauzy defined personal creativity as "the ability of an individual to create new, relevant ideas and perspectives."

Purpose of the Study

The purpose of the study is to show the reader that additional inputs of creativity are found in creative software and web portals. In this paper will discuss two major creativity software (ThoughtPath and Ideafisher) and will comment on two major portals (Brint.com and im-boot.org). This study should enhance a knowledge worker's creativity by using triggers found in software and portal. Leadership and management of all levels can use ideas mentioned in this study to plan ahead by investigating existing creative software that might help in brainstorming and meetings, if the problem is not understood or additional ideas are need to a find solution. This study shows the importance of innovation, but we cannot innovate, or add value to any business without finding the creative idea first (managinginnovation.com, Creativity vs. Innovating).

Review of Literature

This section discusses creative problem solving, creative software, and portals.

Creative problem solving

With many management theories and problem-solving techniques, one wonders whether creative problem thinking is a fad that will not last. In support of the continuation of creative problem solving as a lasting technique, a researcher at the North Carolina University at Chapel Hill stated that creative problem solving has been around since the1940s and it is practiced by governmental, commercial and non-profit organizations around the world. In the article, Creative Problem Solving by the Co-Creativity Institute, the author referred to Alex Osborn's attempt to ignite creativity and problem solving to businesses and educational institutions. During the annual meeting for creative problem solving organized by Osborn's Institute in the mid of 1950s, educational and business leaders jointly created a course in creativity and problem solving that was helpful to the general population.

Mitchell and Kowalik (1999) defined the three terms: creative, problem and solving. The authors stated that the term creative could be described as an "idea that has an element of newness or uniqueness, at least to the one who creates the solution, and also has value and relevancy." A problem is "any situation that presents a challenge, an opportunity, or is a concern." The term solving is defined as "devising ways to answer, to meet, or to resolve the problem." Further, the author discussed the Osborn-Parnes problem-solving model. The steps included in the model are:

1. Mess Finding - The objective of this step is to recognize a challenge in a situation
2. Data Finding – This step attempts to find all known facts pertaining to the situation and tries to locate needed information that is not available but critical to solving the problem.
3. Problem Finding – This step should result in finding the most important problem statements.

4. Idea Finding – The objective of this step is to find as many good solutions as possible to the problem statement.
5. Solution Finding - Keeping a list of standards in mind, the objective of this step is to select the best answers for action.
6. Acceptance – After attempting to the find acceptance for the best solution, this step calls for a plan of action that leads to executing a solution.

Creative Software

This section attempts to see whether the software industry has included creativity as input parameter in the development process. Also, this section reviews two commercial creativity software: ThoughtPath and Ideafisher.

Software development is a scientific and artistic process. Programmers have to visualize the end product in their mind. Gu and Tong referenced Robert L. Glass who applied a comparison of two facets of software development, namely creativity and discipline. Glass found that building software is essentially a multifaceted problem-solving process while creativity is an ultimate requirement.

In Shapiro's review of Source Book for Creative Problem Solving: A Fifty Year Digest of Proven Innovation Processes, the writer stated that computer technology could enhance creativity and intuition. To illustrate this idea, the author noted that just like the word processor has allowed people to transport their ideas into the material world, creativity software can assist a person in generating ideas, especially in the early stage of idea formation.

This section will discuss two leading software, ThoughtPath and IdeaFisher. Based on the industry's reviews, these two software have been classified as the best in their category.

ThoughtPath

Thoughtpath.com defined the software as a way of bringing "techniques and processes" to augment a person's creative abilities. Further, the software utilizes 40 years of research in innovation and creativity by the Synectics Company. ThoughtPath has the following features:

1. "Idea generating techniques"
2. Creative problem-solving development capabilities
3. A warehouse to manage a user's concepts and ideas
4. "A creative workout gym" to support mental imaging

The software combines all these methodologies to assist a user through a range of complex problems and opportunities, to find a solution that is "fresh, exciting and workable."

According to MBAware.com who did a full review on this software, there are several benefits to using ThoughtPath. These include its ability to:

1. Help generate solutions to problems in many areas including business process, strategic planning, human resources, marketing, and product development. ThoughtPath can generate innovative solutions by increasing the quality of a user's work.
2. Provide a "Gym" that supports mental imaging, leading to creative thinking.

3. Manage ideas and concepts using a "warehouse" that allows a user to store, classify, explore and share ideas to enhance finding solutions for problems in a later stage.

Ideafisher

According to ideacenter.com, IdeaFisher allows a user to develop, explore and deal with "ideas at a touch of a button." Further IdeaFisher permits creative thinking by providing easy access to a lot of ideas while a user develops a business plan in a very short period of time. Further, Ideacenter.com continues by stating that Ideafisher eradicates creative blocks by providing a user with numerous business ideas. Examples of these ideas are related to marketing, design, writing script and writing in general.

Lloyd(2004) stated that for over 10 years, Marsh Fisher, the developer of the software, spent his time improving and developing the software, most of the time spent on sorting thousands of words organized in hundreds of boxes where each box had its "associative categories." The output is a huge database of concepts with many relationships.

Lloyd also stated that IdeaFisher "creates mental associations starting from a word or a concept." Further, it allows the user to compare two concepts for "common meanings." For example, Lloyd compared the two terms, creativity and computer. In response, Ideafisher generated 53 associations. Some of the association in the list included design, designer, robotic animal, Silicon Valley, to name a few. Interestingly, under the categories "People/Animal," the software listed gremlin and monster. This is an interesting response if we consider the number of images that might cross our mind when combine some of the returned words together.

The last feature Lloyd discussed is QBank. If the user feels lost at the start of a project, the software would provide various lists of questions to assist the user to find direction. The same feature would work well for the middle stage of a project where a user is confused by too many questions. QBank should be able to assist users by narrowing their options.

Academicsuperstore.com maintained that Ideafisher is has the ability to unlock creativity by applying associative thinking. Academicsuperstore.com referred to it as the "world's leading creativity software." Further, "in addition to all of the words and phrases included in Writer's Edge, it includes five modules, providing a database of over 900 idea-provoking questions to help clearly analyze situations, isolate mission critical issues and develop solutions."

Portals

Webopedia.com defined portal as a web site that provides the user with multiple services including email, forums, search capabilities, and even shopping. The first portal was AOL service, however, many of the bigger search engines are classified as portals by expanding their services beyond the scope of searching capabilities to attract more users.

Whatis.techtarget.com defined a portal as a "gateway" that offers a starting point to the users once they are connected to the web. Further, there are two types of portals: general and specialized. Examples of general portals are found in major search engines such as Yahoo, Excite,

CNET, Microsoft Network and AOL.com to name a few. Examples of dedicated portal are Garden.com, Fool.com for investors and SearchNetworking.com to assist network administrators. According to whatis.techtarget.com, additional features are considered typical services accessible by portals including directories, the ability to search for other web sites, news, stock markets, weather, phone, maps, and occasionally a community forum.

A portal can be also found at a smaller scale, e.g., a corporate portal, where a company can utilize the features usually found in a larger portal for its internal informational and communication needs. The web site Intranet.com, a company that builds and maintains intranet suites, a portal is defined as "a private space that gives employees in a company the ability to organize information, readily access that information, manage documents, share calendars and enable efficient collaboration, all in a familiar, browser-based environment." For a portal to support its goal, a measurement of security must be implemented and maintained. This is caused by the nature of intranet as a private network used by a specific business. The corporate portal has shown a promising growth and will continue to do so in the future. According to Dubow stated that the total of corporate portals in the market grew from $4.4 billion in 1998 to more than $14 billion by the year 2002.

The next discussion reviews two web portals: Brint.com and Im-boot.org. These portals can be very important to educators and decision makers alike.

Brint.com

Brint.com's team refers to themselves as the "The Knowledge Creating Company." In their mission, they referred to their portal as "developing leading edge thinking and practice on contemporary business, information, technology and knowledge management issues to facilitate organizational and individual performance, success and fulfillment."

Brint.com is by far the most inclusive portal of its kind. In demonstrating that Brint.com is as a very comprehensive portal, Brint.com cited Fast Company Magazine that stated, if brint.com "doesn't have it, then you probably don't need it." The home page shows all major options available. The web organizer divided the topics into two major sections. These include "generation" and "reference." Each one of these sections is divided into three groups as follows:

1. The "generation" is divided into:
    a. Business Technology Enterprises. Some of the interesting options available are information infrastructure, computer supported cooperative work, groupware, enterprise resource planning, virtual organization, virtual corporation, outsourcing, data management, and data mining, just to name few.
    b. e-Business & E-Commerce Enterprises. Some of the options available are e-Business, eCommerce, electronic business, enterprise application integration · Internet, intranets, extranets, enterprise portals, and enterprise information portals, just to name few.
    c. Knowledge Driven Enterprise Networks. Some of the available options are knowledge management, intellectual capital, learning organizations, organizational learning, systems Thinking, Chaos Theory, knowledge portals, creative innovation, and critical thinking, just to name few.

2. The "Reference" Section is divided into:
    a. Business Disciplines and Business Research. Some of the options available are business research, accounting, advertising, business schools, business writing, commerce, competitive strategy, computers science, statistics, technology, telecommunications, trade, and corporate culture, just to name a few.
    b. Business Administration and Business Systems. Some of the options are business management, data management, information management, innovation management, knowledge management, tax management, marketing management, operations management, production management, quality management, production management, project management, Systems Management and Technology Management.
    c. Information Technologies and Information Systems. Some of the available options are artificial intelligence, computers, computer-aided design, computer-aided instruction, computer-assisted learning, object-oriented design and problem-solving.

Im-Boot.org

Im-Boot.org is an interesting portal based on its goal of creativity. Their first priority is "to stay ahead and to keep track with the development in the creativity and innovation domain." The welcome message on the homepage states "creative people and methods worldwide" followed by "gain advantage by sharing."

The main features available in the portal are divided into four main sections. These include:

1. Method. The idea behind this section is to allow the user to choose a creative or innovative method based on their needs. This section is divided into two main parts.
    a. List of very helpful websites related to creativity and innovation. Im-boot.org refers to this part as the yellow pages of creativity and innovation. Some of the titles mentioned include lateral thinking, multiple intelligence, visual problem solving, and "innoversity" (innovation + diversity), just to name few.
    b. The second list is referred to as the "body of knowledge." Some of the titles listed include strategy and planning, organization and teams, process, tools and methods for design optimization, and modeling and decision support.
2. People. This section of the portal invites the user to examine how we get our innovative ideas by examining what creative people said regarding this issue. It is an interesting section to examine many approaches and methodologies to creativity and innovation in variety of aspects.
3. News. This section provides the user with news concerning creativity and innovation. The reviewed articles are posted on a daily basis. "Articles cover scientific issues, books recommendations, educational trends," and "valuable information sources."
4. Resources. This section answers the question: "Where do I get help?" This section likes the works of creativity trainers, consultants, and many additional and helpful resources.

Im-boot.org is not limited to the above-mentioned resources. It includes many additional services that can be useful to managers, scholars, CEOs, entrepreneurs, and creativity and innovation

trainers by providing them "with the diversity and richness of research findings, best practice, stories and the great experience" of creative and innovative people.

The Importance of the Study

This study will contribute to the literature of creative problem solving, creativity software and specialized portals. The most notable contribution of this study is the exploration of commercial creativity software. The realization that having software might trigger our creativity is an advantage when we deal with thought obstruction. This study assessed two creativity software: ThoughtPath and Ideafisher. Also, this study discussed two portals and the ability to obtain endless amounts of information. Brint.com and im-boot.org can help to educators and managers alike. The wealth of information and knowledge in these portals will be invaluable to the decision-making processes.

Conclusion

There is a great chance of improving our creativity by using some of the existing software and portals. In many cases, our minds are waiting for a simple trigger to unleash their own creativity. Software and specialized portals can help by providing these triggers. The software industries and the ease of access to the World Wide Web can present the required basis for learning and applying the creative process.

Rahph Waldo Emerson was quoted as saying "…in art, the hand can never execute anything higher than the heart can inspire." It is our belief that within the soul of every human being lies the dream to create. Many of us forget that we have choice and the ability to create whatever we can dream. When life's events make our journey a little bit harder and our dreams start to slip away, it doesn't hurt to ask for a trigger for our next creation.

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Serving 11 Institutions WebCT from a Central Location

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Background

The Appalachian College Association is a non-profit organization made up of 34 four-year colleges and universities in the central Appalachian region. The member institutions range from under 700 students to over 3,000 students within multi-campus environments. These colleges and universities are located in some of the most beautiful areas in the country, gently carved into the rolling Appalachian Mountains throughout a five state region. Its members share the goal of service to the people of the region through higher education and related services. The Association helps develop and share ideas, information, programs and resources to achieve its goals, which include promoting cooperation and collaboration among its member institutions to serve the people of Appalachia. The ACA functions independently of any one institution to serve all its members equally.

" The Appalachian College Association is an organization of independent liberal arts colleges which fosters cooperation and collaboration among its institutions for the mutual benefit of the member colleges and service to the people of Appalachia."

The ACA developed from a grant-funded project at the University of Kentucky over a 10-year period between 1980-1989. In 1990, the ACA became an independent organization, with its own tax-exempt classification status under Section 501(c)(3) of the 1986 Internal Revenue Service

Code. Six research universities in the region (University of Kentucky, University of North Carolina, University of Tennessee, West Virginia
University, University of Virginia, and Virginia Tech) are affiliated with the ACA. These institutions assist the ACA in reviewing grant and fellowship applications and conducting workshops. The ACA's assets have grown from less than $1 million to approximately $10 million due primarily to the generosity of the foundations that have continued to fund its programs to benefit central Appalachia.

During the initial period of service in the early 90's the Appalachian College Association focused on the support of our member institution's faculty, as this was the focus of the initial project leading up to the formation of the association. After realizing many successful projects in this area it became apparent that there were tremendous avenues available for expansion of the association's focus. The ACA slowly began to diversify the types of programs offered as well as the content within some existing programs. This diversification would lead to the formation of programs such as the "Central Library", the "Appalachian Collegiate Business Programs Association", "Virtual Center", "Laptop Lab", "Multi-Media Lab", the "Information Technology Collaborative Group" and the CTAAC (Collaborative Technology Application in Appalachian Colleges). Continuing to grow and expand these programs helped shape the future of the Appalachian College Association as they changed the way in which the ACA supported its faculty. Continuing the ACA's vision that faculty are key to a successful institution, but realizing that underlying technological foundations and infrastructures were extremely important to the success of faculty and the classroom of the future, caused the ACA to adopt a technology foundation that would serve to create new efficiencies in old programs and make the adoption of new programs more accessible.

New Developments

In our continuing efforts to provide increased technological opportunities to our member institutions the Appalachian College Association has spent considerable time over the past year exploring possibilities associated with the further development and sustainability of a centralized technology program. To promote collaborative ventures and the ability of our institutions to adopt and use new technologies, previously found too expensive or labor intensive for our small campuses, the ACA is working to build a technology center that would support multi-institutional services and training opportunities.

Services in use by one of our institutions are quite often in use at several other institutions within our member population, creating many opportunities for the ACA to reduce the cost of technology, increase the efficiency of some programs, and to promote a collaborative sharing nature among our 35 member institutions. In order to support and sustain services such as course management systems, library catalog servers, and student information systems, which are core campus services, the ACA technology center must employ the following key strategies.

At the physical level the center must provide a secure environment in which to house the equipment necessary to support the services implemented. This equipment must have electrical power available at all times, including emergency situations. There must be a reliable scheduled backup routine in which all essential data is archived to tape media and removed from the onsite

location. This equipment must also be highly available to the users via a connection to the Internet, in which several transport methods may be implemented including virtual private networking and secure socket layer encryption. Constant power and network connection, secure location and environment, and the consistent archiving of essential data are key physical attributes in which the ACA must operate services of this nature and importance.

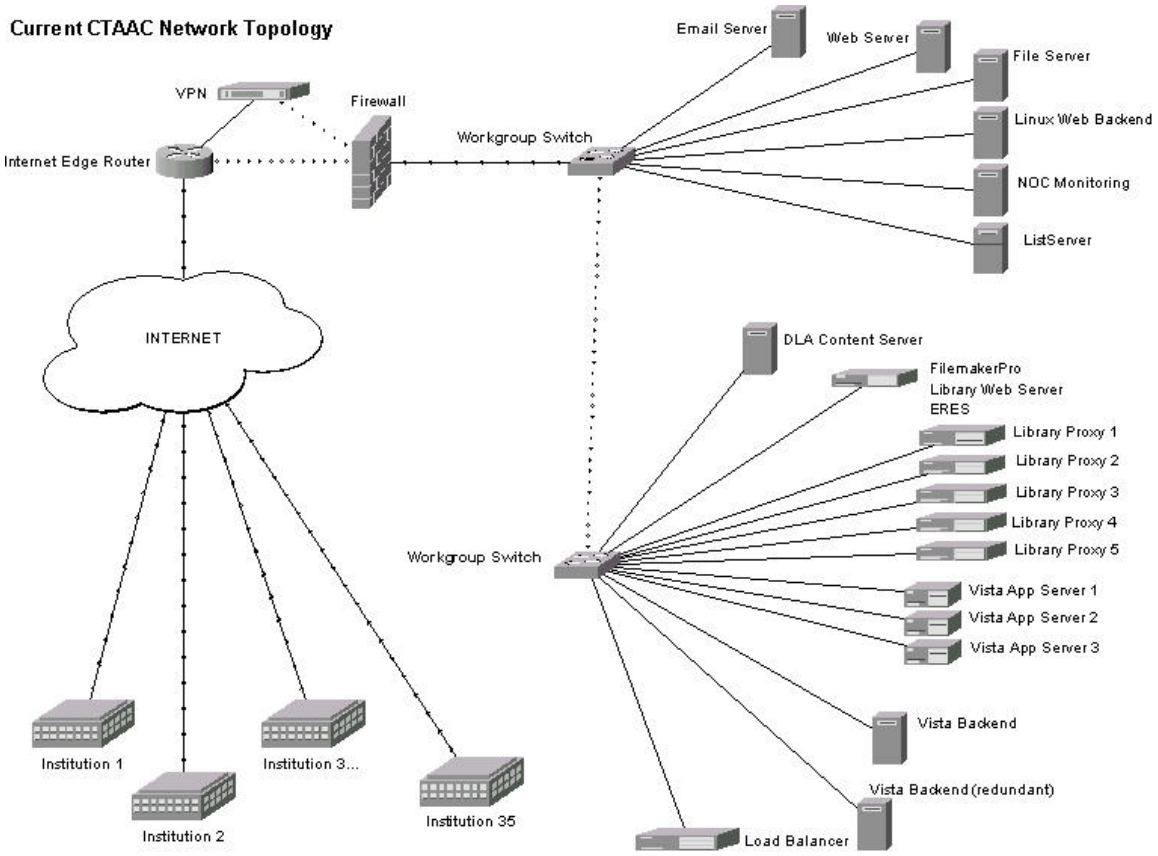
At the service level the center must provide timely response to support questions and offer the ability to provide remote access or management services for management of hosted services. If a particular service requires that a member institution will have an on campus administrator or will be responsible for minor service updates the center must support secure access to the service or equipment involved. Combining the physical with the service level the center will provide a reliable architecture for the development, implementation, and ongoing remodeling of services supported by this centralized model.

The requirements listed above pertain almost entirely to the basic principal of a highly available data center and do not even begin to reflect the requirements necessary to support an effective and successful collaborative higher education tool. Core campus services such as those listed earlier are important tools in the day-to-day business model of higher education. It is no different in our Appalachian institutions where high-end course management systems are becoming the expected and electronic resources available to students from our libraries are growing at a phenomenal rate and are deemed necessary by student expectations. To build collaborative tools that will satisfy the expectations of our member institutions the technology center must be extremely flexible yet in tune with the direction and focus portrayed by our member institutions.

CTAAC (Collaborative Technology Applications in Appalachian Colleges)

In central Appalachia, which contains all of the Appalachian College Association member institutions, technology enhanced education is a difficult subject. The value of this service is widely known and our institutions realize the advantages that might come from the adoption of certain current technologies being utilized by many other institutions in today's higher education market. However, seeing the potential and realizing the value of these opportunities does not, unfortunately, bring the cost of technology to an obtainable level for our institutions. Utilizing the power of 35 private liberal arts institutions, with some 38,000 students, and more than 2,500 faculty members the Appalachian College Association strives to bring this enhanced educational experience to our member institutions through collaborative communication, purchasing, and support.

In order to alleviate many of the cost limitations associated with the development and implementation of projects, which will provide application services for use by students and faculty, the Appalachian College Association has successfully built centralized academic systems for use by our member institutions. Adopted by many of our members and in use today are systems that range from the provision of library resources for off-campus students to systems that are the primary source of online course content. As the availability of these centralized applications grows and the feasibility of such programs increases one of our primary concerns is the ability of our members to reach the CTAAC center, which is home to the equipment that powers these critical services.



Over the past year the Appalachian College Association has worked to help our institutions gain control of mission critical bandwidth through the purchase of traffic shaping devices and caching equipment. Although these purchases have been instrumental in providing our institutions with the ability to control and prioritize critical traffic in "normal" circumstances the continuing increase of virus and Spam traffic has taken a toll on our ability to provide quality services to our institutions. This traffic utilizes an ever increasing portion of the costly bandwidth available to our institutions, thereby decreasing the amount available for academic use on the local campus and especially affects the use of the CTAAC services which many now consider mission critical services.

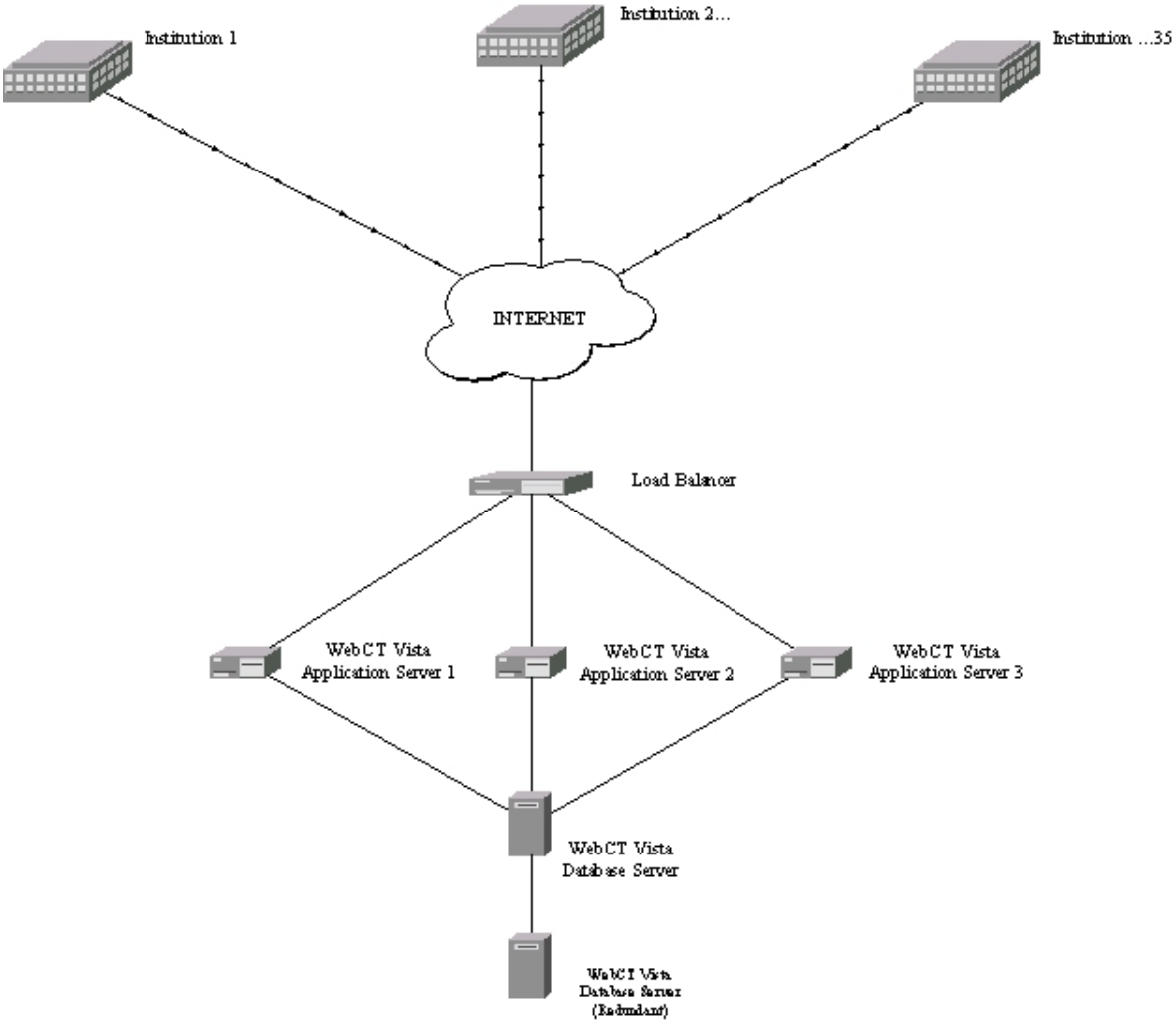
As we have found through countless conversations and meetings it would be nearly impossible for the association to create new bandwidth for our institutions through the implementation of a high-speed wide area network. In the future this could be a realistic possibility as costs decrease and would by far create the optimal situation. Although the future looks feasible the Appalachian College Association must continue to provide equipment that is of great value now, while simultaneously working from a long-range goal in which the services and equipment that currently serves our institutions will continue to be of essential value. Thus we have implemented devices that will help manage non-academic traffic, a value on any network, and application services that will only be enhanced by greater bandwidth. In order to continue our growth we must be aware of many avenues of communication and technology provision that will allow the continued use and improvement upon our current centralized service base.

WebCT VISTA

One of the largest projects currently under support and development by the CTAAC is the WebCT Vista, enterprise course management system. At the time of this writing the system supports 11 institutions and approximately 16,000 students. Each institution has appointed an administrator who works with students, faculty, and course designers on each campus and serves as the contact point for the CTAAC center. Every institution has an autonomous look and feel through the user interface, yet also has the ability to collaborate with others using the system through content sharing, course sharing and best practices scenarios on the backend content management system.

The Vista system consists of two pieces, a front-end application server and a backend oracle database server, which reside in the CTAAC data center. Each institution and system user connects to this system via the Internet, which allows for a wide variety of access locations and system support. Both the application server and the database server reside on Intel based dual Xeon processor systems with 4gbs of DDR RAM. These two systems run Windows 2000 Server and are interconnected via gigabit copper to achieve the communication level needed to support the transactions that take place between the two systems. The database backend, powered by Oracle, has approximately 300gb of drive space that is running on a raid five hot swappable drive system. Anticipating the possibility for large amounts of data we deployed a network attached storage file system with an extra 300gb of space for use by the database system. The application server stores little data but requires space available for the multiple logging facilities built into the front-end application system.

Over a three-month period we implemented the WebCT Vista system and began to bring institutions online. Several of the participating institutions were utilizing earlier versions of the WebCT course management campus edition and required course migration in order to convert existing content into courses available through Vista. During this implementation phase the local campus administrators were given the opportunity to attend a three-day training session designed to familiarize them with the system while teaching them how to design courses and adopt best practices relevant to the use and support of WebCT Vista. This training was considered a “Train the Trainer” scenario so that much of the ensuing faculty training could be distributed to the local campuses. However, after having used this scenario we are currently exploring the opportunities available through online resources for training faculty to use Vista. It has become evident that the on-campus administrators are utilizing much of their time to help faculty in mid development stages and are left with little time to configure structured sessions for new faculty.



With a system that supports multiple institutions, each with unique schedules and needs, it is extremely important to map out a structured maintenance schedule that will allow for maintenance windows and predetermined outages. This schedule was developed in conjunction with a backup strategy that allows us to do a full offline backup of the database server one time per week. In order to minimize downtime we perform nightly hot backups, in which the system remains functional and reserve cold backups for off peak hours, at this point Saturday evening starting at 1:00am. We have configured a weekly maintenance window, 8:00pm Friday through 8:00am Saturday, which allows us to perform routine service pack additions and small adjustments to the system. These maintenance windows serve as a scheduling guideline for faculty, so that large assignments and exams are not performed during these hours. We do however provide advanced warning of planned outages within our maintenance window but are unable to provide the extended advanced warning which would be needed for faculty syllabus planning, this shows the value of setting a probable maintenance window.

As with any single institutional implementation we strive to perform large system upgrades, which would possibly create extended periods of service outage, for break periods that are longer in nature, generally with the varying consistency of schedules among the participating institutions this time is during the summer. During the 2004 summer we will be upgrading the system

one full version and will be implementing a clustered front-end server architecture that will support the growth of participants expected. This new clustered system will include multiple application servers with load balancing capabilities as well as a second database server to create a redundant fail-over configuration. This system will then be capable of supporting all 35-member institutions and their 39,000 students.

As we bring the first year of this project to a close we have developed many interesting ideas about the provision of course management from a collaborative centralized model, some of which were good and some of which were not. As our service level grows and the participants increase we will undoubtedly face new issues and new problems, but it is our position that the communication channels supported by the association will allow us to overcome these occurrences and build upon them to enhance our ability to provide a diverse group of programs for our member institutions.

Instructional Technology in Computer Science Education

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Introduction

Computer science instructors – aren't they the disheveled-looking ones sporting thick glasses held together with white athletic tape, pocket protector with a myriad of writing instruments, inadvertently spiked hair, white socks, wrinkled shirt, and a far-away look in their eyes? You know – the geek, computer-nerd-type professor that loves to be in his office hacking away. His office hours are midnight to 3 AM, because he's awake anyway and most productive then.

Why should that instructor consider the integration of technology into their teaching? They create technology and systems. They train the students who in turn create and program technological systems in all kinds of environments including business, industry, health and allied fields, and education.

Well, you may not actually know any computer professors who fit the above description, but perhaps you might be interested how one such "prof" tries to integrate the appropriate use of technology into classroom teaching.

I teach computer science at Grove City College. The courses that I teach (or have taught) include Computer Programming I, Database Management Systems, Systems Analysis, Data Communications & Networking, Computer Architecture & Organization, Visual Basic .NET, Web Programming Technologies, Software Engineering, & Technologies of Instruction. As I write that list of courses, I realize that one of the reasons that I use technology to help me is that I need help all the help that I can get!

Here are some of the strategies that I have used over the years to help me do a better job of teaching, to augment and enrich courses, to appeal to different kinds of learners, to engage the learner in and out of the classroom. Certainly you have used some of these ideas. I trust that one or two will be novel to you and will give you an idea that you can use. (Perhaps if you attend my presentation you'll share one of YOUR ideas.)

Intranet -- Syllabus

Let us start with an idea that I am sure many also have implemented – the Web-based syllabus. I do not hand out hard-copy. My syllabus is available only on our campus network as a Web page. When the class and I first look at the syllabus, we view it using the classroom digital projector. If students need a printed copy, they may certainly do so, but I warn them that the syllabus is dy-

namic – a living document. All of my lectures outlines are illustrated with Microsoft PowerPoint and are subsequently hyperlinked in the syllabus.

The folder that contains the syllabus also contains handouts, assignments, sample code, etc. that students need.

Intranet – Inbox

How do you collect your assignments from students? Hard copy? For a time I collected some assignments via email, but with the advent of spam, I decided to keep my email to a minimum. Besides, collecting source code for a program via email still required exporting it so that I could compile the code as part of the grading process – or forwarding it to a student grader.

My current strategy is to have an "Inbox" in the class folder, a subfolder for each student in the class. The folder security for each student folder is such that only that student-owner of the folder can Read&Execute, List Folder Contents, Read, and Write to that folder. Thus a student may drag and drop an assignment into his/her folder. They cannot view the contents of any other student folder, nor can they remove files from their own folder. The advantage of this is that an assignment is time-stamped when it is handed in – no questions, no "slipping the assignment under the door," etc. I can give the Inbox to a grader via CD or USB flash drive. The downside is that time is required at the beginning of the semester to setup the Inbox. I do it manually. I create each folder, removing unwanted access, adding individual and modify owner access. Let me know if you have a method for automating that process. (Where is a VAX/VMS batch file when I need one?)

Intranet – Papers

I require papers and/or writing-intensive assignments in several courses: Data Communications & Networking, Software Engineering, and Systems Analysis. Who reads the paper and assignments? Traditionally only the instructor and the student read the paper. The student reads his/her paper while creating it (hopefully) and the instructor reads it while grading it. Why not allow (or force) other students to read each others' work? All paper and writing assignments in my classes are done as "Web papers" and posted in student Web space on the Intranet. The capabilities of Microsoft Office enable HTML documents to be easily created. FrontPage is easy for students to use as well. (I confess that I have a few students who will only use Notepad and pure HTML, perhaps yielding to a CSS file here and there.)

My Web programming class MUST create an HTML table (itself an assignment) in which each row represents an assignment for the class. Each row includes due date, assignment description with hyperlink to my HTML assignment document, description of what they used/did to complete the assignment, and a hyperlink to the student document. The students email the URL of this table to me and I build a table of hyperlinks to all of the students' work. This makes reference convenient for any assignment for any student. It is also useful for "show & tell" in the class. We devote time now and then for volunteers to demonstrate what they have done. Final project demonstrations are mandatory using PowerPoint and the Web.

Anyone else see a student's assignment? Why not use the PC lab and let students do some peer evaluation? Give them a hard copy of the rubric used for grading a program, and have students demonstrate their programs in pairs while you go around and observe. Review what they are looking for. Let them see what other students are doing. (I pair them up in pairs of students who do not know one another.) This can't be done with any regularity, but it is a useful exercise for at least one assignment. All they need is the PC lab and their own network space. We use our notebook computers, one of the benefits of a mobile computing initiative.

Intranet – Independent Study and Honors

Our curriculum is lean and mean, and our faculty is small – lean and mean as well! Thus we have students who on occasion want to conduct independent study with a faculty member on a topic not offered by a formal class. When I am asked to sponsor someone, I require that the student create his/her own Web syllabus and then create/maintain a Web journal of their study. The journal takes a form similar to the Web assignment table previously mentioned. Learning is described; outcomes are hyperlinked and available. Thus other students can benefit from what each independent study student has done.

Intranet – Image Editing

In two courses, Web Programming Technologies and Technologies of Instruction we study image manipulation using Photoshop Elements 2. Students are required to create photo galleries of the "before" and "after" of the images altered. The photo gallery utilities of Photoshop Elements and FrontPage make that task easy. Students post these assignments on the Web for all to view.

Course Management System – Blackboard

Blackboard (Web CT, Jenzabar's LMS) is a course management system that may function as a communication center for a course of instruction. I use it for email lists and unofficial grade book, but one of my favorite utilities is the Discussion Board (or Forum in some systems.)

I require my Data Communications & Networking students to peruse the net, the library, and trade journals for articles relevant to class, summarizing them in the Discussion Board of Blackboard. Students are then able to read one another's summaries, and, when appropriate, reply or react. I build in incentives to do so. We have had some healthy discussons.

Some group assignments are posted in the Discussion Board also when the answers are open ended or issues are discussed. Students benefit from viewing other approaches to solving a problem. For example, I use this approach for a set of problems where students read a scenario and then suggest and defend media selection for a LAN.

Blackboard's Web Sites is also useful for collecting and utilizing Web sites with tutorials that augment and enrich the class activities.

Conclusion

The Web, the Internet, the intranet and associated resources, campus computer labs, smart classrooms, course management systems, and a plethora of software packages all offer opportunities for every classroom instructor to enrich in-class and out-of-class activities. What are you doing that is novel? Have you shared what you are doing with anyone? I would encourage you to do so.

Possibilities for the Visiting e-Lecture

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We have all taught for many years, using pencils and paper in brick and mortar classrooms. But now with computers, we can teach students online, at the speed of light at 186,000 miles per second, or even more fantastic, with wireless technology. Now that's creative!

I have happily utilized the Web as a teaching environment in various ways for the past five years. In all of my face-to-face classes I use it as a virtual classroom, and also design new hybrid courses as well as ones that I teach completely online. Although we might be thousands of miles away from each other, as online learners, we are only a mouse click away.

In all of my online teaching, I like to maintain perspective by keeping the contrasting ideas of Neil Postman and Bonnie Nardi and Vicki O'Day in mind. As I navigate the wild, ever changing terrain of computer land, their ideas keep me focused on prioritizing my intentions and clarifying my instructional content.

It was my honor and privilege to know Professor Postman when I was a graduate student at New York University. He is the founder of the Program of Media Ecology and was the Chair of the Department of Culture and Communication for fifteen years. All twenty books of his books, he once proudly stated, were written on yellow legal pads. Although he is no longer with us, his voice remains strong in the literature, reminding us to be critically aware of why and how we use technology in our schools.

In Building a Bridge to the 18th Century: How the Past Can Improve our Future, Dr. Postman cautions us to be thoughtful about implementing new media in our society. He encourages us to ask, "What is the Problem to which this technology is the solution?" (Postman, 2000)

I believe that online teaching provides a new avenue for the human imagination, another way for students and teachers to creatively participate in one of the predominant cultural forms of our time, the Internet. By distributing lectures online, educators teaching at all grade levels, from elementary school through graduate school, can easily share their great ideas across distant geographies.

In Information Ecologies, Using Technology with Heart, Bonnie Nardi and Vicki O'Day present the possibilities for a holistic, ecological approach. They encourage people to engage their own values and commitments while using technology. (Nardi & O'Day, 1999) Their ideas remind me to design educational content that builds community and that continues to encourage awareness of our natural environment as a learning outcome.

As an online instructor using readily accessible techniques, I have been privileged to work with many communities of learners and to share their discoveries of themselves and others. Responding to both Postman and Nardi and O'Day, I will give an overview of what I have found to be effective ways of delivering content within digital learning ecologies.

Although it is possible, of course, to use sophisticated means to deliver online lectures, such as videoconferencing, streaming video and audio, state of the art Web page authoring software, etc., I believe that content should be the primary concern. To that end, even the most simple means can even be effective, such as sending a basic .PDF file or a Microsoft Word Document with embedded external hyperlinks via e-mail. My students have made simple instructional Web sites with various online tools on free sites such as Angelfire. NiceNet, Internet Classroom Assistant, for example, is extremely user friendly and is available free of charge. These possibilities are available to all educators without a large investment in hardware, software, or time. All that is required for online content delivery is a basic computer interface.

Stephen Johnson, in Interface Culture, tells us that the interface is the place where computers, people and ideas meet. He says that "there are few creative acts in modern life more significant that this one, and few with such broad social consequences." (Johnson, 1997)

We are all familiar with the desktop Graphical User Interface (GUI), with its folders and trash-can. In Distance Education on the Web, Course Management Systems provide a common interface for the Virtual Classroom. In my online teaching I have used:

- Web CT
- Blackboard
- Campus Pipeline
- Specific proprietary systems

(if none of these are available, group e-mail lists, course web sites on local servers, free chat rooms and free virtual classrooms such as NiceNet can be used)

My Online Courses

Ecology Art Education Online, an experimental Fine Arts Course 1999, 2000 - Ohio University, Blackboard
Art & Nature - FA 1000 Intro to Art, 2002, 2003 - Kean University, Web CT

Hybrid Courses:

Teaching Art in the Middle Schools: Computers - 2000, 2001, 2002 School of Visual Arts, Campus Pipeline, free chat rooms
Graduate Research Methods – 2003, University of the Arts, group e-mail
Art & Nature -Continuing Education, 2003 – School of Visual Arts, Campus Pipeline, free chat rooms
History of Ideas in Art and Museum Education – 2004, University of the Arts, NiceNet
Educational Media – 2004, University of the Arts, NiceNet
Interactive Media – 2004, University of the Arts, NiceNet
Technology in Art Education – 2004, School of Visual Arts, NiceNet

The Guest Online Lecture

PROBLEM: The predominant personal voice and teaching style of a typical university course is the on-campus instructor. Frequent guest lecturers are costly.

SOLUTION: Geographically remote faculty and artists can be invited to the virtual classroom for diverse perspectives.

Among many invited guests in my digital classroom, Dr. Mary Stokrocki, professor of Art Education at Arizona State University, shared her Participant - Observer research method and findings with my students on the East Coast via the Web. Her distinguished research methodology was made easily accessible to my students for review and discussion as a guest online lecture by means of an embedded hyperlink to her Web site from my course's Interactive Syllabus Schedule. (Stokrocki, 2003)

Interactive Syllabus Schedule

PROBLEM: A traditional paper syllabus schedule is static and unresponsive to student learning in real time, and presents one instructor's point of view.

SOLUTION: A dynamic electronic document can employ a constructivist approach, unfold in real time, and include embedded hyperlinks to online guest lectures.

In my courses, an online Syllabus Schedule is updated each week, with current assignments due, and embedded links for online lectures, guides, readings, and articles of interest. I have found this to be an effective way for students to develop a cumulative view of their learning process, to participate in collaborative authorship, and to stay informed about upcoming assignment due dates.

Student Assignments In Message Board

PROBLEM: It is difficult to make all student work available for reading, discussion, and assessment.

SOLUTION: A Message Board is an effective way for faculty and students to post and reply to class assignments and those built into visiting online lectures. All allow the posting of URL's and, on most of them, students are able to attach images. It is also an excellent assessment medium for use by the instructor, by the students themselves for self-reflection, and for peer critiques.

All Course Management and Virtual Classroom Interfaces have Message or Discussion Boards, or Conferencing components, where teachers and students can initiate a topic for discussion or respond to other postings. In my courses, I have found it very effective to post weekly reading topics so students may add their reflections, post images, and most importantly, reply to each

others' work. This online forum is very valuable as a resource for revisiting student course participation, making it easily accessible at all times.

A Community Of Online Learners

PROBLEM: Student projects and research are sometimes viewed within a narrow context and there is little opportunity for building an active community of learners.

SOLUTION: Digital archives of student projects, inter-institutional Internet Collaborations, and hyperlinks to professional work create a wider context for student work.

Making student portfolios from previous semesters available as an online resource can be very valuable for student learning. This can be done by digitally archiving student work including past projects from online lectures and exhibitions and linking them to the online Syllabus Schedule.

Frequently, I engage students in inter-institutional and Web-based collaborative projects with a shared online lecture as a guideline so that they might experience the richness of diverse cultural perspectives while working with others at a geographical distance. Linking to artists' personal web sites is another effective way to connect students to a critical context for their work. (Julian, 2003)

"What is the problem to which this technology is the solution?" The problem is the difficulty of effective human communication. Online learning provides a good way to extend the human dialogue into new dimensions for teaching, for learning, and for understanding.

References

Johnson, Stephen. (1997) Interface Culture: How New Technology Transforms the Way we Create and Communicate. New York: HarperCollins.

Julian, June. (2003). A World Community of Old Trees [On-line]. Available: http://www.nyu.edu/projects/julian/

Nardi, B., & O'Day, V. (1999) Information Ecologies: Using Technology with Heart. Cambridge. The MIT Press.

Postman, Neil. (2000) Building a Bridge to the 18th Century: How the Past Can Improve our Future. New York: Vintage Books.

Stokrocki, Mary. (2003). Qualitative Research, Participant Observation [On-line]. Available: http://www.public.asu.edu/~ifmls/POFolder/PartObTOC.html

Course Management Systems

Blackboard. http://www.blackboard.com

Campus Pipeline: http://sct.com/Education/p_cl_campuspipeline.html

WebCT: http://www.webct.com

NiceNet: http://www.nicenet.org

Faculty/Student Surveys Using Open Source Software

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Abstract

This session will highlight an easy survey package which lets non-technical users create surveys, administer surveys, gather results, and view statistics. This is an open source application all managed online via a web browser. By using phpESP, the faculty is given the freedom of creating various surveys at their convenience and link them to their web pages seamlessly. A demonstration of the application implementation, functionality and how it developed will be presented in this session.

Introduction/Background

Philadelphia Biblical University (PBU) is one of many institutions striving to bring technology in the classroom while teaching Biblical truths. The university has about 1300 full-time students offering various degrees from undergraduate to graduate. With the increase in the number of programs and with the development of technology, a new need arose where the faculty needed to be able to create and design their own surveys from anywhere.

We looked at various commercial products but they were rather expensive or did not have all the features available to customize them. We found that phpESP is free, open source and meets our needs.

Product Information

REQUIREMENTS:

- A web server that supports PHP
- PHP4.2.1 or above
- MySQL installed in the machine

PhpESP and its documentation and a live demo can be obtained by going to http://phpesp.sourceforge.net. We are currently running phpESP on a Red Hat system. The hardware requirements are very minimal. Even a Pentium II computer running Linux works well.

As the name implies, phpESP (which stands for php Easy Survey Package) is based on the PHP scripting language. Installation didn't require much more than unpacking its folders to our Web server, creating a MySQL database and making a few small configuration file changes. We were able to get it running on Linux with no problems.

Once phpESP is up and running, all management is done through a browser-based management interface. The product provides enough simple group and access management features to control the capabilities of different types of users.

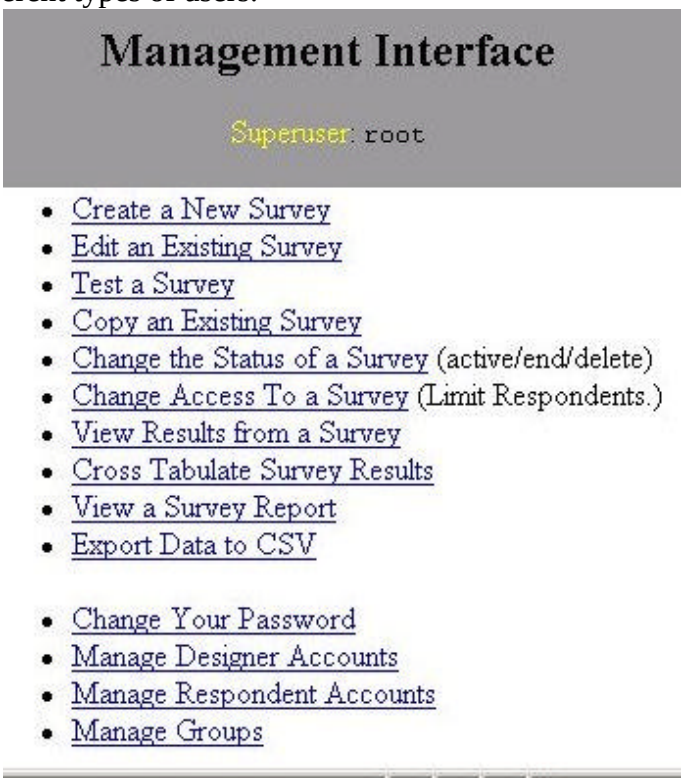


Figure 1 – Management Interface

Usability

There are three basic things faculty need to do: make surveys, deploy surveys and retrieve or export the data.

Making Surveys: This is a straightforward procedure. The application provides the survey designer with five tabs: General, Questions, Order, Preview and Finish. This can be accomplished by going to Management Interface normally: http://yourwebserver.edu/phpESP (this may depend on how you set it up initially).

- **Creating a new survey**
  - Click **New Survey Design** from the Management Interface.
  - **General Tab:** Enter a name for the survey in the **name** field. Do not use spaces in this name, think of this as a filename.
  - Choose a **group** to own this survey.
  - Fill out the **title**, **subtitle**, and **info** fields. These fields will be used in the creation of a header for the final survey.

- If you would like to receive a copy of each submitted survey via email, enter a valid email address in the **email** field. (This is intended for **backup**, not as the primary data collection, you should probably leave it blank.)
- If you would like to theme your survey, select the appropriate theme from the dropdown list. This will establish a link to a specific css style sheet for your survey.
- The **Confirmation Page** is the page users will be shown after filling out the survey online. Fill in the **heading** and **body text** for the page, or leave them blank to use the default.
- Click continue, or click the **Questions** tab at the top to proceed to the questions section.

Figure 2 – Survey Design Tabs

- **Questions Tab:**
  - Enter the text of your question (i.e. *What is your favorite color?*) in the **question** box. Optionally enter a **field name** for this question, if you leave it blank one will be generated for you.
  - If you would like to require the user to respond to this question, select **yes** in the **required** field.
  - Choose the **type of response** for this question.
  - If you chose a response type that has answer options, fill in one answer per line on the bottom half of the form. If you need more lines, click **Add another answer line**. [Question types with answer options are: Check Boxes, Dropdown Box, Radio Buttons, Rate.] For check boxes and radio buttons, you may enter `"!other"` on a line to create a fill in the blank option. An "Other" box defaults to using the prompt *Other:* , but is configurable by using the format:
    - `!other=prompt text`

- Add more questions by clicking the **New Question** button. Edit/View existing questions by clicking the question numbers at the top of the form.
- Click continue, or click the **Questions** tab at the top to proceed to the questions section.

- **Order Tab:**

  On this tab, you can change the order of the questions, delete questions, and insert **section** breaks. A section break, divides your survey into multiple pages (good for long surveys).

- **Preview Tab:**

  Shows a preview of your survey. You can switch to this tab at any time to see what your survey will look like. If you would like to make changes, go back to the appropriate tab and make the changes. If you are satisfied with the survey, click the **Finish** tab or button at the bottom of the page.

  The **Next Page** and **Submit Survey** buttons are inactive in the preview mode.

- **Finish Tab:**

  Shows you the block of PHP code that you need to paste into the HTML of your webpage to embed the survey.

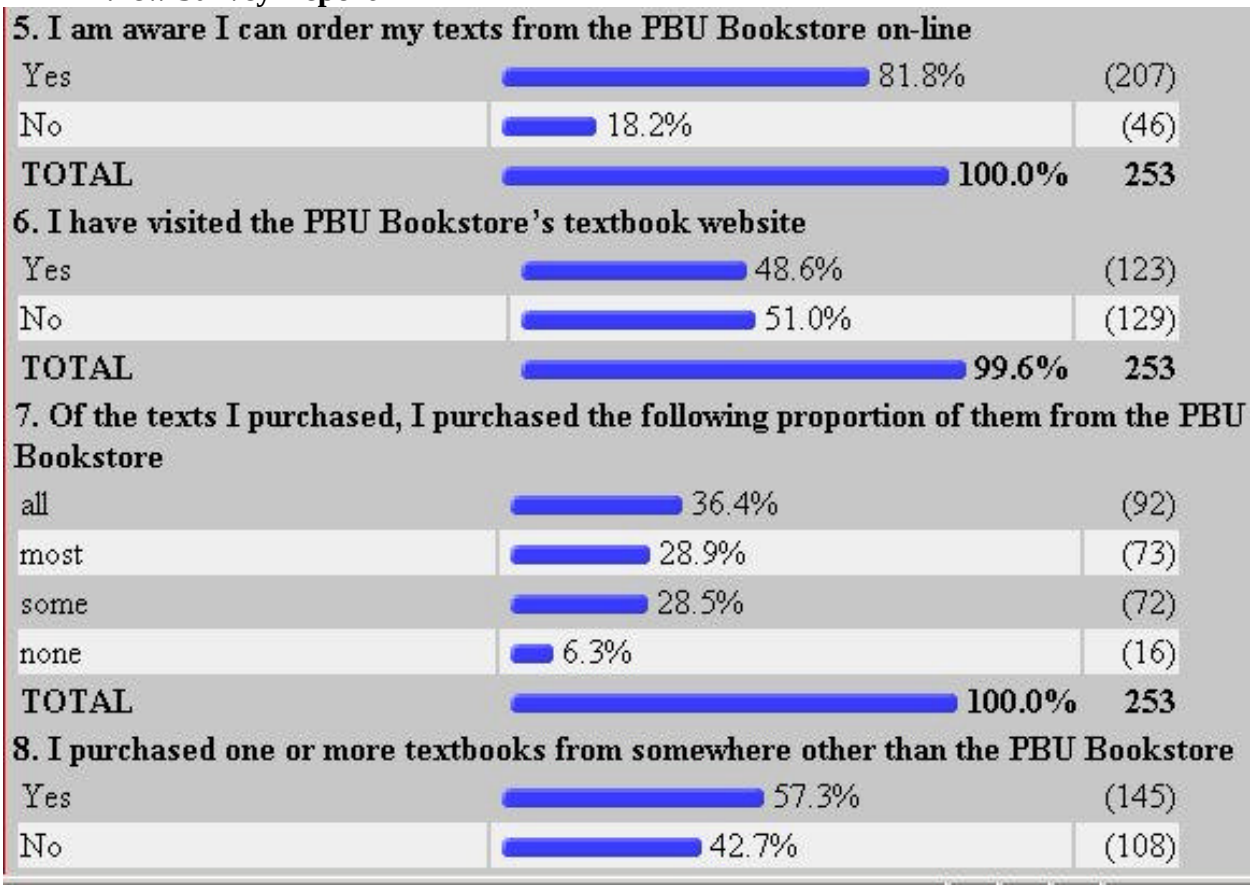
  Once a survey is finished, you may return to editing it by choosing **Edit an Existing Survey** from the Management Interface. When all final edits are done, you need to change the survey status from **new** to **test** or **active** mode. You can change the status by choosing **Change the Status of an Existing Survey** from the Management Interface.

Deploying Surveys: After a survey is made (and tested), you can deploy it. This is a simple as going and clicking on "Change Status of a Survey" and clicking on "Activate". There are two options for the deployment of a survey: one is to embed it in a customized HTML page, or to use the automatic template (which is very plain and simple). To use the automatic template, simply copy and use the URL given to you on the "Finish" Tab. If you want to have the survey embedded on some custom web page, insert the PHP tag that was given on the "Finish" tab in the desired place in your HTML file. Make sure that the HTML file you put that code in has a ".php" extension.

***Retrieving Data*:** For any survey that is in Testing, Active or Ended Mode, you can view the results in various ways:

- **Export Data to CSV:** By going to the Management Interface and selecting "Export Data to CSV" you can download a copy of the data on the computer and then resort it and use it in various ways.
- **Email:** If you specified an email address when designing the survey, you will receive copies of the completed surveys via email as they are completed.

- **View Results of a Survey:** By going to the Management Interface and selecting "View Results of a Survey", you can view the data cumulatively for all respondents or simply for each respondent.
- **Cross Tabulate Survey Results**
- **View Survey Report**



5. I am aware I can order my texts from the PBU Bookstore on-line		
Yes	81.8%	(207)
No	18.2%	(46)
TOTAL	**100.0%**	**253**
6. I have visited the PBU Bookstore's textbook website		
Yes	48.6%	(123)
No	51.0%	(129)
TOTAL	**99.6%**	**253**
7. Of the texts I purchased, I purchased the following proportion of them from the PBU Bookstore		
all	36.4%	(92)
most	28.9%	(73)
some	28.5%	(72)
none	6.3%	(16)
TOTAL	**100.0%**	**253**
8. I purchased one or more textbooks from somewhere other than the PBU Bookstore		
Yes	57.3%	(145)
No	42.7%	(108)

Figure 3 – Survey Results

***Other Actions*:**
You can also make copies of surveys, which is very handy if you want to change a survey that has already left the Edit/Test phase. Copying copies the survey questions, none of the collected data is copied. Then the copied survey is placed in "Editing Mode".

Permissions

Before beginning administration you must understand the user/group relationship. There are three classes of users.

- Superusers: Have complete control in the Administration Mode.
- Designers: Users who will be creating, deploying, and analyzing surveys.
- Respondents: Accounts are for private surveys (surveys which require a user to login before entering data). It is worth noting that at this time this survey package does not provide any way of authentication for the users taking the survey. phpESP currently provides LDAP authentication for the designer accounts only.

Each of the Designers and the Respondents is associated with a group. It is expected that a group will contain members of a similar area. For example there may be a group for a department, or a club, or just for some arbitrary group of people who are working on a similar subject. There may exist an unlimited number of groups.

Conclusion

PhpESP provides a good amount of results analysis, even letting us view results as they arrived in real time. We can choose to view the results of all respondents or drill down to individual responses. Results from multiple surveys can be cross-tabulated to view trends, and results can also be exported as comma-delimited text for use in Excel and other analysis tools.

PhpESP holds up well performancewise, handling close to 1,000 responses in the span of a few hours while running on a fairly modest Intel Corp. Pentium III system with the open-source Apache browser. Moreover, this provides faculty with a powerful survey tool which they can use from anywhere.

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Honeypots: Covert Network Security

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Introduction

The concept of a honeypot is fairly simple, it does nothing. The honeypot exists on a system that is not used by anyone for any purpose. So, if the system has no users other than someone checking logs, then there should be no substantial network activity aside from communication with routers for ARP table entries from time to time. Therefore, any activity on the system is genuinely suspect in nature. Looking at logs of any and all network activity with the non-production system can give an idea to what happened. There is a possibility that some piece of equipment is malfunctioning on the network and accidentally communicates with the honeypot, but that can be easily recognized, traced, and fixed. Any other traffic can be labeled as a malicious activity. Any traffic leaving the honeypot can be a direct indication that the honeypot itself has been compromised and the attacker is using it to possibly stage other attacks. So, you can expect nothing from the system, and anything you get will be directly helpful. This gives us a few advantages with using honeypots. They are simple to build and deploy, they don't require many hours of development and management. The return on investment can be seen easily in the value of the data. Any data collected will be of value to the organization since it will give direct information about the current security procedures and threats. Also, you see it directly and it is clear. With a firewall, you know it's probably deterring some attacks, but it's not really clear the number or breadth of attacks being repelled. With a honeypot you will see exact attacks and what is happening.

All that glitters is not gold though, and there are disadvantages to honeypots. For instance, you can gain a view of your network and its security, but it will be fairly narrow. The honeypot will only capture activity directed at the honeypot and nothing else, although the more honeypots you have on the network, the more probability you will have of capturing possible attacks. With that, though, you have the disadvantage of costs becoming higher and more time in maintaining and monitoring the honeypots. Also, there is a fair amount of risk associated with a honeypot. There is the risk that an attacker could fingerprint the system and decide to retaliate by destroying it and all data the honeypot has collected or other systems on the network. Another risk is that the attacker could compromise the system and use it to launch attacks against other systems in or outside of our organization. Due to these disadvantages, honeypots should not be used to replace other network security tools such as firewalls or intrusion detection systems, but should instead be used in conjunction with these devices to bolster security and allow covert views of activity, like that of a mole in an organization.

Types of Honeypots

Honeypots are rated generally in three categories: low, medium and high interaction. These interaction categories refer to how much interaction the hacker will have with the actual operating system and how much of the operating system is simulated, and will dictate how much risk there is of the attacker being able to take control of the system. Typically, how much information can be gathered from the honeypot will also relate directly to the interaction level.

Most low interaction honeypots will only give some basic information about what the hacker is doing, and the more interaction you give them, the more information you can gather. For instance, a low interaction honeypot will generally have a hands-off approach with hackers. This can be characterized as a port scanner or key monitor. The value of a low interaction honeypot is that it will let you know what ports are being scanned and are at risk on your network. This can be an effective way of tracking script kiddies and worms that are working through the network. A worm can be tracked using a low interaction honeypot by only having to monitor ports on the system and log where the incoming traffic is coming from. With this information we can deduce what type of worm was most likely attacking the honeypot by the port it was scanning, which the port can typically be traced back to a general vulnerability that the worm is looking to exploit. We also know where the worm came from and now know another system on the network that has already been compromised by that worm. We can now fix that system and move on to looking for other systems that are compromised.

Medium levels of interaction with honeypots will give attackers some basic options with the operating system and services that are being used as traps. Using a medium level honeypot, you will generally get more information on your attacker. At this point you can start easily discerning script kiddies from black hats and capturing what they do. You will learn more about what the attacker is doing, because they have a larger ground to work with than with the low interaction honeypots. It is also at this level, that you can start working with customizing your honeypot to appear more like exact types of computers and systems. For instance, you can create an emulation of a web server that has some but not all functionality. This gives you the ability to have more lure for the attacker to stay around while you trace him/her, but the safety of knowing they don't have as many options as they think. You will also have some added risk though. There is a possibility they can break through your barriers and figure out a way to take control of the system anyway.

High interaction honeypots are very challenging to work with. These honeypots give the attacker basically a full system to work with. This will give you the greatest insight to what attackers are doing with your system and captures everything they do. With this, the attacker won't be necessarily warned by features not working correctly and may think it is a standard production machine. There are many difficulties with this however. Creating exact replicas of systems for hackers to break into while maintaining security of the machine and monitoring capabilities can be extremely difficult. Also, there is an even greater risk of the attacker being able to break through the barriers and take control of the machine, at which point they could use it again as a staging ground for attacks on other systems in the organization or outside on the internet.

Generally, these interaction levels are taken into account when deciding what you want to do with your honeypot. If you want a honeypot that has a value in production with the organization, then you would most likely work with a low interaction or medium interaction honeypot. The reason is that these will give an adequate measure of security in prevention and detection of attacks while maintaining a minimal risk to the rest of the organization. These production honeypots will appear to be other production machines within your organization and will prevent attacks that could have been directed to other systems had the honeypot not been there. They will also act as a detection method by letting you know what is roaming around the network. On the other hand, if you want to research hackers and any kind of attack being perpetrated you would want a higher medium interaction honeypot or a high interaction honeypot to get as much as you can out of attacks. With this research honeypot, you can collect data to make generalizations of what to expect from attackers and where they are going. More often, the research honeypots are not used in corporate environments as they usually cost more in time to operate and maintain. Most research honeypots are being used in academic environments or with security companies that want to know what is on the horizon of data security.

For our purposes, we will be looking into customizable honeypot software that can create a low, middle, or high interaction honeypot. Honeyd, the software we will be using in our honeypot, is usually installed on a Unix based system and can emulate any service, nearly any operating system and monitor any port.

Our System

For our Honeypot, we will be using a Compaq Armada E500 with a 1Ghz processor, 256 MB of ram and a 40GB hard drive. This should be more than sufficient for the small amount of software our honeypot will actually be running. I have installed Red Hat Linux 9.0 on it for the operating system. The reason for this is that Honeyd currently only has stable releases for BSD, GNU/Linux and Solaris systems. The computer has been given a static IP address.

Honeyd is a daemon written for Unix based operating systems by Niels Provos. Honeyd will create virtual hosts on a network. In other words, when Honeyd is deployed on a network it can emulate any number of separate computer systems, as well as emulating many different operating systems. It emulates each service based on script sets that are programmed and referenced in the configuration files. The emulation of the operating system and the services are only as detailed as the scripts are written to make them.

Here is an example of one script:

```
create windows
set windows personality “Windows NT 4.0 Server SP5-SP6”
set windows default tcp action reset
set windows default udp action reset
add windows tcp port 80 “perl /etc/honeyd/scripts/iis/main.pl”
add windows tcp port 25 block
add windows tcp port 23 proxy real-server.tracking-hackers.com:23
add windows tcp port 22 proxy $ipsrc:22
set windows uptime 3284460
```

```
#bind specific IP addresses to specific templates
bind 192.168.1.200 windows
```

The example above was one created by Lance Spitzner in his book *Honeypots: Tracking Hackers*. I use this example because it shows a really basic setup for a Honeyd configuration and is easy to learn from. Going line by line in this script, the first will create the template of what you are trying to emulate. In this case, this is creating a template called windows. The next line sets the personality of windows to Windows NT 4.0 Server, specifically the release of service pack 5 and 6. Setting the personality will tell the system how to behave at the IP stack level of the operating system. This is necessary because every operating system operates slightly differently at the IP stack level. Due to this slight difference, a system can be fingerprinted and uniquely identified by looking at the structure of the IP stack. Attackers can use a tool called Nmap, which will scan ports and the IP stack of a target system to determine what services are running and it checks against a database to see what operating system is on the system. Needless to say it would look a little suspect to have a Linux system emulating a Windows service when it is fingerprinted against Nmap, thus alerting the hacker that what they are about to encounter is most likely a honeypot. To counter this, Honeyd uses the same Nmap databases to determine how to structure the IP stack when it is sending and receiving packets. It relates the personality to the Nmap database, and will now interact using the IP stack for a system running Windows NT 4.0 Server instead of one running Red Hat Linux 9.0.

The next lines:

```
set windows default tcp action reset
set windows default udp action reset
```

simply tell Honeyd that when it encounters any tcp or udp connections it will just reset the connection and not allow any access, emulating a closed port. The next line tells Honeyd that any traffic that comes over port 80, the default port for HTTP traffic, will be sent to the script main.pl in the folder for IIS. Main.pl in this case is a perl script that emulates an IIS web server on Windows NT. This gives the hacker a web server that is as functional as the perl script will make it.

The next line will take any packets received going to port 25 and drop them, this emulates a firewall port. The next line tells Honeyd to take all traffic coming to port 23 and redirect it to a server called `real-server.tracking-hackers.com:23`. The server can be any server, it doesn't have to be named, it could just be the IP address of that particular server, and the ":23" will direct the traffic to port 23 on that server. The last add line in the configuration will do another proxy, but this time it will redirect all traffic coming in on port 22 back to the original source of the traffic. In other words, Honeyd will send the exact same packet back to the sending machine on port 22. The last setting in the windows template sets the uptime. A system can look suspicious if it appears to have just come online recently. This setting will tell Honeyd to make the system appear to have been on for 3,284,460 seconds, or 38 days and 21 minutes. If the uptime is not specified, the program will assign a random uptime between 0 and 20 days.

The last two lines in the configuration are a comment and a bind command. The bind will tell Honeyd to take any traffic that is destined for the IP of 192.168.1.200 and use the windows template. Using bind commands in this fashion and many separate templates, a single honeypot with Honeyd can take on thousands of IP addresses, split them up to emulate different operating systems and services for specific IP ranges.

At this point it would be best to describe how Honeyd is able to emulate so many different machines at one time. The set up for how Honeyd interacts with networks and packets is somewhat network specific; there is no one exact way to set it. The method we will be using is termed as blackholing.

In an Ethernet setup, packets of data are sent from the clients, servers and the internet to the routers and switches, which then disperse the packets to their destinations. The Franklin College network is setup a little bit differently. In our network, the clients and servers are all addressed depending on where they are physically located. In this situation, sub-networks are created so that traffic is able to be redirected faster to where it is destined. For example, when a router gets some packets that are being sent to a computer with an IP address starting with 10.23, it will know that they are going to Elsey and route them to the routers in Elsey. Each subnet has the potential of over 64,000 unique IP addresses.

For our honeypot's purposes, Michael Lavengood, Network Security Administrator at Franklin College, and Jim Riggle, Network Administrator, have set up a new subnet in the routing scheme. The subnet they have set up will create the 10.96 network for our honeypot. In this case, what the router will do is simply redirect all traffic destined for an IP address starting with 10.96 into the honeypot running Honeyd. In this sense, we will now have a potential of more than 64,000 virtual hosts all running simultaneously. If all were running at once, it is assumed that Honeyd won't have any issues, as it has been tested by its creator to take on 65,536 in a simulation, though it is doubtful all 64,000 will be hit at one time.

The router has been configured so that the honeypot will never see the internet. The router has been set this way to narrow the scope of what the honeypot sees only to the campus network so we can study just the situation of the network as it is and for legal reasons that will be discussed later. This setup will create a black hole in the network, where no other computers will take up any real existence.

The other common method of setting Honeyd onto a network is very tricky and uses a technique known as ARP Spoofing. Routers store all addressing information into a table called an ARP (Address Resolution Protocol) table. The ARP table basically references IP addresses to MAC (Media Access Control) addresses. In the situation of ARP spoofing, Honeyd will fool the routers ARP tables into letting it take up the entire unused network. This method is used in a situation where there are systems used for production and systems not used for production (honeypots). What Honeyd will do, is use a program called Arpd to keep track of the ARP tables. It will look at the structure of the current ARP table and decide what all IP addresses are available. When traffic comes to the router, it will look to see if the traffic is destined for any of the real entries (actual production systems) in the table. If the packets are meant for an address not in the ARP table, it will send them directly to Honeyd for it to take over and acts like a target production system.

While this method can cover a lot more IP addresses, it is very dangerous and can cause problems with other users getting into the routing table. By not using this system, but creating a

black hole, we will short circuit a long list of potential problems while still catching what we are looking for, wandering probes that can attempt attacks on non-existent machines on a network. With our black hole, the network can now be viewed like Figure 5.

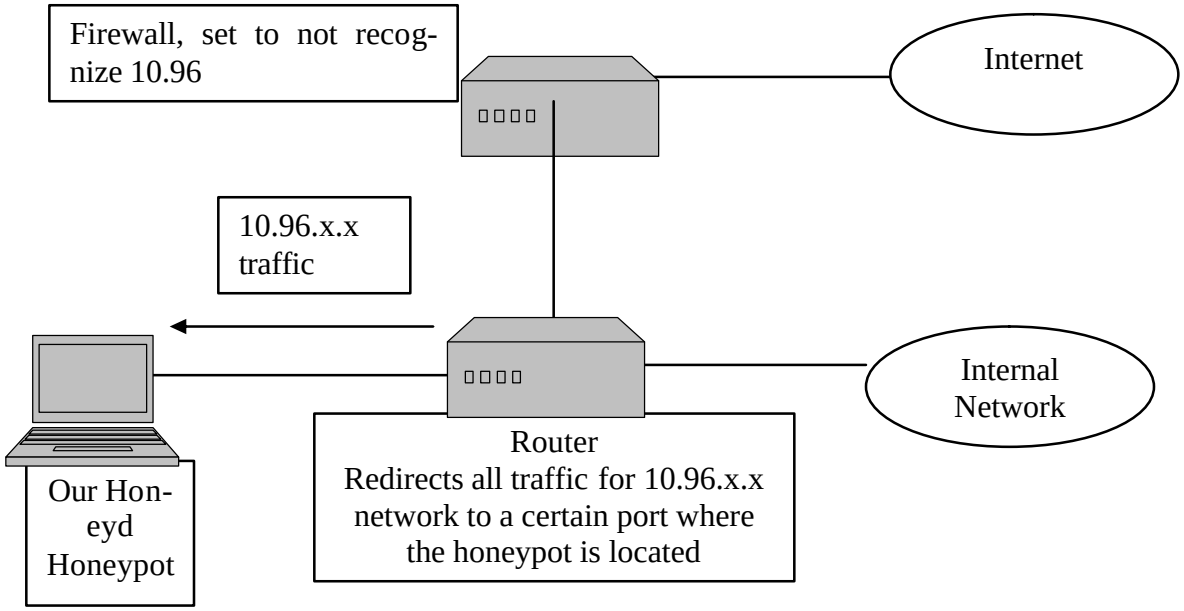

Figure 5: Simple Network Diagram with our Honeypot

This system will now emulate any possible operating system and service we want to program. For our tests, we will be emulating common services that are found on the internet and can become targets of hackers. These services will include a HTTP server, pop3 and SMTP mail services, and Telnet. While Honeyd will help us emulate these services, it won't, however capture the packets or the keystrokes of the attacker. For that purpose we must use a sniffer that will look at and capture all activity with the honeypot. For this, we will most likely use Snort, another open source piece of software that can capture all activity related to clear text-based connections such as FTP, HTTP and Telnet.

An interesting feature about Honeyd is that you don't have to use only one configuration. You can actually split up an entire network over any number of configurations by using the bind commands to tell Honeyd which template to use on what IP address. In our tests, we are setting only a certain number of servers on the initial setup. These will be the addresses from 10.96.2.3 through 10.96.2.23, making 20 servers available with the services listed above. The rest of the 10.96.2 network is going to be set with another template. By naming the template default, it will fill any addresses that Honeyd finds that nothing else is bound to. The default template will look read out:

```
create default
set default personality "Microsoft Windows XP Professional"
set default default tcp action reset
set default default udp action reset
set default default icmp action open
set default uid 32767 gid 32767
add default tcp port  1080 "/honeyd-files/mydoom.pl -l /honeyd-files/mydoom"
add default tcp port  3127 "/honeyd-files/mydoom.pl -l /honeyd-files/mydoom"
```

```
add default tcp port  3128 "/honeyd-files/mydoom.pl -l /honeyd-files/mydoom"
add default tcp port 10080 "/honeyd-files/mydoom.pl -l /honeyd-files/mydoom"
```

This will set the virtual hosts to look like standard Windows XP Professional machines with default actions of resetting connections over tcp and udp, while leaving icmp open. I left icmp open so we can ping the machines and still receive a response. The tcp ports left open are meant to replicate the vulnerability exploited by the myDoom worm. Once a system connects to our honeypot using any of these hosts on these ports, it is sent to a script that logs where the probe came from, what time, and at which virtual host it was directed.

To get Honeyd to install, you must first install three libraries it depends on, libevent, libdnet, and libpcap. These libraries replace some system settings in Linux to make sure packets are transmitted correctly for Honeyd to work. It also requires a perl compiler to get perl scripts to run correctly. A final element necessary in getting Honeyd to run properly is a program called Arpd. Arpd will reconstruct the arp tables the Linux kernel uses to determine what packets it should handle.

Once these are installed and the configuration file created, there are only a few commands to run in terminal. For our first run with Honeyd, we enter `arpd 10.96.2.0/24.` This recreates the arp table to let the system take in any data sent to any IP address on the 10.96.2 network. Next, we need to add a routing reference to tell Linux where to route these packets. By running the command `route –n add –net 10.96.2.0/24 eth0,` we tell Linux to take any data sent to Ethernet adapter 0 on the 10.96.2 network. Next, to start Honeyd, enter the command `honeyd –p /honeyd-files/nmap.prints –f /honeyd-files/honeyd.conf –l /honeylogs –u 00000 –g 00000 10.96.2.0/24.` This will tell Linux to run Honeyd with a certain nmap file, what configuration file to use, where to save the logs, that the user in the process log should be root, and the network to watch. Finally, to start Snort to capture all data coming down the pipe, run the command `snort –de –l /log –c /snort-2.1.1/rules/snort.conf.`

Our Agenda for the Honeypot

We have two main agendas with our honeypot: hackers and virus detection. We're not sure how successful we will be at either of these agendas, as this whole project assumes that there is a threat. The threat that is not as likely, but more hazardous, is hackers. Our honeypot is set to log any and all activity going in and out of it, including keystrokes and remote addresses. We chose to emulate telnet, IIS, and ftp servers because those are ones that traditionally seem to get hacked. It seems doubtful that any network would be full of servers, which is why only 20 have been bound to IP addresses.

As far as virus detection, the other virtual hosts that fill up the network will allow us to view that activity. Our main concern at the moment is the myDoom worm that has been running across networks. All virtual hosts that are not servers are emulating machines that would be vulnerable to the myDoom worm. There is no risk here, since myDoom only affects windows systems and the ports are only open to do one thing: log. When a system connects to the virtual host on any of the ports vulnerable, a script runs that logs the day and time of the probe as well as the virtual host being attacked and the attacking system. This will give us an idea of who on the college network is infected so we can fix the problem before other systems are infected.

Honeypots have an interesting quark when it comes to viruses that spread through worms or auto rooters that depend on vulnerability. They can fix the vulnerability and remove the virus. It's not particularly hard either. All you need to know is the vulnerability, how to fix it, and how to remove the virus. Once you know these, you can write a small script that runs a few programs that will do all of this. Then, find out what ports the vulnerability relies on and set the configuration file of Honeyd so that any time it receives a probe on a port related to that vulnerability, it replies by sending the fix programs and script back to the attacking system through the vulnerable ports. From there, the system will update and fix itself from any future issues. There are some major legal issues at stake here, which we will cover soon.

Legal Issues

There are a number of legal issues concerning honeypots. In his book, *Tracking Hackers*, Lance Spitzner dedicates most of a chapter to discussing these legal issues, and Government Computer News Daily writer William Jackson echoes Spitzner's legal warnings in an article he wrote in 2002. First we should consider a right to privacy. Do people, hackers included, have a right to their data being private? There is no exact legislation over this matter yet, but current laws lean to the concept that any criminal trespass will negate a right to privacy by the intruder. Certainly, an attack on a computer system is a trespass. Does capturing the data about the hackers constitute an illegal search and seizure protected by the 4th amendment? This does not apply since the 4th amendment deals with searches performed by law enforcement. The Electronic Communications Privacy Act makes it illegal to intercept data and disclose it to others. With honeypot operators, however, we are capturing a copy of everything, and the ECPA provides legal groundwork for how to turn that over to the authorities if needed for prosecution, be aware though, there are specially provisions for honeypot operators that are Internet Service Providers.

The Wiretap Act makes it illegal to collect information streaming through systems. The Pen/Trap Statute makes it illegal to monitor the routing and addressing of that data. These two federal laws could make it sticky to operate a legal honeypot, but there are exceptions to the law. One is consent. Most services and systems have login banners when someone accesses the system. If you bury somewhere in that banner an agreement that states by using or accessing the system or even logging in, the user agrees to his activity being monitored, then you can be operating legally. Also, the laws provide for an exception when the monitoring is done to protect the property of the system provider.

The primary legal issue any honeypot operator needs to address is that of liability. The question will arise that if the attacker managed to break through your protections and take control of the honeypot, then does damage to a computer with that honeypot, can you be held liable in a lawsuit for the damages? This can be a very broad topic, especially considering all of the people involved. The natural response would be that the hacker is responsible. What if, however, the courts ruled that by operating a honeypot you invited the hacker in and are therefore responsible for his/her subsequent damage? Also, you have to consider the fact that this could all take place in different areas. The attacker could be in one state, you in another, and the person whom got attacked by your compromised honeypot in yet another. Now you have three sets of state legislation to deal with to decide who is responsible for what. Not to mention if this all takes place in

different countries, then you have federal and state laws in completely different areas to be worried about.

This is the reason why we decided to block our honeypot from the internet and focus only on the internal network issues. We are covered for our liability with student and faculty systems, since everyone agrees to an acceptable use policy before ever logging onto the network. This policy covers our monitoring the traffic into and out of the honeypot. This does not cover us damaging student systems, which is why we aren't activating anything on the honeypot to automatically fix and remove viruses from student computers. There is the remote possibility that something would go wrong, and we would be held accountable for the resulting damage. However, we are legally covered to monitor the information being passed through the network.

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Technophobes Teaching with Technology

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Technology has been used in classroom situations for years now. Traditionally, technology has been used by faculty that were early adopters or who liked the technology. These faculty members would handle the implementation of technology and bring it into the classroom by themselves, with only a small amount of outside support. This evolved into faculty members who were comfortable with technology (but not early adopters) using more and more technology in the classroom with increasing outside support from IT staff and other faculty. What is happening now is that faculty members who are not comfortable with technology, or who are even technophobes, are using technology in increasing ways in the classroom.

Traditional technology users were somewhat easy to support. They would often bring their own equipment and software in, and support themselves. On the rare occasion they would need help, the solution usually came quickly. When the next wave of technology users came along, they were a little harder to support. This group would know what technology they wanted to use, but would not always have the right answers or know the correct ways of using the software. The group of users that are not familiar with technology are usually the hardest to support. Using any type of technology may come as a challenge to the people in this group, and therefore, they don't go out of their way to use technology, or will even avoid it (sometimes at all costs!). This group of users can therefore present many unique challenges.

When a faculty member decides to teach using technology, it can be a challenge for them, even if they are a seasoned technology user. Technology does not always work the way it should, due to various technical and end user problems. These problems are annoying enough when there is only one user involved. When these problems occur during a classroom setting, the problems are compounded. How then, does a faculty member who is NOT comfortable with technology, teach using technology?

There are several key ideas that need to be addressed when dealing with techno phobic faculty. Even if the faculty members aren't truly scared of the technology or averse to it, these guidelines should still be followed. The first key idea is to keep the technology as simple as possible. This seems very obvious at first glance, but it should not be overlooked. The second key idea is to provide ample training and practice using the technology. The last key idea is to be sure to provide adequate and timely support, especially at the beginning of this process.

For this paper and presentation, the focus will be on a particular faculty member, Dr. Svetlana Rakic. Svetlana is an Art Professor, who has written several books over various art topics. Svetlana was comfortable with basic email and Internet usage, but did not have a lot of experience with other software and hardware tools. In this case, she realized that slide images were the way

of the past, and wanted to branch out into digital images for her class presentations. She was unhappy with the poor quality of the slide images, and didn't like carrying around huge slide trays for each class. This situation opened the doors to new opportunities for using technology, but also had some problems associated with it.

There were several main problems that had to be overcome: technology, training, support, and content. In this case, technology was at first thought to be one of the bigger problems. Some of the needed technology was already in place, but other issues would need to be addressed. As it turned out, technology was one of the smallest issues.

In the fall of 2001, Franklin College finished construction on the first new academic building on campus since 1927. The building was designed to house the Fine Arts and English departments. Each classroom was outfitted with projection equipment that could be used to show videos, DVDs, computers, and other video sources. Each classroom has one projector, with the exception of the art classroom, which has two LCD projectors mounted in the room. When the digital image project first started, it was before the Fine Arts building was finished. The idea at the time was to go with software that would show two images on the same screen. Satisfactory software could not be found, and the single projector output wasn't big enough to view the art images in detail. Once the art classroom was finished, this particular problem was solved.

With the completion of the art classroom, there were still problems as to what technology would be used. Once again, software for projecting images was evaluated, without finding a good solution. As a last resort, the images were inserted into PowerPoint. Happily enough, this gave a much higher resolution and better picture quality than other programs.

With the software problem fixed, other problems came into focus. Svetlana has a laptop that could be used for one projector, but how do you display images on the second? This problem was further compounded by the fact that there was only one VGA input from the podium. The second input was in the equipment booth at the back of the classroom. Eventually, an older computer was put in the booth, which had PowerPoint installed on it. With the connection of a wireless mouse, Svetlana was now able to project on both LCD projectors, and was able to advance both slide shows from the podium at the front of the classroom. This solution was fairly simple, yet elegant. Svetlana would be able to project side by side comparisons of images for class, which could then be used to show the images in greater detail.

Training was the next issue to be addressed. Svetlana wasn't a true technophobe, since she wasn't truly scared of the technology. However, she didn't feel comfortable using technology, especially when she first taught with it. This was addressed through practice and training before classes started. Svetlana very quickly caught on to the basics. Once the PowerPoint files were opened, moving through them was very similar to using slide projectors, which was familiar to Svetlana. Turning the equipment on in the room and getting the correct output to the correct screen was a small problem at first, but soon became a familiar process for Svetlana.

Support became one of the bigger issues that needed to be addressed. At the beginning of the first semester using the technology, several issues arose. Svetlana would sometimes forget how to turn on the equipment, or would not remember the process to use the technology. She would

often require quick assistance. Luckily, there is a full time technology support person in the building, so support was close at hand. The support given was done in a manner that coincided with traditionally good customer service practices. There is never a "stupid question", and questions can never be asked too often. Good, friendly, quick, accurate, and timely support was, and is, important.

Other technical issues would occur from time to time, including unreliable VGA connections, and one of the LCD bulbs burning out prematurely. The VGA connection issue was finally resolved by replacing the VGA connection in the floor box with a better connector. Also, both bulbs were replaced simultaneously in the two LCD projectors, to give an even image quality between the two projectors. By correcting these two technical issues, the use of the technology went much more smoothly.

The biggest issue, which is still ongoing, is content. The digital images for these classes came from various sources. At this time, Svetlana has just one of her courses set up to use only digital images. The rest of her classes are in the process of converting over to digital slides. At first, slides were scanned and adjusted through Photoshop to work on the screen. This process is lengthy, and does not always give good quality results, as some of the slides are faded. The files are sometimes supplemented with images found from online sources, but this is an unreliable source, especially since the image quality varies, and the copyright information is often unclear. Acquiring digital images will hopefully be resolved with the usage of ArtSTOR's online database, which Franklin College is in the process of licensing. With this database, Svetlana and the rest of FC would have access to a digital library of over 300,000 images, which can then be used in classes.

When working with faculty who want to teach with technology, there are several key factors that must be addressed. These factors are important for all people using technology, but are especially important for techno phobic faculty. First, the solution should be simple, familiar if possible, and easy to use. In this case, the controls for the equipment are in one place, on the touch screen installed in the podium. This makes it easier to start the equipment and get set up for class. Moving through the digital slides is essentially the same process that was used for analog slides, so it was familiar territory for Svetlana.

The next key factor is training and practice. In this case study, there were multiple training and practice sessions prior to the first class. This helped Svetlana get more familiar with the equipment, without the added stress of an audience that the class provides. She was able to run through a typical class session, and get adjusted to the new controls.

The third key factors are adequate and timely support. When Svetlana first started using the technology, there were constant problems. These ranged from basic user errors ("I don't remember how to start the program", "I can't find the files", etc.) to more severe technical difficulties. The VGA connection that was in the floor box was hard to get to and hard to secure. It was poorly designed, and would not allow a solid connection. Often, the connection would not send a signal, so Svetlana would be unable to project half of the slides, until the cable could be reseated and a good connection made. This problem was fixed by replacing the VGA connection with a better designed input. The other technical issue was that one of the LCD projector bulbs

burned out. This meant that after the bulb was replaced, the output from one projector was much brighter than the second. Manually adjusting the brightness of the bulbs did not fix the issue, so eventually the bulbs were both replaced. Replacing the bulbs were not cheap at $500 a piece, but now the VGA connection and LCD bulbs both work the way they should. Support was important at first, because Svetlana would become nervous if she wasn't able to get everything working immediately. For the first semester, there was a support person that would schedule time to be available during Svetlana's class times, so if any problem arose, it could be dealt with quickly. For the first semester that Svetlana used the technology, she asked for help almost daily, before each class. As the second semester of using the technology started, she was less reliant on support every day, and would only need help on average of once a week. (The bulb and VGA issues were resolved before the second semester of use.) In the third semester of use by Svetlana, she has rarely asked for assistance. When she does ask for support, it is usually for something outside of the bounds of normal issues, not the regular digital slide projection questions.

At first glance, the reasons for using technology in this situation may not be clear. However, there are usually benefits to using technology in the classroom. In Svetlana's case, she was able to stop carrying around physical slides, and no longer had to worry about selecting slides for each class and putting them into the slide trays. Now, she is able to open up the specific PowerPoint file for each class, and then be up and running. The biggest benefit to using digital slides for Svetlana is the quality of the images. To start off, the digital images are much larger, because an LCD projector projects a much larger image than a slide projector. With the LCD projectors, the images are not only larger, they are brighter, clearer, and you can see each image in more detail. Slides will fade over time, as the materials in the slide start to break down from normal use and storage. With the digital images, the quality never degrades. After a class is over, Svetlana can post the slides on Blackboard so that students can look over them for review. As a result, Svetlana is very happy with using technology, even after running into the problems mentioned before. She has become very proficient with the technology, even after some initial apprehension. Svetlana has grown in her comfort level with technology to the point that when issues arise, she prefers to be the person doing the steps to correct the problem, so she is able to learn and fix the problem the next time it arises. She has gone from a person who would balk about touching anything to do with technology, to a technology user that is proficient with the tools she needs, and it actively looking to improve how she uses the tools.

Svetlana's use of technology has been a great success, and has helped her colleagues recognize that technology can be a helpful tool in the classroom, not a "waste of time" or a "toy" that grabs a student's attention. This in turn has helped other faculty start to branch out into technology use. Many times, a simple solution like a wireless remote mouse for PowerPoint, or a small one-on-one session over using Blackboard helps an individual faculty member realize that they too can use technology. By following the key ideas mentioned earlier, the IT department was able to provide a great way to use technology to enable faculty to better teach by using technology.

Driving Strategic Outcomes with E-Learning: Web CT, Your Roadmap to Success

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Abstract

Many institutions facing budget and human resource constraints must also support more students with high expectations for quality. Institutions worldwide are leveraging WebCT Campus Edition, the leading course management system, and WebCT Vista, the industry's premier academic enterprise system, to meet their challenges. Hear real-world examples of how institutions are incorporating innovative learning technologies, supporting diverse student populations, and addressing their unique goals with WebCT.

Note: This session is a software demonstration and no paper will be provided. The presenter has provided copies of his slides and these are included on the following pages

DRIVING STRATEGIC
OUTCOMES WITH E-LEARNING

ASCUE 2004
37th Annual Conference
June 6-10, 2004

Agenda

- Trends in the e-learning market
- Success stories
- Are you ready?

What we're seeing in the e-learning market…

Institutional Challenges

Maintain Institutional Reputation for Excellence

Meet Increasing Student Expectations

Provide Best Possible Tools for Academics

Expand Access and Outreach

Leverage Research Activities

Provide Integrated Environment for Staff

The Current State of E-Learning

According to Gartner Research:

- 73% of institutions have selected a standard CMS[1]
- 38% of institutions have standardized on WebCT[1]
- E-learning is used as a course supplement at 83% of institutions worldwide[2]
- Integration between the CMS and other campus systems is on the rise:
  - SIS integration at over 80% of institutions
  - Library-system integration at 26% of institutions[3]

[1]Gartner Research Note DF-18-8100, "Higher Education Institutions Should Select a Standard CMS," 30 April 2003.
[2]Gartner Research Note COM-20-0839, "Supplement Beats Remote in Higher-Education E-Learning," 19 May 2003.
[3]Gartner Research Note COM-19-9149, "Integration Indicates Higher-Education E-Learning Commitment," 1 May 2003.

Predictions for the Future of E-Learning

Gartner Research predicts that by 2005:

- Academic technology services will supplant ERP as the next major new investment in higher education. [1]
- More than 70% of students will be enrolled in courses that use e-learning[1]
- Supplemental use of e-learning among faculty will rise from 28% to more than 50%[1]
- The amount of digital material delivered per student will quadruple. [1]
- Approximately 50% of e-learning spending will be directed towards best of breed pedagogical and content management tools[2]

[1]Gartner Research Note COM 18-9597, "Higher Education IT Gets Academic," 10 December 2002.
[2]Gartner Research Note COM-20-0839, "Supplement Beats Remote in Higher-Education E-Learning," 19 May 2003.

Planning for the future…

- Develop academic technology plan based on ability of technology to deliver academic value grounded in institutional educational goals.*
- Introduce content management workflow policies*
- Seek out leading-edge institutions and consortia and begin to develop content sharing strategies to keep development and distribution costs down.*
- Institutions must plan for geometric, rather than arithmetic, growth in e-learning system capacity.*

*"Higher Education IT Gets Academic", 12-02, Gartner Research

Value for Faculty

- Develop and deliver learning opportunities easily and efficiently
- Seamlessly incorporate best-of-breed tools into the learning environment
- Create a personalized and flexible environment to improve student learning
- Easily author, re-purpose, and continually improve online content

Value for Students

- Easy access to critical learning resources
- Enhanced communication with academic staff and among each other
- Personalized learning environments to meet individual needs and learning preferences
- Improved academic performance and completion rates

Value for IT Professionals

- Ability to provide a scalable and reliable environment for users
- Ability to ensure systems performance
- Efficient integration with existing campus infrastructure to reduce costs and promote growth

Value for Senior Management

- Serve wider audiences
- Maintain/enhance institutional reputation
- Track, analyze and continuously improve the quality of academic offerings
- Open new revenue streams

Leadership in e-learning is NOT defined by…

- Institution size, type or geography
- Technology alone
- Budget size

Defining leadership in e-learning today

- Vision for the future
- Strategic plan connected to the mission
- Commitment to institutional change
- Sponsorship at all levels

Virtual Learning Environments

Course Management

- Structure is module based, not institution based
- Limited content sharing
- Single branding option

Key Characteristics of an Academic Enterprise System

- Single platform for staff of different functions and experience levels
- Student learning information and tracking
- Selective and controlled sharing of content
- Local ownership with shared administration
- True enterprise architecture for integration reliability and growth

Success Stories Across the Spectrum

Marylhurst University

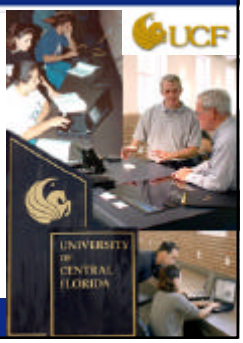
- Mission:
  - "Making innovative post-secondary education accessible to self-directed students of any age"
- Key Goals:
  - Create flexible learning opportunities
  - Reach out to new markets
  - Expand student enrollments
- Result:
  - **91% student retention rate** for online courses, 5 years running!

University of Central Florida

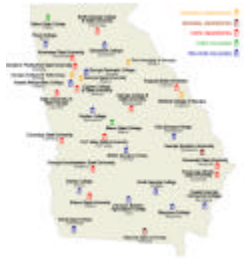
Mission:
- Offer the best undergraduate education available in Florida

Goal:
- Ensure the application of technology to learning improves student performance

Result:
- Student grade ranges increased from 68.9 – 85.1 to 81.6 – 88.5



University System of Georgia



Mission:

- Create an innovative model for resource sharing and usage across multiple institutions

USG – System-wide Results

- Expanded access to learning opportunities
- Increased the reach and quality of programs
- Enhanced accessibility for students of all abilities and learning styles
- Leveraged student performance data to enhance teaching and learning experience
- Improved campus to campus collaboration

Standardization at Purdue University

- Strategic Challenge:
  - Enhance educational experience for faculty and students
  - Sustain rapid growth
  - Create operational efficiencies
- Operational Plan:
  - Implement WebCT Vista as the standard e-learning system for 4 Purdue campuses
  - Centrally support 45,000 students with WebCT Vista

Standardization at Purdue University

IMPACT:

- Consolidate IT, training, and support resources with a central installation of WebCT Vista
- Leverage content across multiple campuses
- Preserve branding and maintain local academic control at each campus
- Develop innovative extensions to the WebCT platform based on faculty needs

Integration of Campus Systems

- 75% of WebCT customers have integrated or plan to integrate WebCT with other campus systems
  – 2003 WebCT Customer Survey
- 80% of institutions currently integrate (half real-time) with their SIS with real-time representing way of future
  – Gartner Research*
- 26% of institutions have integrated with library systems with rising demands for future
  – Gartner Research*

Opportunities:

- Streamline enrollment and grade-reporting
- Improve student services
- Maximize ROI for campus systems

*Gartner Research Note COM-19-9149, "Integration Indicates Higher-Education E-Learning Commitment," 1 May 2003.

Integration at University of Ulster

Strategic Challenge:

- Meet the growing demand for remote access to campus systems
- Increase student usage of library resources

Operational Plan:

- Connect VLE (virtual learning environment) to the University's digital libraries
  - 4i Project: Integrated, Interoperable, Institutional Implementation
- Build off success of previous integration of WebCT with SIS and HR databases

Integration at University of Ulster

IMPACT:

- Allows remote students to conveniently access library resources
  - Effectively pre-authenticates WebCT users to Library systems and resources - users are "ready to go"
- Increases utilization of Library services and resources
- Reduces administrative and helpdesk workloads

Development of Online Degree Programs

- 80% of WebCT customers have at least some percentage of their WebCT courses as "fully online"
  - 2003 WebCT Customer Survey
- 36% of WebCT customers have fully online degree programs
  - 2003 WebCT Customer Survey
- In academic year '01-'02, more than 350,000 students were enrolled in fully online distance learning programs, a figure growing more than 40% annually - ECAR

Opportunities:

- Expand access to non-traditional students
- Create new revenue streams

Online Degree Programs at Tennessee Board of Regents

- Strategic Challenge:
  - Provide education to 78% of Tennessee's population without degrees
- Operational Plan:
  - Development of Regents Online Degree Program (RODP)
    - 5 online degree programs developed by 19 members of TBR

Online Degree Programs at Tennessee Board of Regents

- IMPACT:
  - 62% student retention rate
  - Share courses and best practices across system
  - Enrollment has nearly doubled each year
    - 5,500 enrollments in Spring 2003
  - Generate incremental revenues as a result of the RODP
    - $7 million in academic year '02-'03

Enterprise e-Learning – Innovative Approaches

Single Institution	**Efficiently scale your mission-critical implementation**
ASP Model	**Host your own and other institutions' implementations**
Shared Services	**Collaborate for mutual benefit**
System-wide	**Centrally support multiple installations**

Are you ready?

Calls to action:

- Strategic planning
- Standardization
- Integration
- Development of online programs/degrees


WebCT
www.webct.com
31
WebCT

Streaming Media Seminar – Effective Development and Distribution of Streaming Multimedia in Education

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Introduction

Concisely defined, "streaming media" is moving video and/or audio transmitted over the Internet for immediate viewing/listening by an end user. However, at Saint Francis University's Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA), we approach streaming media from a broader perspective. Our working definition includes a wide range of visual electronic multimedia that can be transmitted across the Internet for viewing in real time or saved as a file for later viewing. While downloading and saving a media file for later play is not, strictly speaking, a form of streaming, we include that method in our discussion of multimedia content used in education.

There are numerous media types and within most, multiple hardware and software platforms used to develop and distribute video and audio content across campus or the Internet. Faster, less expensive and more powerful computers and related tools brings the possibility of content creation, editing and distribution into the hands of the content creators. This offers instructors the opportunity to "roll their own" multimedia content. It is important to learn when that is appropriate, and when content creation and production is best turned over to the experts.

The decisions regarding the types and formats of streaming multimedia content must also consider the technical capabilities of the sender, the receiver, and the network connecting them. The focus of distance education research at CERMUSA is the utilization of appropriate technologies to serve remote and technologically under-served populations. The Saint Francis University campus in Loretto, Pennsylvania, is a bright beacon of broadband in a sea of dialup access. As a result, when developing Internet-delivered multimedia content, the limitations of our end-users must be considered. At the same time, it is important to establish reasonable minimum technological requirements so that distant students can access educational materials in a useful and meaningful manner. Campus Information Technology managers must be cognizant of the increasing use of bandwidth-intensive multimedia content. Course developers must be aware of the capabilities and limitations of the available technology and of end-user computer skills.

Media Types

Three companies, each with their own proprietary streaming format, dominate the traditional video streaming environment:

- Windows Media (Microsoft)
- Quick Time (Apple)
- Real (RealNetworks)

Each of these uses to varying extents, the Moving Picture Experts Group (MPEG)-4 standard as the foundation of their latest formats; and codec developers have made cross-platform playback possible in limited circumstances, making easier the choice of which format(s) to use when producing streaming video content (Microsoft, 2002). In general, Windows Media offers the advantage of a broad user base (every Windows-based) PC or laptop that comes equipped with a version of Windows Media Player. Apple's QuickTime offers perhaps the best overall video and audio quality over both Mac and Windows-based platforms, but also requires additional support at the server level, and has the lowest installed user-base of the three. Real has over the years managed to make the most of limited bandwidth, but the company has pursued an aggressive cost-recovery business model at both the developer and end-user levels. A free version of the Real player is still available, although finding the free version on Real's website can be challenging.

As we broaden the working definition of streaming media to encompass any multimedia delivered over a distance, we begin looking into programs such as Macromedia Flash. While strictly speaking, a Flash object downloads its entire payload before playback begins (although Macromedia plans to eventually release a streaming version). The smaller file sizes and close integration with most browsers results in an end-user experience that looks and feels very much like streaming. Originally designed to accommodate low frame-rate animations, the newest version, Flash MX, is increasingly able to effectively handle large frame-rate video files in limited circumstances, again depending on the transport method and available bandwidth from point of origin to destination(s). These alternatives to "traditional" video/audio streaming will continue to grow in value and usage with the continued improvements in computer hardware and software.

One of the newer additions to the video file menagerie is Material Exchange Format (MXF), developed primarily in response to the conversion to digital transmission by the broadcast television industry. Bruce Devlin, principle research engineer at Snell & Wilcox UK and a member of the standards body, the Society of Motion Picture and Television Engineers (SMPTE), describes MXF as "an open file format targeted at the interchange of audio-visual material with associated data and metadata. It has been designed and implemented with the aim of improving file-based interoperability between servers, workstations, and other content creation devices. These improvements should result in improved workflows and result in more efficient working than is possible with today's mixed and proprietary file formats." The proposed standard is now in final SMPTE review (Devlin, 2002).

The MPEG Consortium is also working on new extensions to the MPEG protocols (MPEG-7 and MPEG-21) which also address these issues.

Creation and Playback Software

Over the past five years, video stream content development and delivery has gone from something that only big media powerhouses did regularly to something that anyone with a reasonably recent computer and some extra cash can do. A big part of this evolution came about due to computer-based non-linear video editors and the capabilities therein. A Non-Linear Editor (NLE) allows video, audio, and other elements of a traditional multimedia production to be handled as separate objects. These objects can be manipulated and moved around within a timeline analogous to moving text around in a word-processing document. NLEs can speed the editing process or, more frequently, allow for better use of post-production time by incorporating video effects, audio/video processing and adjustments, and functions for rendering streaming media.

In the mid 1990s NLE systems required dedicated graphics workstations and were tools available only to the major Hollywood film production companies. Now, consumer-oriented laptops often include a movie editor as part of the basic software bundle. Consumer level editing equipment and software generally does a few things quite well, and may be a reasonable solution for an instructor seeking to create and develop multimedia content. Figure 1 offers a sample of popular consumer-level NLE software packages currently in the marketplace. This list is not inclusive. Companies and computer home brewers are adding products and add-ins daily. Additionally, all of these NLE systems will save the movie that is created into an MPEG file, which is the universally accepted file for conversion into the many different flavors of streaming media. One item of note: many digital video cameras now include software that allows you to input the video, edit with software, and finally, output the edited video to tape or file.

Figure 1
Consumer Level Video Editing Tools

Name of Software:	System Requirements:	Cost:
iMovie	Mac OS X	Bundled with Macintosh systems
Windows Movie Maker	Windows XP	Bundled with many Windows XP systems. Also available as a freeware download
Avid Free DV	Mac OS X 10.3.2 & up Windows XP	Freeware
MuVee autoProducer	Windows 98 & up	$50 to $70
Pinnacle Studio 9	Windows 98 SE & up	$100
Roxio VideoWave 5 Power Edition	Windows 98 SE & up	$100
Sony ScreenBlast Movie Studio 3.0	Windows 98 SE & up	$100
Ulead VideoStudio	Windows 98 & up	$100
Canopus Let'sEDIT	Windows 2000 & up Mac OS 9 & up	$150
Final Cut Express 2	Mac OS X 10.2.5	$300
Adobe Premiere Pro	Windows XP	$700

Professional level systems, not including the video decks and monitors (typically considered a separate purchase), start around $12,000 for a basic turnkey system, including a computer, memory, video/audio inputs and outputs, and media storage for projects. Customization, add-ons, bigger hard disk space, system upgrades, and product upgrades can push a purchase like that above $50,000. Just as we've seen across the technology environment, each year delivers hardware and software improvements and lower (especially per byte) prices.

CERMUSA currently uses a dpsVelocity 8.2 NLE system running on a dual Pentium III system running Windows 2000, with 512 MB of RAM, a 36 GB editing disk (for making graphics, effects, A/V work, and streaming storage), and a 130 GB off-deck media storage. The NLE suite includes a Panasonic DVCPro AJ-D450 Video Tape Recorder (VTR) and an input selector from an A/V routing system that incorporates all video resources within the production facility known as the Distance Learning Prototype Lab (DLPL.) Outputs include both a Serial Digital (SDI) and component into the aforementioned DVCPro VTR, as well as a component output into the video routing system. One of its main uses is the production of streaming media, with encoders for QuickTime, Real, and Windows Media.

The use of a fairly specialized system is a result of the multifunctional capabilities of the DLPL and the wide range of uses for a variety of multimedia across the research and administrative environments of CERMUSA. While some of our needs could be met by any of the NLE packages listed in Figure 1, much of our output consists of highly demanding work that necessitates a professional-grade solution. In addition, our recording format of choice is DVCPro stock, which is a pro-level stock, and the integration of the NLE into our studio makes for the necessity of a professional-grade NLE. That is not to say, however, that we don't use desktop-style programs for streaming. The Clinical Pharmacology courses for which CERMUSA produces streams, is directly recorded live, edited, and converted to streaming files on a studio laptop using Sonic Foundry's SoundForge 6. In the time that it takes for the mid-class break, the preceding lecture can be wrapped with meta-data and posted for student use.

Figure 2
Primary Streaming Formats

Name:	Common Extension(s):	Platform:	Player Cost:
QuickTime	mov, mpg, mpeg	Windows, Mac	Free download; Pro version $25. Bundled on Macs.
Real	rm, ram, mpg	Windows only	$9.95 for the RealOne player. Free version available
Windows Media	wmv, wma, avi, asf, mpg, mpeg	Windows 98 SE & up. Support for Mac OS 10 and higher.	Free. Bundled on Windows PCs

As stated earlier, the principle streaming playback viewers are QuickTime, Real, and Windows Media. Figure 2 breaks down the differences between the three. These players can be

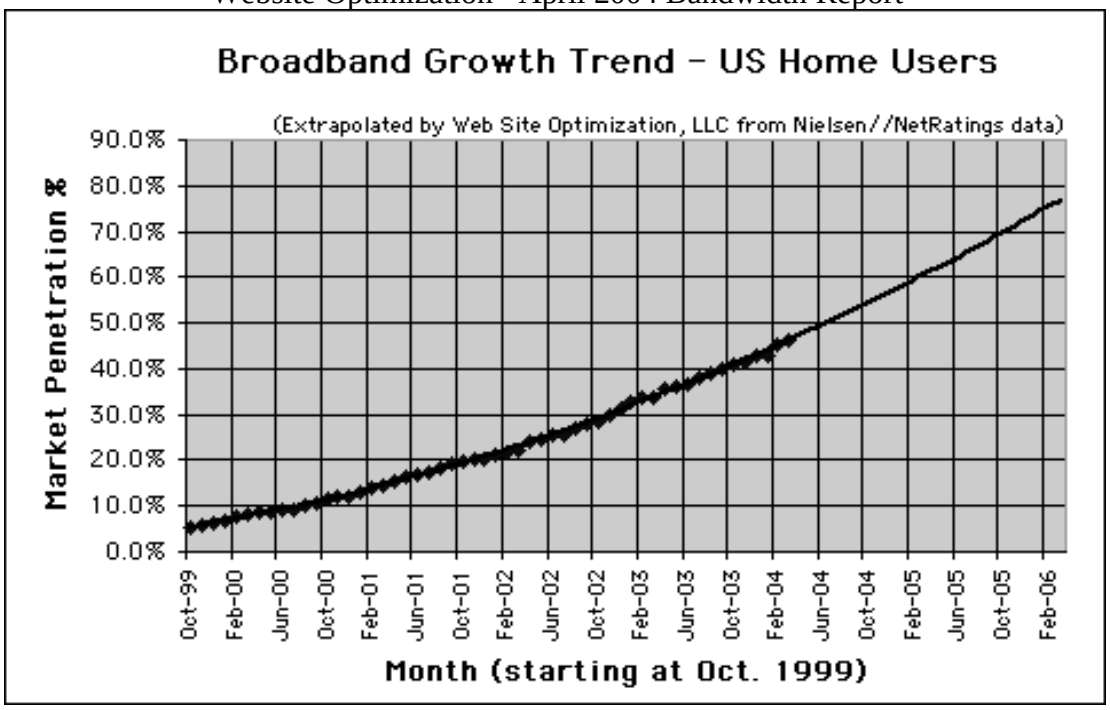
downloaded from the websites listed. Once downloaded, a user can change settings, select defaults, etc., and begin viewing streaming media.

Bandwidth Limitations

As previously mentioned, the effective use of available bandwidth is a primary factor in deciding how to develop streaming multimedia content.

When developing content for streaming, the most important question that must first be answered is "how much bandwidth is available to the end-user?" Our research at CERMUSA has tended to focus on the most rural and remote populations who have no access to broadband technologies. However, broadband access is growing rapidly. The Leichtman Research Group reports in its study, "Broadband Internet Access & Services in the Home 2004," based on a survey of 1,600 households nationwide, that, as of November 2003, 62% of residential households subscribed to an online service at home, and about one-third of this group subscribed to broadband (Leichtman Research Group, (2004). Another new media consulting firm, Website Optimization (WSO), using data from Nielsen/NetRatings and Ipsos-Reid, places broadband penetration in American homes at nearly 46% as of March 2004. As shown in Figure 3, WSO predicts broadband penetration to exceed 50% by July 2004, and reach three-quarters of U.S. homes by the end of 2005.

Figure 3
Website Optimization - April 2004 Bandwidth Report



If your audience is expected to include a significant proportion of the one quarter of Internet-connected homes restricted to (or choosing) narrowband, your streaming options will be accordingly limited (Websiteoptimization.com, 2004).

Applied Streaming Media

When considering "teaching with technology," it is easy to imagine a lecture delivered to a remote campus using interactive television, a multiple-choice test given online, or other cases where new tools are used to enable or enhance existing teaching practices but do not radically change the practices themselves.

However, there is reason to believe that technology is affecting a transformation in teaching and learning, shifting the focus from the teacher to the learner. Technology tends to empower students to direct their own learning, whether it is setting their own pace in an online tutorial, directing their own learning in a fully interactive simulation, or constructing their own knowledge using authoring tools. Technology also encourages decentralized and democratized classes by supporting open discussions, collaborative work, peer reviews, and other communal learning activities (Campbell, p. 24-26, 61).

Such change compels instructors to rethink teaching and learning and examine the educational theories and principles that have long been studied but less often put into practice. Nearly 75 years ago Kurt Lewin discussed the significance of learners playing an active role in discovering knowledge for themselves, of the importance of a cohesive approach to instruction that includes cognitive, affective, and psychomotor activities, and the powerful impact that the social environment of the learner has in supporting change (Stahl, 1999). Yet frequently in distance education courses, students often have a difficult time visualizing concepts and struggle to grasp information that is presented either verbally or in writing. This situation certainly exists in traditional classrooms, but it can become particularly acute in an online environment.

Cognitive research suggests that the addition of multimedia *can* actually improve the learning process if certain methods are employed. By using auditory and visual methods of presenting information, students can process that information more quickly, often fostering an enhanced learning process. Thus, streaming media can play an important role in effective distance education delivery. An excellent example is the Educational Streaming Media Program at Cincinnati Children's Hospital Medical Center where a variety of audio and/or video programs are offered via streaming media. Examples include nursing and pediatric lectures that are worth continuing education credits once the participant completes the online post-test.

A CERMUSA research study was initiated in 2001 into the use of multimedia-rich, web-delivered case studies. This practicum in pharmacology provided physician assistant students a virtual opportunity to ask questions of a simulated patient, diagnose their ailment, and recommend a course of treatment. This was achieved through the development of a web-based interface, seen in Figure 4, containing streaming video clips of the questions and responses that would be typical of a routine medical examination.

Production of the streaming clips is a straight forward process. Taping takes place in CERMUSA's DLPL using a "green screen" in the background to create a virtual medical exam room. During the post-production of each segment, the background of the doctor's office is inserted in this green area (Griffin, 2001, p. 175-180).

Figure 4
Case Study Screen Shot

After editing is complete the segments are encoded as streaming Windows Media files. When encoding anything, one must take into account a number of variables: Will the students access the data at the same time, or will it be spread over time? How much bandwidth is available at any given time, from server to end-user? Which media player format(s) are available to the end-users? What kind of restrictions will the learning institutions place on content being delivered through their networks? Will any of the students connect via dial-up? The answers to these questions would determine the various encoding processes.

The ultimate goal of encoding streaming media is to have the most number of people be able access the highest quality video or audio possible. Using these parameters and the above questions, we developed a plan for the encoding of video. At the beginning of this project, each clip was encoded at three bandwidth levels, 28 Kbps, 56 Kbps, and 100 Kbps. Doing so allows for a range of connection speeds and accommodates a range of Internet and local network traffic conditions. It soon became apparent that the lowest setting, 28 Kbps provided inadequate image quality, and it was eliminated from the encoding mix.

Other factors that contribute to the overall viewing quality of a streaming file include optimizing for smoother motion or for sharper pictures quality and frame rate. Standard television video in North America contains 30 frames per second (fps.) Streaming video seen on the Internet ranges from only a few fps, up to 30 fps, with 12 to 15 fps being the most commonly seen rates. The process is a matter of compromise, balancing file size against quality. Higher frame rates result in larger file sizes and require additional bandwidth. The pharmacology case study files were encoded at no lower than 15 fps.

In order to compress and decompress the video files, the encoding software makes use of key frames. They can be looked upon as "anchors" or reference points in a video stream. When users fast forward or rewind to selected portions of a video file, they are actually jumping across key frames. Key frames contain far more information than do regular frames and so, an increase in key frames will result in larger file sizes. For this project, the lowest bandwidth files were encoded with one key frame every eight seconds, while the higher quality files contained a key frame every five seconds.

Figure 5
Window Size Comparison

Picture size is a key factor in determining file size. This is measured width by height in pixels, thus a 320 by 240 image is 320 pixels wide by 240 tall. As Figure 5 illustrates, the smaller dimensions result in less information having to be saved, and therefore reducing the overall file size. For the case study project, video clips are encoded at 240 by 180, providing a useful window size within the overall case study web interface.

Internet 2

To this point we have centered on how best to cope with bandwidth limitations. Virtually the opposite is true when considering use of Internet2 for delivery of high quality video content. Internet2 is a consortium led by more than 200 universities working in partnership with industry and government to develop and deploy advanced network applications and technologies, with a focus on bandwidth-intensive applications such as high quality, full motion video, 3-D modeling, and the like (About Us).

If the traditional Internet is described as an information freeway, Internet2 is a toll road. While access is limited, it should be remembered that the original Internet had similar beginnings as a limited access network connecting research institutions and the U.S. Department of Defense.

The lesson to be taken from the emergence of this new communication channel is the continuing evolution in our ability to send and receive bandwidth intensive content. At the same time, we

must remain cognizant of the limitations forced upon or chosen by some of our constituents by virtue of their location in relation to the information infrastructure.

Conclusion

In the end, the decision on whether or how to incorporate streaming video or other multimedia into course content contains both technological and pedagogical dimensions. While on the one hand, it is becoming much easier for the average person of modest technological talents to create useful streaming content, to be useful, the consumers at the far end of the information pipeline must be able (and willing) to make use of that content. To that end, we see a generation of students who are increasingly comfortable at the keyboard, navigating the Internet as easily as they stroll through the local mall on a Friday night. They are the ones driving the increasing demand for bandwidth for both recreational and educational purposes. Conversely, non-traditional students make up a growing proportion of higher education's consumers, creating a growing need for nontraditional distribution methods to accommodate their busy schedules. Streaming media and other forms of bandwidth-intensive content will play an increasing role in serving their needs.

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Reconceiving the IT Organization: Survival of the Fittest

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Abstract

How many times have you been asked to consider downsizing, had your budget frozen or to consider the implementation of technologies or tasks that have requirements beyond the size, skills and abilities of your staff? The IT manager faces a continuous stream of uphill challenges as he or she tries to balance the demands of an informed user community, ambitious leadership, admissions officers looking for a competitive edge and parents who demand every new bell and whistle for their student all under the watchful eye of stressed out institutional budget mangers. In order to survive and prosper, the higher education IT organization needs to constantly assess the scope, manner and range of services that it provides to the community in order to consider whether functional and structural adjustments are necessary to respond to current technical, cultural and fiscal pressures. This paper will discuss the drivers of these pressures and offer a practical method of functional analysis and organizational structural review to ensure that the information resource manager can make clear and considerate choices in response to the evolving needs of their communities.

Note: This paper was not available when the proceedings went to print. The author will provide more printed material at the session or make it available via the web.

Progress Report - Microsoft Office 2003
Lynchburg College Tutorials

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Abstract

Progress Report – Update on the Microsoft Tutorials

For the past several years Lynchburg College has developed Microsoft tutorials for use with academic classes and faculty, student and staff training. The tutorials are now used internationally. Last year Microsoft and Verizon sponsored a tutorial web site at **http://www.officetutorials.com**.

This website recognizes ASCUE members for their wonderful efforts in spreading the tutorials throughout higher and K-12 education. Because of this effort, the tutorials became a 2003 Microsoft Model Professional Development Award recipient. Since our last meeting, the Office 2003 tutorials have been created, and are available, through the website. One of our ASCUE members, Bernadette Ortiz-Brewster, is translating the tutorials into Spanish. Karen Fraser of Hendrix College, Arkansas is MACing the tutorials. Several other ASCUE members have also published tutorials, from their institutions, on this website. Currently, a Microsoft Producer tutorial is being created. As this is being written, the tutorials are being considered by the National Forum on Information Literacy, the Department of the Navy Information Literacy Toolkit, the Virginia Department of Education, and the Teaching, Learning, Technology Roundtable. This presentation will furnish an update on all of these initiatives, as well as some others, which are "unfolding" at this time.

Introduction

In the early 1990's software tutorials were expensive and not specifically designed for academic use. At Lynchburg College the decision was made to develop specific, general use tutorials that covered the "most used" aspects of each Microsoft Office application - except Microsoft Word. The initial Microsoft Office 95 tutorials were created in 1995.

Since then, Office 97, 98, 2000, XP/2002 and 2003 tutorials have been introduced.

Since many groups have still not migrated to Office XP/2002 or 2003, this paper will be written for this audience.

A Quick Word About Windows XP and Office 2003 Backup Files

For many years, users of Microsoft Office/Windows have been "promised" that the software will make easy to retrieve "backups" available when there is a system failure. To date, the only "automatic" backups were in Microsoft Word, and the save prompts in Microsoft Publisher. Window 95, 98 and 2000 had the temporary file feature available for system failures. However, it was often difficult to determine which "temporary" files were available, since all of the files utilized the .tmp extension. In Office XP/2002 and 2003 this dilemma was solved. When a system fails, Office 2003 applications, like their predecessor XP/2002 applications, are automatically saved. When next accessed, the Task Pane automatically displays a recovered file area on the left or right side of the screen. Eighty simulated "crashes" were created. When the applications were again accessed, "crashed files" were recovered 100 % of the time.

General Overview of Office 2003 – Task Panes

Users will notice, when browsing through the various applications in Office 2003, that the Task Panes, added to Office XP/2002, are still in each application. When a user selects certain features such as Searches, Text Formatting, Graphics, Templates, etc., a special "Task Pane" appears on the right or left side of the screen. These Task Panes, logically, vary from application to application. It takes awhile to get used to them but, once mastered, they are a very efficient method to enhance the features of the application in which you are working. We'll cover certain Task Panes for individual applications later in this paper.

Graphics

In Office 2000, the graphics were enhanced for the more graphic Office applications: PowerPoint, Publisher and FrontPage. Each of these applications took advantage of a new Clip Art Gallery that had significantly expanded features, images and sounds. Office 97/98 clip art contained only static graphic images. Clip Art Gallery XP/2002 retained the static clip art, but also included high quality photographic images, a sound gallery and animated images that were a part of Office 2000 Gallery.

When you imported clips in Office XP/2002 you noticed another new feature. In any application where you downloaded Clips Online, the Clip Organizer appeared. You observed a button at the bottom of the Clip Art Task Pane that allowed you utilize your Clip Organizer whenever you accessed a clip art image.

This has all been retained in Office 2003 – except that the Design Gallery has been expanded to the new Microsoft Office Clip Art Online. The extended collection still goes into the Clip Organizer, and it's still curious how the organizer determines into which folder to place the clips. This is covered for each application in its tutorial.

Outlook 2003

As all of the various computer magazines reported, Outlook 2003 is **THE** application of this release. To begin, the visual choices for display have improved significantly. You can organize

your Inbox, Sent Items, and various folders to be viewed in just about any way you desire, with the graphics and Reading Pane features.

The old Outlook bar on the left is replaced by a more visual combination of the old bar and the folder list – combining the best features of both. You can further edit this "Mail" bar as you desire. Having the new Mail bar on the left, the Inbox in a column down the center and a reading pane on the right is really productive.

The Contact screen has also been considerably enhanced. If you have a digital image of a contact, you can view this when that Contact screen is open.

As you are entering e-mail address into a message, Outlook 2003 will remember those addresses you most frequently use. As soon as you begin an address, a list will appear and you can choose from it.

The Calendar is also enhanced a bit. You can now color code your meetings to a scheme that you find appealing.

There are also six different colored flags that you can use to prioritize your messages. This comes in very handy with the enhanced message grouping features. There are now 13 standard groupings available, and you can customize your own groupings, if these are not sufficient.

A Word About Word 2003

While there have not been any Word tutorials to date, a comment about Smart Tags is appropriate in this paper. Word XP and 2003 have this new feature. When Word XP/2003 "sees" a proper name, it assumes that the author of the document desires to have a Smart Tag attached to the name. A dotted, purple underline will appear under the proper name and a small box with an "i" will appear above the name. When you click-on this box, a drop down menu will appear that allows you to use Microsoft Outlook Mail features like Send Mail, Schedule a Meeting, Open a Contact, etc. This has been further enhanced in Word 2003.

In addition, in both Word XP and 2003 have the Reveal Formatting feature – like the WordPerfect Reveal Codes – which has been further enhanced in 2003. You are now able, in English, to enhance your formatting fairly easily. When you highlight or click a section of the Word document, all of its formatting appears in the Reveal Formatting Task Pane.

Powerpoint 2003

Probably the greatest enhancement in PowerPoint 2003 (opinion of author) is that the old Pack and Go for PowerPoint files has been replaced by Package for CD. This is a really great feature. When you use it, it places "everything" for your PowerPoint presentation in a folder which can then be copied onto a CD. Not only does it place everything in the PowerPoint presentation in the folder, it also creates a PowerPoint viewer as well. So, on your CD you are safe to go anywhere - as you take both the Viewer and PowerPoint with you. We have taken any number of

"old" PowerPoint presentations, opened them in PowerPoint 2003 and then put them on CD's. Response has been wonderful to date – and it appears foolproof.

Many of the features of PowerPoint 2003 are very similar to those in XP. If you are still using PowerPoint 2000, this is probably the application in which you will immediately notice the most significant changes.

The first thing you'll notice is the screen layout. On the left you will see the "old" small slide view that was common in the "old" Normal View. There are now only three "view buttons" at the bottom left corner of the screen in PowerPoint 2003 – Normal View, Slide Sorter View and Slide Show. The new Normal View has the small slide images on the left, Speaker Notes at the bottom, and a Task Pane on the right (when a Task Pane is active).

As soon as you begin creating your slide show you will notice that a Slide Design Task Pane appears on the right side of the screen. As you insert clip art and utilize Custom Animation, the Task Pane will change to these features. As you "accumulate" Task Panes, you will be able to move back and forth between Task Panes. You will also notice that when you are in Normal View, and using Custom Animation on your text and images, that each line of text or image which you animate, has a numerical marker by it. If you click-on a marker, the associated Task Pane will appear to assist you. No longer will you see the "old" PowerPoint menu screens that you did in the past. Everything is replaced by Task Panes.

Another significant enhancement is the fact that, if you choose, you may apply a different Design Template to each slide. In "old" PowerPoint this was a "tricky" undertaking. As with PowerPoint 2000, you can still access additional Design Templates through the Microsoft PowerPoint web site.

In PowerPoint 2003 you may have an object, text, or just about anything, move around your slide. This is called a Motion Path. The object will move around the screen, wherever you trace your path – at a speed you determine – and with sound if you desire. Wherever you move your mouse, the object will move. The PowerPoint 2003 tutorial explains this feature in detail. You will also notice that text transitions have been significantly enhanced as well. There are now many new "nifty" text transitions.

Publisher 2003

As indicated earlier, you will notice that Publisher 2003, like 2002, is more graphically oriented than the previous version. As soon as you select a publication style from the New Publication Task Pane, you will see that the Publication Wizard has been replaced by a graphical Publication Task Pane that appears on the left side of the screen. Instead of selecting individual Wizard "steps," you will select graphic objects which furnish a "thumbnail" preview of each selection.

The Publisher Task Pane will change each time you select a new task – just as with the other applications.

Those who send their Publisher publications to commercial printing companies will notice that the commercial publication features are also enhanced. When the Publisher 2000 tutorial was first created, there was a help feature which assisted in finding a commercial printing establishment in your area. That has now been replaced by a Microsoft Certified Commercial Printer system. Many commercial printers have now been certified by this system and accept Publisher files as they are presented to them.

Frontpage 2003

Again, FrontPage 2003 is very similar to the 2002 version. There are several new features that enhance the 2003 version.

You are now able, in the Design screen, to split the screen so that you can not only see the web page as it would appear on a browser, but also see the code for the web page at the same time. At the bottom of the view there are now two buttons – Design and Split. So, for folks that are into html coding, this is really handy. Wherever you click, in Design or Code areas, it will mirror in the other half of the screen. Really handy when you need it.

You can also place construction grid lines in your Design view to assist as need be. The grid can be scaled to a very fine or open grid.

Another two features are Code Snippets and IntelliSense. These are made for html folks. You can create a "dictionary" of your most often used html code lines (snippets), and place them in a Snippet Dictionary for use at any time a code screen is being used. IntelliSense is like the Auto Correct feature in Microsoft Word. By entering IntelliSense in the Microsoft FrontPage 2003 Help search, you will get a long list of ideas on how to use IntelliSense to complete HTML coding tasks that you use everyday.

There are also enhanced table features which come in very handy. Much like frames, you can create custom tables in your web page with this new feature.

FrontPage 2003 retains the "tabs" at the top of the web site pages that make moving from page to page, in the web site, much easier. You no longer have to use the Window-select the web page, Folder List, nor the Navigation feature to move between pages. Simply click the tab and the page appears.

In addition, the Frames, Tables, Navigation and Shared Borders features are also enhanced. These enhancements are included in the tutorial.

Excel 2003

There are not a significant number of enhancements to the non-graphic applications. Pivot Tables are becoming more popular and are enhanced in Excel 2003.

The Excel 2003 tutorial is also expanded with additional images and text to make the tutorial more easily understood. Many have requested additional images and instructions in a number of areas. These are included in this edition.

Access 2003

There is one huge change in Access 2003- file saving features. In Access 2003, as in Access XP, you are truly able to open and save database files to and from earlier versions of Access. Using the Import/Export feature in Access XP/2002 and 2003 you are able to import and export individual databases, tables, queries and reports from Access 2003 to the 95/97, 2000, and XP versions, as well as to import these same functions.

The major enhancements added to the Access 2003 tutorial are an integral part of this "edition." In addition, the new Saving, Import and Export features are also covered.

File Structure

All of the Office applications (Word, Excel, PowerPoint, Publisher, FrontPage, and now Access) use the same file structure as their predecessors. So, you may "go back and forth" from 2003 to 95/97/98/2000/XP/2002. Some of the PowerPoint enhancements may not be available if you save to an earlier version of PowerPoint.

Conclusions

As indicated above, the graphic oriented applications (PowerPoint, Publisher, FrontPage) evidenced the major changes from previous versions. The enhanced graphics are much better. Also, the commonality and availability of the Task Panes assist the user significantly.

The Office 2003 tutorials are greatly expanded to include additional instruction in areas that users have requested.

All of the Lynchburg College-Microsoft tutorials (Office 97/98/2000/XP/2002/2003) can be downloaded from:

http://www.officetutorials.com

The tutorials have become popular internationally. We have created a CD, which includes of all 30 tutorials in Microsoft Word (English) - available at no cost to those who desire a copy. Simply contact me at one of the addresses on the first page of this paper if you desire a CD.

UPDATE! The Impact of Becoming a Laptop Teacher Preparation Program on the Performance of Preservice Teachers

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Abstract

The Education Program at Pikeville College became a laptop driven program in the academic year 2000-2001. Students receive laptops when they are admitted to the education program and keep them if they remain in good standing during their matriculation at Pikeville College. At the present time, five classes have received laptops and are involved in this unique program.

Note: This paper was not available when the proceedings went to print. The authors will provide more printed material at the session or make it available via the web.

DVD Portfolios as a Strategic Career Move

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While completing my doctorate in music education, part of my workload as a graduate assistant included observing student teachers. One of the requirements of the Education College was for each student teacher to create a digital portfolio of his or her work. The students were to author web pages containing examples of their work in the classroom, their teaching philosophy, a short bio, and a resume. Unfortunately, very few of the students had the skill or experience to author web pages. While there was a "Portfolio Boot Camp" that each of the students was to attend, in which they were given a crash course on using *Dreamweaver,* the limited experience combined with the student teachers' limited schedules allowed very few of the students to ever get past an index page, much less to the point of having a viable product that any future employer could look at.

I wondered if there was a better way to create a digital record of student work that could be easily accessed by future employers? This paper will attempt to answer this question and propose a new option for the digital student teaching portfolio that overcomes many of the challenges inherent in Internet portfolios.

Why Portfolios?

Over the past two decades, there has been an increased interest in measurement and assessment throughout the educational establishment. Authors and instructors have focused attention on the measuring of achievement through various assessments, including performance-based assessments, observational techniques, peer appraisal and self-evaluation. One of the outgrowths of this interest has been the portfolio. A portfolio of student work was traditionally a compilation of various assignments, evaluations and artifacts that represented the work of that student. For university students completing a student teaching experience, the portfolio became a valuable tool to show future employers more about themselves and their experience than they could easily communicate in a standard resume. By the mid 1990s, most universities with teacher education programs were requiring their students to produce a student teaching portfolio.

I remember the first time I saw a student teaching portfolio. I was teaching choral and general music at Horizon Middle School in Kissimmee, Florida. As a member of the faculty, I had been asked to sit on a hiring committee that considered future teachers for employment in the coming school year. A candidate came to the committee with the usual cover letter, resume, and references. After the initial introduction, the candidate lifted a large three-ring binder onto the table and said that this was his student teaching portfolio. The binder contained hundreds of pages documenting everything the candidate had ever done related to teaching. There were lesson plans, examples of student work, copies of quizzes and exams given, etc. I remember that the

committee passed around the notebook and each member thumbed through a couple of the pages, but most of us didn't know what to make of the book. While it demonstrated that the candidate had spent considerable time compiling the various documents for the portfolio, the paper documents didn't answer the only question that was on all of our minds, "Can you really teach?".

Gone Digital

As technology has progressed, there has been a natural desire to digitize the student teaching portfolio. A digital portfolio generally consists of an Internet site or web page where documents and files are posted. The digital portfolio can present all the information contained in a paper portfolio, but it offers one major advantage: the potential to include video clips of the teacher in the classroom. If a picture is worth a thousand words, than being able to show a future principal or school administrator how you teach in the classroom is priceless. A future teacher's biggest and best selling point is their ability to teach and interact in the classroom, and digital portfolios allow future employers to observe this.

However, digital portfolios posted on the Internet have some serious limitations. First and foremost is the issue I observed as a graduate assistant: most students do not have the skill to create their own web pages. Although the software applications for web authoring continue to become more user-friendly with less-steep learning curves, I feel that this is still the major limiting factor for most student teachers. Once they compile the documents, artifacts and video clips for their portfolios, they are not able to put them on the Internet. Additionally, most universities only allow a small amount of web space for students to post their web pages. Even if students are able to create the pages, they rarely have enough space allotted to them to be able to include video clips of any significant length.

Because of these limitations, some university education programs have subscribed to services that enable students to create and post portfolios on the Internet. Some of these services provide templates that are easier for students to use, however the university pays the costs only until the student graduates. After graduation students often have to pay monthly subscription rates to keep their web portfolios active.

Computer learning systems have been used by some to post web portfolios. These include Blackboard, WebCT and TWIST, among others. These systems are used by many university professors and students already, and posting information and files is quite easily accomplished on these platforms. However, access to the programs is usually limited to the university community that purchases them, and a student teacher's future employers are not able to secure passwords and user IDs to login and view the student's portfolio.

A Solution

This past fall, I began working with my student teachers to create digital portfolios on DVD. I ordered a DVD burner for my office computer, and after having learned about Vegas video editing software at last year's ASCUE conference, I purchased the Vegas + DVD software bundle. My students and I quickly learned to use the software and by the end of the semester, we were using my office computer to create professional-looking DVDs.

Digital student teaching portfolios have many advantages over web-based portfolios. First, the DVD is compact and portable. It can be easily carried to any interview or mailed to a prospective employer. Second, the DVD can hold an enormous amount of data. With a capacity of 4.6 GB, and a potential of four hours of video, there is plenty of room for video clips, audio files, resumes, pictures, etc. Third, anyone with a DVD player can access the portfolio. Most schools have at least one DVD player, and many new computers do as well. Even if a school is woefully behind the times, nearly everyone has a DVD player in their home. Last, the DVD architect software is easy to learn and to use. Student can simply select from preset themes, drop video files into menus, and create submenus and bookmarks (see Figures 1-3). Students with more computer experience or interest can explore numerous plug-ins, create their own themes, and add audio and animated video thumbnails.

Way of the Future?

For several years, education professors, career placement centers and technology specialists have worked together as they attempt to digitize the student teacher portfolio. However, it has been difficult to find a viable medium through which these portfolios can easily and efficiently be created, organized, and presented to future employers. The DVD portfolio created with DVD architect offers a solution that is easy to distribute, easy to create, inexpensive to duplicate, and capable of storing and presenting a great deal of information. Additionally, DVD players, copiers, and burners will likely continue to be more readily available and less expensive, making this format an even more logical choice. Student teachers who present their future employers with DVD portfolios will have a strong advantage in the job search. Not only will they demonstrate their technological skills, but they will also allow their future employers to see their outstanding teaching – the most important message they can deliver.

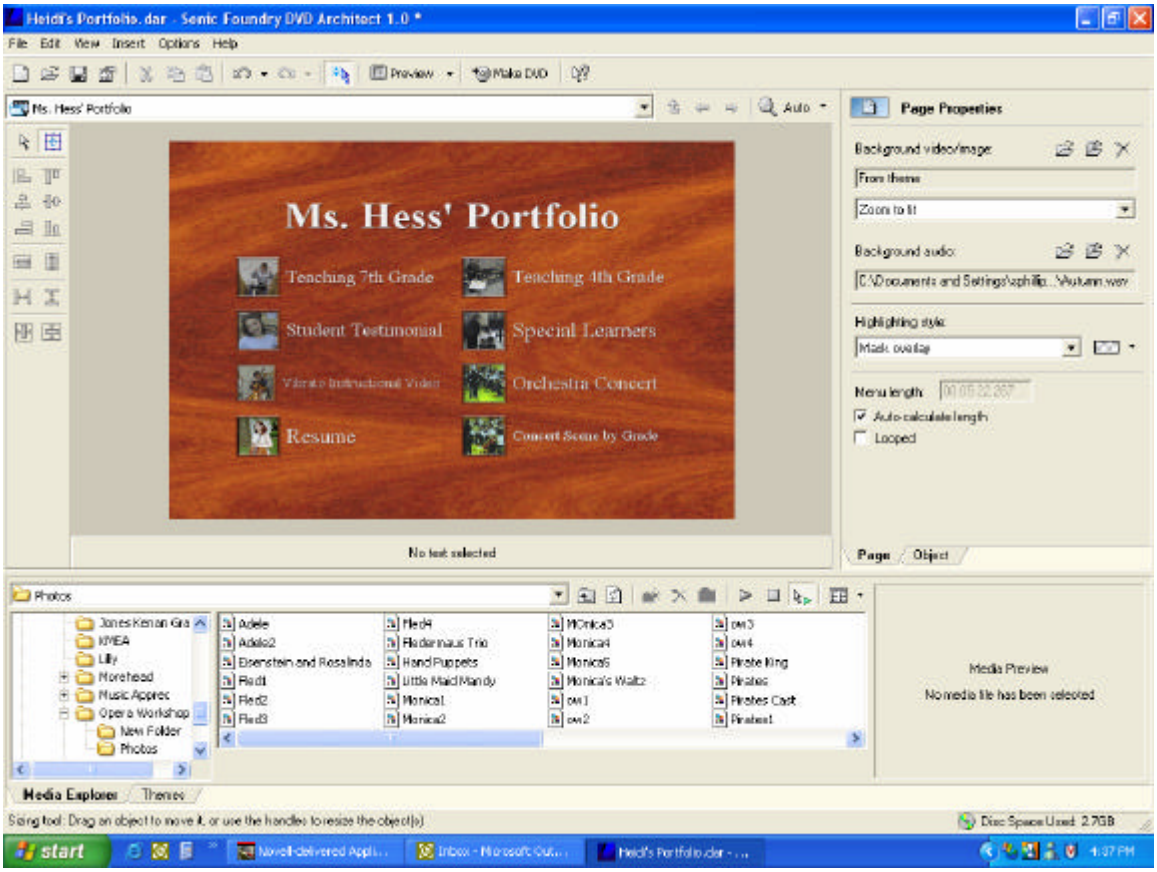

Figure 1. Theme Selection Menu in DVD Architect

Figure 2. Main Menu Page of a Student Teaching Portfolio, as Previewed in DVD Architect

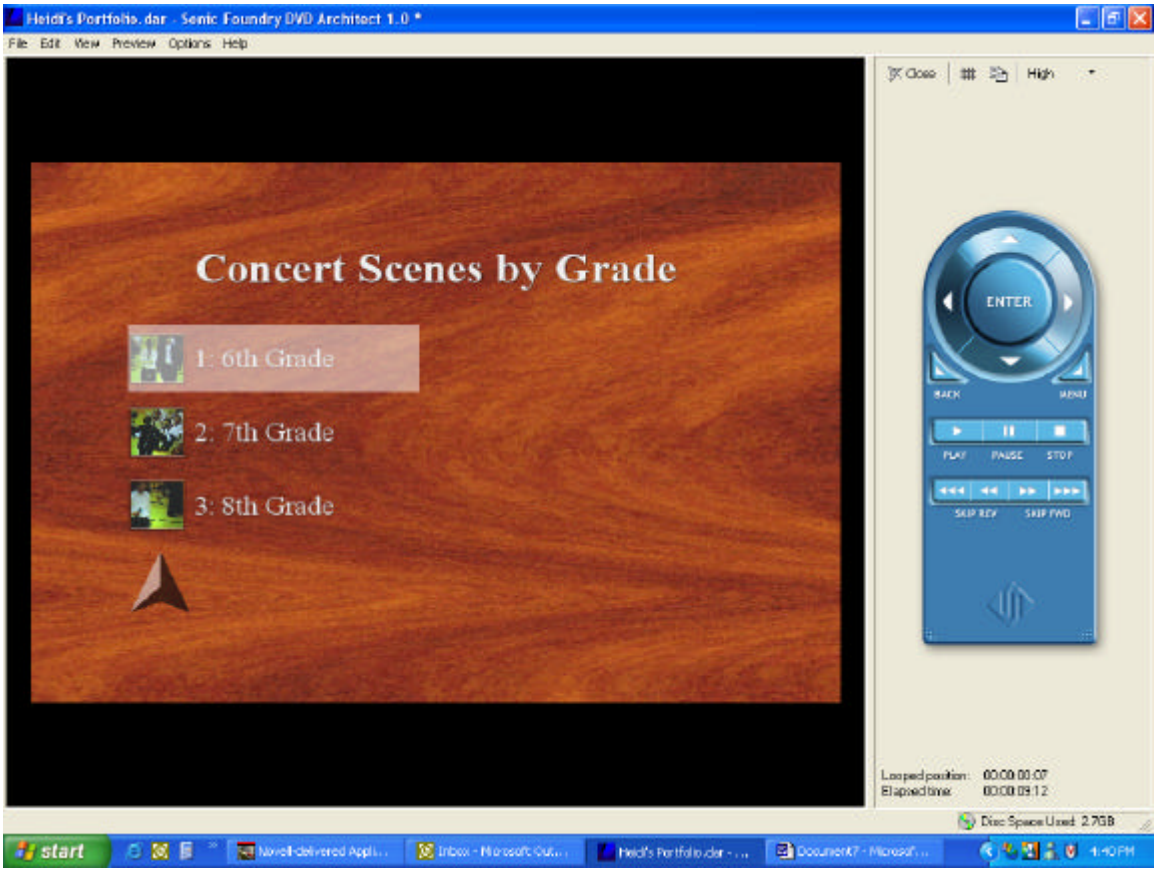

Figure 3. Scene Selection Menu Created in DVD Architect

The Potential Impact of Offshore Outsourcing on Information Systems Education Programs

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Introduction

As recently as the 1999-2000 academic year, the most sought after graduates were those completing degree requirements in a wide variety of information systems based programs. Many graduates were enticed by lucrative signing bonuses as organizations prepared for the dreaded uncertainty of Y2K. Information systems and computer science programs and courses were in great demand as most students wanted to demonstrate that they had developed significant competency in using computers and understanding the value of information systems.

Now, four short years later, many information systems professionals are unemployed, and many others are fearful of losing their well-compensated positions to outsourcing initiatives. Particularly distressing is the fact that many of these outsourcing initiatives are offshore. The dislocation of information systems related employment opportunities in the United States is becoming significant. Chief Information Officers in companies across the country are beginning to realize the magnitude of the potential loss of talent, knowledge, and performance. The U.S. Department of Labor projects that by 2010, nearly 300,000 computer-related jobs will be lost to offshore initiatives.

This paper will examine the impact of today's offshore outsourcing movement. It will also include a discussion of the potential impact on our education programs as a result of a decreased number of entry level career opportunities and a commensurate decline in interest in information systems education.

The Outsourcing Movement

Previously, when the term outsourcing was used, we interpreted it as meaning that an agreement had been reached with an outsourcing organization in the region. Job opportunities stayed in the region and in the U.S. However, the current trend is to outsource jobs to offshore service providers. The jobs currently being outsourced go beyond application development and maintenance. Business processes such as claims processing, financial analysis and even U.S. tax return preparation are now being outsourced Herera (2003) and Thibodeau (2003). An Indian IT services giant, Wipro lists about 350 clients, about 70 percent Fortune 1,000 companies (Herera).

The chart of salary comparisons below reveals one of the primary reasons for the movement to offshore providers (Herera).

	U.S.A.	India
Engineer	$90,000	$23,000
Software Developers	$50-75,000	$7-10,000
Call Center Agents	$23-32,000	$2,300-3,200

U.S. companies need to remain competitive in the world market, and offshore outsourcing currently offers feasible combinations of cost and service. Offshore vendors offer quality methodologies such as Software Capability Maturity Model (CMM), People CMM and ISO 9000, capabilities that most U.S. organizations lack on an in-house basis (Morello, 2003). A recent survey conducted by the National Retail Federation (NRF) revealed that 26% of 57 retail executives polled are making offshore outsourcing a strategic initiative for 2004 (Sliwa, 2004). Although Sears is undertaking an outsourcing initiative that will impact 270 of its 1,160 IT staff, it will continue to have U.S.-based project managers, architects, developers, business analysts and testers (Sliwa). Furlonger et. al. caution that because of the wide cost differential for services ($100 per hour in the U.S. typically equates to $20 in India) an A.T. Kearney study predicts 500,000 financial services jobs in the U.S. are at risk for offshore outsourcing through 2008. Thus, the outsourcing movement goes beyond IT.

In a recent Computerworld article, Bart Perkins (2003) contended that offshore outsourcing is here to stay, but issued the following set of questions that should be explored before making an offshore commitment:

- Which cost/service trade-offs are you willing to make?
- How much risk can your company tolerate?
- How will you make decisions and resolve disagreements with your offshore partner?
- How important is Software Engineering Institute certification? Does your company require Software Capability Maturity Model (CMM) Level 5 processes?
- Do you have several low risk projects that would make good pilots?

Offshore outsourcing also has a negative side to many organizations. Customer complaints about poor service have been prevalent. Dell decided to bring its corporate PC tech support back to the U.S. Customers have complained about inflexible technicians, English that was not understandable and bad telephone connections (Johnson, 2003).

A recent article by Harper (2003) summarized data from the U.S. department of Labor and Forrester Research, Inc. depicting the far-reaching impact of offshore outsourcing. The chart follows:

Number of U.S. jobs moving offshore

Job Category	2000	2005	2010	2015
Management	0	37,477	117,835	288,281
Business	10,787	61,252	161,722	348,028
Computer	21,171	108,991	276,954	472,632
Architecture	3,498	32,302	83,237	184,347
Life sciences	0	3,667	14,478	36,770
Legal	1,793	14,220	34,673	74,642
Art, design	818	5,576	13,846	29,639
Sales	4,619	29,064	97,321	226,564
Office	53,987	295,034	791,034	1,659,310
Total	102,674	587,592	1,591,101	3,320,213

Source: U.S. Department of Labor and Forrester Research, Inc. All numbers have been rounded

Another area of great concern is data security and privacy. India, for example, has no formal data privacy law (Vijayan, 2004). Vijayan further states that it is difficult to control how data is transmitted, accessed, used, stored and shared.

Thibodeau (2003) states that U.S. firms are quite comfortable offshoring application development and maintenance, but the willingness to outsource business processes such as claims processing is also growing. Concerns about security, privacy and intellectual property protection have prevented infrastructure outsourcing on a large scale. However, offshore providers are setting strict personnel rules to ensure security, and some now feel that a significant increase in outsourcing infrastructure support will likely occur within the next year (Thibodeau).

Andrew Grove, Intel Chairman, is very concerned that the U.S. is facing a competitive crisis and may lose its position as the world's most innovative technology provider. Grove is also concerned by the fact that more than 50% of graduate students in technology and science are foreign nationals and because of immigration policies the U.S. is unable to retain foreign talent (DiCarlo, 2003).

Implications for College and University Technology Programs

The dilemma that computer science and information technology educators face deals with program content and employment opportunities for graduating students. The graduates of our computer science and information systems programs will likely have fewer entry level opportunities than has traditionally been the case.

We are faced with an array of unanswered questions. How should we, as educators, advise our students? Are we preparing them for a job market that does not exist? Who are the potential employers of our graduates, and what are their needs over the next four years? Should our technology education programs be a supplement to another functional area to which technology can be applied? What is the current impact of offshore outsourcing, and what will it be in the next four years? What is the potential for future opportunities in your region? Is all of the media attention devoted to offshore outsourcing overblown? Are we reacting appropriately to a changing environment with appropriate program updates?

All of the questions posed above are worth considering and discussing. However, the challenge lies in being able to change and adapt. The author has long contended that technology-related educational programs must be dynamic and must adapt to an ever-changing marketplace. This is not to dispel the importance of simply having programs that teach people to think, analyze and solve problems. Those attributes are a "given." But, technology professors must be more willing to embrace change than many of their counterparts. Although it is nearly impossible to keep pace with the rate of technological change, we must ensure that our students are properly prepared.

A recent survey of the 20 members of the Duquesne University School of Business IT Advisory Board was somewhat encouraging (Duquesne, 2004). The advisory board members agreed there would be entry level positions available through 2010. This notion is strongly endorsed in the article by Santana (2003). The article bases many of its conclusions on data provided by the U.S. Bureau of Labor Statistics.

Santana actually reports that there will be a huge shortage of IT workers due to the retirement of millions of baby boomers. The report also states that there is already a shortage of properly trained professionals in the prime age work pool (ages 26 to 54) and only half of the retirees can be replaced by this pool. Santana concludes that the current slump in IT positions, due largely to economic conditions and offshore outsourcing, will not last very long. The Bureau of Labor Statistics also reports that eight of the ten fastest-growing occupations in the foreseeable future are technology-related as summarized in the chart below (Harper).

Where the jobs are

	# jobs added	% increase
1. Computer software engineers, applications	380,000	100
2. Computer support specialists	490,000	97
3. Computer software engineers, systems software	284,000	90
4. Network and computer systems administrators	187,000	82
5. Network systems and data communications analysts	92,000	77
6. Desktop publishers	25,000	67
7. Database administrators	70,000	66
8. Personal- and home-care aides	258,000	62
9. Computer systems analysts	258,000	60
10. Medical assistants	187,000	57

The Duquesne University survey is interesting in that it identifies a number of desirable skills that are complementary to a purely technical education. For example, the highest rated skills desired by the executives surveyed include:

- Ability to align IT projects with business goals
- Strategic planning
- Process analysis
- Project planning
- Customer relationship management
- Web applications
- Data Warehousing and Mining

The implication of the importance of the above list is that higher order skills are the mandate for the future. The question is will our students be ready for the challenge? If not, should we examine and revise the content of our programs? A program that ceases to be relevant can be embarrassing to an institution. An even more embarrassing dilemma occurs if a student spends four years preparing for a career, only to find they are not prepared to pursue the career opportunities available in the region.

Morello's research (2003) summarizes three areas of concern that may arise as a result of offshore outsourcing. The first is a loss of future talent. College students in the U.S. and the United Kingdom will not prepare for a technical career that they perceive is moving to an emerging market. The current job slump will not last forever, but when the need for IT professionals increases, domestic talent will not be available.

A second concern is the loss of intellectual assets. This concern is centered on how far outsourcing can go. As organizations begin to outsource areas of core knowledge, they must also determine a way to protect and maintain control of their major areas of core knowledge.

Finally, Morello reports that overall organizational performance can be impacted as many organizations already have a fragile employee/employer relationship.

Recommendations and Conclusions

If we assume that some of the positions that previously served as entry level opportunities for our students go offshore, several options should be considered. One option might be to analyze the most difficult positions to fill in an IT organization. As we consider these positions, we must also determine the knowledge base required for qualification and deliver that knowledge base in our programs. Unfortunately, it is the author's view that many of the positions listed require both knowledge and considerable experience. Mok, (2003), reports that organizations are experiencing great difficulty filling the following positions, in the order listed:

- Database Administrator
- Internet/Web Architect
- Network Architect
- Network Engineer
- Security Analyst

Mok also identifies skills in Oracle administration, PeopleSoft, Unix and general enterprise resource planning (ERP) - related skills.

A second option would involve considering the design of an educational program that develops competencies in five areas in an effort to "offshore-proof" your career. Once again, experience may be a key ingredient in qualifying for the positions. The areas named in Santana's research include the following:

1. IT Requirements Analysis – fitting system requirements to organizational processes.
2. Business Process Design – reviewing existing workflows, recommending and designing new processes, and identifying tools.
3. IT Contract Management – aligning outsourcing and contract strategies that align with budgets, missions and strategic goals.
4. IT Business Relationship Management – building and maintaining a critical network of organizational relationships.
5. IT Architecture Planning – specifying technology strategies to support organizational goals.

A final option is to encourage students to become "versatilists." Kidd (2003) defines a "versatilist" as "someone who can apply depth of skill to a progressively widening scope of situations and experiences, gaining new competencies, building relationships, and assuming new roles." In the context of a business school program, this might be translated as an IT student who is cross-functional with other disciplines such as accounting, supply chain management, or marketing. The author is an avid advocate of this approach. The author has been a long-time advocate of IT being an applied rather than a pure stand-alone discipline. Hayes (2003) indicates that the job of the pure programmer is turning into a commodity, and that to maintain job security, programmers must understand business processes and be capable of automating and streamlining these process in their new role as business technologists. As the chart presented earlier in this paper indicates, the U.S. Department of Labor also provides data on many other fields that will be affected by the offshore movement as this strategy is not limited to the IT workforce alone (Harper). Santana (2003) also stresses the importance of "soft skills" such a communication and change management to supplement one's technical skills.

As educators, we must continually assess our program content, and in the spirit of continuous improvement, make adjustments to ensure currency. Our students rely on us to do this well. Several options were presented in the paragraphs above for consideration. The world of information technology is not "business as usual." In addition to the rapid pace of technological change, economic conditions and offshore outsourcing threaten to cause upheaval in the area of entry level job opportunities. This is of paramount importance to technology programs in higher education as we are preparing our students to compete in this constantly changing environment. Without wanting to leave the impression that I am over-reacting, the author encourages all to examine our educational programs and our job markets, and make the necessary program changes to synchronize the two related areas.

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Computer Phobes Anonymous: Helping First Year Students Conquer Technophobia

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Abstract

Computer Phobes Anonymous (CPA) consisted of a small group of self-selected, computer phobic, first year students. These students participated in a learning community to overcome their computer anxiety and improve their computer skills. Through a series of ten workshops over the 2003-2004 academic year, basic computer skills were acquired and fears shattered. This session will describe the CPA program and workshops, how the students' technophobia and computer skills compared to their peers', and the results of pre- and post-testing of computer anxiety and basic computer skills of the student participants.

Note: The presenter chose not to prepare a paper. He will make his powerpoint slides available at the session or make them available via the web.

The Effect of a Computerized Teaching Assistant on Student Interaction, Student Satisfaction, and Retention Rates of Students in a Distance Course

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As distance education programs proliferate and enrollments soar, faculty teaching distance courses are being pressured to increase communication and find ways to improve interaction with distance students. High attrition rates in distance courses are being partially attributed to a lack of communication and interaction with faculty (Carr, 2000). Instructors are feeling an increased burden as they deal with student expectation of 24-hours-a-day/7-days-a-week (24/7) availability and response (Young, 2002). In fact, the increased use of course Web sites, e-mail, and discussion forums have significantly increased faculty workloads in face-to-face classes as well as distance classes (Messing, 2002).

Intelligent Agents or "Knowbots", while still an emerging technology, have been touted as "a way to leverage scarce academic resources to assist students" (Knode & Knode, 2001, p. 125). An intelligent agent would be utilized as a teaching assistant, with a back-end database or knowledge base that is accessed by the user via an appealing graphic interface (e.g. cartoon character, animal picture, 3D image of the professor). These computerized teaching assistants can be programmed to answer questions, provide navigation assistance, generate e-mail responses, and even instruct and sympathize (Knode, 2001). This technology can significantly increase student interaction, without significantly increasing the instructor's workload.

The purpose of this study was to investigate the effect of a computerized teaching assistant (CTA) on student interaction, student satisfaction, and retention rates of students in a distance course. The CTA is humanoid and speaks in a human voice from recorded sound clips, to give the student the feeling that he/she is interacting with a person, not a computer program. It has been programmed to answer frequently asked questions (FAQs), provide positive feedback and encouragement to students, and to initiate contact with inactive students.

Relevance and Significance

Although the literature lacks substantive research on national retention rates in distance learning programs, reports indicate that retention rates are lower (at both the course and program level) in distance learning programs than in traditional, face-to-face programs (Carr, 2000; King 2002; Rovai, 2003). These studies indicate that there are a number of factors that contribute to this attrition. In fact, many of these factors also contribute to student attrition in traditional educational programs: time constraints, job and family responsibilities, and financial pressures. Outside of these factors, one factor that was mentioned is specific to distance courses – the lack of contact with the instructor and the resulting feeling of isolation. Picciano (2002) surveyed a group of graduate students in an online educational administration program at Hunter College in New

York City and found a strong, positive relationship between student perceptions of their interaction in the course and their perceptions of the quality and quantity of their learning.

Higher attrition rates have not stopped many college and universities from creating and expanding distance programs, nor has it stopped students from registering for distance courses. This is evidenced by the 49,690 courses offered via distance, up from 25,730 courses in 1994-5 (National Center for Education Statistics). A 2003 study by the Sloan Foundation indicated that 81 percent of all 5,010 U.S. higher education institutions offered distance education courses during fall 2002, with 97 percent of all public institutions offering at least one online or blended course, and 49 percent offering an online degree program. The study also estimated that 1.6 million students took at least one online course during the Fall 2002, and one third of these students took all of their courses online (Allen and Seaman, 2003).

Questions about the quality of distance courses, pressure from educational administration, and personal concern about retention and success in their classes have caused some faculty to feel increased pressure to provide more frequent and timely feedback to students, to respond to e-mail within a specified amount of time, and to increase interaction with students (Young, 2002). But this increased communication does not come without a cost. John Messing, Sub-Dean of Teaching Quality, Faculty Science and Agriculture at Charles Sturt University in Australia researched the hidden workload costs suspected to be associated with the use of new information and communication technologies. As course coordinator of the Graduate Diploma of Applied Science, he began archiving all of his e-mail messages in 1991. Messing traced the increase in his e-mail traffic for a ten year period, and calculated that the number of e-mail messages had grown 645 percent from 498 in 1991 to 3,212 in 2001.

He also separated the messages into five basic categories: subject content, subject management, course-related, administrative, and other. His figures indicate that e-mail messages actually decreased for subject content and subject management categories, but increased in course-related (advisory-related questions and answers for both current and prospective students) and administrative categories. He attributed much of the growth in course-related messages to an increased student expectation of almost instantaneous response. Lacking a quick enough response, students will send another e-mail message, sometimes generating three or four messages about the same question/problem in one or two days.

How can faculty increase interaction and communication with students, move it beyond the course management level, and still maintain manageable workloads? One solution would be to employ a computerized teaching assistant. The instructor would enter the answers to questions that individual students ask repeatedly each semester into a database. Students would ask their question of the CTA, which would extract the information from the database and provide the answer. If the question was not preprogrammed into the database, the CTA could generate an e-mail message to the instructor and advise the student of an expected response timeline. The CTA could also be programmed to demonstrate a procedure, provide a link to internal and external class resources, and even send reminder e-mails to students who have not yet completed an assignment. Students who are reluctant to admit to the instructor that they do not understand a concept might be more likely to ask the CTA to explain it. The CTA would also be available 24/7, and would be willing to go over a procedure as many times as it is asked.

One of the barriers to widespread adoption of knowbots as teaching assistants has been the technology. True intelligent agents that are capable of "learning" (i.e. autonomously adding information to its database) are still in the developmental phase and are cost prohibitive for most colleges. When the researcher contacted a development company about having a knowbot created for educational purposes that utilized natural language processing, she received a quote of $10,000 for initial design and development of a text-based knowbot that was "100 questions smart," i.e. programmed with answers for 100 questions. There would also be a monthly fee of $3,800 for maintenance and licensing.

Knowbots are being utilized in businesses where high cost is not a big deterrent. Companies are developing virtual assistants that give the user a tour of the company Website or explain the benefits of the company's products. Layne (2001) reported on knowbots used in the customer service area. NativeMinds, Inc. uses virtual representatives (vReps) to answer commonly-asked help-desk questions on the internal and external Websites of major corporations. The idea is to streamline redundant questions and free up "live" personnel for more productive activities. Kiwilogic, a European company, has developed natural-language interfaces called Lingubots to interact with customers using more logical conversation streams. This allows customers to ask their questions more naturally, and not have to phrase their question in unnatural "computerese" so that the computer can understand them. When a customer's question is not found in the FAQs, the caller is transferred to a real, live person for assistance.

Another company, LifeFX is working to make knowbots more human-like. They create photo-realistic images of people, animals, and imaginary creatures that respond to customer questions with spoken answers and appropriate facial expressions. The company asserts that customers will "bond" with these knowbots and will feel greater satisfaction with their interaction, and more loyalty to the site because of this bond.

Business adoption has spurred the technology forward, and affordable development packages are now becoming available that allow individuals to create virtual characters for personal and educational use. ActiveBuddy, Incorporated offers a product that allows the user to develop a customized, text-based virtual assistant that can be accessed 500 times per month for a onetime fee of $199.00. Haptek, Incorporated has a product called People Putty that for $59.95 allows individuals to create photo-realistic characters that speak using synchronized sound files, which can be incorporated into Websites or other compatible software environments. It will be a combination of these two technologies, ActiveBuddy and People Putty, that will be used for this study. The benefits of the products are the ease of development and the low cost. Although they will lack the sophistication and professional programming of previously mentioned tools, they will allow the researcher to inexpensively create tools that will initiate student interaction with the material and with the created humanoid CTA. For this study, the CTA will be created to pictorially resemble the instructor, and will be programmed to verbally respond using sound clips of the instructor's voice. Generic characters could be utilized in wide-spread adoption, or individual CTAs could be created to resemble instructors or live teaching assistants.

The potential for using knowbots to improve retention in distance classes has already been minimally explored. Thaiupathump, Bourne, and Campbell (1999) conducted a research study

using Intelligent Agents in an online workshop at Vanderbilt University. They found a significantly higher completion rate when an Intelligent Agent (or knowbot) was used in the workshop than when the workshop was offered without the use of a knowbot. They also found a moderate positive correlation between the number of times participants used the knowbots and the number of assignments completed by the participants in the session that had help from knowbots.

There were multiple knowbots used in the study that provided two main types of scheduled and on-demand assistance to workshop participants. There were knowbots responsible for tracking participants' work: required forum postings, course-reviewed message postings, and participants' homepage components. Participants could check the status of their assignments via the knowbot at any time. The knowbot was also programmed to automatically check the status of student work at designated points in the eight week term and to give a detailed report of the assignment status to each participant.

Other knowbots were designed to assist students with assignment submission. Each assignment had a tailor-made submission knowbot that notified the workshop facilitator about the submission, provided a template for the facilitator to check the participant's work, stored the results in the database, and sent a notification e-mail to report the results to the participant. The study was designed primarily to test the hypothesis that an intelligent agent improves retention rate, but additional measurement methods were employed that allowed the researchers to also examine how facilitation time, learner satisfaction, and motivation were affected by the use of knowbots in an asynchronous learning network.

Research results indicated that Intelligent Agents were effective motivators when used to remind students of missing or incomplete assignments. A participant survey was conducted at the end of the workshop, and results indicated that encouraging e-mail, immediate feedback, and reminders from the knowbots helped motivate the participants to complete assignments and the workshop. The survey results also suggested that a high number of participants in the knowbot cohort who completed the survey had positive attitudes about using the knowbots as tutors. The knowbots provided immediate feedback and offered possible solutions to help learners solve their problems.

Thaiupathump, Bourne, and Campbell (1999) tested a secondary hypothesis that using knowbots in the distance classroom would reduce time and effort of facilitators. The researchers, however, found the opposite to be true. Students in the cohort who used knowbots asked more questions than students in the other cohorts, and facilitators provided more detailed responses to these questions than to questions asked by the students in the other cohorts.
This increased facilitation time is another potential barrier to adoption of CTAs. Increases in workshop facilitation time will be problematic if the increased time is spent on "hand-holding" or step-by-step nurturing. Instead of being able to focus on facilitating discussion and interaction, many faculty get overwhelmed just handling the increased e-mail communication from students taking distance classes. Unfortunately, much of this e-mail communication is course management in nature with questions like "When will the grades for the last assignment be posted?" Young (2002) reports that some faculty feel that "e-mail can foster laziness in some students, who feel they can ask their professor how to do an assignment rather than thinking through problems themselves" (pg. 5). Students also seem bolder online, often questioning grades and disput-

ing point deductions from assignments, to the point where some faculty and graduate assistants admit that they dread checking their e-mail.

However, increases in workshop facilitation time that is spent answering content-specific questions or providing thorough, thoughtful feedback to students about assignments would be considered by most to be a positive result. Bower (2001) reports that personal interaction with students is one of the most gratifying aspects of teaching, and the loss of this interaction is one of the major concerns of distance education detractors. The Thaiupathump, Bourne, and Campbell (1999) study does not identify how the increased facilitation time is spent, and unfortunately messages related purely to course logistics were removed from the message count and analysis. The researchers acknowledge that a more thorough examination of the time the facilitators spend on various tasks is necessary to draw any firm conclusion about why facilitation time was higher for the knowbot cohort.

The Thaiupathump, Bourne, and Campbell (1999) study used only a text-based graphical user interface. This study included a humanoid virtual assistant. Reeves and Nass (1996) assert that people treat media, including computers, like they are human. Using a computerized teaching assistant that is produced with an animated 3D graphic and responds in a human voice will help reinforce the feeling that the student is actually interacting with a person. Carr (2000) reports that successful distance instructors communicate with their students regularly—sending e-mail, responding to student e-mails promptly, and posting photos of themselves on course Web pages. Prior to the beginning of the spring 2004 quarter, the BIS 101 Keyboarding course offered via distance learning at Sinclair Community College was split into two sections consisting of approximately 30 students each. Following normal registration procedures, students will self-select into one section of the course. One of the sections will be randomly selected to use a CTA during the duration of the course. Students will not be aware that one of the two sections will use a CTA. Ken Baker, Assistant Professor of Business Information Systems, has been teaching the distance section of this course for three years, and he will teach both sections of the course during the study.

The study will be designed to last for the duration of the quarter (eleven weeks). Students in the two sections will be taught by the same instructor, use identical course structure, textbooks, materials, and course management tools and interfaces. The only difference in course structure and delivery will be that the experimental group will use a computerized teaching assistant in their course section.

Retention for each course will be monitored throughout the quarter and will be analyzed and compared at the end of the quarter. All faculty/student communication for both sections will be captured, categorized, and analyzed. The number, length, and subject of all messages and communications will be recorded. The faculty member will keep a record of the purpose and amount of time spent on each class-related activity. The FAQ database will provide detailed data about who used the interface, the type of questions asked, the success of the inquiry (did the Knowbot have an answer) and dates and times of usage for analysis.

A student satisfaction survey was administered to both the control and experimental groups to solicit their opinion about the quantity and quality of interaction with the faculty member and

their satisfaction with the course. Students in the experimental group will also be asked to rate the quantity and quality of their experience with the computerized teaching assistant. The instructor will also be asked to provide feedback on any perceived differences in the quality or quantity of student interaction between the two sections.

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Recent Legal Developments in CyberCrime & Terrorism

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Introduction

Congress and individual states have been busy over the past year combating spam, protecting (or eroding, depending on your perspective) privacy rights, and trying to catch the law up with the cyber criminal. This paper will examine recent legislative developments in the above titled areas of spam, privacy, and cybercrime from both Congress and state legislatures, and will also briefly discuss current initiatives that have failed to pass but could represent possible trends in these areas.

The Computer Security Institute (CSI) conducts a survey in association with the FBI annually to examine the current state of cybercrime and its effects. The latest report, the 2003 CSI/FBI Computer Crime and Security Survey, looks at several hundred companies, big and small, and asks about intrusions, loss, and attitudes and responses to computer crime.

The report states that losses from computer attack fell 57 percent from record levels last year, mainly in the areas of computer fraud. While unauthorized use was about the same at approximately 60 percent, computer fraud losses from survey respondents fell dramatically from $116 million last year to just $10 million. Theft of proprietary information remained the number one area of survey respondent loss from attack, but denial of service attacks were a close second. The most common forms of attack remain virus attacks, with insider abuse of network access slightly behind. As an interesting side note, respondents continued to be against hiring reformed hackers as security consultants and only 30 percent of those respondents reporting security intrusions reported them to law enforcement.

Clearly, though the number of security incidents remained essentially unchanged, the dramatic drop in computer fraud may show that high profile prosecutions of these crimes may be acting as a deterrent for the potential perpetrator, or that precautions by industry are catching up to the cyber criminal and helping to minimize the damage done per intrusion.

Another form of intrusion that has the average citizen calling their congressperson is spam, or unauthorized email. Perhaps no other aspect of the internet is so universally hated that the dreaded spam message hawking the latest pill, potion, or plan to get rich. According to a new study published on January 6, 2002 by market researcher Ferris Research, the annual cost of spam to U.S. corporations is $8.9 billion, and $2.5 billion for European businesses. U.S. and European service providers take on an additional $500 million in costs due to spam. Individual

states have attempted to regulate this menace, businesses have resisted plans to mandate toll-free lines to opt-out of mailings, and Congress has been debating the merits of several plans for some time. The courts have ruled at least two state laws against SPAM unconstitutional because they were "unduly restrictive and burdensome", and Congress searched for some time to develop a law that balanced the free speed rights of the advertiser with the privacy and property rights of the consumer and Internet Service Provider. Congress and President Bush signed the "Can-Spam Act of 2003" and it went into effect at the beginning of 2004.

Spam Legislation

The Can-Spam Act of 2003, officially called the Controlling the Assault of Non-Solicited Pornography and Marketing Act, requires unsolicited commercial e-mail messages to be labeled as such.

The Act also required the advertiser to include opt-out instructions and the sender's physical address. Obviously this is problematic to enforce since most spam comes from email domains that either don't exist or are used without permission. Subject lines and headers in messages that are deceptive are prohibited, but no definition of specific deceptive practices is mentioned in the act, leaving the courts to shape this area. Finally, the Federal Trade Commission is authorized but not mandated to establish a "do-not-email" registry, similarly to their widely popular do-not-call for telephone solicitation.

Previous state laws, such as California's, that require the subject line of any unsolicited email to start with "ADV" would be preempted or superseded by the Can-Spam Act, as would any state or local laws that regulate opt-out procedures, State laws prohibiting unsolicited email entirely are also preempted by this act, though such laws were unlikely to pass constitutional muster once they were litigated. State laws are not entirely superseded by this act, however. Any state laws dealing with falsity, deceptive business practices or fraud in these messages would remain in place.

Overall, this law, while sounding tough, appears hold little promise for reducing spam in the future, primarily because it seeks to legislate out what is essentially a technical problem: being able to track the identity of someone sending bulk email on the net, and shifting the costs of their behavior to them rather than the end user and the service provider. Its lack of specifics, like labeling convention for spam, making filtering difficult if not impossible, and its precatory directives to the FTC mean action will be delayed if not avoided.

Hopefully, some of the bills that did not pass that have more enforcement teeth show a trend in Congressional action in the future. The Computer Owners' Bill of Rights, proposed in 2003, would require the FTC to setup a do-not-email list, and provides for the imposition of civil penalties upon those who send unsolicited commercial e-mail to addresses listed on the registry. The Stop Pornography and Abusive Marketing Act, proposed by not adopted in 2003, required specific subject line labeling, assisting in filtering. While both of these proposed bills mandate actions only suggested in the Can-Spam Act, they appear to fall outside anything "unduly burdensome' to advertisers, a requirement under current caselaw.

Finally, perhaps representing the vanguard of spam, the Wireless Telephone Spam Protection Act proposed in January 2003 to prohibit the use of wireless messaging systems to send spam primarily to cellular phones and pagers. While not a major problem yet, spammers are not doubt planning these and other offensives in the future and it is promising to see Congress at least thinking on the cutting edge.

CyberCrime and Privacy Legislative Developments

The Patriot Act, though passed in response to the attacks on the World Trade Center in 2001, is only now being analyzed and examined with sufficient detail to raise the ire of civil libertarians.

The Patriot Act, whose lengthy and official title is the Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism Act, has been analyzed in great detail by both proponents and detractors. The Act consists of ten titles which, among other things: give federal law enforcement and intelligence officers greater authority to gather and share evidence particularly with respect to wire and electronic communications; allowing "sneak and peek" search warrants which don't require notification of the person or organization searched; amend federal money laundering statutes and make them more restrictive particularly with overseas accounts; changes existing federal criminal procedure, particularly with respect to acts of terrorism; and finally to modifies immigration law, increasing the ability of federal authorities to prevent foreign terrorists from entering the U.S., and to detain and/or deport foreign terrorist suspects.

While clearly the potential for abuse of the act is present, prosecutorial and law enforcement discretion is required with all the laws, and the Patriot Act simply streamlines and facilitates existing laws and procedures.

Civil liberty advocates are also concerned about the potential privacy implications of the Cyber Security Enhancement Act, part of the Homeland Security Act (HSA). Several of the CSEA's provisions allow Internet service providers to disclose customer information in exigent circumstances without probable cause that the information is linked to a crime. Specifically it states companies can disclose information based on the good faith belief of "an emergency involving danger of death or serious physical injury to any person". This determination is done by the holder of the information, and could lead to abuses.

Conclusion

While much of the legislation discussed has the potential to change the cybercrime and privacy law landscape, inertia and the strong and understandable resistance to place burdens on commerce prevents rapid and comprehensive action in the areas of Spam, Cybercrime, and privacy protection.

Adding Interactivity to a Non-interative Class

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Abstract

The IT 3050 course at Capella University is an introduction to fundamental computer networking. This course is one of the required courses in the Bachelor of Science in Information Technology program.

In order to provide a more enriched learning environment for learners, Capella has significantly modified this class (and others) by infusing it with interactive tools and web-based resources. Students report a more enhanced learning experience, which should result in many positive results for both the University and the learners (and, by extension, their employers).

The following discussion provides a more detailed look into these changes. The course has evolved from an online discussion-based approach to an online discussed-based approach infused with a wealth of interactive tools and web-based resources. First, the Network+ Virtual Lab software is required and learners report that this tool enhances their learning by providing a realistic hands-on experience. In addition, many Net-based resources are utilized, including downloadable software learners then install and evaluate. The combination of these features provides a more interactive and hands on class, therefore providing the learner with a "real world" environment. Thus, there is a significant value added effect present.

IT 3050 Learning Goals

> Goal I. Describe the basic concepts of networking technology, standards, protocols, and architecture as related to systems design, implementation and maintenance.
>
> Goal II. Demonstrate the ability to use the necessary hardware, protocols, and media to establish, maintain, and troubleshoot network connectivity between workstations.
>
> Goal III. Assess weaknesses and strengths of network security while emphasizing bandwidth and availability.
>
> Goal IV. Evaluate the different options of establishing a successful information technology data network.

Goal V. Demonstrate the ability to apply Transmission Control Protocol/Internet Protocol (TCP/IP) networking technology protocol and to subnet different Internet Protocol (IP) classes in order to meet the defined existing or future business environment.

Goal VI. Evaluate network security, integrity, and availability on a Local Area Network (LAN).

Goal VII. Explore the different Network Operating Systems (NOS) available today while emphasizing Microsoft (Windows NT 4 and 2000), Novell (Netware 4 and 5), and Unix.

Goal VIII. Select the best Network Operating System (NOS) for a specific business to meet its current and future needs.

Learner Requirements

1. At least once per week, participate in CourseRoom (online web-paged) discussion as indicated in each Learning Unit.

2. Complete all assignments as indicated in each Learning Unit.

3. Complete an Individual Project The project must demonstrate an understanding of the objectives of this course.

References

Learning Resources

Required texts and readings include:

- Dean, T. (2000). Network+ guide to networks. ISBN: 0-7600-1145-1.
- Lammle, Todd & Tedder, William (2002). Network+ Virtual Lab. , Alameda, CA. ISBN 0-7821-3026-7

This course utilizes a "hand on" approach to reinforce course concepts through a virtual lab simulator so you will be able to try out network commands that you otherwise could not experiment with on you own computer. You will also be able to prepare yourself for an industry standard certification test.

Unit 1 -- introduction to the basic concepts of a network.

Study Assignments:

1. If you have not already done so, please purchase the required textbook and lab simulator and any additional material you feel would be beneficial to the successful completion of this course.

2. Read chapter 1 and answer the review questions as a self-assessment.

3. Search the Internet for additional information that will reinforce the general concepts described in this unit. Be sure to spend at least one hour on this assignment. Share some of the links with your fellow learners.

4. Install the Network+ Virtual Lab software and work through the four review labs for chapter 1.

5. MediaCenter Assignment: Read the overview titled "Thinking Habits of Heart, Mind, and Imagination." Produce a one-paragraph analysis of this overview, delineating how this applies to your academic experience.

6. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Unit 2 -- Networking Layers and Protocols

Study Assignments:

1. Read chapters 2 and 3 and answer the review questions as a self-assessment.

2. Go to http://www.webopedia.com/quick_ref/OSI_Layers.html, read the tutorial information, and go over some of the links related to the topic. Be sure to spend at least two hours on this assignment. Also, study the MediaCenter assignment entitled "An Example of OSI Layering."

3. Search the Internet for additional information that will reinforce the concepts outlined in these chapters. Share some of the links with your fellow learners. Be sure to post at least two of these links, along with a one-line sentence describing them.

4. Become familiar with the terms at the end of each chapter.

5. Read the short overview titled "TCP/IP and Protocols" in the MediaCenter.

6. Continue to work on your individual project.

7. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Unit 3 - Network Architecture

Study Assignments:

1. Read chapter 4 and answer the review questions as a self-assessment.

2. Go to http://www.anixter.com/techlib/vendor/cabling/d0503p02.htm, read the tutorial information, and go over some of the links related to the topic. Be sure to spend at least one hour on this assignment.

3. Work through the Labs in Chapter 2 and Chapter 3 in the Virtual Lab Simulator, particularly the Hands-On Lab 3.5

4. Search the Internet for additional information that will reinforce the concepts outlined in this chapter. Share some of the links with your fellow learners. Be sure to post at least two of these links, along with a one-line sentence describing them.

5. Become familiar with the terms at the end of the chapter.

6. Read the overview titled "Media, Cable, Connectors, Max Segment Length" in the MediaCenter.

7. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Unit 4 - Network Devices and Connectivity

Study Assignments:

1. Read chapters 5 and 6 and answer the review questions as a self-assessment.

2. Go to http://www.webopedia.com/TERM/E/Ethernet.html, read the tutorial information, and go over some of the links related to the topic. Produce a one-page synopsis of this information.

4. Search the Internet for additional information that will reinforce the concepts outlined in these chapters. Share some of the links with your fellow learners. Be sure to post at least two of these links, along with a one-line sentence describing them.

5. Become familiar with the terms at the end of each chapter.

6. Read the overview titled "Media, Cable, Connectors, Max Segment Length" in the MediaCenter.

7. Conduct research and produce a chart listing the current prices for a router, a hub a repeater, and a NIC suitable for home or small-business use.

8. Answer the Chapter 6 questions in the Virtual Lab.

9. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Unit 5 - WAN Topologies and Remote Connectivity

Study Assignments:

1. Read chapter 7 and answer the review questions as a self-assessment.

2. Go to http://www.cisco.com/univercd/cc/td/doc/cisintwk/ito_doc/introwan.htm#xtocid1, read the tutorial information, and go over some of the links related to the topic. Produce a one-page synopsis of this information.

3. Search the Internet for additional information that will reinforce the concepts outlined in these chapters. Share some of the links with your fellow learners. Be sure to post at least two of these links, along with a one-line sentence describing them.

4. Become familiar with the terms at the end the chapter.

5. Go to http://download.cnet.com/downloads/0-10071-100-895454.html and download Netlab, a network tool. You can use this FREE tool to find out IP addresses, do DNS look-ups and more.

6. Answer the Chapter 7 review questions and do the two Hands-on labs in the Virtual Lab.

7. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Unit 6 - Network Operating Systems - NT, Netware, and UNIX

Study Assignments:

1. Read chapters 8, 9, and 10 and answer the review questions as a self-assessment.

2. Go to the following links:
- Operating System - Webopedia.com
- UNIX - Webopedia.com
- Windows 2000 Technologies
- NetWare 5 Overview and Installation - Novell Documentation

Read the tutorial information in the fourth link, and go over some of the links related to the topic. Produce a one-page synopsis of each network operating system.

3. Search the Internet for additional information that will reinforce the concepts outlined in these chapters. Share some of the links with your fellow learners. Be sure to post at least two of these links, along with a one-line sentence describing them.

4. Become familiar with the terms at the end of each chapter.

5. What NOS capabilities does Win XP possess? Search the Net and produce a chart of at least three capabilities.

6. Work through the hands on labs (all five) for chapter 5 in the Virtual Lab. There are exercises for each operating system. Also do the review lab covering these systems.

7. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Unit 7 - TCP/IP Fundamentals and Implementation

Study Assignments:

1. Read chapter 11 and answer the review questions as a self-assessment.

2. Go to http://www.learn2subnet.com/ or http://www.howtosubnet.com/and read the tutorial information. Go over the presentation to master the binary system, IP addressing, and IP subnetting. Make sure to spend at least four hours on this tutorial. This tutorial can be purchased on a CD directly from either site. Produce a one-page synopsis of this information with an example of a subnetted network.

3. Search the Internet for additional information that will reinforce the concepts outlined in these chapters. Share some of the links with your fellow learners. Be sure to post at least two of these links, along with a one-line sentence describing them.

4. Become familiar with the terms at the end of the chapter.

5. Read the overview titled "Subnetting" in the MediaCenter.

6. Continue to work on your individual project.

7. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Unit 8 - Network Troubleshooting and Maintaining a Network

Study Assignments:

1. Read chapters 12 and 13 and answer the review questions as a self-assessment.

2. Search the Internet for additional information that will reinforce the concepts outlined in these chapters. Share some of the links with your fellow learners. Be sure to post at least two of these links, along with a one-line sentence describing them.

3. Become familiar with the terms at the end of each chapter.

4. Work through the Hands-on labs for Chapter 4 in the Virtual Lab and answer the lab 4 review questions. Also answer the review questions for Chapter 10 in the Virtual Lab.

5. Become familiar with the terms at the end of each chapter.

6. Go to http://www.acterna.com/global/products/descriptions/LinkView/index.html and download the LinkView Network Analyzer. This is a FREE demo program that will show you how to diagnose networks. Use it to view and analyze network traffic flowing to your PC.

7. Present three tools or network commands that you can use to diagnose a network problem (i.e. tracert). Specify the problem you would try to diagnose or solve with the tools. Include a discussion of your experience with the tools either from the Virtual Lab or the LinkView Analyzer. You may include scripts or traces that illustrate how the problem/s are analyzed.

8. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Unit 9 - Network Integrity, Availability and Security

Study Assignments:

1. Read chapters 14 and 15 and answer the review questions as a self-assessment.

2. Search the Internet for additional information that will reinforce the concepts outlined in these chapters. Share some of the links with your fellow learners. Be sure to post at least two of these links, along with a one-line sentence describing them.

3. Become familiar with the terms at the end of each chapter.

4. Work through Chapter 8 Hands-on and the review questions in the Virtual Lab. Work through Chapter 9 review questions in the Virtual Lab.

5. There are several products on the market that provide firewall type protection and virus protection, etc. that are readily available for a modest price. It is assumed that you are using one of these products already, although you do not specifically have to buy one for this class. Several vendors are:
Zone Labs http://www.zonealarm.com/zap26_za_grid.html
Symantec http://www.symantec.com
Mc Affee http://www.mcaffee.com
Install one of these and write a one-page report describing your experience. Use the Shields Up tool both before and after installation of this firewall and report the results in your report.

6. Use the Shields Up! FREEware tool at http://www.grc.com/ to run a security analysis of your PC,. Modify some parameters of your security product and re-run Shields Up

7. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Unit 10 - Network Design Overview

Study Assignments:

1. Read chapter 16 and answer the review questions as a self-assessment.

2. Go to http://www.webopedia.com/Networks/Security/ and read the tutorial information. Go through the different links and read the different topics related to top security. Produce a one-page synopsis of this information.

3. Go to http://www.panicware.com/3. and download their anti-spam product, Pop-up Stopper. Install this product and use it for a short while. Then, produce a one-page report on how easy it was to install, configure, and operate and how effective it was.

4. Become familiar with the terms at the end of the chapter.

5. Go to: http://download.com.com/3000-2192-10152793.html?tag=lst-0-1 and download LanFlow 3.5, a FREE network design product. Produce a one-page report on how easy it was to install, configure, and operate.

6. Complete the three Discussion Questions posted by your Instructor. Also, post responses to your fellow learners.

Conclusion

As can be seen, Capella University had a need for introducing more interactivity into a text-based class. To this end, research was conducted to locate interactive resources such as hands on exercises that might allow a learner to be provided with a hands on experience, not just reading a section of text and answering some questions afterward. Many Net-based resources were located and integrated into this class as well as the use of a Network Simulation tool which the learners purchase and then utilize throughout the class. Learners now report a much improved learning environment due to these changes.

Relationships Between Computer Skills and Technostress: How Does This Affect Me?

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Introduction

The creation of computer software and hardware, telecommunications, databases, and the Internet has affected society as a whole, and particularly higher education by giving people new productivity options and changing the way they work (Hulbert, 1998). In the so-called "Information Age" the increasing use of technology has become the driving force in the way people work, learn, and play (Drake, 2000). As this force evolves, the people using technology change also (Nelson, 1990).

Adapting to technology is not simple. Some people tend to embrace change while others resist change (Wolski & Jackson, 1999). Before making a decision on whether to embrace technology or not, people may look at the practical and social consequences of accepting change. Therefore, the technology acceptance model, the accepting or resisting of technology, is considered to be a form of reasoned behavior (Wolski & Jackson).

Technology changes the way people work and learn. As the role of technology is being defined and is constantly being improved, change is inevitable (Davis-Millis, 1998; Brand, 2000). As a result, those involved in higher education have to find ways to adapt to technological change. Administrators, faculty, academic librarians, and students should define the role of technology for the purposes of (1) sharing new ideas and techniques for teaching and learning; (2) encouraging enthusiasm and innovativeness; and (3) learning about opportunities and challenges, and how to deal with them (Landsberger, 2001).

In fact, college faculty are spending more time with those from the business sector to ensure what is taught in the classroom is applicable in the workforce (Gavert, 1983; Lynton, 1984; Katz, 1999). This collaboration on a curricula that meet education standards and job related skills required in industry is providing opportunities for faculty to remain current in rapidly changing technical disciplines (Gavert; Katz). On the other hand, other disciplines such as liberal arts have had less need to adapt as quickly, and perhaps have been more reluctant to change (Miller & Rojewski, 1992).

Statement of the Problem

The rapid growth in technology over the last three decades has been well documented. Accompanying that growth has been an equally rapid increase in the struggle to keep up with technol-

ogy. The way services are provided by society and to society (e.g., fast, instantly, remotely) is changing. While virtually all facets of society are affected by technology, its impact can be clearly seen in the way higher education clientele have been served. Colleges and universities are being changed in multiple and profound ways, ways almost unrecognizable to students, faculty, academic librarians, administrators, and alumni.

The move to the Information Age, with its changes and need for adaptation to technology, has been rapid and stressful for many people. While many people have increased their usage of technology and are comfortable with it, many others still do not use much technology and are not comfortable using it when they must do so. For those who are not amenable to change, who find it difficult to adapt, there are often a variety of responses or results. One type of response is called technostress. Technostress is the inability to adapt to or cope with new computer technologies which reveals itself in one of two ways: (1) computer users struggle to accept the technologies or (2) computer users over-identify with the technology (Brod, 1984).

Studies relating to technostress have been fairly limited. Those conducted have sought to determine correlations between such variables as personality type, academic performance, self-concept, and why certain faculty decide to use technology while others do not. Study participants have included people from the business industry, students majoring in business and education, and a limited number of faculty members and librarians. However, there are few studies that look at the severity of stress for various types of computer users (e.g., faculty, staff, administrators, academic librarians) in postsecondary settings.

Because business faculty deal with people in business and industry, the researcher presumes that professors in Colleges of Business Administration are more adept and comfortable using technology than those in other colleges within universities. In order to ensure what is taught in the classroom is applicable in the workforce, college faculty are spending more time with those from the business industry. This partnership is providing opportunities for faculty to remain current in rapidly changing technical disciplines because both are collaborating on curriculum that meet education standards and job related skills required in industry (Katz, 1999).

Likewise, education faculty are preparing future teachers, counselors, and administrators to go into elementary, middle, and secondary schools. These teacher programs may or may not require their students to obtain and use technological skills. Similarly, there may or may not be an expectation among the education faculty to obtain or utilize these same skills. Some education faculty and students may only learn and use technology because they wanted to and not because there was an expectation (Miller, Rojewski, 1992).

University library staff also have had to adapt to a wide variety of technological demands unimaginable just a few years ago (e.g., processing library materials and teaching research skills online). Other disciplines such as liberal arts have had less need to adapt as quickly, and perhaps have been more reluctant to change. All, however, are faced with the necessity to change. Therefore, in all likelihood, all professors are experiencing some level of technological stress.

The intent of the researcher was to explore the relationship between technology skills and the possible causes of technostress among academic librarians, and education and business faculty.

The exploration looked at the role, if any, computer skills had on the levels of technostress experienced by academic librarians, and business and education faculty.

Research Questions

The study was designed to answer the following question: Do computer skills relate to the levels of technostress among faculty in the Colleges of Business and Education, and academic librarians? The following seven related sub-questions were also addressed in this study:

1. How do the business and education faculty and academic librarians rate their computer skills?
2. At what levels do the business and education faculty and academic librarians experience technostress?
3. Do differences in technostress and computer skills exist among business and education faculty and academic librarians, and if there are differences, do these differences still persist once college unit/affiliation, age, sex, rank, tenure status, and classification status have been considered?
4. Is there a correlation between the self-rated computer skills of the business and education faculty, and academic librarians and the levels of technostress they may experience?
5. Does the correlation between the self-rated computer skills and levels of technostress still exist once college unit/affiliation, age, sex, rank, tenure status, and classification status have been considered?
6. What are the possible causes identified by business faculty, education faculty, and academic librarians in higher education when they experience technostress?
7. How do the business faculty, education faculty, and academic librarians cope with technostress?

Procedures

Participants were given the option of completing a survey instrument electronically and having the responses e-mailed to the researcher, or receiving numbered, color-coded paper copies and mailing the results back to the researcher in a self-addressed stamped envelope. The numbered, color-coded paper copies were used to keep track of participants who responded so the researcher could do follow-up requests for survey participation. The survey was a new instrument containing four sections: (1) Computer Hassle Scale-revised (CHS-R); (Hudiburg, 1999) (2) Computer Skills Survey (May, 1998); (3) two open-ended questions; and (4) demographic items. When completing the CHS-R section of the instrument, respondents were asked to circle the number corresponding to the severity of the computer hassle they have experienced. Choice of numbers were 0=not at all, 1=rarely severe, 2=moderately severely, and 3=extremely severe. They were asked to complete the Computer Skills section by rating his/her skill level. Answer choices were 1=low, 2, 3=medium, 4, and 5=high. The faculty and academic librarians were then asked to answer two open-ended questions about what they perceived to be possible causes of technostress and possible solutions for relieving technostress. Lastly, faculty and academic librarians were asked to provide the following demographics: (1) college/unit affiliation; (2) rank; (3) tenure status; (4) age; (5) software applications or programs used; (6) number of hours per week spent using computer technology; (7) faculty status; (8) classification status; (9) sex; and

(10) teaching level. All paper copies were mailed back to the researcher using a self-addressed stamped envelope for data analysis.

Alternatively, participants completed the instrument electronically by filling out a web-based form posted on the Internet. Using the same numeric code found on the paper copy of the survey, each faculty member or academic librarian wishing to complete the instrument on-line was able to enter that code on the web form for tracking purposes. The code was used to keep track of those who responded to the survey so the researcher could request participation from non-respondents after follow-up contact had been made with those not responding initially. Each participant completed the CHS-R section by clicking the radio button corresponding to the appropriate severity level of each of the computer hassles they have experienced. The choices were the same as the ones on the paper copy. Similarly, the Computer Skills section had clickable radio buttons corresponding to the skill level for each computer skill. The choices were the same as those on the paper copy. Two open text boxes were provided for respondents to type in their responses to the open-ended questions. Lastly, clickable radio buttons were provided for responding to the demographics section. All responses from the survey were e-mailed to the researcher for data analysis.

Analysis of Research Findings

The major findings of this study are summarized as follows:

1. Business faculty reported their computer skills as the highest over education faculty and academic librarians even though their mean score was not statistically different.
2. Although their severity scores were not statistically different, academic librarians perceived themselves to experience more severe levels of technostress than business faculty and education faculty.
3. Education faculty reported the lowest computer skills level, and they perceived to experience lower levels of technostress than academic librarians but they did not experience more technostress than business faculty.
4. Although these were not statistically significant findings, males reported lower computer skill levels than females in all three units. Females in the College of Business and female academic librarians reported higher levels of technostress than males in the same units. Additionally, females in education reported lower levels of technostress than males in their unit.
5. Assistant and associate professors in education reported higher computer skill levels resulting in a significant difference in the levels of their computer skill. However, full professors in the same unit reported the lowest levels of computer skills.
6. Based on statistically significant results, tenured academic librarians reported lower computer skill levels than non-tenured librarians.
7. The levels of technostress among all three units decreased as their levels of computer skills increased.
8. Academic librarians, education and business faculty used a wide variety of software applications or other computer technology but they mainly used e-mail, word processing, and the Internet.
9. Participants identified computer information and computer runtime problems more than any other problem as causes of their technostress (see Table 1).

10. Solutions for reducing technostress as reported by the participants included calling for help, screaming or yelling, walking away, leisurely talking to someone, and doing something non-technical or non-computer related (see Table 2).

Table 1
Causes of Technostress as Perceived by COBA and COE faculty, and Academic Librarians

Cause	Frequency
computer information problems	178
• difficulty keeping up, too many passwords	
computer runtime problems	119
• hardware failure, computer crashes	
computers' impact on society	70
• increase in expectation to use computers, increase in demand or time to use computers	
Internet/E-mail problems	48
• too much email, spam	
everyday computer technology	42
• confusing, threatening computer terminology, answer cannot be found	
computer processing speed	41
• slow CPU/Internet connection	
computer as person	8
• lack of human interaction	
computer costs	2
• software costs	

Note: Hudiburg (1997) identified eight categories for measuring causes of technostress.

Table 2
Solutions for Coping With Technostress as Perceived by COBA and COE faculty and Academic Librarians

Solution	Frequency
increase knowledge and skills	114
• ask for help, attend training workshops	
relax or socialize	77
• take nap, talk to people	
manage time or projects/tasks	77
• multi-task, back up data	
complain	54
• threaten computer, yell and curse	
try to fix the problem	29
• reboot computer, start project over	
exercise	24
• yoga, play basketball	
change attitude/expectations	24
• find humor in situation, control anger	
eat	12
• drink tea, eat popcorn/candy	
perform non-technology related tasks	1
• clean office	

Recommendations and Conclusions

This study attempted to investigate whether computer skills relate to the levels of technostress among faculty in the Colleges of Business and Education, and academic librarians. The analysis of the data revealed a negative weak relationship that as computer skills increased, technostress levels decreased among these three groups. In order for these and other computer users to experience less stress, they will have to keep up with the rapid change of technology and take part in some form of training on a regular basis. "Changes break patterns that we are comfortable to, and that can be rather threatening. The key is to make sure that we are the masters, and that computer and other formats of technology are tools we manipulate. IN SHORT, WE ARE THE ONES WHO ARE IN CHARGE" (Rocha, 2001)!

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The use of multiple monitor and KVM (keyboard, video, and mouse) technologies in an educational setting

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Abstract

Having more than one screen of usable space can enhance productivity, both inside and outside of the classroom. So can using one keyboard, screen, and mouse with multiple computers. This paper (and session) will cover the author's use of multiple monitor and KVM (keyboard, video, and mouse) technologies both inside and outside the classroom, with particular emphasis on setup, configuration, troubleshooting, and use of these technologies. In addition, a practical way is presented for moving a laptop on a cart, that uses these technologies, between office and classroom with minimal effort.

Introduction

This paper (and session) will cover the author's use of multiple monitor and KVM (keyboard, video, and mouse) technologies both inside and outside the classroom, with particular emphasis on setup, configuration, troubleshooting, and use of these technologies.

In most cases, the exact method for installing and/or configuring the features depends on the version of the operating system used, the hardware used, etc. This being the case, some specific examples are given, but the reader is urged to do a relevant Internet search to find specific instructions for his or her own computer configuration.

Multiple monitors

At some point in using a computer, a user may increasingly spend more and more time moving windows on the screen, not being able to see enough. This is especially true for programming tasks, where a programmer needs to see code, debugging windows, object browsers, the executing program being developed, documentation about the program, email, etc. Often, getting a bigger monitor can be an expensive proposition, although prices keep falling. Traditionally, CRT monitors took up lots of space and used lots of power (warming up the local area in which they are used). LCD monitors are compact, use little power, and prices have dropped steadily in the past few years. Yet, larger monitors can cost significantly more than smaller monitors.

One solution to this problem is to add additional monitors. Microsoft Windows supports multiple monitors (as does Linux), except for Windows XP Home Edition, which supports only one monitor. Windows calls this feature MultiMon. However, in addition, the hardware and software drivers must be present. For a desktop, a multiple-monitor compatible video card must be used. Most

laptops in the past few years support multiple monitors, but one should check before buying one to be sure. The author has used Toshiba laptops for many years, and has had no problems using multiple monitors.

For most laptops, selecting simultaneous video mode displays the same image on the laptop monitor and the external monitor. However, if the video driver and operating system support it, the "Settings" tab of the "Display" Control Panel applet can be used to make the external monitor different than the built-in monitor (i.e., laptop screen).

The following command can make it easier to automatically invoke the "Settings" tab of the Monitor Control Panel applet.

```
C:\WINDOWS\rundll32.exe shell32.dll,Control_RunDLL desk.cpl,@0,3
```

This (Windows Me compatible) command can be assigned to a shortcut, run from a batch file, etc.

The monitors on the "Settings" tab can be moved as desired to conform to the physical arrangement of the monitors. To add another (existing) monitor, select the desired monitor. Windows asks if you want to activate this monitor. To remove the monitor (i.e., to go back to simultaneous mode), select the monitor and uncheck the option for "Extend my Windows desktop onto this monitor".

Most laptops will support an additional monitor in this manner.

Since the summer of 2001, the author has used three monitors at home and in the office. In 2002, the author started using two monitors in the classroom. In 2004, the author started using three monitors in the classroom.

The author uses the Margi Systems Display-to-Go PCMCIA/PC card to add a third monitor to the laptop. This requires an available PCMCIA/PC card slot in the laptop. Some newer laptops only provide one such slot. The Display-to-Go provides software (that conveniently appears in the tray, with the clock, etc.) to make it easy to check the status of video drivers, monitors, etc. It also provides a way to save the Desktop layout of shortcuts as Windows has an annoying habit, especially in the presence of multiple monitors, of forgetting the Desktop layout.

Most LCD monitors will work very well as long as the hardware resolution of the monitor is matched with the video card. That is, if the LCD monitor is 1023x768, then the laptop resolution should be the same. Otherwise, the image can be appear fuzzy. At home, the author uses two Philips Brilliance 150P LCD monitors, at 1023x768 resolution. One is connected via a digital connection. One is connected via an analog connection. Both appear to provide the same quality image.

Not all software supports multiple monitors. In PowerPoint, for example, one can select "Slide Show", "Set Up Show", and, under "Show on:", select "Monitor 2 Default Monitor" to select the monitor where the show will be displayed. In this mode, one can see presenter notes on one monitor while displaying the full presentation on another monitor.

In class, the author uses a small computer cart/desk that has a laptop screen (i.e., the primary monitor), the second monitor connected to the classroom projection system, and the third monitor on the cart (a smaller 14-inch LCD monitor that fits nicely on the cart). This allows the author to manage classroom administration tasks, etc., on screens such that the students are not distracted. The author lets the students know that multiple monitors are being used, and that, occasionally, the mouse will be lost on one of the three screens (i.e., for a few seconds). To show the Desktop, task bar, etc., on the classroom screen, the task bar can be moved to the desired monitor.

When software is used that does not fully support multiple monitors (e.g., Equation Editor in Microsoft Word), then the author switches to simultaneous mode on the laptop while that software is being used in class.

A useful web resource for multiple monitors is the VideoSaver site at http://www.realtimesoft.com/multimon/ [as of Tue, Apr 20, 2004]. There are programming links, usage tips, etc. Their feature software is UltraMon. The UltraMon software system can be used to get more out of a multiple monitor system. As their web site states, ***UltraMon is a utility for multi-monitor systems, designed to increase productivity and unlock the full potential of multiple monitors. 1. Efficiently move windows and maximize windows across the desktop. 2. Manage more applications with the Smart Taskbar. 3. Control application positioning with UltraMon Shortcuts. 4. Multi-monitor support for desktop wallpapers and screen savers. 5. Mirror your main monitor to secondary monitors for a presentation.*** The price for one copy of UltraMon is $40 [as of Tue, Apr 20, 2004]. A trial version is available.

Another web resource is http://www.multiplemonitors.org/ [as of Tue, Apr 20, 2004].

Keyboard and layouts

Most people use the QWERTY keyboard layout. The design of this layout, going back to the second half of the 1800's, was designed without consideration for ergonomic factors. In fact, it appears that the design of the layout was done to avoid jamming the keys. The story goes that the letters on the top row allowed the salesperson to type the word "typewriter" without leaving that row, most likely to help make the sale by impressing the user with the speed with which such a long word could be typed.

In the 1930's, Dvorak developed the Dvorak keyboard layout. The placement of the keys was designed to make typing easier. The vowels are in the middle row of the left hand. The most used letters in the middle row of the right hand. More common letters are on the top row. The least used letters are in the lower row. The placement was adjusted to make it easier to type common combinations of letters. Here is the (most common) Dvorak layout for upper-case letters.

```
  PYFGCRL
AOEUIDHTNS
 QJKXBMWVZ
```

Here is the Dvorak layout for lower-case letters.

```
   pyfgcrl
aoeuidhtns
 qjkxbmwvz
```

A standard Windows (or Linux) keyboard can be converted to the Dvorak keyboard layout. The following command can make it easier to automatically invoke the "Language" tab of the Keyboard Control Panel applet.

```
C:\WINDOWS\rundll32.exe shell32.dll,Control_RunDLL main.cpl,@1,1
```

This (Windows Me compatible) command can be assigned to a shortcut, run from a batch file, etc.

However, it is nice to have labels on the keycaps. Hardware Dvorak keyboards are expensive. Keycap labels seem to cost more than they should. The author designed a Dvorak keyboard layout PostScript/PDF file/page that can be printed onto Avery standard address labels, cut, and pasted onto a keyboard.

From a business point of view, it turns out that once someone has learned a keyboard layout (e.g., the QWERTY layout), it is not cost-effective to retrain that person (i.e., the payoff is not that great). However, if one wishes to self-absorb the cost of retraining, it can be done in about 40 hours. The first 10 or so hours can be very frustrating, so if you are about to try it, plan ahead. The author tried switching over to the Dvorak layout in 1984, but switching between QWERTY on the mainframe and Dvorak on a personal CP/M computer was too inconvenient. After laser eye surgery in 2002 (which went very well), the author decided to give it another try while recovering and adjusting. After 10 days, the author was sufficiently converted to not consider switching back. The only frustrating part was (and sometimes still is) that once fingers have "learned" certain patterns, those patterns can be hard to unlearn. The author has now used the Dvorak layout for more than two years, and is not planning on going back to Qwerty. This can make it inconvenient for students to use the author's keyboard (e.g., during an in-class PowerPoint presentation), but does seem to make typing easier for the author. A future area of investigation is the promising area of voice recognition software that can, hopefully, reduce the amount of typing that must be done.

KVM's

Although one computer is enough for most users, there are times when one might need to use, or control, more than one computer. This is especially common in situations where network, web, and/or database servers are being controlled. Space and convenience are often issues. There is never seems to be enough space to put everything and there never seems to be enough time to do what needs to be done.

For example, three computers can take a lot of space if three keyboards, video monitors, and mice are needed. And, anyone who has tried to use more than one keyboard and/or mouse can tell you that it is not uncommon in such situations to start typing on one keyboard while looking

at a screen for another computer. While this is inconvenient, it can sometimes create problems if the right command is issued to the wrong computer.

This is a situation where one or more KVM's might be useful. A KVM is a device that allows one keyboard, video monitor, and mouse to be used with multiple computers. Thus, the name KVM.

The author has been using LinkSys KVM's for several years now and the descriptions here reflect that usage. There are larger more expensive KVM's, but most personal uses can be satisfied with either 2-port or 4-port KVM's. Both types are small boxes. Some have a button that is used to switch the computer to which keyboard and mouse signals are sent. Most recognize special keyboard signals to switch between options. If the KVM has no button, then keyboard signals must be used.

The LinkSys KVM's with buttons recognize the "Ctrl" key quickly pressed twice in succession as the signal to switch to the next computer. The LinkSys all-in-one 2-port KVM uses the "Scroll Lock" key quickly pressed twice in succession to switch computers.

A typical price for a LinkSys 4-port KVM is $80, without cables. Cables are extra and can range from $6 to $20 depending on brand, length, quality, etc. The LinkSys 2-port KVM, with a button, bundled with cables, is about $60. A LinkSys Proconnect Integrated (i.e., all-in-one) 2-port KVM switch, without a button, but with cables, is $35.

The more expensive KVM's have their own power supply (another cable and power brick) while the smaller ones get their power from the computer's keyboard port and default to the port that is providing power.

One annoying feature is that when DOS window sessions are used (not full screen sessions), the video signal is occasionally interrupted (Windows seems to do this) on task switching and the KVM may revert to another computer. This can be annoying but does not happen very often.

Another annoying shortcoming feature of Windows is that a PS/2 mouse, once lost or disconnected, requires a reboot of the computer to re-recognize it. This can happen with a KVM if a switch is made where the mouse is not connected. To avoid this problem, the author has a spare USB mouse on the web server so that the web server does not need to be rebooted just to re-recognize the mouse.

Iogear has a several USB KVM switches that add audio support, but the author his not had the opportunity to try theses systems.

Integration

Years ago, while director of Academic Computing, the author noted that the computer capability on the office desktop should match the computer capability in the classroom. [1] If the office has more capability than the classroom, the teacher will be frustrated. If the classroom has more capability than the office, the additional capability will seldom, if ever, be used. Since that time,

the author has reconciled this dilemma by putting a computer an a cart and then moving the cart between office and classroom.

The cart is comfortable enough to be used in the office. The current configuration of the cart is now described.

A UPS, uninterruptible power supply, is used to condition the power, and extend the life of the laptop battery when moving between office and classroom.

An inexpensive DSL/Cable router is used to connect to the Internet. Currently, fixed IP addresses are used in the classroom, so the router is assigned the fixed IP address, and the laptop uses DHCP to dynamically connect to the Internet. Thus, the laptop uses DHCP at home, at the office, and in the classroom. The author tried a wireless router and PC Card, but encountered problems. The current situation allows students with laptops, but no wireless card, to connect to the Internet during class (if they sit near the front and bring their own network cable).

A Gyration cordless mouse and keyboard, with USB connection of the relay to the computer, are used to move away from the cart during classroom presentations. In particular, the multimedia keys of the keyboard are useful, as they can be programmed to do certain actions (slide forward, slide reverse, etc.) when pressed. The author has actually hooked the keyboard in author-written software to do specialized tasks for classroom presentation. Here are the multimedia keys, in Delphi Pascal notation.

```
const
   VK_BROWSER_BACK        = $A6; // Browser Back key
   VK_BROWSER_FORWARD     = $A7; // Browser Forward key
   VK_BROWSER_REFRESH     = $A8; // Browser Refresh key
   VK_BROWSER_STOP        = $A9; // Browser Stop key
   VK_BROWSER_SEARCH      = $AA; // Browser Search key
   VK_BROWSER_FAVORITES   = $AB; // Browser Favorites key
   VK_BROWSER_HOME        = $AC; // Browser Start and Home key
   VK_VOLUME_MUTE         = $AD; // Volume Mute key
   VK_VOLUME_DOWN         = $AE; // Volume Down key
   VK_VOLUME_UP           = $AF; // Volume Up key
   VK_MEDIA_NEXT_TRACK    = $B0; // Next Track key
   VK_MEDIA_PREV_TRACK    = $B1; // Prev Track key
   VK_MEDIA_STOP          = $B2; // Stop Media key
   VK_MEDIA_PLAY_PAUSE    = $B3; // Play/Pause Media key
   VK_LAUNCH_MAIL         = $B4; // Start Mail key
   VK_LAUNCH_MEDIA_SELECT = $B5; // Select Media key
   VK_LAUNCH_APP1         = $B6; // Start Application 1 key
   VK_LAUNCH_APP2         = $B7; // Start Application 2 key
```

The 30 foot range of the wireless keyboard allows freedom of movement, though sometimes the signal is lost, due to a bad connection, weak batteries, etc. Without a wrist support, however, the remote keyboard is not of great use for typing (from the author's point of view).

A zip drive and USB CD-RW drive are used for backup purposes.

A 14-inch LCD monitor provides the third monitor and is attached to the cart with multipurpose ties to keep it from falling off during movement.

A security cable is used to provide a minimal level of security for the laptop while on the cart (e.g., while in the office, left unattended for a short period of time, etc.).

When entering the classroom, three cables must be configured: the power cable, the network cable, and the video cable. The power cable is plugged into the power outlet. The network cable is plugged into the network outlet. Since the instructor classroom computer is on that line, the author added a short cable with a connector that makes it easy to disconnect the instructor classroom computer and connect the router on the cart. Likewise, a video extension cable makes it easy to disconnect the instructor classroom computer and connect the laptop. A 2-port KVM (with a button) on the cart makes it easy to do this.

At the end of class, the reverse is done. In the office, a 4-port KVM is used. Since KVM's can be cascaded (i.e., hooked together), the KVM cable on the cart is connected to the KVM in the office, allowing the keyboard and mouse on the cart to control the web server in the office.

Summary

This paper has described the author's use of multiple monitor and KVM (keyboard, video, and mouse) technologies both inside and outside the classroom, with particular emphasis on setup, configuration, troubleshooting, and use of these technologies.

References

[1] Snyder, R. (1994). An institutional multimedia system for instructional support. Proceedings of the 8th Annual Computers on Campus Conference. Myrtle Beach, SC.

[2] Snyder, R. (1996). A personal multimedia system for instructional support. Proceedings of the 29th Annual Conference of the Association of Small Computer Users in Education. Myrtle Beach, SC.

A Practical Introduction to the XML, Extensible Markup Language, By Way of Some Useful Examples

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Abstract

XML, Extensible Markup Language, is important as a way to represent and encapsulate the structure of underlying data in a portable way that supports data exchange regardless of the physical storage of the data. This paper (and session) introduces some useful and practical aspects of XML technology for sharing information in a educational setting (e.g., class rosters). Such ideas can be useful for both end-users requesting information from the computer support staff and for the computer support staff in providing information needed and/or requested by end-users in a useful manner.

Introduction

Anyone who has looked at any book on XML will probably go away wondering what XML is all about. This paper introduces some useful and practical aspects of XML technology for sharing information in a educational setting by way of some, hopefully, useful examples.

Officially, XML stands for Extensible Markup Language.

XML, Extensible Markup Language, has become increasingly important in recent years as a way to represent and encapsulate the underlying data structures of a problem in a portable way that supports data exchange of the relevant data, regardless of the actual physical storage of the data, while supporting data presentation at the client browser using HTML. This paper presents a way to use XML to represent the critical path project management problem using, as an example, project management software written by the author for classroom use. As such, the paper serves as both an introduction to XML in general and as a specific application of XML.

XML, Extensible Markup Language, is a metalanguage that has become increasingly important in recent years as a way to represent and encapsulate the underlying data structures of a problem in a portable way that supports data exchange of the relevant data, regardless of the actual physical storage of the data, while supporting data presentation at the client browser using HTML [10]. Like HTML, XML can be used to format text, but, in addition, XML can be used to structure the underlying data.

When using XML, the first step is to design an XML data format for exchange. There are many ways to do this. In practice, the preferred way is the way in which everyone has agreed to repre-

sent a particular problem so that all of the systems are interoperable. In XML, customized tags are created to represent the data. The meaning of each tag is determined by mutual agreement of those using the XML format. XML was designed so that data in XML format can be self-describing. Here is one way to represent a sample of virtual red and blue M&M's using XML.

```
<?xml version="1.0" standalone="yes"?>
<!DOCTYPE sample SYSTEM "mm1.dtd">
<?xml-stylesheet type="text/xsl" href="mm1.xsl" ?>
<sample type="M&amp;M" id="0">
<item value="red"  />
<item value="blue" />
<item value="red"  />
<item value="red"  />
<item value="blue" />
<item value="red"  />
<item value="blue" />
<item value="red"  />
</sample>
```

The first three lines are header information that specify the XML version, the syntax requirements of the XML (described below), and the stylesheet to be used to visually depict the XML (described below). The rest of the XML, for this example, represents the structured data. XML looks superficially similar to HTML except that XML has a much stricter syntax. In particular, every tag needs and ending tag. The following are equivalent.

```
<item value="red" />
<item value="red"></item>
```

Every valid XML document must have a root element. In an HTML file, the `html` element is the root element. In a document representing virtual M&M's, the `sample` element is the root element. In this XML format, the `type` attribute for the `sample` tag is the type of sample and the `id` attribute is the database identifier for the sample, or `0` if there is no database behind the scenes (i.e., the virtual M&M sample is dynamically generated but not stored persistently).

One way to make the data format more robust for exchanging data in XML format is to specify some syntactic restrictions on the data format using a DTD, Data Type Definition.

Here is the (external) DTD for the previous XML that, for reference purposes, is stored in file `mm1.dtd`.

```
<!ELEMENT sample (item*)>
<!ELEMENT item EMPTY>
<!ATTLIST sample
   type CDATA #REQUIRED
   id   CDATA #REQUIRED
   >
<!ATTLIST item
   value CDATA #REQUIRED
   >
```

Without getting into too many technical details, here is a short explanation of the above DTD.

- The root element of the document is `sample`, so `<sample>` and `</sample>` tags are needed.
- The tag element `sample` contains zero or more `item` tags.
- The `sample` tag has the required attributes `id`, the database id, if any, of the sample, and `type`, the type of the sample.
- The `item` tag is empty and has the required attribute `value` which is unevaluated text (i.e., `CDATA`).

The primary use of the DTD is to insure that interacting processes developed by different people, organizations, etc., conform to an agreed-on data format. Thus, the use of the DTD is not strictly necessary and can be omitted when first starting to use XML until one has gained some experience with XML.

There are many ways to visually depict the underlying data. An XML-compliant browser, such as Microsoft Internet Explorer 6.0, will, in the absence of a style sheet, display the XML tree.

Another way to visually depict the underlying data is to use a stylesheet. One stylesheet format is CSS, Cascading Style Sheets. A problem with using CSS is that attributes of tags cannot be displayed. Another way is to use XSLT, Extensible Stylesheet Language with Transformations, which is essentially a system that transforms tree structures into trees (or other output).

Another common method to visually depict the underlying data is XSLT, which allows access to the attributes of each tag. An XSLT stylesheet file is an XML file so it must adhere to the rules for an XML file. By changing the stylesheet used, the HTML output can be easily changed.

Another way is to use program code that explicitly loads the data and displays it. A simple way to do this is with SAX, a Simplified API for XML. A more powerful, complicated, and more computationally expensive way to do this is with the XML DOM, Document Object Model. The Microsoft MSXML component makes this fairly easy to do.

Usefulness

An example to justify the usefulness of XML is as follows. Suppose that ***n*** groups wish to share related data, but each has a specific way of storing that data (e.g. transcript information by a Registrar at a University). In order to share data, each of the ***n*** groups must write customized program code to export to ***n-1*** data formats and to import from ***n-1*** data formats. This could be a nontrivial effort, as in general $2*(n-1)^2$ data format conversions are required to make each groups format interoperable with every other groups format. If there were a common intermediate language for data transfer, then, if each group created ***1*** conversion of their format into that intermediate language and ***1*** conversion of their format from that intermediate language, only ***2*n*** data format conversions would be needed for all the groups, rather than $2*(n-1)^2$. XML is such an intermediate format. And, in the case of XML, each of the ***2*n*** data format conversions can use standard software specifications and software to work with XML and XML-related technologies. Finding qualified people to do the transformations should become easier as XML achieves more widespread usage. These are some of the motivating factors behind XML. Note that the previous

analysis is similar to using an intermediate language between ***n*** high level source languages and ***m*** low level target languages whereby, instead of ***n*m*** complete compilers, only ***n*** front end (i.e., source code handling) compilers and ***m*** back-end (i.e., target code generation) compilers are needed.

For example, one might want to make student transcript information available to approved users (e.g., faculty advisers). Allowing faculty access to the actual database might be either difficult or place a burden on the database management system (i.e., the institutional database system). A common approach, used in business for many years, is a three tier client-server model whereby the data is replicated and synchronized to/from an intermediate server so that end-users can easily access the data but not bog down the mainframe system. Since transcripts do not change very often, and, in most cases, an adviser is interested only in the transcript for a one student at any one time (i.e., not in a query that asks which students have taken a given course), then an XML transcript record could be very useful.

The primary problem is coming up with in XML format to which everyone agrees. Then both sides, the user interface side (i.e., boundary object) and database side (i.e., entity object) are separated from each other, allowing independent changes on either side so long as the XML format is maintained.

Even if data is not to be shared among groups, it might be shared between one web page. One useful example is that of a text database.

This process can be simplified to three steps.

Step 0. Decide on an XML format.

Step 1. Convert the data to XML.

Step 2. As needed, convert the XML to a display format (e.g., HTML).

Some examples will now be briefly discussed.

Text databases

XML can often be used to facilitate database access for data for which a database management system is not needed or desired. Using a data management system, such as SQL Server, introduces an overhead and, in some cases, a licensing fee, as well as support costs. The advantage of a relational database system is that data can be accessed in a relational manner. That is, the data can be accessed in many related ways that are not dependent on the fixed structure of the database. However, there are many applications where a full relational model is not needed. In such cases, a hierarchical database structure can be used in the form of XML. Note that it may still be useful to keep the data in a relational database, but generate the XML to be accessed in a hierarchical manner.

The author was looking for an application of XML for storing a large text database. The large text database used was a public domain version of the 1611 King James Bible that consisted of several megabytes of text organized into books (66), chapters (over 1000 total), and verses. Other text databases might include the works of Shakespeare, etc.

The approach used was as follows.

Step 1. A (Delphi/Turbo Pascal) program was written to take the (huge) text file and partition it into XML consisting of books containing chapters containing verses. The XML directory consists of over 5MB of data in 1190 files. This is fairly easy once the format of the XML is decided.

The XML directory format used the number of the book (i.e., 01 to 66) as a prefix, followed by the number of the chapter of the book (i.e., 001 to 999). So, the first chapter of Genesis is in file 01-001.xml while the last chapter of Revelation is in file 66-022.xml. The file 00-000.xml is the index file and has the following format.

```
<?xml version="1.0" standalone="yes"?>
<rmsBible>
   <rmsBook index="01" chapters="50" book="Genesis"/>
   ... books 02 to 65 omitted ...
   <rmsBook index="66" chapters="22" book="Revelation"/>
</rmsBible>
```

A chapter in a book, such as Genesis 1, in file 01-001.xml, has the following format.

```
<?xml version="1.0" standalone="yes"?>
<rmsChapter book="Genesis" chapter="1" verses="31">
<rmsVerse index="1">
In the beginning God created the heaven and the earth.
</rmsVerse>
... verses 3 to 31 omitted ...
<rmsVerse index="31">
And God saw every thing that he had made,
and, behold, it was very good.
And the evening and the morning were the sixth day.
</rmsVerse>
</rmsChapter>
```

Thus, starting at the index file 00-000.xml, any verse in any chapter can be accessed.

Step 2. A web page using ASP, Active Server Pages, was written to provide access to the text. Thus, one web page provides access to over 1000 chapters. Creating thousands of similar web pages to access the data would not be a good idea.

For completeness, here is the HTML/ASP that could be used to load the first chapter of the first book, 01-001.xml, and generate the HTML.

```
<%@ language="VBSCRIPT" %>
<% option explicit %>
<% Response.Buffer = True %>
<html>
```

```
<head>
<title>King James Bible</title>
<body>

<%
Sub loadChapter(fs)
Dim xml1, doc1
Dim book1, chapter1
Dim nodes1, i, n

   Set xml1 = Server.CreateObject("MSXML2.DOMDocument.4.0")
   xml1.async = False
   xml1.resolveExternals = False
   xml1.load fs

   Set doc1 = xml1.documentElement
   book1 = doc1.getAttribute("book")
   chapter1 = doc1.getAttribute("chapter")
   Response.Write book1 & " " & chapter1 & ":"
   Response.Write "<ol>"
   Set nodes1 = doc1.selectNodes("rmsVerse")
   n = nodes1.length
   For i = 1 To n
      Response.Write "<li>" & nodes1.item(i-1).text & "</li>"
      Next
   Response.Write "</ol>"
   Set doc1 = Nothing

   Set xml1 = Nothing
   End Sub
%>

<% loadChapter("D:\X\KJV.XML\01-001.xml") %>
</body>
</html>
```

The output would appear similar to the following.

```
Genesis 1:

1. In the beginning God created the heaven and the earth.
... verses 3 to 31 omitted ...
31. And God saw every thing that he had made,
and, behold, it was very good. And the evening
and the morning were the sixth day.
```

A more complete page would allow the user to select from any book and, within that book, select any chapter. The author's has written an HTML/ASP page that does this.

Generated versions of questions

Another useful application of XML that the author has used is a system to generate multiple instances of problems such that students can access and try the questions, knowing that some of them will be on the exam. During the 2004 Spring semester, the author created over 30 such problems for a course in business statistics. The details of the creation of these problems, involving object-oriented programming techniques, is beyond the scope of this paper, but the XML output can help in understanding the use of XML.

Here is the format of the index file 000.xml for one of the problems.

```
<?xml version="1.0" standalone="yes"?>
<rmsQuestions type="regress1" fd="REGRESS1" fn="000"
   topic="Slope of a line" index="0" count="24">
   <rmsRandoms count="4">
      <rmsRandom value="15"/>
      <rmsRandom value="111"/>
      <rmsRandom value="141"/>
      <rmsRandom value="201"/>
   </rmsRandoms>
</rmsQuestions>
```

In this case, the problem type involves determining the "Slope of a line". There are 24 such problems, in files 001.xml to 024.xml. In general, hundreds of instances could be created. Note that, for generating random numbers in a certain way, some random number seeds are provided in this file.

Here is the format of the first question for this question type.

```
<?xml version="1.0" standalone="yes"?>
<rmsQuestion type="regress1" fd="REGRESS1" fn="001"
   topic="Slope of a line" index="1" count="24">
   <rmsRandoms count="4">
      <rmsRandom value="7"/>
      <rmsRandom value="155"/>
      <rmsRandom value="53"/>
      <rmsRandom value="183"/>
   </rmsRandoms>
   <rmsSteps>
<rmsStep>
What is the slope of the line going through the points
(11, 26) and (49, 68)?
</rmsStep>
<rmsStep>
The slope of a line with points (x1, y1) and (x2, y2) is
m = rise/run = (x2-x1)/(y2-y1) = (49-11)/(68-26) = 42/38 = 1.11.
</rmsStep>
<rmsStep>
The answer, in the required format, is 1.11.
</rmsStep>
</rmsSteps>
<rmsChoices type="1" answer="1.11" format="x.xx"/>
</rmsQuestion>
```

Again, random number seeds are provided so that a problem formatting system can generate random numbers in the same way every time that a question is generated. Four values are provided to allow for four versions of the random formatting.

By convention (of the author's format), the first step is the problem statement. The last step is the answer. The in-between steps cover how to solve the problem. The choices could consist of multiple choice letters. But, in this case, the choice is a numeric answer with format "x.xx". The interface program would allow the user to specify all three digits in multiple choice format, but selecting digits 0 to 9, in some convenient way (depending on the interface).

The web page allows access to any of the generated questions. The interface might appear as follows.

```
Example multiple choice questions for "Slope of a line".

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
```

A student can select a question, enter an answer, see if it is correct, and select the "Show me how" to see how the question might be answered. Many students use the "Show me how" first, and then learn how to do the questions that way, but at least most of them learn how to answer the questions.

Web server considerations

From the web server point of view, the ASP pages need access to the XML data. Typically, the XML data is not to be directly available on the Internet. Thus, the web server needs access to a directory containing the XML, but that directory is not directly available on the Internet. The webmaster must allow this access for XML to be used in this way, which could be a problem if the webmaster will not cooperate in granting the access.

Summary

This paper has introduced some useful and practical aspects of XML technology for sharing information in a educational setting by way of some useful examples.

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Design Principles to Improve Website Accessibility

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Introduction

We live in a maze of silver bullets and werewolves (Brooks, 1995), mythical man months and fears of humiliation if caught violating Brooks' Law (Brooks, 1975), mental models of Tom Sawyer and partitionable / nonpartitionable projects (Johnson-Laird, 1983), heavyweight PMBOK/ANSI (PMI, 2000) standards and the like. Successfully navigating this maze of project management laws, paradigms and standards is a formidable task for large projects. Exactly where is Van Helsing and his kit of monster-destroying tools when those smaller "demon projects" suddenly appear out of no where, replete with a cloud of gray smoke and the smell of brimstone?

We have been aware for years that only a fraction of all projects are completed on time and within budget. This study was a measure of larger information technology. We must also be mindful there is an entire class of small to very small projects that also need to be completed successfully. We will examine a project management methodology for smaller projects that comes by way of quality improvement, providing a necessary element of structure without the document and process overhead of traditional larger project management methodologies. Agile methods, so successful in software, now have a counterpart in project management.

Characteristics of smaller projects to which this methodology has been applied include:

- They are projects in the sense that there is a defined beginning and end, and not a repetitive endeavor.
- They have basically a zero budget (employees are expected to get them done as part of their daily work), hence Earned Value Analysis is not appropriate.
- They are restricted by time (there is a specific deadline in which to complete the project), hence computation of a Critical Path is not an issue; perhaps there are only two nodes, START and FINISH.
- They must be completed correctly, hence quality is an issue.
- Accommodation of smaller projects with a different, lighter project management strategy fits well as part of Agile Methods

Examples of smaller projects that fit these characteristics include:

- Development of a new course to be implemented the next semester while teaching a full load
- Mounting a new Internet web server and transferring 25 domains for hosting (in a one-week timeframe) with no release from full-time duties

Learning from Quality Improvement

Two terms that have been borrowed from the Japanese are HOSHIN (a breakthrough innovation or dramatic change in level of performance), and KAIZEN (an ongoing refinement of process). The Hoshin process is, first of all, a systematic planning methodology for defining long-range key entity objectives, while not losing sight of the day-to-day "business fundamental" measures required to run the business successfully. Kaizen (Kaizen, n.d.) is a Japanese word meaning gradual and orderly, continuous improvement. Kaizen has (and must contain) two distinct parts: improvement/change for the better, and ongoing/continuity. As an example, the phrase "business as usual" contains the element of continuity without improvement. The expression of "break-through" contains the element of change or improvement, but is missing the element of continu-ity.

Eddlestone and Roberts (1992) have illustrated two cycles of the Plan, Do, Check, Act (PDCA) cycle sometimes called the Deming or Shewhart cycle for improvement (ISO, 2002), with one cycle representing Hoshin, and another cycle representing Kaizen. The Agile PDCA Project Management Model (Figure 1) is a variation of this approach.

Application of the PDCA Hoshin/Kaizen Approach

Implications for the use of this as a project management methodology are based on the following eight steps:

1. PLAN - Develop process innovation (project) plans
2. DO - Implement plans
3. CHECK - Check capability (test and measure the success of the implementation)
4. ACT - Act on results (decision point)
5. PLAN - Develop process improvement (project) plans
6. DO - Implement plans
7. CHECK - Check variation
8. ACT - Act on results (decision point)

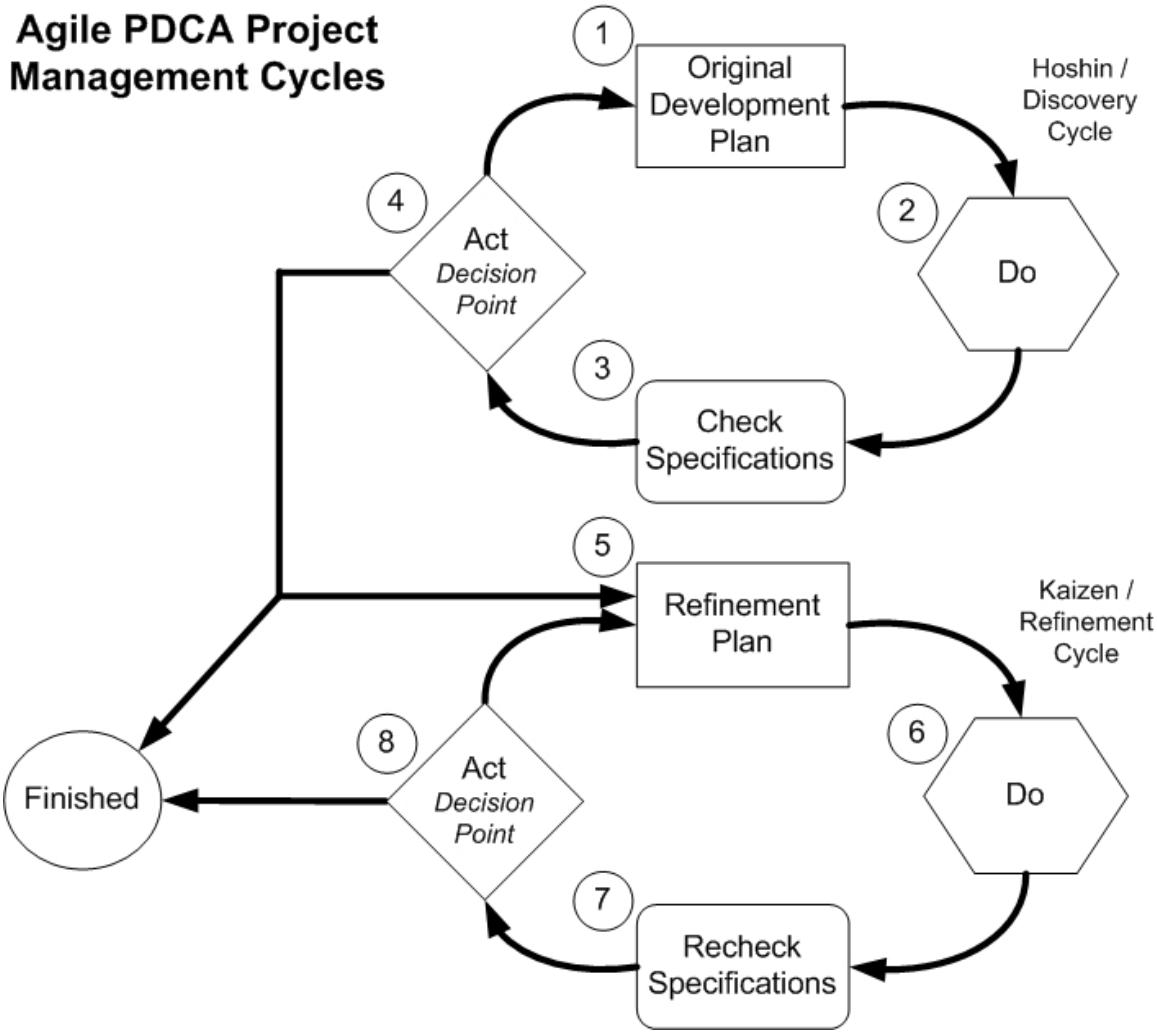

Figure 1. The Agile PDCA Project Management Model

It is to be noted that as we are dealing with a project that has an end, we have eliminated the path from Step 8 to Step 1, found in the original diagram. This feedback loop is used for the case when the process developed has become unstable and needs further breakthrough or development (Hoshin).

We will explain each of these eight steps as they are used in the practice of project management of small projects:

Step 1: Plans can be developed in a standard hierarchical outline form. It is also advisable that a second, parallel, plan be created in the form of a Pattern (as attributed to Christopher Alexander, 1975). The use of a pattern approach to describe a solution to small project implementation is basically a cross-check to validate completeness of the project steps.

Step 2: Implementation of a working prototype serves two key purposes: validation of the specifications given by the project owner, and opportunity for the developer to have a trial run at the

development of the final system, entirely consistent with Fred Brooks' "Build One to Throw Away" approach from the Mythical Man-Month Essays (Brooks, 1975).

Step 3: Test the prototype against the specifications. The project owner may now be involved to test usability and functionality. At this point, the prototype will be determined: finished; needing changes; or, needing redesign and redevelopment.

Step 4: If the project has been completed, then it is HIGHLY advisable to go to lower PDCA (Kaizen) cycle for further refinement. Usually these refinements come from input by the project owner, and do not constitute major changes or a redesign of the system. Otherwise, another upper cycle needs to be completed, with a Refinement Plan, new implementation, and new testing/validation.

Step 5-8: Patterned after Steps 1-4 above, with the Plan step now being a Refinement Plan, and the Check step actually a validation the project now meets the required specifications.

The Plan (Step 1) Written as a Pattern

A sample of a modern version of Alexander's pattern template, found in The Knowledge Enabling Organon (Honeycutt and Pichou, 2001) is found in Appendix A. Below is an adaptation for the development of a new service course at Coastal Carolina University (“CCU”), and was used with the PDCA Methodology for managing this project.

NAME. Computer Science Service Course

ALIAS. CSCI 105, CSCI 106, CSCI 120 (Other service courses taught at CCU)

CONTEXT. University departments must provide a variety of service courses that not only serve majors in other departments, but provide a relevant learning experience for their majors as well. They can successfully be constructed to be of high quality as a service course, while serving as a quality elective for the hosting department's majors.

PROBLEM. While "all courses are equal," some courses "are more equal than others." Any new service course must have a legitimate and coherent content, be well-regarded by students and other faculty who place their student advisees in the course, and have the respect of the faculty who will teach the course. A service course can not be an empty placeholder course that is subject to ridicule as the material is considered "trivial" or not of value (out of date, etc.). Furthermore, it may be necessary for faculty to have to learn material with which they are not familiar to be able to deliver the course properly. This pattern is intended to detail the CS Department's experience with providing such a course.

FORCES. All disciplines are relying (or beginning to rely) on technology for origination, data collection, communication, and general advancement. More courses of this type will be needed in the future, so their creation should not be a mystery.

SOLUTION. Technology, as required today by all disciplines, can either be taught by the individual departments (on a one-by-one, individualized basis), or by the CS department (with enough variation so that it is not a one-size-fits-all approach).

When each department teaches such a service course, they each have to find someone technically competent to teach the course as well as provide the facilities. While optimal, this is not always possible. When one department offers such course material, a more general course is offered to serve several departments' needs (unless, of course, there are enough students to offer one specific course for one specific department of school).

The training should focus on skills necessary for the advancement of the discipline. These skills cross most all academic department boundaries and include:

- Communication
- Collecting data for research (quantitative or qualitative)
- Analysis of that data
- Presentation of the results
- Instructors in the CS Department, while literate in their field, may need to build some skill sets to be able to effectively offer a service course that targets a particular department.

METAPHORS.
Net-Centric Skills: Those without this general set of skills survive very well in our net-centric world. Data collection through the Internet and research skills (through search engines, etc.) are now a requirement and not an option.
Analysis Skills: Both business analysts and university researchers must have the skills outlined in CSCI 110 to be competitive (get the jobs), and persistent (keep the jobs)

EXAMPLES. Following is an example of using this pattern and the value in its use. The example course selected in CSCI 110, a new course that has been planned with the principles that were used to create this pattern:

- Developing a separate service course (such as for business):
- Enough students (estimated 750 per year)will be available for a large number of sections
- A common body of knowledge is desired by the School of Business that is unique to the School

From previous experience with service courses, the CSCI Department understands the following issues:

- How to handle training for large groups
- How to schedule resources for training large groups
- Access to the resources to provide the training (equipment and rooms)
- How to select and use one basic text for many sections of classes
- How to have the course sections set up and ready in time for advising so that we can place students into sections for Fall 2004

- Having a person that is well-trained and knowledgeable in the content area develop the curriculum in conjunction with the requesting party
- Coordinating the delivery of the curriculum with the Information Technology staff
- Having one person that is knowledgeable in the content area to coordinate faculty, curriculum, scheduling, and communication with other departments whose students are taking the course.
- The need for some standardization mechanisms (such as a standard exam) to make sure the professors all cover the material that is necessary for students to successfully complete the course
- The need for the students to learn a common body of knowledge so this course properly prepares the students for future tasks
- Proper hiring and availability of tutors for the students

RESULTING CONTEXT. The combination of course material, students from one or several disciplines, instructors (who may or may NOT have any experience with the material), and a general structure leading to a standard exit examination will provide a successful experience for the students.

Conclusions

In general, agile processes value production more than plan-driven processes, which consider planning artifacts as "first-class." (Cohn & Ford, 2003) The Agile PDCA Project Management Model is an example of such a process, concentrating on activities and their consequences while providing needed structure for small projects with little or no budget, and very little time to be completed.

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A Follow up: Developing Growing Need for Soft-Skills in IT Professionals

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Abstract

In this paper we follow up *Developing Growing Need for Soft-Skills in IT Professionals,* a paper from the 2003 ASCUE Conference. In that paper we examined the need for "soft-skills" by information technology professionals. In the current economic climate, IT outsourcing is becoming increasingly popular. Our Columbus, Indiana Purdue campus has a long history of partnerships with Cummins Inc. In the past two years we have worked with Cummins to develop the Business/Systems Analyst Training program to retool valued IT professionals at Cummins. The focus is on turning Cummins from a traditional IT organization into one that is increasingly based on dealing with offshore outsourcing. The skills required in-house will focus more on the "soft-skills" as Cummins transitions employees from programming to business/system analyst positions. Since presenting our paper last year we have delivered two sessions of the Business/Systems Analyst Training. In this paper we will provide an update with feedback from participants, management and faculty. How effective was the training? Is this a program that other universities can emulate? We will explore those and other issues in this paper.

Introduction

In our paper we submitted to last year's conference entitled *Developing Growing Need for Soft-Skills in IT Professional*", we took a look at a local Fortune 500 company, Cummins Inc. and their need for soft-skills in their IT staff. To give a little background, we will summarize the findings from our first paper. Cummins, like many companies in the United States in recent years has begun to utilize offshore outsourcing for IT positions. According to the Gartner Group offshore outsourcing continues to gain in popularity in the United States. According to Gartner Group the draw is lower costs, coming mainly from the use of less expensive labor (Perez, 2003). India is the largest provider of offshore outsourcing for the United States and a major supplier of Cummins' outsourcing needs. Some types of IT work can be done for 20% to 50% less using offshore outsourcing (Hoffman, 2003).

Cummins has found the cost savings of offshore outsourcing attractive and have pursued that with a firm in India. Cummins estimates that currently about seventy percent of their IT staff is

in applications development and support. To effectively compete, management determined that they would need to reduce that to about thirty percent of their IT staff. One of Cummins' goals was to take valued employees with outdated skills and retool them to be effective personnel in Cummins changing IT environment. They reasoned that it was better to retool these employees that were already in the community and familiar with the Cummins culture than to recruit all new workforce. The skills Cummins needs in the move to offshore outsourcing are Business/Systems Analyst skills. Specifically, to be successful with offshore outsourcing Cummins needed professionals that could create tight specification packages that could be passed to offshore programmers. They also needed these professionals to be able to effectively team with these contractors and users to develop and support applications.

Cummins approached Purdue with a proposal to develop a program to train Business/Systems Analysts. At the time of last years paper Cummins agreed to have Purdue offer two courses in their Systems Integration track (a track used to prepare students to become Systems Analyst). The first phase would be to offer CPT 280 - Systems Analysis and Design Methods, in condensed format (five days and a final exam) and students would then be given a Cummins' specific project that they would work on in teams similar to Cummins' Six Sigma training. Six Sigma utilizes short courses followed by work on a live project and then coming back for additional training. They would have three progress reports with the team of instructors teaching the course and a final presentation. The course would be delivered in a team approach using four instructors, three from the Computer Technology Department (CPT) and one from the Organizational Leadership and Supervision Department (OLS). The "soft skills" section communication and teaming would be delivered by the OLS professor. A second phase would have students selected from the two CPT 280 sessions to take the CPT 380 Object-Oriented Systems Analysis and Design course.

Since we presented the first paper, the format and content were changed. In September 2003 we delivered our first program with plans to deliver five in the 2004.

Business Analyst Program

Course Format

In September 2003 we delivered the first session of the Business/Systems Analyst Training. The format of the session was a five day class meeting from 8:00 to 5:00. The format was lecture along with individual and group exercises. At the end of class students were placed on teams and given a "live" Cummins' project to work on. They met with individual instructors via teleconference three times to give progress reports and get feedback. A final teleconference had all teams present their results to their peers and instructors at the end of October.

Although the basic format did not change, Cummins decided to offer the course as Continuing Education instead of a for credit format. For the students this meant there were no quizzes, exams, or final grades given for the class.

In January 2004 we delivered the second session of the Business/Systems Analyst Training. For this session the only change in the format was in the progress reports. In this session all instruc-

tors and students were involved in each teleconference. The intent was to have all instructors provide feedback for each group instead of one instructor. as in the first session. This allowed students to get additional feedback from all of the instructors and allowed them to see their progress comparative to the other teams.

Course Content

The following are the topics that were covered in the training.

1. The Context of Systems Analysis and Design Method
2. Information Systems Building Blocks
3. Communicating with the Systems Team
4. Team Building with the Systems Team
5. Information Systems Development
6. Project Management
7. Systems Analysis
8. Fact-Finding Techniques for Requirements Gathering
9. Modeling Systems Requirements
10. Data Modeling and Requirements
11. Process Modeling
12. Feasibility Analysis and the System Proposal
13. Object-Oriented Analysis and the Modeling using the UML
14. Database Design

The "Communicating with the Systems Teams" and "Team Building with the Systems Teams" consisted of 4 hours out of the 40 hours of training. These are the so called "soft-skills" of the training. These two topics were covered on the first day. Even though this seems like such a minimal amount of time to devote to the "soft-skills" portion of the training, these skills were taught throughout the course in all of the topics. Each professor made it a priority to teach the technical skills, besides reinforcing the importance of communication and working in teams to the success of getting the technical skills "right". Example – fact finding is a tool/technique of collecting pertinent information from the stakeholders of a project. Learning the tool/technique of fact finding is the technical part of the training. Learning how to communicate with the stakeholders in order to use this tool to its fullest, are communication skills and team building skills, hence "soft-skills".

Feedback from Program

In this section we will discuss the feedback of the program specifically in terms of the soft skills based on comments of Cummins IT training coordinator, the instructors who handled the training of the soft skills and the students' feedback.

The Cummins representative who was involved in setting up the program was the Cummins IT training coordinator. After the second session we asked him several questions concerning the soft skills portion of the class. The following are some of his comments on the program.

How important are the "soft-skills" (communication and teamwork) to a Business/Systems Analyst at Cummins?

> "In response to this, I am thinking of the results of the half day we held that prioritized the skills needed by an analyst at Cummins. The group prioritized soft skills very high. This was identified by that team as perhaps the area most lacking for analysts and were considered very important" (Nehring, 2004).

> How receptive do you think the Business/Systems Analysts were to the "soft-skills" part of the class? Helpful? Unnecessary? Why pay for this? We already know this? Etc.

> "I think again the results of the course assessment indicate how the attendees viewed this. Comments included "very important", "learned a lot", "valuable", "excellent instructor", etc. Hallway conversation also validated this. People really enjoyed and benefited from this part of the training" (Nehring, 2004).

> How receptive do you think the managers of the Business/Systems Analysts are to the "soft-skills" part of the class?

> "Managers are less receptive. The erroneous thinking is that if we have to cut something, cut this. I believe that management feels that anyone can learn soft skills in the day to day work they perform. Also, comments such as "Why pay for this? There must be some other less expensive way," or "We already know this stuff". It is interesting to note that managers think that soft skills training can be provided by eLearning tools. The reality is that the soft skills training available through eLearning is less effective than other training using this medium. Frankly, most people don't like the soft skills training available through eLearning" (Nehring, 2004).

Based on the above comments from the IT Training Coordinator, it can be assessed that the students' reaction to the training was positive. They felt it was beneficial and they learned a lot. Ironically, the managers still see that paying for "soft-skills" isn't beneficial. I am not sure if they fail to see the correlation between learning the tools/techniques and the importance of strong communication skills in order to use these tools effectively. Or is it more a function of limited training budgets, and when "push comes to shove" training money is spent only on technical skills and not "soft-skills". I would argue it is the latter. However, communication skills are vitally important for IT professionals, especially in the outsourcing environment. According to an article in *Computerworld*, "Job Skills: Preparing Generation Z", CIO's say college graduates aren't ready for corporate IT jobs. "We have to get away from strict programming and systems development" says Voutes. "Those are skills to get into the field, but we have to train our technology people to think more like business people and arm them with strong communication skills" (Hoffman, 2003). Research and field experience indicate an important, if not critical need for soft skills training.

Implications

The Information Technology Association of America (ITAA), in a recent study states that outsourcing has eliminated nearly 104,000 jobs so far. This is nearly 3 percent of the positions in the United States technical industry with software engineers being the hardest hit. They also predicted that the demand for U. S. software engineers will shrink through 2008. (Heikens and AP). This is already having an effect in computer programs at universities in the United States. A study to be published in May 2004 shows the number of declared majors plunged by 23 percent in the 2002-2003 school year. This is alarming considering the enrollments continued to increase after the dot-com bubble burst earlier in the decade (Schoenberger, 2004).

What are the implications? The feeling is that jobs will be going offshore at least for the foreseeable future. Employees that remain will need to adjust. The skills that are important at least in the eyes of one Fortune 500 company include what Cummins calls Business/Systems Analyst skills. The software engineers that remain will need to be retooled, with strong technical skills, and stronger business and communication skills. Even though managers seem unwilling to pay for strictly "soft skills", students, instructors and Cummins' training coordinator comments indicate it was a vital part of the course and those same managers see the need for communication skills. In many respects this is similar to what happened in the auto industry several decades ago. As with the auto industry, employees lost jobs in efforts by car makers to save costs. Many of those workers that remained found the need to retool their skills to stay employed.

As for academia, what does this imply for the information technology programs? Students and potential students are aware of what is happening in business and industry. I have had students and potential students ask if they will be able to get a job after they graduate. Our numbers in Computer Technology at our Columbus site reflect some of the national numbers mentioned. Like the computer programmer working at Cummins, we are faced with the hard reality that we will have to make changes to survive. Nancy Wilson Head is the Director for Purdue programs at Columbus Indiana site. She is also an Associate Professor in member in Purdue's Computer Technology Department teaching classes in the System Integration track that prepares students for careers as System Analyst. Ms.Wilson Head offered a few comments in her role as professor and site director concerning importance of "soft skills" and implications to outsourcing on our program. Following are her comments:

How important are "soft-skills" (communication and teambuilding) for the IT professional?

> "Soft-skills are extremely important. A successful IT professional must be able to speak/read/write/listen effectively. Taking off my academic hat and speaking as an Information Technology (IT) professional, I know that the people who get promoted are those who communicate well with all levels of employees, inside of IT and outside of IT. Putting my academic hat back on, I know that the students whom recruiters hire excel in technology skills but can also speak/write/listen to users and all levels of management. Recruiters have sometimes criticized our graduates because their soft-skills aren't strong enough. I think teambuilding is a skill crucial for promotion within IT. But you have to learn to be a good team MEMBER before you will be skilled at team building" (Wilson Head, 2004).

How do you reinforce the "soft skills" in your computer courses?

> "In my courses I use personal examples of how I learned the hard way that soft-skills were important. I give examples of past co-workers who failed miserably in a project or didn't get the promotion they wanted. Not because they weren't technically knowledgeable but because they were poor communicators or poor team players or their interpersonal skills were deficient. I also ask students who are working in the IT industry to give us examples of someone they know where they work who has poor soft skills. We often find these examples as humorous, but the students are learning by the example" (Wilson Head, 2004).

In industry, why do you feel that managers are reluctant to spend money on "soft-skills"?

> Because they don't often see the return on their dollars. The payback is much slower. A manager can send someone to learn a new programming language or a new technical skill, and that person can come back to the work place and immediately put that skill in place. Also, because soft skills are harder to measure. I can measure the number of lines of programming code someone writes, but how do I measure if someone is an effective team member or an effective team leader? How do I measure if someone listens well when the user is speaking about technical specifications needed for a new system" (Wilson Head, 2004).

Do you think the outsourcing will force us to revise our CPT curriculum and focus more on these skills?

> "I think outsourcing has already caused us to revisit the skills our graduates need. We can no longer churn out programmers or "techno-geeks" as we traditionally have. Those kinds of graduates are not hirable any longer. As you know, we've already seen an impact nation-wide. If we don't revise our CPT curriculum to meet the market's demand, our program will die" (Wilson Head, 2004).

As a Director what do you think the best way to approach this need is, in our curriculum or by offering the short courses?

> "I definitely think we need to address this within our curriculum. Short courses are sometimes effective, but those are one-time hits that students may or may not attend. By addressing it in the curriculum we have a captive audience and can build the message and enhance the skills as the students progress through all four years (more in the case of non-traditional students) of coursework. You can't teach the importance of soft-skills or the techniques of soft-skills in one course or one semester" (Wilson Head, 2004).

Conclusion

By all accounts it is apparent that offshore outsourcing is not going away. It has and will continue to have a dramatic effect on the IT workforce in the United States and in turn the college programs that provide workers in the industry.

At the writing of this paper we have successfully delivered two sessions of our Business/Systems Analyst Training program. By all accounts the program has been a success. An important part of the program has been a focus on the "soft skills". Comments by faculty, administrators and students point out the need for these skills in today's changing IT work environment. At the present time we are scheduled to deliver four more sessions before September of this year including a session in Darlington, United Kingdom. If all of these sessions are delivered we will have trained over approaching twenty percent of Cummins worldwide IT staff. We are also in negotiations with Cummins for a Phase 2 of the program that would explore some of the topics covered in the Business/Systems Analyst in more depth. We are also exploring the possibility of partnering with other universities in delivering this program to some of Cummins more distant sites.

In conclusion this has been a positive experience that has a win-win situation for Cummins, Purdue University and the Columbus Indiana community.

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Multi Media Madness – Improving Professional Development for Instructional Technology

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Abstract

Multi Media Madness (3Ms) was a faculty development program where participants were guided by mentors through the development of a multimedia project. Nine faculty participants attended a week long workshop session in June 2003 taught by three mentors. At the end of the workshop series, the participants submitted a project plan that was reviewed, critiqued, and approved by the mentors. During the summer, the faculty developed the proposed project with guidance from the mentors. In September 2003, the group met and presented their projects to their peers and evaluated the program. The 3M's program was considered to be a success by both the participants and the mentors; however, changes need to be made to improve future offerings. This paper presents a summary of the project and recommendations for improvement.

Introduction

Sinclair Community College offers over 100 faculty development workshops per year covering a variety of technology and pedagogy topics. Although the workshops have been well attended and the attendees have been very satisfied with the learning experience, it did not appear that the participants were transferring what they had learned at the workshops into the classroom. A spring 2002 survey confirmed the suspicions and a new program, Multi Media Madness (3Ms), was developed to address the issues identified in the survey.

The purpose of this project was to learn if faculty members gain a better understanding of instructional technology when they are guided by mentors in a project-based faculty development program. Nine faculty participants and three faculty technology mentors participated in this study. In June 2003, the participants attended a weeklong workshop series that covered instructional design, project planning, and a variety of multimedia tools. At the end of the workshop series, each participant submitted a project plan that was reviewed, critiqued, and approved by the mentors. Participants were given a multimedia notebook computer, software, scanner and laser printer for their use throughout the project. During the summer, the participants developed their projects with guidance from the mentors. The group presented their projects to their peers and evaluated the program in September 2003. The 3M's program was considered to be a success; however, changes need to be made to improve future offerings.

Project Results

Four methods were used to gather data for this study: survey, discussion, review of completed projects, and interviews. The data were collected during the wrap-up session on September 11, 2003 and in interviews with the mentors September 22 – 26, 2003. Data were collected to measure the amount of improvement in the participants' skill levels, their increased understanding of applying instructional technology, the quality of the projects, the perceived effectiveness of the learning experience, useful technologies, and effectiveness of the mentoring process.

The 3Ms participants completed a survey (see Appendix A) at the September wrap-up session. Questions solicited feedback on the participants' perception of their beginning and ending skill levels, useful technologies, ease of learning the technology, mentoring process, learning experience, and technical support. They also had the opportunity to make suggestions to improve the program.

Group discussion topics at the wrap up session focused on which technologies were useful, what added and detracted from the learning experience, and how the overall program could be improved. Interviews were conducted with the mentors in late September to gain insight into their experience. The interviews began with an open-ended question so that the information was contributed freely and not determined by the questions asked. The 3Ms participants presented their projects at the wrap-up session. The projects were reviewed and evaluated by the researcher and the mentors based on instructional effectiveness, level of technical expertise, and use of multimedia.

The data for the improvement in skill level were gathered from the participants' survey responses to the skills self-assessment question (see Table 1). Participants were asked to rate their starting and ending skill levels for each of the technologies that they used to complete their projects and their starting and ending overall instructional technology skill level. The increase in ratings shown in Table 1 demonstrates improvement. The largest increases were seen in Microsoft Producer and video capture/editing. The average skill level for Producer increased from 2.00 to 3.30, a 65% increase; while digital video capture/editing increased from 2.40 to 3.90, a 63% increase. The participants' overall technical skill level increased form 3.36 to 4.10, moving from the *beginner* to *proficient* level.

The data for increased understanding of applying instructional technology were gathered from an open-ended survey question that asked the participants how their participation in the program improved their understanding of instructional technology. One participant stated that she gained confidence in using technology and would use technology in other classes. Another participant realized how multimedia could be used to better engage the students and allow them to construct their own knowledge. A third participant indicated that her skills had improved and that she would be more likely to request assistance from her colleagues and technical support staff. All participants agreed that they would use technology to develop additional enhancements.

Table 1. Starting and ending skill levels

Beginning Average	Ending Average	Change	Technology
3.70	4.60	0.90	Microsoft PowerPoint
2.00	3.30	1.30	Microsoft Producer
2.40	3.40	1.00	Camtasia
1.25	2.40	1.15	Vegas Video
2.80	2.90	0.10	Macromedia Dreamweaver
2.50	2.60	0.10	Macromedia Flash
2.40	3.90	1.50	Digital video capture/editing
3.30	3.80	0.50	Digital sound capture/editing
4.40	4.50	0.10	Scanning / digital image editing
2.90	3.70	0.80	Vox Proxy
3.36	**4.10**	**0.74**	**Overall instructional technology skill level**

Key: **1** – None **2** - Poor **3** – Beginner **4** – Proficient **5** – Expert

The quality of the final projects was judged at the wrap-up session by the researcher and the mentors. The projects were judged based on the instructional effectiveness, level of technical expertise, and types of multimedia used. As shown in Table 2, the participants found a variety of methods to integrate technology into the learning process. The review team was impressed with the unique ideas that were implemented by the participants. All projects were rated very good to excellent.

Table 2. 3Ms Projects

Project	Description
What is Horsepower?	Digitized a Dukane slide show that had been created in the 1960s
Theatrical Lighting	Scanned over 75 pictures and shot video of varying lighting effects and incorporated into a PowerPoint presentation
Blueprints	PowerPoint presentation to highlight and explain blueprints
Chemistry Pre Lab	PowerPoint presentation to demonstrate procedures prior to completing them in the lab
Dental Lab Dark Room	Producer presentation to demonstrate dark room equipment and procedures
Electronic Resume	Producer presentation to be used as an example for students who will be creating electronic resumes
Infertility Clinic	Producer presentation with digital video scenarios of nurse meeting with patients
Cardiac Surgery	PowerPoint presentation containing pictures and video from local heart surgeon
Student Email	Camtasia screen movies demonstrating features of student email system

The data for effectiveness of the learning experience were gathered from group discussions at the wrap-up session. Discussion topics included the effectiveness of the learning experience – what

made it a good learning experience and what detracted from the learning experience. Overall the participants agreed that it was an excellent learning experience. Eight of the nine participants strongly agreed that creating a project was more beneficial than attending workshop sessions. They especially enjoyed the workshops where they developed a group project, and indicated that the experience helped them understand the project development process and the uses for the various technologies. It was felt that the group project experience provided a good foundation to begin developing their individual projects. Several participants confessed that they procrastinated and that intermediate deadlines might have helped them stay on task.

The technologies used were determined from faculty responses to the survey where they were asked to indicate which technologies they used and to rate the ease of learning for each technology and from the project demonstrations. The wrap-up session also included a discussion about which technologies were most useful. The ease of learning ratings from the survey are shown in Table 3. PowerPoint, Producer, digital video capture, and digital sound capture were rated as the easiest to use and learn. This was further supported by the technologies that the faculty used most frequently in the development of their projects.

Table 3. Technologies used by 3Ms participants

Average Rating	Number of Raters	Technology
4.80	12	Microsoft PowerPoint
3.50	12	Microsoft Producer
2.20	11	Camtasia
1.60	11	Vegas Video
1.80	12	Macromedia Dreamweaver
2.00	11	Macromedia Flash
4.00	12	Digital video capture/editing
3.80	11	Digital sound capture/editing
3.10	11	Scanning / digital image editing
2.80	11	Vox Proxy

Rating Scale
1 – I did not use this technology.
2 – I attempted to use this technology, but it was too difficult.
3 – I learned to use this technology, but I needed a lot of assistance.
4 – I learned to use this technology, but required some assistance.
5 – This technology was easy to use / intuitive.

In discussions, the faculty agreed that PowerPoint and Producer were the easiest and most useful technologies. Even though digital video and sound capture were rated as easy to learn and use, participants complained that it was very time consuming to plan and write the scripts and record quality video and sound. It was reported that sound levels, popping "P's", and video recording were problematic. Further discussion revealed that those who used Sound Forge (sound capture software that was available on their notebooks) did not experience sound quality problems. Two faculty members experienced difficulty with video recording. One participant reported that it took seven hours to produce 10 minutes of usable video; however, a video producer who attended the session stated that this time commitment was not unusual. One participant who at-

tempted to video theatrical lighting effects experienced difficulty because the auto focus on the camera compensated for the lighting changes which prevented her from capturing the desired effects. This problem could have been quickly resolved if she had called her mentor or technical support staff, who would have instructed her to use manual focus.

The effectiveness of the mentoring process was measured by the number of times the mentors were consulted and the perceived value of the mentoring process from both the participants' and mentors' points of view. Participants were asked to rate the mentoring experience on the survey. Closed-ended questions asked the number of times a mentor was contacted and if the mentor was beneficial. Open-ended questions asked what problems were encountered in the mentoring process and how the process could be improved. The mentors were interviewed and asked to summarize their mentoring experience, explain what worked best, and suggest how the mentoring process could be improved.

The mentors were consulted an average of 2.83 times per participant. Eight of the nine participants found the mentoring process to be beneficial and six participants strongly agreed that having a mentor made them more willing to try something new. Although the mentoring and technical support processes were explained at the initial workshops and each participant was given a card with the names and phone numbers for all mentors and technical support staff, one participant was not aware that she had a mentor and another commented that a list of contacts would have been useful.

Recommendations for Future Offerings

Additional data were gathered to help improve the next iteration of the 3Ms program which began in December 2003. Suggestions for improvement were solicited during the group discussion at the wrap-up session. Six participants strongly or partly agreed that required meetings with their mentors and due dates for various milestones would have improved the learning experience. Eight participants strongly or partly agreed that periodic group meetings and required intermediate deliverables would have been beneficial.

A group discussion with the three mentors revealed that they each had different approaches to working with their mentees. M1's mentees had the lowest beginning skill levels. She scheduled meetings with her mentees and developed check lists for them so that they knew what they needed to do. Her mentees successfully completed their projects by the due date and they were very proud of their accomplishments.

M2's mentees had higher technical skill levels. Even though M2 contacted his mentees several times and attempted to set up appointments, he was successful in meeting with each participant only once. He suspected that because his mentees considered themselves to be technically skilled, they did not want him to know that they needed help. The faculty in this group did not complete their projects by the due date, but the pieces that they did finish were quite professional.

M3 simply told his mentees to call him if they needed help. One mentee never called for help, but was able to produce a PowerPoint presentation with a menu and six videos. The other two mentees called him once or twice to ask a question, but there were no face-to-face meetings.

The mentors agreed that the mentoring process needed to be more clearly defined. They recommended that all mentors use M1's check sheets to better guide the participants through the process. A *Designing Classroom Materials* workshop was also recommended. It was agreed that two or three mentees per mentor is the optimal ratio. They recommended that mentees be required to meet with their mentors on a monthly basis and that at least one group meeting of all mentors and participants be scheduled per quarter. It was suggested that the project scope needed more precise definition – one or two lessons where each lesson is composed of 15 to 25 screens or slides was recommended.

Conclusion

The 3M's program was considered to be a success; however, changes need to be made to improve future offerings. Overall the participants agreed that it was an excellent learning experience. Eight of the nine participants strongly agreed that creating a project was more beneficial than attending workshop sessions. All participants agreed that they would use technology to develop additional enhancements. The participants' overall technical skill levels increased from the *beginner* to *proficient* level. The review team was impressed with the unique ideas that were implemented in the projects. All projects were rated very good to excellent. PowerPoint, Producer, digital video capture, and digital sound capture were the technologies that were rated as the easiest to use and learn, and were also the technologies most frequently used in the projects. However, participants did experience some difficulty with video and sound capture. All participants successfully created a project, although some participants completed their projects two weeks after the due date. Intermediate due dates could help reduce this problem. All participants indicated that they would use technology for future course enhancements. Several participants and all mentors indicated that they would like to participate again. Although the mentoring process was considered beneficial, it needs to be improved. Suggestions for improvement include: use of checklists to better guide participants, required monthly meetings with mentors, quarterly group meetings to share ideas and progress, and intermediate due dates.

Appendix A
3M's Program Evaluation Survey
September 11, 2003

1. Please rate the ease of learning for the technologies that you used or attempted to use in developing your project.

Please rate each technology using the following scale:

1 – I did not use this technology.
2 – I attempted to use this technology, but it was too difficult.
3 – I learned to use this technology, but I needed a lot of assistance and/or it had a steep learning curve.
4 – I learned to use this technology, but required some assistance and/or it had a moderate learning curve.
5 – This technology was easy to use / intuitive.

Rating	Technology
	Microsoft PowerPoint
	Microsoft Producer
	Camtasia
	Vegas Video
	Macromedia Dreamweaver
	Macromedia Flash
	Digital video capture/editing
	Digital sound capture/editing
	Scanning / digital image editing
	Vox Proxy
	Other (please list):
	Other (please list):
	Other (please list):

2. For each of the technologies that you used to complete your project, please rate your beginning and ending skill levels using the following scale:

1 – None
2 - Poor
3 – Beginner
4 – Proficient
5 – Expert

Beginning	Ending	Technology
		Microsoft PowerPoint
		Microsoft Producer
		Camtasia
		Vegas Video
		Macromedia Dreamweaver
		Macromedia Flash
		Digital video capture/editing
		Digital sound capture/editing
		Scanning / digital image editing
		Vox Proxy
		Overall instructional technology skill level
		Other (please list):
		Other (please list):
		Other (please list):

Use the following scale for questions 3 - 5

1 – Strongly disagree
2 – Partly disagree
3 – Neither agree nor disagree
4 – Partly agree
5 – Strongly agree

3. Please rate your project creation experience

Rating	Question
	I will use technology to develop additional course enhancements.
	Creating my project was a rewarding experience.
	I feel that the project that I created will improve student learning
	Creating a project helped me better learn the technology than attending individual workshops sessions.
	Knowing that a mentor was available made me more willing to try something new.

4. **The following changes would improve the learning experience.**

Rating	
	Required meetings with a mentor scheduled at the time of the face to face workshops
	Periodic group meetings to share ideas, progress, and experiences with my colleagues
	Required intermediate deliverables
	Due dates for various milestones in project development

5. **Please rate the tool kit that was provided to you.**

Rating	
	The equipment was set up correctly
	The hardware was adequate
	I was able to complete the project with the hardware and software that was available for the 3 Ms program.

6. **Please rate the technical support that was available.**

    a. How many times did you request technical support for your tool kit? _____

    b. If you required technical support, what type of support did you need?

7. **Please rate the mentoring experience.**

    a. How many times did you consult a mentor? _____

    b. Was it beneficial to have a mentor available? Yes No

    c. Please explain how the mentoring process could be improved?

8. **How did your participation in the 3Ms program improve your understanding of instructional technology?**

9. **What was your biggest challenge in completing your project?**

10. **Other comments/suggestions.**

Thank you for your participation in the 3Ms Project

Center for Instructional Technology: A Strategic Imperative

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Abstract

Ohio Dominican University, a small traditional Catholic Liberal Arts University steeped in the Dominican tradition, is in the midst of a technological metamorphosis. At the forefront of the change is the Center for Instructional Technology. Charged with supporting the development of technology enhanced, hybrid, and totally online curriculum, the CIT wishes to showcase our web-supported (intranet) resource and the steps taken in the creation of this faculty portal. Provided will be the strategic plan, developmental stages, testing process, full implementation, faculty and administrative assessment and lessons learned. Using our Course Management System, WebCT CE, we have created a dynamic, interactive learning community with the specific intent of providing a repository for the sharing of best practices, helpful hints, training and development resources, online-faculty orientation tutorial and access to our CIT staff.

Introduction:

Technology enhanced education is the fastest growing and most controversial phenomena facing higher education. Small liberal arts institutions are not immune. Ohio Dominican University, a small urban liberal arts institution steeped in the Dominican tradition is in the midst of a technological metamorphosis. The impetus for this metamorphosis was to support not only the departmental mission but the overall strategic initiative identified by our leadership. Currently Ohio Dominican University has embraced web-enhanced courses but is hesitant to expand into hybrid or distance education. The mission of the CIT is to focus on the effective design and application of instructional technology in the learning environment to leverage our faculty expertise. Thus, we set out to provide faculty with alternatives beyond standard workshops for accessing resources to accomplish this mission. A second focus of our mission is to become the driving force behind the understanding, adoption and implementation of hybrid and fully online courses and degree programs. Due to limited staff and resources, we had to move in a purposeful and efficient manner. Described in this paper are the steps involved in this journey, including the development of our strategic plan, design and implementation process for our faculty portal, testing process, faculty and administrative assessment and lessons learned from our endeavor.

Strategic Plan:

Our team set out to define our mission, goals and strategic objectives with the understanding that it must first advance the university strategic plan but also incorporate individual job expectations and leverage our professional expertise. Each member of the CIT staff provides a unique perspective on faculty development and training. Our small department has experience as faculty, student advisor, curriculum developer, instructional designer, certified technology trainer, audio/video production specialist and digital media creation in all delivery forms. With such a wealth of experience coupled with a conscious effort to continue our own professional development and training, the questions of how to engage and provide faculty access to our expertise beyond the traditional venues needed to be answered. With guidance from our Executive Vice President who was also serving as our Vice President for Academic Affairs, we crafted our strategic plan to incorporate traditional means of delivering faculty training and professional development with an online component.

Developmental Stages:

In order to fully support the needs of our audience the CIT developed our faculty portal using three metrics. First, what do we, as Instructional Technology professionals, believe our audience needs to know to be successful using technology in enhancing their courses and programs? Secondly, identify, describe and demonstrate technologies that are currently available to our faculty. And finally, assess through a survey the needs articulated by our faculty.

In addition to the identified metrics for content development, the site also took into consideration our faculty level of comfort with technology. The goal of this site was to provide non-users the opportunity to experience the benefits of technology in a non-threatening manner. Thus, we spent an extensive amount of time discussing navigation to ensure our audience success in locating information of interest and need. For our novice and moderate users we provide access to resources, learning objects and exemplary courses to encourage continued development in their own courses. Finally, for our advanced users we provide access to trial accounts of new technologies, helpful hints and best practices from experts in the field and encouragement to utilize our staff to develop and incorporate advanced multimedia in their courses.

Website Design:

The architecture of the CIT site was chosen after research and review of similar institutional (size, scope, mission, demographics) resource sites and consultation with our Campus Web Master. The CIT site is comprised of an ASP (Active Server Page) application page that will dynamically display content based on user choice. This then dynamically displays information on the page based on the viewers' selection. This method allows the CIT staff to create content in their specific area of expertise by following a template without disrupting the overall design of the site. A Cascading Style Sheet is employed to ensure a uniform look specific to fonts, colors, and hyperlink styles. Once the page is completed, a UNC (Universal Naming Convention) encoded string is written. These strings pass a variable for the content to the ASP application.

Also included in the CIT site are two WebCT course shells. One serves as our faculty orientation course and the other a faculty forum to share best practices, concerns, raise issues and questions and discuss pedagogy. Our faculty training course provides faculty an experience from a student perspective. We believe faculty, through this experience, will discover how their curriculum can be presented and learning outcomes accomplished through the use of tools available in our Course Management System and other instructional technologies. In this course we provide both synchronous and asynchronous activities as well as remind faculty that old technologies such as phone, blackboards and chalk are still viable tools in learning. Following the completion of the training course, we encourage faculty to participate in the faculty forum. Faculty who have participated in the online orientation then become faculty advocates and/or mentors responsible for encouraging continued faculty participation. The goal of these additions is to create a community of learners sharing resources and best practices across disciplines.

As the site continues to develop we will move to a database driven technology. This will enable us to manage site content such as text, images, audio, as well as PDF documents and training schedules in SQL tables.

The issue raised in the creation of a dynamic push/pull technology is who controls technology resources; IS (Information Services) or the Center for Instructional Technology? The debate then becomes how much access to technology resources a non-IS staff member should be given and are there programmatic and pedagogical reasons that would legitimize non-IS staff having full access to these technologies. This issue has not been resolved on our campus to date, however, the CIT has been granted access under the watchful supervision of our Information Services department.

Testing Process:

Initial testing was broken down into three main categories; layout/design, cross browser capability and content. For layout design we felt it best to seek input from multiple sources. We identified individual reviewers who were internal and external, vested and non-vested, novice and advanced technology users. The task of these individuals was to assess the overall look and feel of the site. Specifically they were asked to assess if the site was intuitive in navigation, quick to load, visually pleasing and engaging/interactive. Those who had experience or expertise in instructional technologies were then asked to provide feedback on missing components. Cross browser capability was tested by reviewers using multiple browsers and operating systems. The CIT site is specifically designed to meet current Web development standards. Content was reviewed by Ohio Dominican faculty as they are the primary audience. However, many of our external reviewers were experts in distance education and provided insightful recommendations.

Once the initial testing was complete the site was reviewed and approved by the Executive Vice President and acting Vice President for Academic Affairs, Vice President for Marketing and Enrollment and the LIS (Learning and Information Services) Committee consisting of Deans, faculty and Administrative staff.

Assessment:

Our assessment criterion is divided into three categories; faculty use, faculty adoption, and faculty retention.

- Number of hits
- Number of faculty questions and requests
- Number of requested appointments
- Number of faculty taking advantage of open labs
- Number of faculty taking advantage of CIT open office hours
- Number of faculty participating in the faculty forum
- Follow up survey for assessing effectiveness in the classroom

Faculty use will be measured by the number of overall hits and return hits to the site. In addition to number of hits, navigation effectiveness will be assessed by the number of faculty questions requesting assistance with the site. Continued development of the site will be based on requests and suggestions from ODU faculty. Adoption of the technology will be measured though the number of individual appointments scheduled for consultation with one of the CIT staff, participation in open labs and CIT office hours, as well as the increased number of requested WebCT course shells. Technology adoption will be determined through faculty's use of the requested shells with respect to number of tools and level of technologies utilized within each course. Retention will be measured by the continued participation and growth of the repository of best practices and the sharing of ideas in the faculty forum. Additional retention will be measured through continued use of the CMS and institutional faculty commitment to move to hybrid and/or completely online courses and degree programs.

Lessons Learned:

- If you build it, they won't necessarily come!
- IS versus CIT, who owns it?
- Change?
- Faculty frighten easily!
- Client/Consultant or Black Box system?

Our initial attempt to engage faculty has been disappointing. Our attempts to dispel the myths of the use of technology to leverage faculty expertise have not achieved the desired effect. Our open labs have been poorly attended but many faculty have expressed an interest in attending but can't seem to find time in their schedule. However, the faculty that have expressed the interest are the early adopters who are currently using technology. Thus, we have yet to expand the number of faculty adopting the use of technology in their courses. Even with the opportunity to have a CIT staff member build the course using the faculty's current onsite course as a model, they are reluctant to trust online learning as a viable means of education.

We have a new initiative in place for the summer in the form of a faculty development grant. This grant will provide ODU faculty the opportunity to work with the CIT staff to develop a completely online course in their specific discipline. It is our hope that this is the first step to moving into the online arena.

E-Portfolios for Student Teachers—Second Year of a Pilot Program

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Abstract

The Teacher Education Department at the University of Indianapolis has completed a two-year pilot program to enable student teachers to digitize their capstone portfolio for the student teaching experience. The Exit from Program Portfolio for Initial Preparation Programs, the third and final benchmark for completion of the licensure program, is based on the ten INTASC standards and is designed to maximize candidate reflection on teaching and learning during the first of two eight-week student teaching placements. During the first year of the pilot (2002-2003), volunteer candidates used Dreamweaver 4 to create e-portfolios. Though all pilot candidates were successful in completing the benchmark, problems arose with teaching and using Dreamweaver, and a determination was made that more user friendly software should be used. In the second year, candidates used Lectora software published by Trivantis Corporation. Software instruction was easier, but additional problems arose when Lectora was not available as promised for the Macintosh platform. Issues remain as full implementation for all candidates is scheduled to begin during the 2004-2005 school year. Sample portfolios will be demonstrated and additional questions concerning E-portfolios will be raised in the session.

The Setting

The University of Indianapolis is an independent comprehensive university affiliated with the United Methodist Church. It serves 3,700 students and offers associate, bachelor's, master's and selected doctoral degrees in arts and sciences, education, business, and health sciences. There are 191 full-time and 198 part-time faculty. The preparation of teachers has been prominent in the mission of the institution since the beginning in 1902. Teacher education programs were successfully reaccredited by NCATE during the 2003-2004 school year. The department's Unit Assessment System (UAS) was designed over a period of years to assure that graduating candidates are of high quality and meet all of the ten INTASC standards and the subject-matter standards mandated by the Indiana Professional Standards Board. The final piece of the UAS is called Benchmark #3 and consists of a paper student teaching portfolio with major sections including a table with references to each of the ten INTASC standards, culture and climate of the school and community, students with special needs and services, a sequence of five lesson plans (including reflections and analysis of student learning), documentation of professional involvement, and a 45-minute video of teaching.

INTASC Principles:

1. Knowledge of Subject Matter
2. Knowledge of Human development and Learning
3. Adapting Instruction for Individual Needs
4. Multiple Instructional Strategies
5. Classroom Motivation and Management
6. Communication Skills
7. Instructional Planning Skills
8. Assessment of Student Learning
9. Professional Commitment and Responsibility
10. Partnerships

The paper portfolio has been a high-stakes assessment for six years. Discussions over the last three years have focused on ways this benchmark could be made a more powerful tool for candidate reflection. Converting from paper to a digital medium, allowing greater linking of sections and ideas, was explored. In order for software to be useful for this pilot, several requirements were required. We searched for portfolio software that would be cross-platform (both Macintosh and Windows platforms are used in the department); the learning curve should be manageable; and there should be no technical difficulties for reviewers. Through a Title II grant, necessary hardware and software were purchased. A digital camera and three digital camcorders (two of them with wireless microphones) were obtained for the project. Two rolling carts were equipped with laptop computers (one with Windows, the other with Mac OS 9), CD burners, printers, external Zip drives, and a scanner. An ample supply of CDR's, Zip disks, inkjet printer cartridges, and photo printer paper were stocked.

The university's Center for Instructional Technologies worked with faculty in the Teacher Education Department to develop a portfolio template using Dreamweaver software. The plan was to burn the final HTML files including videos onto compact discs for each candidate. One CD would be given to the student teacher, another would be given to two reviewers who would determine whether the portfolio was a "pass" or "not pass." In case of a tie, a third reader would be given the document. If two reviewers did not pass the document, the student teacher would do a new portfolio during the second eight-week student teaching placement.

The First Year

During the fall semester of 2002-2003 eight volunteer student teachers participated in the first e-portfolio pilot program and signed an agreement protecting both the candidate and the institution. Candidates were allowed to quit the pilot at any point if it became impossible for them to continue, and the university was given permission to show their final products to others. Assurance was given that no candidate would fail the portfolio process due to technical difficulties. It was the hope of the faculty that the candidates would choose to digitize video of their lessons, edit them with iMovie, and integrate video clips into the e-portfolio to enhance reflection on the INTASC standards and student learning.

One staff person from the Center for Instructional Technologies and one teacher education fac-

ulty member provided semi-weekly training throughout the student teaching experience for the pilot group. The candidates also attended regular student teaching seminars and help sessions with non-pilot student teachers. Surveys of pilot group attitude and opinion were administered at regular intervals. Midpoint and endpoint surveys of the pilot group indicated that at the end of the project they were very pleased they had undertaken the e-portfolio project. They were able to show an impressive final product. However, most of them felt additional anxiety with the Dreamweaver development on top of what was a stressful student teaching and portfolio process for everyone. It was obvious that members of the self-selected pilot group were highly technically proficient before joining the pilot process. They expressed doubt that this process could be successful if used with all student teachers.

All eight of the first group were successful in completing the digital portfolio and passing student teaching. Of that group, however, only two were able to digitize portions of their videotape and create hyperlinks within their portfolio due to receiving encouragement and assistance from their university student teaching supervisor. Lacking this assistance, the others did not even attempt to digitize and link to video.

Minor refinements to the procedure were made for the spring semester of 2003 when the volunteer pilot group numbered six student teachers using Dreamweaver. Most procedures were the same as in the fall. Surveys produced similar comments as in the previous semester: Dreamweaver was too difficult to master in the midst of student teaching and producing a high-stakes portfolio of any kind. The basic idea seemed to be a good one, but technical difficulties, particularly with mastering Dreamweaver 4, persisted.

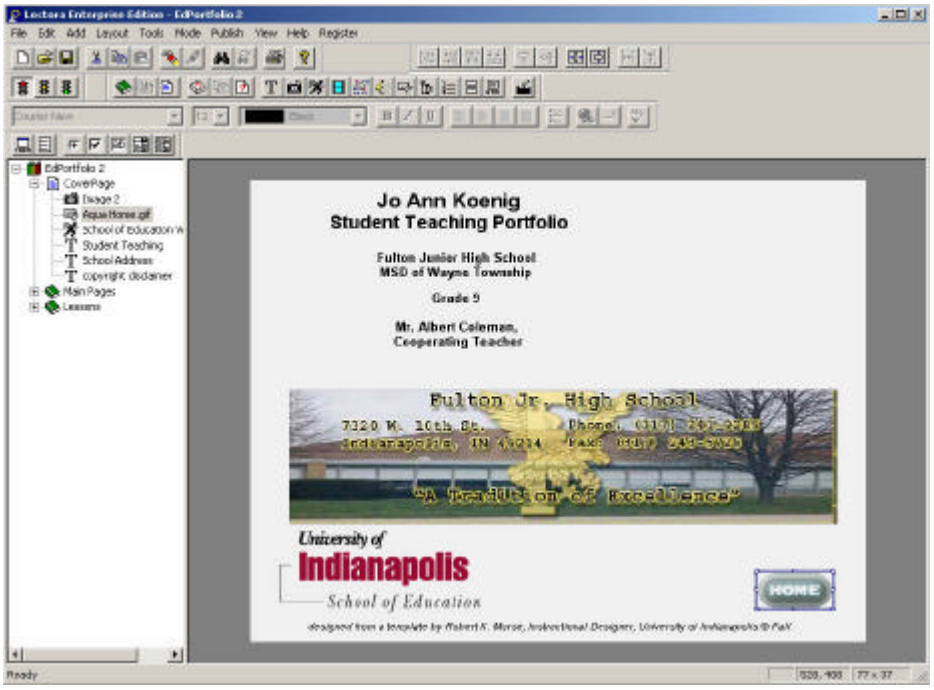
The Second Year

With the realization that Dreamweaver was not a viable option, several faculty meetings were held with staff of the U of I Center for Instructional Technologies to determine how to proceed for a second year of pilot development. Software options were PowerPoint, HyperStudio, LiveText, and Lectora. Lectora was finally chosen as being the most powerful, most practical, and almost the easiest to learn. Its single drawback was that it was for Windows platform only. Faculty received assurances from the publisher, Trivantis Corporation, that a Macintosh OSX version would be available during the fall of 2003. *(http://www.lectora.com)*

The Center for Instructional Technologies once again prepared a portfolio template, this time using Lectora. For the second year pilot a single teacher education faculty member was assigned to do the training and spent a fair amount of summer time learning the software. The department purchased software to install on computer lab machines. Each candidate was also given a licensed copy of the software to use during the pilot program. This gave Lectora a further advantage of being installed on the students' own computers, something that had not been possible with Dreamweaver.

Numbers were small for the second year with only four candidates during the fall semester. One dropped out after several weeks; two completed the digital portfolio, and one had to submit a paper portfolio because of a disk problem. The second semester there were three candidates in the

pilot. Two completed the portfolio, and one quit halfway through. The two candidates who did not complete the portfolio felt they could not spend the extra time it took for this project.



Lectora Template

The candidates who completed the portfolio as well as the one who lost her files felt that this was a good experience; they would all do it again. Some of the comments on their evaluation of the program were: fewer help sessions at the beginning and more the last week before it was due; they were afraid of what might happen at the last minute due to a technical failure; the Lectora software was easy to learn, but it took time playing with it to get the idea of what it could do. Some candidates had problems with getting the buttons they created to go where they wanted them to go.

Lectora uses drag and drop for text, graphics and video. The text must be saved as text or as rich text from Microsoft Word. The program will update the text as it is changed and saved. All files are stored in folders, one for text and one for images. Lectora organizes files as books with chapters and pages. In the template the chapters were set up for the candidates. They had to add more pages as they were needed. This program is like any other multimedia authoring software. You can add buttons as well as hypertext. You can publish the file to a single executable file, as HTML or to CourseMill. The program is very versatile in the things it can do. This would be a good program for using multimedia in classrooms.

Conclusions and Questions

U of I Teacher Education faculty members believe the time for piloting has ended, and the time for full implementation is at hand. Pending availability of a Macintosh version of Lectora, it may not be feasible for Lectora to be the software for full e-portfolio implementation with student

teachers. PowerPoint is again on the table as a practical, easy-to-use piece of software that might allow student teachers to concentrate on content rather than on the digital process. The department also requested permission to create a Blackboard course for each of our student teachers. Student portfolio models using Blackboard have been developed at other universities. Candidates might customize the buttons to link to Career Goals, INTASC principles, References, lesson plans, and the like. Evaluators would have guest access to the course. The portfolio could be modified after successful conclusion of student teaching to become an employer portfolio. Others will determine whether the Teacher Education Department will be given permission to create such a large number of Blackboard courses for student use. Drawbacks of Blackboard include lack of portability of the final product and the immense amount of disk storage space that might be needed to run and archive all the portfolios. We are also considering using an external vendor who would store the portfolios off site. TaskStream is a product that has been recommended for our consideration

The reflective power of the e-portfolio for student teachers has been demonstrated through our two years of pilot development. We must still refine the element of reducing "techno anxiety" to a manageable level for all of our student teachers while maintaining the integrity of the e-portfolio medium.

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More information on the INTASC Principles may be found at:
http://www.ccsso.org/projects/Interstate_New_Teacher_Assessment_and_Support_Consortium/

How to Protect against Terrorism, Disasters, and Disaster Recovery (An introduction class)

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This paper will discuss the "what, why, how and results of a class on "How to protest against Terrorism, Disaster and Disasters Recovery that was presented at Macon State College. The paper will also discuss feedback from the students that attended the class.

In response to the necessities to utilize more security and protection against terrorism in the United States, it is very important that the Information Technology (IT) student learn what to do to protect against terrorism, protect against disasters and what they should do once a disaster happens to their organizational computer systems. With these objectives in mind, Macon State College has started looking into offing courses that will meet the criteria and goals of teaching IT students the importance of protecting against terrorism and disaster recovery.

Macon State College offers a Bachelor of Science degree in Information Technology. This has proven so successful that the program has increased from 50 students in the fall of 1998 to over 1300 students.

The Class Outline

During the class the overall objective was to teach students different ways to help protect against disasters and to also give the student as much real world cases to help with the understanding of the lesson. The instructor also wanted the student to understand what are some of the tools that could also help with the overall protection in everyday life.

Below is outline for a class on "How to Protect against Terrorism, Disasters, and Disasters Recovery". This outline includes Disaster recovery techniques, security, and crimes that may cause disasters.

Week 1: Induction to Disaster recovery

Week 2: The need for Security in Disaster recovery

Week 3: Crimes that will cause a Disaster

Week 4: Developing a Disaster Recover Plan

Week 5: The organization's role in the Disaster Recovery Plan

Week 6: Testing your Disaster Recovery plan

Week 7: Emergency Operations Center

Week 8: Understanding computers and Networks

Week 9: Protecting the Network from Disasters

Week 10: Continued Assessment of Needs, Threats, and Solutions

Week 11: Future trends in Disaster Recovery

Summary

Not having a disaster plan can be a devastating event for you and your business. The 9/11 nightmares have caused many to rethink having a disaster recovery plan or question if the one they have is acceptable. *President Bush recently signed the Homeland Security act into law, authorizing the formation of the Department of formation of the Department of Homeland Security, which will have the authority to develop a plan to inventory and protect the nation's critical infrastructures, telecommunications, financial and banking, energy, and transportation. Safeguarding the IT infrastructure in both the public and private sectors is expected to be a key part of the new department's work. All the U.S. Department of Justice has proposed new legislation that will give it the power to prosecute computer crimes as acts of terrorism. (*The information Management Journal*)*

Appendix A

Why should I write a plan?

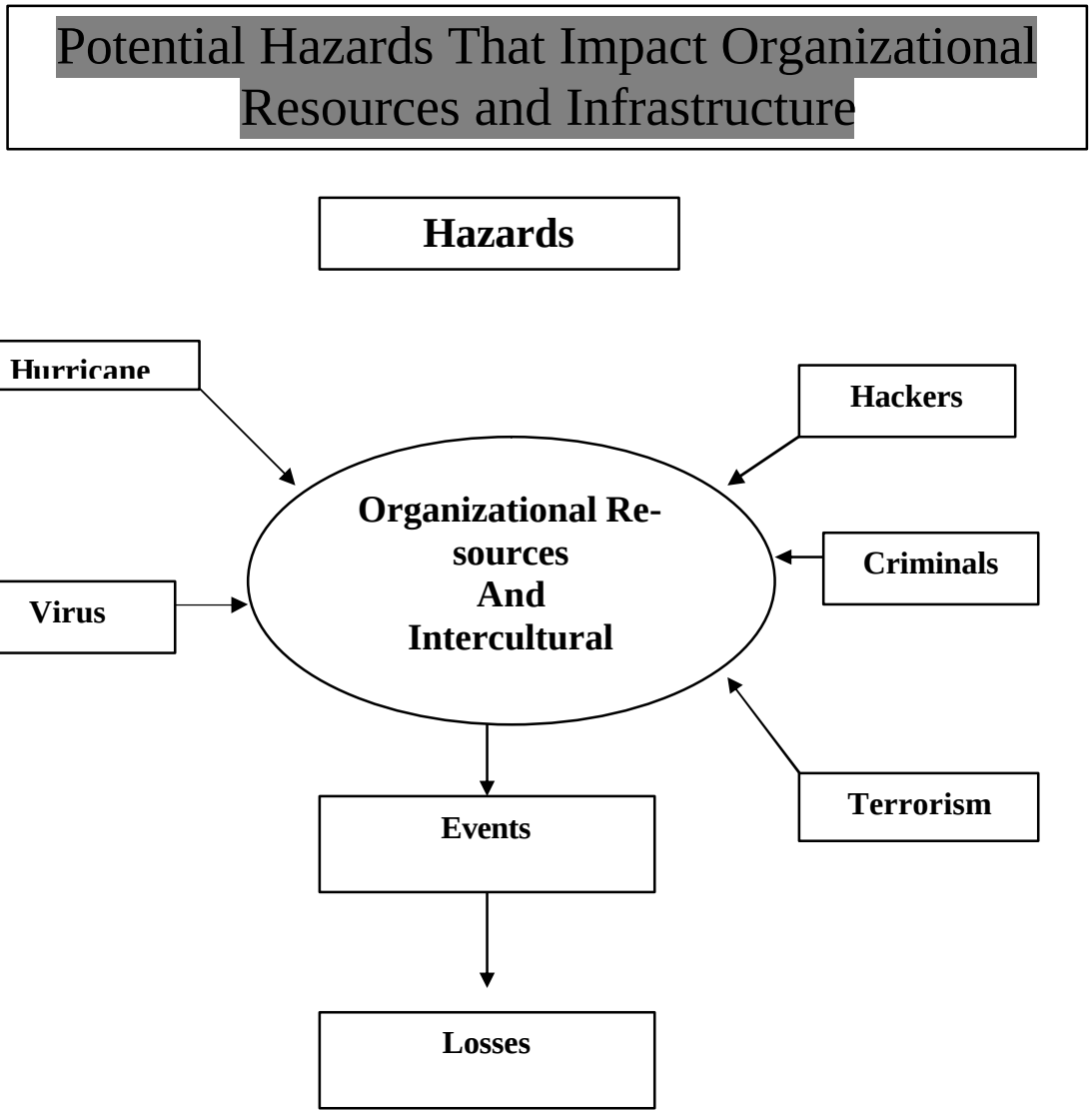
The primary objective of a Disaster Recovery Plan is to enable an organization to survive a disaster and to reestablish normal business operations. In order to survive, the organization must assure that critical operations can resume normal processing within a reasonable time frame. In developing a Disaster Recovery Plan, you should include the following:

- Protecting all vital information from internal and external disasters.
- Restoring business to near normal operation without having major delays
- Facilitating an effective recovery tasks
- Developing an effective back up and recovery strategies to mitigate the impact of disruptive events

To have a feasible recovery plan strategy is not only the job of the business owner but the organization's data processing division, communications and operations divisions. It is also the users of those services and management personnel who have responsibility for the protection of the organization's assets. Many businesses have the misconception that disaster recovery planning is just for the IT department. Technology as well as business areas supported by Information Systems all must be play a significant roll throughout the project for the planning process to

be successful. Disaster recovery planners must keep in mind that the aim of the planning process is to:

- Evaluate existing weaknesses
- Implement disaster prevention procedures
- Develop a comprehensive plan that will enable the organization to react properly and in a timely manner if disaster strikes.



When is it time for a disaster plan?

The start of recovery must begin immediately. Advanced planning, in the form of a Disaster Recovery Plan, puts you in a position to do just that; plan. It will enable you to act appropriately to assure that a minor occurrence does not spiral into a major disaster.

Disaster recovery, when properly documented, addresses not only the recovery of core businesses, but also realizes the importance of support functions. A solid disaster recovery plan will

include the entire business. It was reported that 40% of companies that suffer a disaster goes out of business. Another survey sponsored by National Association of Corporate Treasurers, shows that more than 50% of CFO's felt that their companies were inadequately prepared for coping with disasters. Some business believe that creating an effective plan is time consuming process and one that requires expensive system change. What you need to do will depend on your business situation and structure and risk you may face. When building an effective disaster recovery plan, there are at least five questions you must ask yourself.

What are the mission critical functions?
What are my risks if this happens?
What are my current contingency measures and how effective is it?
What corrective actions must I take?
What are the action priorities and timelines?

You will find below an example of a disaster recovery plan. They also have software that is available to help you create and implement your plan.

Sample Outline Of a Disaster/Contingency Plan

1 **Introduction**

A. Policy Statement
B. Purpose
C. Overview
    1. Definitions
    2. Scope
    3. Objectives
    4. Structure of plan
D. Planning Process Description (use of flow chart)
E. Organization Documents
    1. Organization description
    2. Security/backup systems
    3. Floor plans of electrical, water, exits
    4. Insurance documents
    5. Resource lists/contracts
        a. Equipment vendors
        b. Water-related recovery
        c. Supply/forms/blank checks
        d. Storage companies
    6. Organization inventory
    7. Vital records listing
    8. Location of operating procedures
    9. Distribution of the plan
    10. Maintenance of the plan

F. Testing/Training
    1. Program description
    2. Types of tests
    3. Testing frequency/schedules

2 Risk Assessment

- Description
- Detailed risk assessments
- Results

3 Introduction

A. Level One/Category One
B. Level Two
C. Level Three
D. Level Four
E. Level Five

4 Team Responsibilities/Organization

A. General
B. Management
C. Logistics
D. Users
E. Records and information systems (computers)

5 Restoration Procedures

A. Specific procedures for handling each type of probable disaster
B. Equipment and supply lists with phone numbers