ASSOCIATION OF SMALL COMPUTER USERS IN EDUCATION

ASCUE 2005

38th Annual Conference

June 12-16, 2005
Myrtle Beach, SC

Campus Technology: Anticipating the Future

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2005 Conference Proceedings, June 12-16, 2005

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Keynote Speaker

Linda Fleit, President — Edutech International

Pre-Conference Workshops

Developing On-Line & CD-Based Learning Modules
Stephen Anderson Sr., Univ of South Carolina Sumter

Understanding Project Management
Craig Gray & Nate Tucker Sr., Lee University

Not Just a Flash in the Pan: Making Interactive Learning Objects with Macromedia Flash
Andrea Han, Miami University Middletown

Papers (PDF format)   Get Adobe Reader   Requires Internet Access

Developing In-House Library Multimedia Materials Without A Computer Science Degree (PDF)
Stephen Anderson Sr., Univ of South Carolina Sumter

Faculty ePortfolios - The Future's Calling (PDF)
Tina Ashford, Macon State College

Web-based Quizzes and Surveys Using Free Software (PDF)
Shawn Beattie, Augustana College

Implementing Proactive Network Management Solutions in the Residence Halls (PDF)
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[Enhancing Your Web Site as a Recruitment Tool by Implementing Chat Technology](#) (PDF)

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2005 Conference Proceedings, June 12-16, 2005

2005 Conference Keynote Speaker
June 12-16, 2005
North Myrtle Beach, SC

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Linda Fleit is the president of Edutech International, and has been in the field of higher education computing since 1970. She has held positions at Tufts University, Boston College, the Harvard Business School, and the University of Hartford prior to founding Edutech International in 1985. In addition to her consulting, Linda edits and does a major portion of the writing for *The EDUTECH REPORT*. Her particular expertise is in assessment, strategic planning, organizational issues, the articulation of information technology needs, and information technology management. Linda has written extensively for publications such as *CIO Magazine*, the *Chronicle of Higher Education*, the *Bulletin* of the American Association of Higher Education, and *CAUSE/EFFECT* magazine. Among Linda's most popular writings is a book chapter about information technology assessments and their role in strategic planning (in *Doing Academic Planning*, published by the Society for College and University Planning).

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Pre-conference Workshop:
Developing On-Line & CD-Based Learning Modules

Stephen Anderson Sr., Univ of South Carolina Sumter

Half-day Workshop

Description:

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 • Flexible in that ALL SORTS of "presentations" can be produced including "PR" materials, web-tour productions, lab-based-recordings, software demonstrations, etc. • Basically, if you can see it on a computer screen, you can narrate it and produce a CD-based or on-line presentation with little or no training. 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 actually use Camtasia™ to create such a module during the three-hour tutorial session

Presenter Bio:

Steve is an Associate Professor of Math/Management Science in the School of Business at USC Sumter. His current interests are in the development of cd-based and on-line learning modules.

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Pre-conference Workshop:
Understanding Project Management

Craig Gray & Nate Tucker Sr., Lee University

Full-day Workshop

Description:

Understanding the basic processes behind project management will help provide a framework for managing workload, personnel and management expectations. Come learn the basic processes for Project Management, Documentation and finally how to use Microsoft Project to build a plan, follow the plan and report on the plan.

Presenter Bio:

Craig Gray is married with 6 children ranging in ages from 21-1.5. He is the Director of IS & T at Lee University, formerly a Technical Manager for CMS Energy, specializing in ERP implementation projects, and responsible for supporting world-wide financial systems

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Pre-conference Workshop:
Not Just a Flash in the Pan: Making Interactive Learning Objects with Macromedia Flash

Andrea Han, Miami University Middletown

Full-day Workshop

Description:

Incoming students are increasingly seeking technology based learning activities. While students were once content with a textbook, today's students expect multimedia web-based supplements to their face-to-face classes. Fortunately, Macromedia Flash is a fairly easy to use product that helps instructors create professional looking online course supplements. In the first part of this 6 hour workshop, we'll explore the basics of Macromedia Flash including creating animations and adding basic interactive elements. In the second part of the workshop, we'll look at Macromedia Flash Learning Interactions which allow educators to quickly and easily create engaging interactive online activities. Activities can stand-alone or be part of an online quiz and can even be integrated into LMS systems. Six activity types are available including true/false, multiple choice, fill in the blank, drag and drop, hot spot and hot objects. Learn how to create your own professional looking, online activities!

Presenter Bio:

Andrea Han is coordinator of the Educational Technology Center on the Middletown campus of Miami University. She has previously worked as a high school math teacher and as a consultant for SOITA, a non-profit educational technology agency. She is currently pursuing her PhD in Educational Administration at Miami University.

Developing In-House Library Multimedia Materials
Without A Computer Science Degree

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Introduction

Many years ago, I utilized programs such as Astound™ to build multimedia materials which were much more rich in content that the version of PowerPoint at that time allowed. It also allowed me to narrate the work and publish it in a format which could be put on the web or a CD. Unfortunately, it did not capture screen images and much of my teaching load was at the time the teaching of software. I depended on static screen captures utilizing such programs as Paint Shop Pro. I would then embellish and enrich the screen capture with Astound, but this was quite time consuming and took a fair amount of time to learn how to do. Lotus then came out with Screen-Cam, a screen capture software with the capabilities I needed, but it was no longer being supported by the version of Windows I was utilizing. I then switched to Real Producer which allowed me to create streaming materials which were more easily distributed via the web than PowerPoint produced materials. The software stopped being supported by Real and again I was at a loss for an easy way to produce CD-based and on-line course materials. Two years ago, I discovered SnagIt and Camtasia from Techsmith and immediately became a convert.

I had been been searching for software which would allow me to create CD-based learning modules without the heavy learning curve often associated with such productions. The creation and distribution of a multimedia product via the web or on a CD can seem daunting to the inexperienced user. It is often assumed that the developer must have years of training and experience. It is also often assumed that you must utilize expensive and complicated software to produce and distribute such a product. It might never occur to you that a Librarian with very little technical experience might single-handedly tackle such a project. After finding and using the software we will discuss today for a few weeks, I offered a brown-bag workshop to others on my campus who might be interested. Among the attendees were two librarians who took an immediate interest since they had visions of creating multimedia tutorials which would supplement the bibliographic required for classes, especially given recent budget constraints and staff shortages. After a very short "show-and-tell" similar to what you'll see today, they were ready to set off on their own and start developing materials.

The goals we started out with were to create presentations which tutored our students in the use of the bibliographic materials, especially the on-line card catalog and the on-line data bases available at USC Sumter. Up until now, live classes are being held which walk students through these resources. This face-to-face approach is effective, but somewhat repetitious for the staff since MANY classes required such bibliographic instruction. It was also repetitious for the stu-

dents since they sometimes were required to attend as part of two or more different classes. Our goal was to create live-capture sessions where a bibliographic "expert" would demonstrate the proper use of the research materials using real examples and the real data bases. The staff were not ready to give up their live classes, but did feel that such modules would be very helpful for students who missed such a live presentation, or who needed refresher courses in the use of the research facilities at USC Sumter.

We also had as a longer-range goal of developing live narrated demonstrations of performing basic research on a particular topic, including how to identify and narrow down a topic to be more manageable. Currently, all such instructional material is in written form, and is not very discipline specific. Many professors seemed to think that examples more specific to their discipline might be more effective than one "general purpose" pamphlet. Another future project may include a virtual tour of the library facilities for the general public which could be made available on a kiosk system in the library itself as well as on a web page.

This paper and related 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
- Flexible in that ALL SORTS of "presentations" can be produced including "PR" materials, web-tour productions, lab-based-recordings, software demonstrations, etc.

Basically, if you can see it on a computer screen, you can narrate it and produce a CD-based or on-line presentation with little or no training.

We will discuss the process of capturing video from cameras as well as screen captures, 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 actually create such a module during the paper session. We also will be offering a half-day workshop at the conference teaching the basic skills needed to create such presentations yourself utilizing Camtasia Studio™. We hope to see you at either or both of these presentations, but if not, feel free to ask any questions after reading this paper.

Camtasia Basics

The entire Camtasia screen is displayed in Figure 1. It is straightforward to navigate and after a very short while, we were quite comfortable with basic capture, viewing and editing capabilities.

Figure 1:
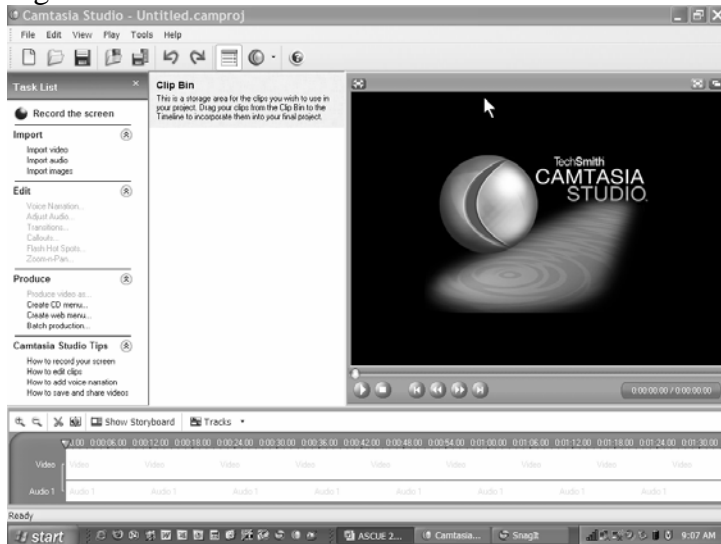
The four areas of the workspace include the task list (command section), the clip bin, the preview area and the timeline/storyboard area. The task list is shown in the screen capture displayed in Figure 2 (captured with SnagIt, a companion program from the same company—Techsmith)

Figure 2:
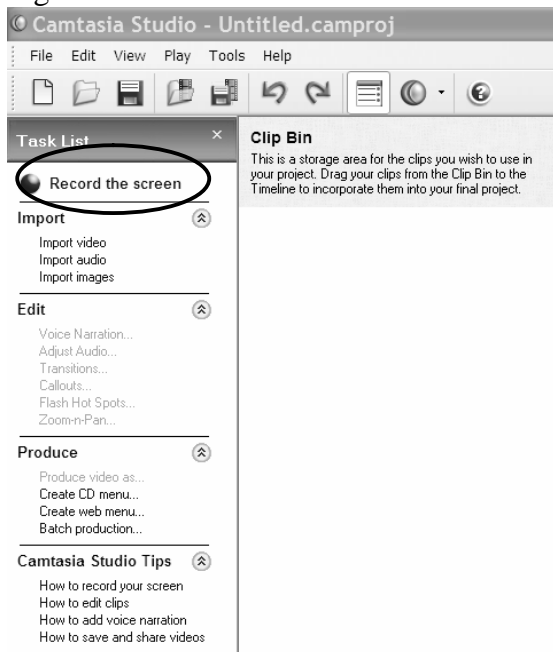
Although there are commands to "Import video, audio and images", it should be noted that this importing directly from a digital device is NOT supported. To capture digital video from a digital camera (still or moving) you might want to utilize Microsoft Moviemaker, now freely available with Windows and at the MS web site. Many cameras have such software packaged with them, but you are encouraged to test others for ease of use and richness of content. Once captured onto a disk drive, you may import digital media files already stored on any disk drive. Note the most

unique command, ***Record the screen***, allows you to start a screen recording, that is, a live capture of all or part of any part of a screen (you choose the exact region you wish to record activity on.) This definitely sets this software apart from most other video editing software. There are other software titles which now allow this feature, but we will not present a comparison here due to space limitations. Perhaps we will visit this in a future paper.

Once you have captured screen activity, or you have imported video, audio, or still images, they will all be displayed in the "clip bin," from which they can be dragged down onto the "timeline" near the bottom of the screen as shown in figure 3.

Figure 3:
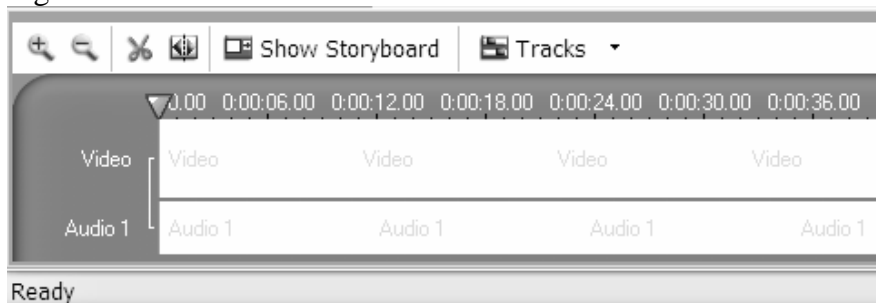
As in most video editing software, the timeline has two "views", a timeline view and a storyboard view. The timeline view (currently displayed) is more appropriate for micro-editing such as the deletion of small portions of the clip, etc. The storyboard is best for macro-editing, such as the rearrangement of individual video clips and still images in a more discrete fashion. As we shall see later, editing is easy (easier in my opinion than MS MovieMaker.) At any time, the video can be previewed in the preview area, which has familiar "recorder buttons" to control playback as circled near the bottom of figure 4.

Figure 4:

I have imported two screen captures into the clip bin and I have dragged them onto the storyboard line at the bottom of the Camtasia screen. Note that in the storyboard view as shown in figure 5, the clips are viewed as discrete units which can be rearranged, even repeated, over the course of the finished video. Transitions can be added between clips for a more professional feel, or they flow one into the other continuously if no transitions are utilized.

14
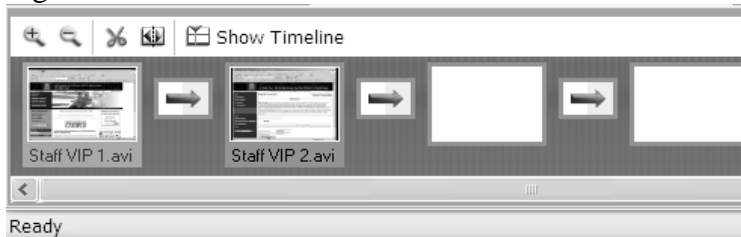
Figure 5:

In Figure 6, the timeline view is displayed, showing just under 6 minutes of video. Note the magnifier plus and minus circled on this figure. When performing deletions, it is imperative to see the time line in MUCH greater detail so the exact boundaries you wish to delete can easily be identified.

Figure 6:
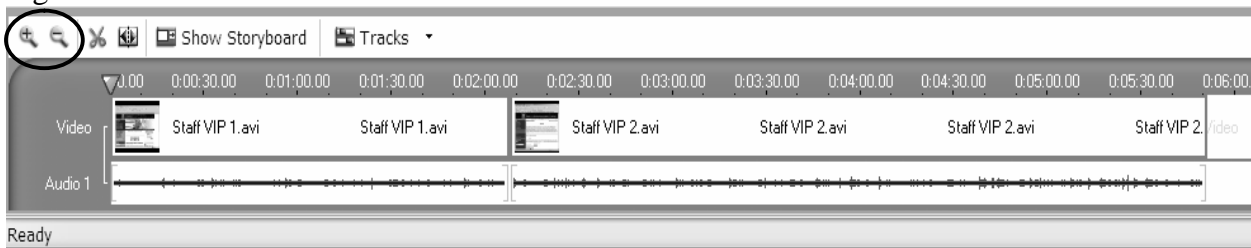
In figure 7, I have zoomed in a huge amount so the timeline shows much greater detail… the first 14 seconds versus the 6 minutes we started with. This allows us to drag a marker much more precisely. Of course, on the preview screen, the exact slide you mark with a mouse click will be displayed. Small movements can be made with the Step Back and Step Forward buttons in the Preview area as shown in figure 8.

Figure 7:
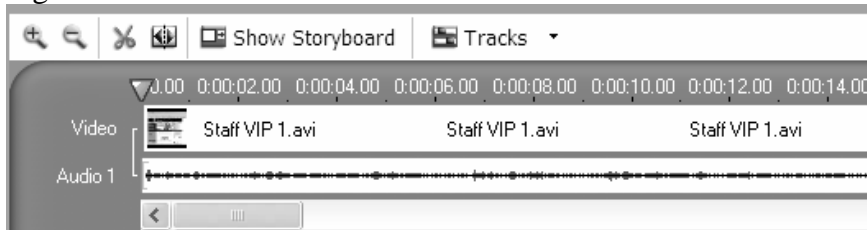
Figure 8:
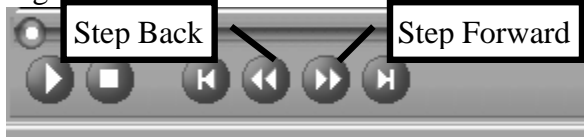
In figure 9 we see how Camtasia clearly identifies the exact position in the clip the markers are at. Markers are placed by clicking and dragging. The selection can be deleted using the delete key or the scissors icon identified below. Also, a clip can be split apart at a given point using the split icon identified in the figure.

Figure 9:
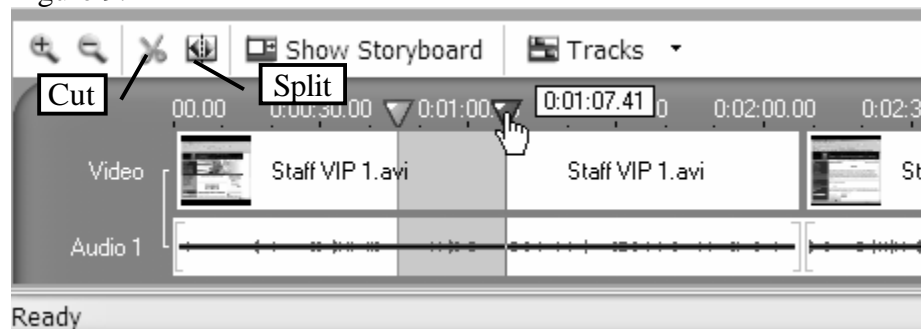
Once all editing changes have been made, it is time to "produce" the video. Camtasia is very rich in production output file format options including AVI, SWF, WMV, and MOV formats. Each has their plusses and minuses and Camtasia tries to guide you as to which is appropriate as shown in the dialogue box in figure 10 below:

Figure 10:
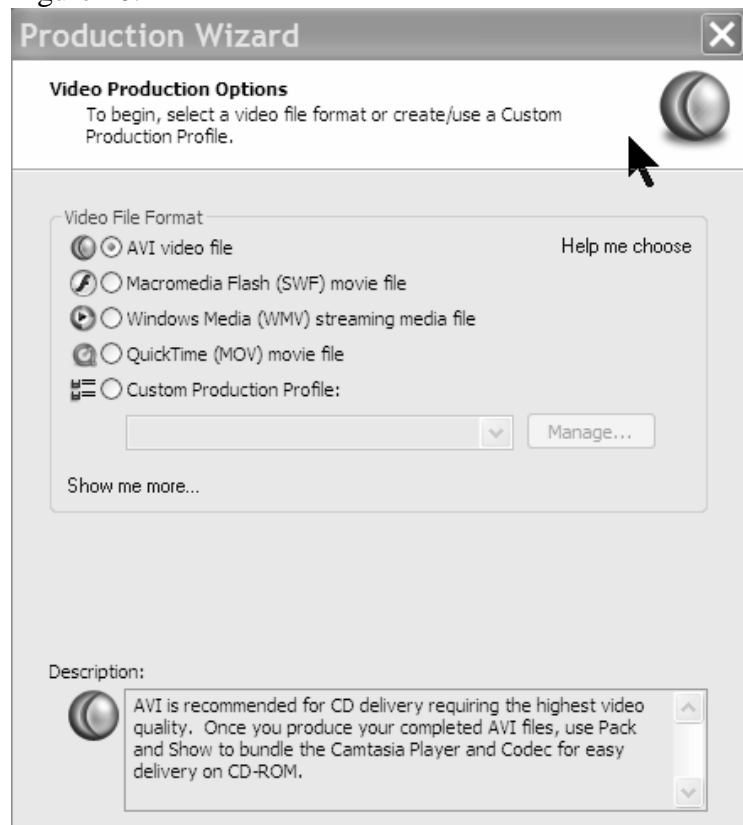
Even more detailed help on the best file format is available using the "Help me choose" option. Figure 11 is a screenshot of the help screen it generates. Techsmith's help screens and tutorials are actually a tutorial in video graphics and can help guide both the novice and the more experienced user in their production issues.

Figure 11:

Camtasia in Action

One example of how much difference there can be was a project I worked on this Spring with a group of Psychology students. They were creating a film clip of child activity levels after consuming various snacks, some high in sugar content, some high in artificial sweeteners and a third group of natural foods. They had to splice 55 minutes of film footage on four cameras into

around 5 minutes of footage displaying "typical activity levels." Then they had to build three "front ends" to introduce the test condition being viewed… but they used the exact same footage in all of the clips. The test, you see, was NOT about the student activity level, but rather in measuring the bias of the audience as to their predisposition in believing that sugars and/or artificial sweeteners might cause behavioral differences as compared to natural snacks.

Our first attempt at producing the 7 minute video was to use AVI format since it was suggested for highest quality CD-based distribution. The resulting file was "Packed and Showed" and resulted in a zip file (with the CODEC and Player hidden in it) of over 1.3GB, larger than a CD! We lowered the screen recording size to 640x480 and got it to fit on one CD at around 650MB. The second two we chose to use WMV format and the same 640x480 option. The resulting file sizes were approximately 14MB, a huge savings. Granted, the WMV files were a touch blurry compared to the AVI format but the loss was acceptable. In hindsight and greater lead time (remember that STUDENTS were involved—of course I NEVER PROCRASTINATE!!!) we would have tried other options such as increasing the sampling rate to improve quality at a modest file size increase.

As we develop our library materials, another wonderful add-in in Camtasia is the ability to create menu systems and HTML support pages automatically. This enables us to export (FTP) the resulting files to a web server with ease and have our productions available quickly. We did learn some important points. If you are utilizing the screen recorder to produce a "class" (like I did to supplement my on-campus classes while I attend the conference) then minimize the editing to save time. Students tolerate our hesitations/slips/etc in class, so they do not tend to freak out when we do them on "tape." Large bloopers can be deleted easily, especially if you remember to leave some hesitations every so often which allow easier editing later. Also learn to utilize the F-9 function key to pause the recording if you get "flustered" or interrupted during the recording process. I used it a lot while recording at home near or four dogs and at my office if the phone rang or the door slammed in the hallway outside my office.

At the time of this writing, the library productions are still works in progress (OK so maybe I do procrastinate a little!) and we expect to have similar comparisons by the time we present at the June 2005 ASCUE conference.

Summary

In summary, we found Camtasia to be an excellent screen capture as well as overall video editor. It is filled with useful help, costs a very reasonable amount, has many output options to help control file size, and has useful menu generation programs to help you produce a professional output without having to become a super expert in multimedia production. The students learned it quickly as did the library staff who attempted it. We do not have everyone on board yet (but then not all need to use it either). If you get interested in learning more about the costs and features of Camtasia and/or SnagIt, vist the Techsmith web site at **http:www.techsmith.com** Current educational discount pricing as of 4/35/2005 is as follows:

Standard Licensing Options

Single User Education Pricing	
SnagIt	$24.95
Camtasia Studio	$149.00
Camtasia Studio / SnagIt Bundle	$169.00

Even better, I am trying to get Techsmith to donate a copy of some of their software to "raffle off" at the ASCUE conference business meeting. They usually come through with other promotional give-aways which I will distribute during the paper presentation (sure—bribery does work sometimes!)

Faculty ePortfolios - The Future's Calling

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Abstract

Paper-based portfolios are a standard for all tenure seeking faculty, however, they can be diffi-
cult to manage and maintain. There may be an easier way – electronic portfolios. This session
will show what future e-portfolios might look like and the easiest way to transform that pile of
documents into an easy-to-update electronic version.

Note: This paper was not available when the proceedings went to print. The author will provide
handouts at the conference or via the web or email.

Web-based Quizzes and Surveys Using Free Software

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Introduction

Many colleges have seen rapid adoption of the web as a tool not only for presenting information, but also as a tool gathering information. However, the mechanism of allowing anonymous submission of information into a useable format has not been as trivial as publishing web pages. Fortunately, in addition to commercial solutions (such as Question Mark's *Perception*) there are many robust free software solutions to this problem.

In addition to presenting the several options I have found useful, this presentation is designed to serve as a launching point into a discussion to share experiences with this class of software, with the goal of developing a "best of breed" among the free software available in this category.

Options

A quick table comparison of the free options we'll be looking at follows. We will focus primarily on Virginia Tech's *Survey* in this presentation, but will provide adequate information on other solutions so that attendees will be able to make an informed decision.

Name	Hosting	Setup	Ease of Use
VT's Survey	Locally hosted	Requires setup on web server	Entry level, one page of training or 15 minutes
PHP-MySQL or PHP-MSAccess	Locally hosted	Usually enabled, but requires access to writeable directory for database or server account	Requires some comfort with high-level programming
Zoomerang (Basic)	Hosted offsite at zoomerang.com, ad-supported	No setup	Entry level – free version is limited
Hot Potatoes	Locally hosted	No web server setup usually needed, but requires access to web server	Entry level to advanced, requires comfort with web

Virginia Tech's *Survey*

Survey from Viginia Tech is an open source application that runs under Java Tomcat Server, which is also a free product that is part of the Apache Project. Initial setup is easy, but requires system administrator privileges. I had our Windows NT administrator install the application, and he informed me that it was a "cookbook installation" in that it was an easy, step-by-step process. Once installed, it runs on a non-standard port on your web server (i.e. http://www.myschool.edu:8080). To make it easy for our users to get to the survey page without having to remember the port, I used a simple auto-redirect page with the following tag:

```
<meta                    http-equiv="Refresh"                    content="0;
URL=http://freya.augustana.edu:8080/survey/login.jsp?r=1">
```

This allows the user to simply go to www.myschool.edu/survey and they are redirected to the login page. A virtual server could also be used (ie, http://survey.myschool.edu).

A demo can be found http://survey.vt.edu; the software can be freely downloaded at http://vtsurvey.sourceforge.net.
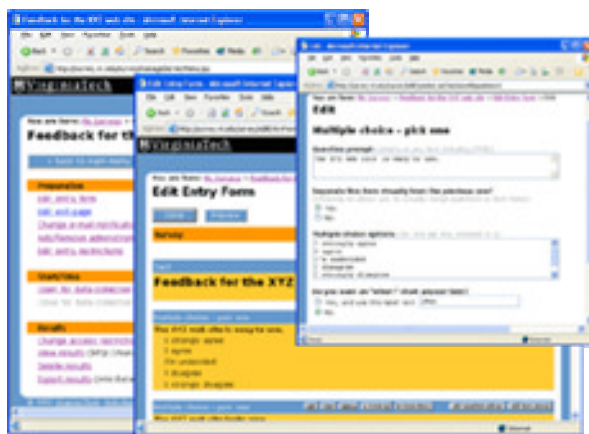
The feature list for *Survey*, as provided on the Sourceforge website, includes:

- Forms-based visual editor for survey creation

- User authentication via internal user database (XML-based) and/or external via LDAP

- Customizable layout (header, footer, colors, styles)

- Enables use of HTML for special-purpose customization (optionally)

- Restrict allowed respondends by user-IDs or shared password (optionally)

- Restrict to only one response per user (optionally)

- E-mail notification for incoming results

- View results online

- Password-protect viewing of results (optionally)

- Export of results to Microsoft Excel, SAS, SPSS or similar (via CSV formats)

- Support for collaborative development (multiple survey admins)

Survey uses a very easy, simplified user interface, which allows users to autonomously create, administer, and run online surveys. All functions are explained well and are augmented with examples to make setup for a survey as simple as possible. Users may password-protect their surveys, allow multiple administrators, or request e-mail notification. Once the survey is complete, they may view results through a web browser or export to comma separated values (CSV) format for viewing in Excel, SAS, or SPSS.

Conclusion

The open source software movement has provided some amazing, high-quality software options to fill the web-based survey need. Virginia Tech's *Survey* is an excellent example of this and has worked very well at Augustana and many other colleges.

References

Apache Tomcat, http://jakarta.apache.org/tomcat

Hot Potatoes, http://web.uvic.ca/hrd/halfbaked

PHP homepage, http://www.php.net

VT Survey homepage, http://vtsurvey.sourceforge.net

Zoomerang, http://www.zoomerang.com

Implementing Proactive Network Management Solutions in the Residence Halls

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About Arcadia University

Arcadia University, founded in 1853, is a private, coeducational comprehensive university in suburban Philadelphia offering undergraduate and graduate study to more than 3,400 students annually. The Arcadia University Center for Education Abroad, ranked second in the country and recognized by U.S. News and World Report for its outstanding programs, is one of the largest campus-based international study programs in the United States, serving an additional 2,000 students each year from nearly 300 American colleges and universities. U.S. News also ranks the University among the top colleges and universities in the North and Barron's has named Arcadia a "best buy" for the past 12 years.

Residence Halls Network

There are about 1,100 students in the 10 residence halls and apartment complexes. The residence hall students connect to the campus network, while the students living in the apartment complexes use the Comcast high speed network for their computing needs. The residence hall students have a dedicated 5 mb connection to the internet. This internet connection is independent of the connection for faculty and staff.

Arcadia University's ResNet was not working to its full potential. We did not have any registration process in place, and lacked the policies and organization needed to run an effective ResNet. The network was constantly being overwhelmed with viruses which created performance issues for the students. All problems had to be fixed manually, which consumed much valuable time.

How Campus Manager Helped Arcadia University

Arcadia University needed a solution to enforce both the ResNet policy and security. The ResNet was overwhelmed with viruses like blaster which caused a lot of problems. All these problems had to be fixed manually which consumed much valuable time.

Campus Manager brings a policy and security solutions for Arcadia University's ResNet

- Enforce the ResNet policies
- Enhance the ResNet securities
- Gain control of the network
- Prevent virus propagation
- Reduce the ResNet downtime

What is Campus Manager

Not a gateway or single point of failure. If Campus Manger fails, network traffic will not stop. The network will be left in whatever configuration it was in at the time Campus Manager stopped working.

Not a turn-key solution. This is not a solution that you plug in and walk away from. Campus Manager is a product the IT Staff must customize to their network in order to get the fullest potential from the solution.

A way to detect rogue DHCP servers, locate and manage vulnerable computers, and enforce network policies.

No client software on the user's computer

How Campus Manager Works

Campus Manager sits passively on the network attached to a core device.

When a new device tries to gain access to the network a link up/down trap is sent to Campus Manager.

Campus Manager reads the user's MAC address to authenticate the user's MAC with Campus Manager's own database.

If the user's MAC is recognized and is considered healthy, the user is allowed access. If the user's MAC is not-recognized or is considered vulnerable, the user must go through the registration and / or remediation processes.

Campus Manager can authenticate with your database using LDAP.

Forced Remediation
Unregistered Client
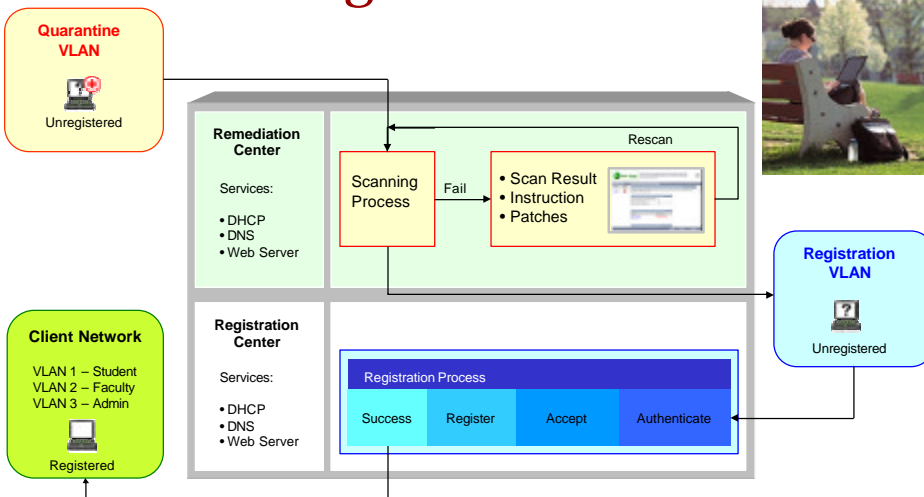
Campus Manager Remediation Center (CMRC)

The CMRC offers a variety of Nessus Scans (www.nessus.org) to check user's computers for vulnerabilities.

Nessus is an open source program with over 2000 scans. Scans are customizable, and custom scans are constantly being added to Nessus's national scan database.

Administrators have the option of choosing which Nessus scans best fit the requirements of their environment.

When a user fails a Nessus Scan in forced Remediation, the user is not allowed any further into the registration process until all the failed scans have been addressed

A web-page will alert the users to their vulnerabilities, provided them with ways to fix themselves, and a 'rescan' link is presented in order to ensure all vulnerabilities have been fixed

Client Assessment Tool (CAT)

Client Assessment Tool (CAT) is an ActiveX application that inspects Microsoft Windows PCs. Run from any web server, the application executes on the client PC and enforces your security and network policies. Designed to work in harmony with BSi's Campus Manager.

CAT provides the option to check for several versions of Anti-Virus software.

CAT provides the option to ensure your clients are running the latest version of Windows Critical Updates and Service Packs.

CAT allows the option to import any registry change into the Windows client. For example, you can import the ability to ignore SP2 critical updates for XP users, turn off DNS caching in Internet Explorer or force updates from a local SUS server. CAT also provides the option to install an administrator level account on the client system.

Detects and removes XP-Home bridging.

Detects and enforces Spyware Protection Program.

Alarms

Email IT Staff

Email offending client

Disable / Re-enable client

Disable / Re-enable port

Mark as "At Risk" and switch to Quarantine VLAN

Conclusion

Campus Manager gives the IT staff the tools they need to proactively manage the ResNet.

With the help of CAT and the CMRC, a Campus Manager solution will help ensure users gaining access to your network are checked for multiple vulnerabilities which would cause numerous problems to the well-being of your ResNet.

Not only does Campus Manager monitor network health, it makes your network healthy. A healthy network has very high up-time, high performance, and involves less time to troubleshoot.

Campus Manager helps ensure the learning process at a higher education institution are not interrupted or disturbed because of computer networking issues.

Information, Courses, Community: Fostering Student Engagement with MyArcadia

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About Arcadia University

Arcadia University, founded in 1853, is a private, coeducational comprehensive university in suburban Philadelphia offering undergraduate and graduate study to more than 3,400 students annually. The Arcadia University Center for Education Abroad, ranked second in the country and recognized by *U.S. News and World Report* for its outstanding programs, is one of the largest campus-based international study programs in the United States, serving an additional 2,000 students each year from nearly 300 American colleges and universities. U.S. News also ranks the University among the top colleges and universities in the North and Barron's has named Arcadia a "best buy" for the past 12 years.

Background

In 2001, Arcadia University launched an Intranet site to provide information to faculty, students and staff. In the fall of 2001 the university also adopted Blackboard as their learning management system. The Intranet and Blackboard were two distinct sites. Faculty and staff found the Intranet site very useful to get updated information from academic and administrative units, but the students were not using the site.

Intranet Site (ArcadiaNet)

We developed our Intranet site to provide specific content to the campus community. The site mainly consisted of HTML content. For security we used the Windows permissions structure. With the permissions we were able to restrict access to content to a specific group or groups of users. The site contained:

- Web Pages for administrative and academic units
- Events Calendar
- Online forms
- Links for emails, and other web sites

Blackboard Basic

In fall 2001 we also implemented the Blackboard basic system version 5.5 which provided the infrastructure for our faculty to post online content for their courses. The system was well re-

ceived by faculty and students. With the growth in Blackboard and ArcadiaNet we starting seeing a clear disconnect between these two systems. Students were only using the Blackboard system because they were driven there for their course content. The number of students who used ArcadiaNet was small, and this was an issue for the university as most of the content was for students and they were not taking advantage of this. Blackboard was used by students, faculty and staff for:

Online course content
Online organizations

In the summer of 2003 the Office of Information Technology made the decision to consolidate ArcadiaNet and Blackboard into a single site. We decided to link ArcadiaNet with Blackboard and make it a single point of entry to both systems. Nearly all of the students need to access Blackboard on a regular basis so it was a better solution for distributing the information. This move was only possible with the move to the Blackboard Learning System from Blackboard Basic. IT also realized that this new solution would be mission critical and invested in hardware to support high availability with both the database and web servers.

MyArcadia

In the spring of 2004, the university launched MyArcadia, the campus web portal. MyArcadia gives students, faculty, and staff access to online courses and departmental web sites. The portal is also the main source for campus announcements and event listings, and provides a single sign-on link to campus email. Initially when we launched MyArcadia, we only had a link to Outlook Web Access (OWA) which opened up in a new window, but the students, faculty and staff had to login again. Since we were using Active Directory to authenticate users on the portal, we worked with Blackboard Inc. to pass the user credentials to OWA to make it a true single sign-on system.

Engaging Students with MyArcadia

The portal has been very effective in driving students to this site to get the latest information about their courses, campus events and announcements. The students feel empowered by the ability to customize the modules and the content to make it relevant to them. We did student focus groups to get their opinion on what content they would like to see on the portal. One of the other big draws to the portal is that we use it as a gateway for online registration and viewing of grades. Students never need to remember multiple URLs on campus, all they need is the URL for the portal where we have links to all the other campus resources and web sites. Access to all the electronic resources from the library is available to faculty and students anywhere, anytime. Students studying abroad also find the resources, news, and Events listed on MyArcadia helpful to keep connected with the Glenside campus.

Summary of features on MyArcadia

- Single campus URL for students to remember
- Posting current information online and directing students to the updated content
- Engaging student clubs and organizations to use this tool
- Campus Announcements
- Events Calendar
- Campus academic and administrative departmental information
- Online forms
- Links to other university publications and web sites
- Link to online registration (SCT-PowerCampus)
- Access to electronic library resources
- Online Courses
    - Online discussions
    - Online quizzes
    - Online grade book
    - Online chats
    - Course documents
    - Links to external web sites
- Student Organizations
- Meeting minutes

Enhancing Your Web Site as a Recruitment Tool by Implementing Chat Technology

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Abstract

By nearly all accounts, the Web has overwhelmingly become the primary resource for prospective students to research potential college choices. Using this medium, however, prospects are able to do their research independently and privately, without having to contact the institution via phone, mail or email to make a formal inquiry. Consequently, many potential inquiries, applicants and students are nameless, faceless web visitors whom recruitment personnel generally have no way of contacting or pursuing with their typical follow-up process. Using Groopz e-commerce software, recruitment staff can overcome this disadvantage by monitoring usage of their web sites and proactively or reactively contacting web visitors. Using this "instant message"-style communication tool, they are able to take online customer service to new levels. In many cases, it allows a staff member to engage in conversation with a casual passer-by, resulting in new recruitment opportunities. Since implementing Groopz on the Philadelphia Biblical University web site, countless visitors, who otherwise may have remained nameless and faceless, have turned into formal inquiries, applicants and students.

Introduction/Background

Philadelphia Biblical University is an independent private Christian university in southeastern Pennsylvania. The University has a full-time equivalent student body of approximately 1,400 students at the graduate and undergraduate levels. Since implementing the university web site in 1997, the Internet has become and increasingly indispensable recruitment tool. In an effort to make the site more interactive and effective, Groopz E-Commerce software was implemented, allowing enrollment management staff to monitor web usage and proactively contact web site visitors as well as reactively providing increased levels of customer service by responding to online inquiries in real time.

Product Information

Groopz E-Commerce software (http://www.groopz.com) is commercial software produced by Digi-Net Technologies (http://www.digi-net.com). The software is sold by licenses on a concurrent user basis. Digi-Net offers the product as a hosted solution (with annual renewal) or as an outright purchase (with annual technical support agreements). The operator software (for monitoring web traffic and engaging in real-time conversations) is freely available for a variety of platforms. The server software is also available for multiple platforms, though not using their *recommended* configuration increases the likelihood of complications.
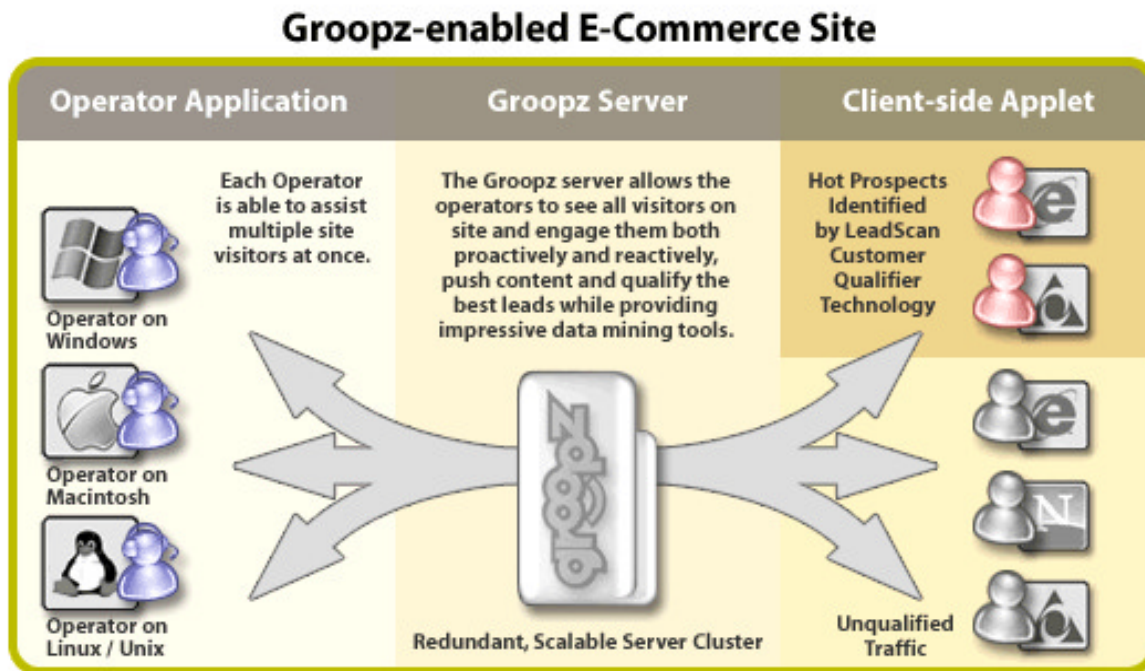
Product Usage

Using the operator console, university staff members can monitor traffic on the web site for Groopz-enabled pages. Pages are enabled for Groopz by including a small snippet of code on each page which ultimately invokes a java application and either displays an image for the users to see and click on or a hidden applet which allows operators to seamlessly monitor traffic. On the page, the code might look like the following:

```
<script language="JavaScript">
customParams = "<param name = groups value = 'Undergrad'>";
</script>
<script language="JavaScript" src="http://groopz.pbu.edu/groopz-ug-pbu.js">
</script>
```

The java applet invoked by this script generates an icon on the page that would appear as shown below. The icon/image displayed is updated on the fly based on operator availability. The example to the right shows what the user would see when there is no operator logged into the operator console. The example to the left shows what the user will see the instant an operator logs

in and becomes available. (The page refreshes/updates on the fly courtesy of the Java applet)
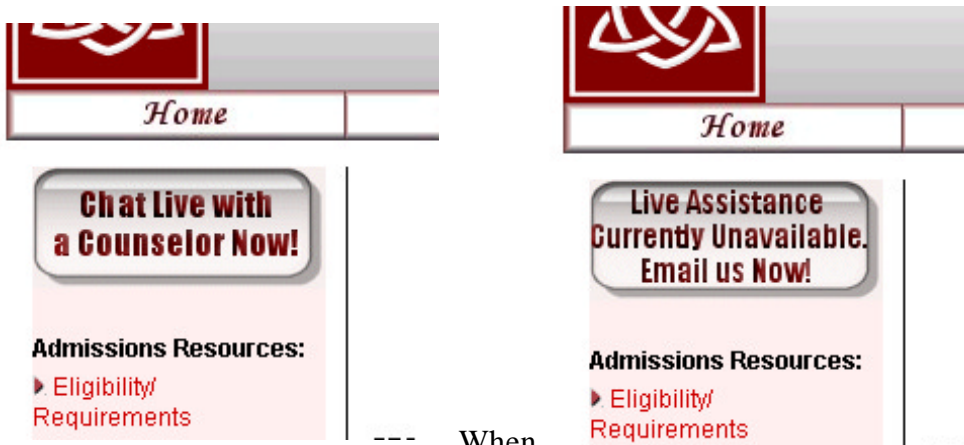
--- When --- an operator is logged in, they see a screen as follows. Web visitors are highlighted/color-coded based on their affiliation, which is determined by parameters in the applet on the page. At PBU we categorize our visitors based on their level, such as undergraduate, graduate, etc. so that an appropriate enrollment counselor can handle the requests.
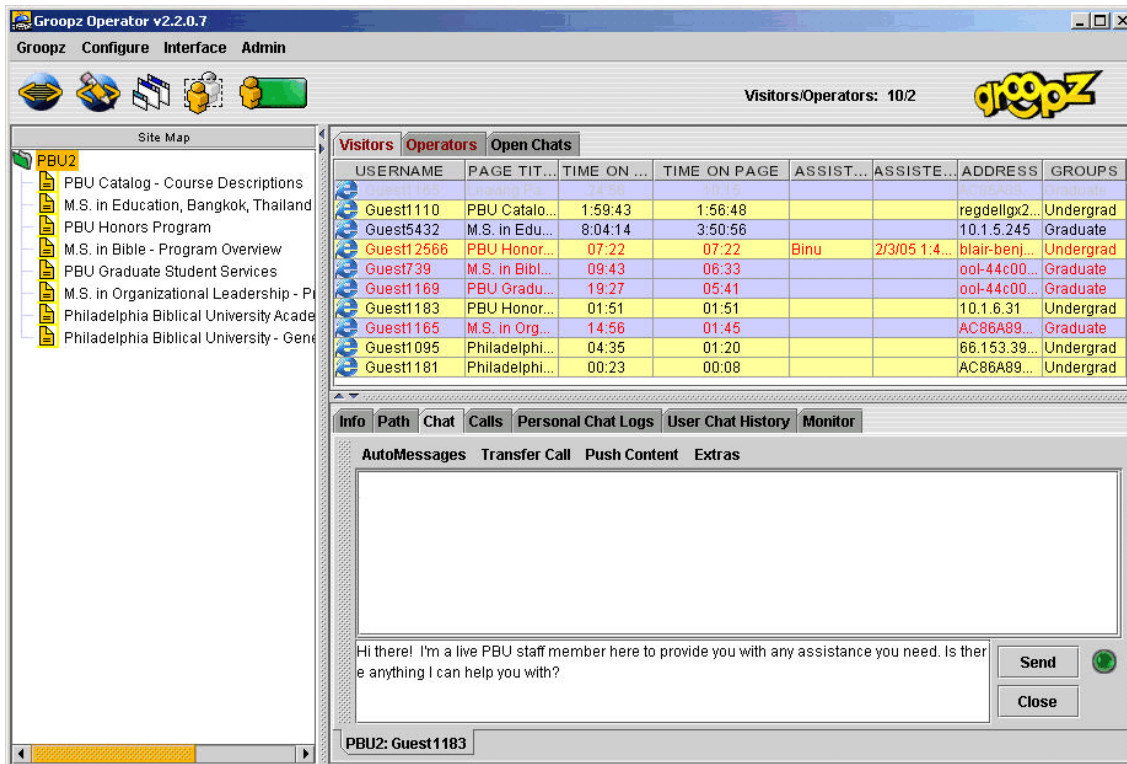
The interface is customizable to show various types of data about both the operators and users. Notable info includes the page on the site they are currently viewing, the time on the page, the time

on the site overall, their IP address, and more. If the operator selects a user, additional info is provided in the bottom window. For example, on the info tab the operator can see the following:

Attribute	Value
Username	Guest1183
Time on Site	1:26:15
Page Title	PBU Honors Program
Address	10.1.6.31
Chats Opened	1
Language	English
Operating System	Windows XP 5.1
Browser	sun.plugin
Groups	Undergrad
Assisted on	4/21/05 2:57 PM
Referrer	none
Time on Page	1:26:15
Affiliate	none
Assisted by	Blair

If the
operator clicks on the "Path" tab, additional info relevant to the user's path through the site is shown. This can help the operator to get a good idea about what the web visitor is specifically interested in.

Page Title	Time	Length	Group
Philadelphia Biblical University Academics	4:23:49 PM	00:01	Undergrad
PBU School of Music & Perf. Arts - Admissions Req...	4:19:34 PM	00:05	Undergrad
PBU School of Music & Perf. Arts - Admissions Req...	4:19:00 PM	00:19	Undergrad
PBU School of Music & Perf. Arts - Degree Program...	4:18:53 PM	00:05	Undergrad
PBU School of Music & Perf. Arts - Degree Program...	4:17:57 PM	00:12	Undergrad
PBU Curriculum Summary - Music Performance - Pi...	4:17:55 PM	00:00	Undergrad
PBU Curriculum Summary -	4:17:44 PM	00:09	Undergrad
PBU Curriculum Summary - Music Performance - Pi...	4:17:41 PM	00:02	Undergrad
PBU School of Music & Perf. Arts - Degree Program...	4:17:34 PM	00:05	Undergrad
PBU School of Music & Perf. Arts - Program Overview	4:17:12 PM	07:31	Undergrad
PBU	4:16:32 PM	00:38	Undergrad
PBU School of Music & Perf. Arts - Program Overview	4:16:22 PM	00:08	Undergrad
PBU School of Music & Perf. Arts - Degree Program...	4:16:20 PM	00:00	Undergrad
PBU Curriculum Summary - Music Performance - Pi...	4:14:16 PM	02:02	Undergrad

If an operator desires, he/she can initiate a conversation with the user in an instant-message fashion. This ability is the primary advantage of this technology because it affords the operator the opportunity to initiate contact with an otherwise nameless and faceless web visitor. This is accomplished by selecting the user from the user list, right-clicking on it, and choosing "engage conversation."
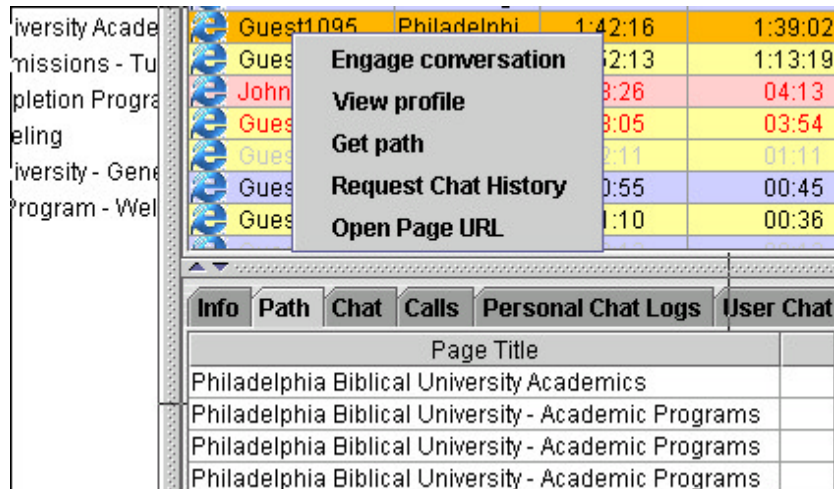
This will bring up the chat window on the operator console. The software has the capability of saving commonly-used messages, such as introductions, etc. to save repeating redundant tasks.
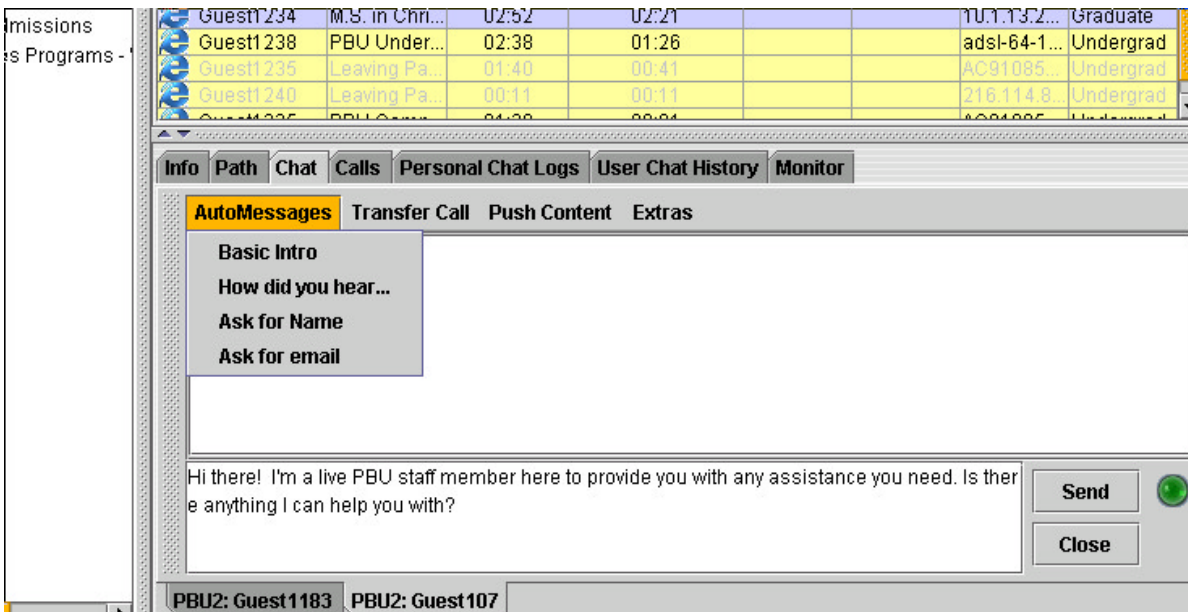
Once the operator hits the "send" button to transmit the message, a window will appear on the user's screen to initiate the chat.
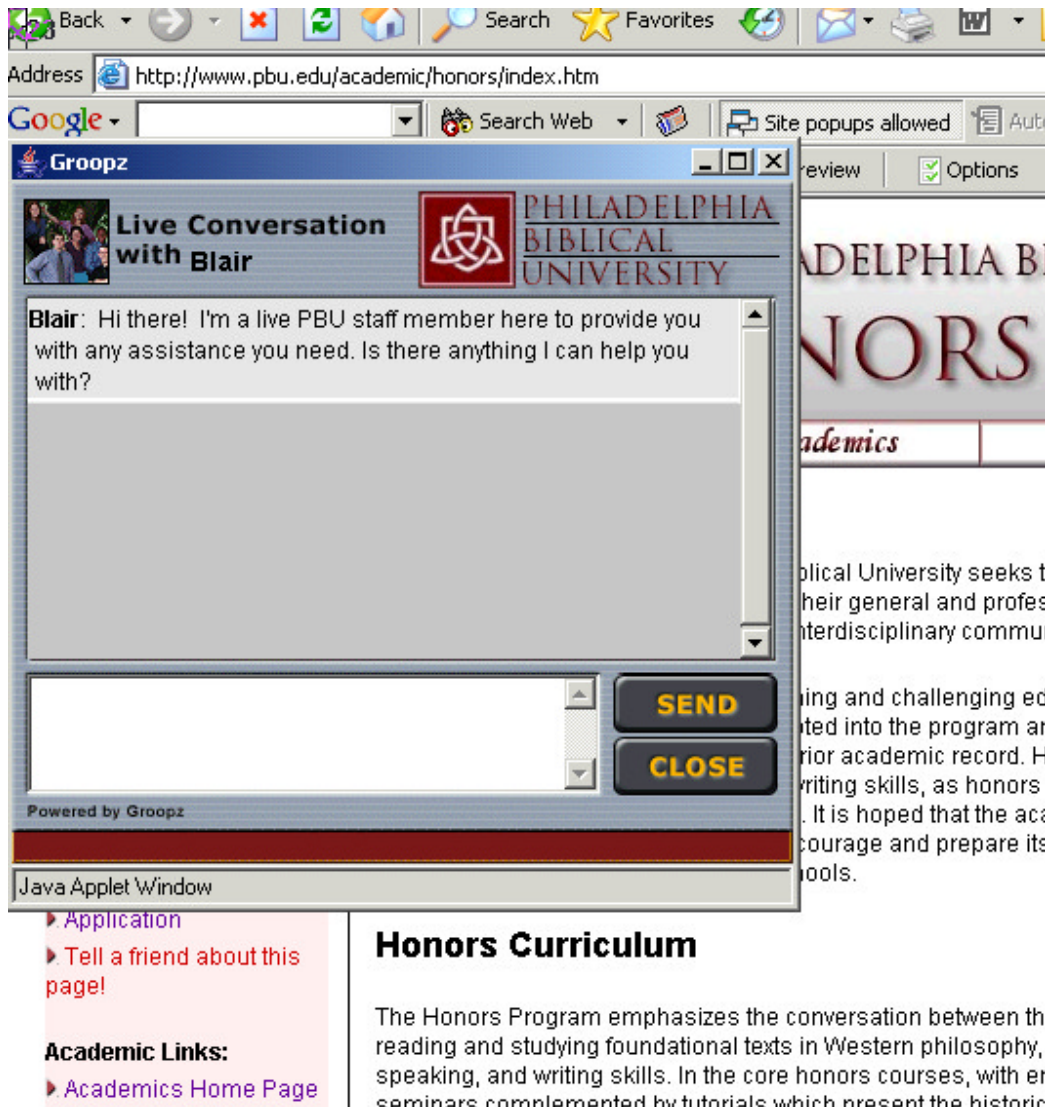
When the conversation ensues, the operator can store info collected from the user to personalize the experience. After the user provides his/her name, the operator can store the info in the operator console on the "info" tab. This will subsequently display the name in the conversation dialogue, replacing the generic Guest101 label.

Groopz

Live Conversation with Blair

PHILADELPHIA BIBLICAL UNIVERSITY

Blair: Hi there! I'm a live PBU staff member here to provide you with any assistance you need. Is there anything I can help you with?

Guest107: Hi, I'm interested in your honor's program. What are the entrance requirements?

Blair: OK, great. I can help you with that.

Blair: May I first ask your name?

Guest107: Sure, I'm Hubert Simms.

Powered by Groopz

Java Applet Window

Guest107	PBU Honor...	19:26	15:15	Blai
Guest1242	PBU Under...	10:28	09:15	
Guest1244	M.S. in Org...	05:54	05:51	
Guest1236	Leaving Pa...	01:10	00:43	

Info	Path	Chat	Calls	Personal Chat Logs	User Chat History	M

Attribute 149×296	
Username	Hubert
Time on Site	19:26
Page Title	PBU Honors Program
Address	blair-benjamin
Chats Opened	1
Language	English
Operating System	Windows XP 5.1
Browser	sun.plugin
Groups	Undergrad

Live Conversation with Blair

BIBLICAL UNIVERSITY

with any assistance you need. Is there anything I can help you with?

Guest107: Hi, I'm interested in your honor's program. What are the entrance requirements?

Blair: OK, great. I can help you with that.

Blair: May I first ask your name?

Guest107: Sure, I'm Hubert Simms.

Hubert: I'm a senior in high school

Blair: OK, great.

SEN

CLOS

Powered by Groopz

In the course of the dialogue, the operator can do other things, such as "pushing" pages to the user. For example, if they inquire about tuition rates, the operator can "push" the tuition page to the user, causing that page on the site to load in their web browser.

Additionally, if multiple operators are logged in, they can transfer calls/conversations to one another.   If an operator is configured with the necessary privileges, he/she can also monitor the conversations of other users for quality control.

An add-on component to the Groopz server software allows for additional reporting and statistics via a separate web interface.

Operator Activity List

Name	Proactive Attempts	Proactive Successes	Reactive Requests	Reactive Successes
Shua	7	3	2	0
Christina	22	9	1	0
Baron	57	18	11	10
Blair	1	1	2	1
Gaynell	8	0	1	1
Binu	18	9	10	6
Christina	30	12	1	0
Christina	13	3	0	0
Katie	59	25	8	2
Totals	215	80	36	20

4/1/05 12:00 AM to 4/30/05 11:59 PM

Chart
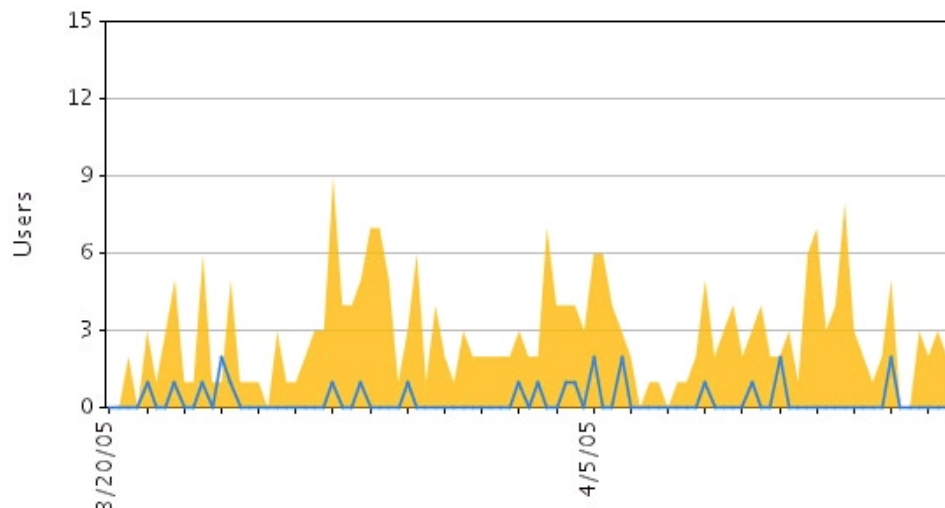
Pros & Cons

Pros

- Digi-Net has a fairly responsive technical support staff who are helpful when problems arise.
- The software is reasonably priced, allowing us to implement this solution without breaking the bank.
- Prospective students and web visitors have been almost unanimously impressed with the technology. The feedback we get is almost always very positive.
- Numerous formal inquires have resulted from proactive contacts from web visitors.
- Users appreciate the personal aspect of support that it allows our staff to provide
- Once the server software was up and running with all of the bugs worked out, it requires very little attention.

Cons

- Lack of consistent standards w/ Java-based technology resulting in some erratic behavior. While the Groopz chat window has little-to-no problems on the user end, sometimes the "push pages" feature doesn't work.
- Configuration for an in-house Groopz server was cumbersome and frustrating. The documentation provided by Digi-Net was anemic and outdated at times. Getting all of the bugs worked out was exasperating. While the Digi-Net staff was courteous and professional, the solutions and patches provided were often untested and ineffective.
- Documentation was also outdated and counterproductive at times.
- Product has not been improved or updated much at all during the two years that we've been a client. Some minor bugs and enhancement requests were submitted, but were not acted upon. Apparently Digi-Net is focusing its energies on a new product to succeed Groopz, which will contain its functionality and then some. (Current Groopz clients with active service agreements will be entitled to the new product.)

Summary

All in all, PBU has been satisfied with Groopz and considers it a valuable component of its web site and online services.

Streamlining Maintenance and Access to a University's Academic Catalog

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Abstract

Developing and maintaining an online version of a University's Academic Catalog has increasingly become a priority for enrollment management and IT staff. Many schools are now using the online version of their catalog as their primary working copy and are generating their print version periodically as needed. Managing and accessing this content can be cumbersome without a viable content management solution. Using Digital Architecture's Acalog^{TM} ACMS (Academic Catalog Management System) solution, the process is streamlined for both the end user and the catalog administrators. Built from the ground up by academic professionals exclusively to meet catalog management needs, this product enables various people in the catalog editing and maintenance process to work together to accomplish their goals without a prerequisite of technical expertise. Additionally, prospective students and other web visitors have speedy and intuitive access to catalog data from both current and previous years. Since implementing Acalog^{TM} ACMS at Philadelphia Biblical University, various individuals have been able to directly participate in the editing process to develop a cohesive, intuitive online catalog presence in an affordable manner.

Introduction/Background

Philadelphia Biblical University is an independent private Christian university in southeastern Pennsylvania. The University has a full-time equivalent student body of approximately 1,400 students at the graduate and undergraduate levels. In recent years with the growing trend towards remote/web access and digital format for most pertinent data, it has become necessary to explore options for making our official catalog data available accordingly. We first made our catalog data available by simply posting a digital copy of the print version using Adobe's .PDF format. With the obvious limitations of .pdf for editing, searching, hyper linking, etc. we desired a more web-friendly format. We then posted an html version of the print catalog, but it was essentially a sloppy html export from print publishing software, resulting in excessive clean-up and formatting work. Our ultimate desire was to make a paradigm shift from working primarily with a print copy (generating an online version as needed) to working primarily with an online version (generating a print version as needed). It was determined that some form of content management software to facilitate the ongoing management of the catalog would be necessary.

Considering the Options

To make the paradigm shift to working exclusively with an online catalog for ongoing mainte-nance, revisions, etc. and abandon the ages-old way of catalog management, we formulated a wish list of features that would need to be available in any sort of solution. These items included the following:

- A user-friendly interface for the web visitor who needs access to catalog data
- Intuitive and easy to use for administrative staff who publish and maintain catalog data
- Ability to archive previous versions of the catalog
- Ability to easily and cost-effectively generate print versions of the catalog to meet the re-duced, but ongoing need for print copies
- Ability to have an ongoing editing process transparent to the end user
- Ability to have multiple levels of access and permissions
- A search function to access catalog data quickly and easily
- Compatibility with other areas of our web site, including the "look and feel"
- Cost-effective in both the short term and long term
- Ability to track changes made to catalog data
- Reduce the need for the print version and its associated costs (postage, printing, etc.)
- Streamline management with reduced dependence on IT for routine editing

Given this list of needs and wants, it was quite clear that a content management solution of some sort was in order. As we contemplated the options, we found that nearly all viable options were either full-fledged CM solutions designed for managing an entire web site or were scaled-down versions of such systems geared for smaller applications. Additionally, all were quite expensive, typically in the \$50-\$100K range for licensing alone.   In the midst of our search we discovered Digital Architecture's Acalog^{TM} ACMS product (http://www.acalog.com) , which was excep-tionally well-suited to our goals in virtually every way. Acalog^{TM} ACMS was originally de-signed from the ground up as an online academic catalog solution. It was developed *by* acade-mia *for* academia and had no purpose other than to serve as a turn-key solution for schools look-ing to publish their catalog(s) online.

We made the decision to purchase Acalog^{TM} ACMS based on its compatibility with our needs and wants, our impression of Digital Architecture as a company, the professionalism of their staff, and their affordability.

Requirements

Acalog^{TM} ACMS runs as a hosted solution, resulting in essentially no in-house technical in-volvement from an IT perspective with regard to ongoing maintenance. Digital Architecture's competent staff takes care of all upgrades and maintenance to both the software and hardware.

Using the software

Acalog^{TM} ACMS has two primary components–the Publisher and the Gateway. The Publisher is the management interface (requiring authentication), and it is used to manage, edit, export, up-date, etc. all components of the catalog(s).

Acalog™ ACMS is currently home to both our Undergraduate and Graduate catalogs. The Publisher interface allows our staff to simultaneously work on existing catalogs as well as future catalogs. Currently existing catalogs can be copied over to serve as the groundwork for future years' catalogs. Catalogs are not live/accessible to users on the Gateway until they are enabled accordingly in the Publisher interface. Future catalogs can consequently be edited on an ongoing

basis and published publicly only when editing is complete.

The catalogs published by Acalog™ ACMS are highly customizable and flexible in order to meet the specific goals and structure of a given college or university. Courses, colleges, schools, departments, programs, etc. can all be added, deleted and arranged accordingly in order to build the precise hierarchy for the institution within their Acalog™ ACMS database.

Within the Publisher interface there are several tools and features to streamline the editing process. These features include:

- Change Notification - Establish lines of approval for making changes to content, communicate with other editors from within the Publisher interface, and approve/reject changes
- Audit Snapshots - Compare changed versions versus previous versions
- Version Tracking - Track all changes to catalog content with detailed audit trails

When the need inevitably arises for a print version of the catalog (accreditation requirements, etc.), the Acalog™ ACMS software has provisions for generating an export file of the entire catalog, suitable for import into a pre-press software application. Additionally, Digital Architecture's staff offers optional pre-press services for handling the specific formatting and final layout of the print version.

The second major component of the Acalog™ ACMS system is the Gateway, which serves as the public user interface to the catalog data. The Gateway is designed using style sheets and templates to match the general look and feel of other areas of the university's web site. It consists primarily (80%) of dynamic data that is pulled from a database and managed primarily through the aforementioned Publisher interface.

When viewing the catalog in the Gateway interface, users can select different catalogs from a pull-down menu. Available options will be all catalogs that have been "published" and typically includes current and past versions of all catalogs that the University is currently managing in the Acalog^{TM} ACMS system.

Visitors may also optionally authenticate to the system (with an email address & password) and maintain a "portfolio" of courses and programs of interest for future reference. This can be a benefit in the college decision-making process or during the advising process for enrolled students.

Pros & Cons

<u>Pros</u>

- The system meets all of our needs, satisfying all of the items on our original wish list. Every department involved in the catalog editing process, particularly those most closely involved, has been universally satisfied.
- Performance is fast and intuitive
- The staff at Digital Architecture is very courteous and professional and has always been very attentive to our needs. They didn't put us in the back seat once we had signed our contract. They honor their quotes and have always been very sincere in every aspect of our interaction with them. Additionally, they were very patient and gracious throughout our long decision-making process.
- Product has been continually developed and improved with customer feedback and needs in mind
- Allows IT to have minimal involvement in the ongoing editing, maintenance and support of the online academic catalog(s).

<u>Cons</u>

- The non-dynamic areas of the catalog, which consist of static HTML pages (message from the provost, policies, calendar, etc.), cannot be edited directly from within the Publisher interface and the process instead entails editing the HTML offline (using an editor) and uploading the static pages using the Publisher interface.
- Modifying the actual design template and/or style sheets cannot be done independently. However, these types of changes are very infrequent and would typically be done only in the case of a site redesign.

Summary

All in all, PBU has been extremely satisfied with the Acalog™ ACMS system and has had no regrets. It has served us well in the short time we have been clients and we highly recommend it to other institutions that are looking for an online catalog management solution.

Teaching Computer Science at a Small University

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Abstract

Small universities do not have all of the resources that larger ones do. There are fewer computers, fewer teachers, fewer technicians and of course less money. Charleston Southern University (CSU) seeks to be one of the smallest universities to meet national accreditation standards in computer science (ABET-CAC). This presentation will provide a history of how the department has grown and demonstrate how we use labs that are much smaller and less well equipped than any accredited program in computer science. We will demonstrate the use of virtual machine software (VMware and Virtual PC) to reduce the amount of hardware required to run an effective lab, the use of instructor controlled labs (using NetSupport), show the importance of using software alliances (Microsoft) to achieve excellence without all of the expense.

History

Charleston Southern University is a small, Christian liberal arts college founded in 1964 in Charleston, South Carolina. With about 2900 students, the University is one of the largest private colleges in the state, offering about 35 undergraduate and graduate degrees. However, it is still small, and resources are scarce. However, the school and its Computer and Information Science department have been making a big impact on the University and its graduates since 1969 when the first course to use computers was introduced.

The process of creating a department of computer science has been a long process. In 1969, Fred Worthy (M.A.T. University of Colorado), a professor in the physics department responded to students' requests to learn FORTRAN. Using the University's IBM System 34, Worthy used his NASA experience in FORTRAN to teach. At that time students would turn in data entry forms to be punched by staff members who would run the programs. Eventually, another punch card

machine was purchased as well as a removable Winchester disk for class. In 1978, Worthy went on sabbatical to Clemson to study COBOL, assembly and ALGOLW. Upon his return in 1979, the first standalone course in programming was taught.

As Worthy continued to work with data processing, arrangements were made to allow students access to a terminal in the data processing department where they could key in their programs directly into the computer and do away with punch cards. Work was limited to Tuesday and Thursday nights. It usually took at least two weeks turnaround time for students to get results, but they were "in the computer age."

With the demand for computer scientists and information systems specialists at an all time high, the University needed to offer a degree. However, according to the accreditation rules of the Southern Association of Colleges and Schools (SACS), a degree could not offer a bachelor's degree without two Ph.D.'s in the field. With great foresite, Loren Radford, Stan Ricketts and Worthy designed an Institute to house computer courses without offering a degree. The Information Systems degree was actually a business degree with an emphasis in information systems with 18 hours within the Institute. The Mathematics department created a new degree with 28 hours of mathematics and 34 hours of computer science. The degree programs first appeared in the 1982 catalog. Although the two programs have evolved with changing technology, they retain the basic framework put into place by these early visionaries.

The new computer science program needed a home. An old Biology laboratory was selected as the first computer laboratory. The room was not perfect; the tables were old Biology laboratory tables, complete with sinks. (see Figure 1) Besides being available, one wall of the laboratory was also a common wall above the Data Processing department. Initially, six IBM personal computers were placed on the lab tables with cables from the lab down through the floor into the Data Processing department's System 36. By Fall 1983, the curriculum was expanded to include other courses including Database Management and COBOL on the System 36.

Figure 1 First Computer Laboratory with Biology Sinks

In 1984, the University hired Jim Roberts (M.S., Texas A&M), a retired Air Force Lt. Colonel, with masters degree in computer science as the Director of the Institute. The Institute's title was the Computing and Information Sciences Institute (COINS).

SACS grew concerned about the college computer being used by students. A small IBM System 36 was purchased to create a "stand alone" laboratory, no longer connected to the university System 36. In January 1991 Charleston Southern University and IBM entered into a Jointly Defined Effort to establish a Center for Computer Integrated Manufacturing (CIM) education, training and demonstrations. The university was to become a training site for IBM customers. As part of this agreement, IBM would provide the University with an IBM AS/400 Model B45 with an estimated value of $450,000. The University spent an additional $50,000 on dividing the laboratory into three rooms: a classroom, a seminar, and a room to house the system. The first course offered on the new AS/400 was COBOL. Other courses were developed including database management and short courses teaching the operating system. As a part of the IBM educational training program, the University was encouraged to offer short courses for the benefit of the business community. Beaufort, SC Commission of Public Works, Georgetown, SC tax office, Westbury Trucking Company, and Coberg Dairy participated.

In June 1994, IBM discontinued their involvement in the training program. The AS/400 was transferred to CSU. As part of this arrangement, the university would remain a part of the IBM CIM in Higher Education Program and the CIM in Higher Education Alliance. Part of this alliance is the Higher Education Software Consortium. As part of this Consortium, the University can take advantage of a special software package program from IBM.

From 1994 to 1997, the AS/400 system was used in the expanding COBOL courses, and data base management. In addition, all COBOL students were taught the principles of operating a mid-range computer system. A few students (five to six) were made lab assistants whose responsibility was the AS/400. These students were taught the fundamental information needed to keep the system running or restore the system after a failure.

During the spring of 1997, Version 3 Release 2 Modification supporting TCP/IP was installed allowing PC's running Client Access 400 access over the Internet. Eight direct dial phone lines were also installed into a router to allow students who did not have Internet access the ability to get to the AS/400 from off campus.

The Last Five Years

In 2000, the university had 5 PC laboratories, each with 24 computers. In 2001, Mary Gene Ryan and Pat Bower applied for and received a $1.75 million grant from the Department of Education to spread technology through out the University curriculum (Naylor and Hambrick, 2003). Some of the funds were used to create a state of the art laboratory capable of live Internet online classes. Some funds were used to train faculty from all areas how to update classes to use computer technology. Every faculty member was given a laptop and all rooms were fitted with projectors. Two mobile carts of laptops were added to allow any room to act as a computer laboratory. All classrooms provide wired and wireless access to the Internet.

To move the computer program forward, funding was approved to hire a Ph.D. in computer science in 1999. After two number of years vacancy, Jack Briner (Ph.D., Duke University) was hired. Briner came with 4 years of teaching and 6 years of industrial experience. After a year of observation, Briner began the process of developing a new curriculum which would meet the

Accreditation Board of Engineering Technology (ABET) and follow the Association of Computer Machinery (ACM) and the Institute of Electrical and Electronic Engineer (IEEE) Joint Task Force recommendations (Joint Task Force on Computing Curricula, 2001). Most recently he wrote and was awarded a National Science Foundation grant to attract and support computer science students under the Computer Science, Mathematics, Engineering and Science (grant) program. This will support up to 29 students per year for the next four years. Together with two new Ph.D. positions, the program is set to take a leap forward. However, the leap forward is not designed to break with the department philosophy but to build on it.

The Department Philosophy

The mission of the department is to provide students a Christian learning environment which will prepare students for a broad range of graduate schools and job markets. In particular, we believe that the following skills are critical: reasoning and problem solving; in-depth knowledge of at least one programming language and an appreciation of other forms of computation; an understanding of the foundation of computing (theoretical); the ability to apply theory in programming, networking and system administration; the ability to effectively communicate both in oral and written forms; and, an understanding of the ethical and social issues involved in computing. To achieve our mission, we apply the following techniques. All of our courses require reasoning skills. The skills are built using a prerequisite structure that ensures that skills deepen as students come closer to graduation. Students are required to work on projects beginning in COIN217, Visual Basic, through to their final senior project. All courses integrate the theoretical into practice so that the student will be prepared for the marketplace. Specifically, the courses Applied Networking and Applied Operating Systems give students a hands-on computer environment in which to apply principles to cutting-edge technologies. After the first course, all courses require have an ethics component: a paper or debate. In most classes, Students are required to present results of projects or research to the class. How can we achieve these goals with such a small faculty?

Dedicated Faculty.

COINS has a dedicated faculty who share the philosophy that involved students learn best. Students are made to realize early that computer skills, like art, cannot be taught; they must be learned through initiative, hard work and constant practice. Consequently, COINS' faculty do not "teach", but rather "coach" by creating the environment where the students "learn by teaching themselves" through hands-on involvement with realistic problems. Lecture is used sparingly. Unlike most universities, almost all COINS courses are taught in a computer laboratory where students immediately apply, test, and/or practice topics while they are being discussed. This "learn-by-doing" or "learn-by-teaching-oneself" philosophy has paid off handsomely for our students. This ability to self-teach is a critical quality in the workplace given that computer professionals must reinvent themselves every two years due to technology turnover.

Small Class Size.

Additionally, small class size with a maximum of 24 students per class and a senior project requirement that brings each student into a direct working relationship with one of the faculty al-

low the faculty to know each student personally. Consequently, COINS students have a sense of belonging, and because of the senior project, also have ownership in the program.

Emphasis on Teamwork.

COINS emphasizes teamwork in all of its courses. Employer input indicates that teamwork is an essential quality in computer workplaces since almost everything is done in teams. According to them, graduates of most institutions are not ready for teamwork since most academic experiences emphasize competition between students for grades instead of teamwork.

Focus on the Fundamentals.

COINS' main focus is on fundamentals with the goal of producing well-rounded graduates who are able to function at all levels of the workplace. This includes not only technical fundamentals, but also people-skills. Each student is required to communicate his or her work orally and in writing throughout the curriculum, and especially during his or her senior project defense before a panel of faculty, professionals and peers. Employers increasingly prefer well-rounded graduates with fundamental skills to those who focused on acquiring a greater number of technical skills (which usually are dated almost before the student graduates). They cite greater value to the company. Employers also know that they will have to train whomever they hire to function in their own particular technical environment. They have discovered that they are better equipped to teach the specific technology than the fundamentals. Comments from several employers and alumni have validated this philosophy

Diverse System Environment.

Students need a well rounded view of computing. Many students today graduate without ever having worked on a computer larger than a PC. We believe that students need to have been exposed to a number of different systems and operating systems. CSU maintains state-of-the-art mid-size computers which gives CSU much of the technology necessary to capitalize on the emerging trends. CSU's ability to attract and prepare students for the decades to come depends on our ability to keep pace with the needs of industry.

Continuing the tradition of hands-on-experience with the IBM series, Fred Worthy remains one of the few instructors of hands on AS/400 and iSeries computers in South Carolina (Roberts, 2005). However, paradoxically there are a number of sites using these computers. For example, almost every grocery store in the area uses a machine running the AS/400 operating system.

Using VMware and Virtual PC, the department can simulate multiple, concurrent operating systems on one piece of hardware. This makes efficient use of computer resources and provides a level of security. Students may be administrators on the virtual machines without corrupting University machines. Linux, other variants of UNIX, Microsoft operating systems and others can be learned without exposing the University to unnecessary maintenance of University operating systems and hardware.

The Learning Environment

Keeping Students On Track

All computer courses are taught in the laboratory setting. One difficulty with this setting is that students have a hard time focusing when the faculty are trying to lecture or give out important information. There are a number of products on the market which allow an instructor to take control of students' computers. CSU uses NetSupport School ("Networked Classrooms With NetSupport School", 2005). Figure 2 shows views from 39 student seats on the instructor's console. Any picture may be clicked to show a window size view of a particular student's machine. The instructor may take control of the keyboard and mouse or may share the keyboard and mouse with the student.
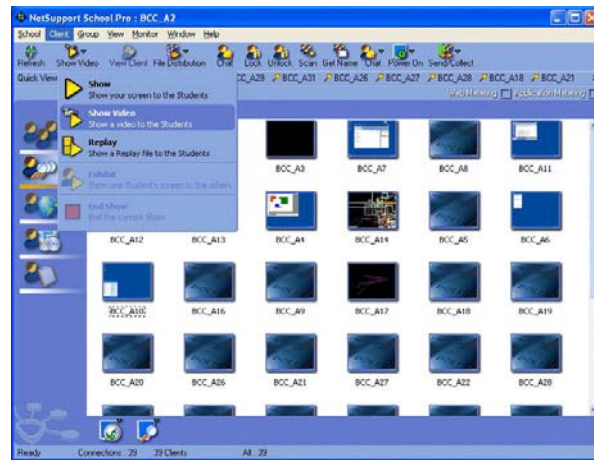
Figure 2 NetSupport School Thumbnail View

The thumbnail view allows the instructor to look over multiple shoulders at once. However, it is impossible to look over everyone at once. The system also provides the ability to limit the applications that may be started by the student (see Figure 3). Likewise, students may need to be limited to certain Internet domains to keep them on track. Figure 3 shows the use of limiting which domains can and cannot be accessed. Also, the tool provides the ability to lock student terminals completely so that they will focus their attention to the front of the classroom when appropriate. NetSupport provides other tools such as file distribution, homework collection, testing and surveys as well.

51
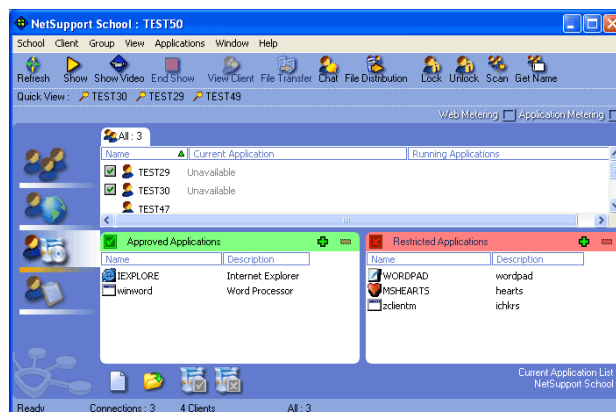
Figure 3 NetSupport Application Control
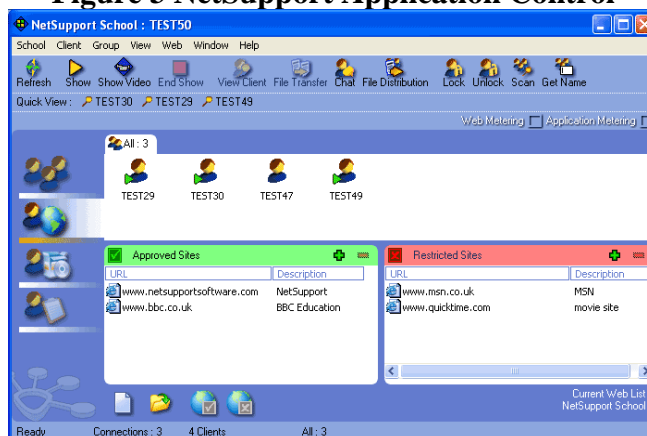
Figure 4 NetSupport Network Control

Broadening Student's Horizons Without Breaking the Bank

Students need exposure to a broad range of systems. CSU supports three operating systems: OS/400, Windows (XP/2003 Server), Linux ("Red Hat Enterprise Linux - Academic Editions," 2005 and "Fedora Project," 2005). OS/400 is run on the i520 E-server. Windows XP are the standard for all student workstations. Linux Enterprise Academic Version is run on a Dell, multiprocessor server.

These Windows XP workstations, in turn run VMware ("VMware Workstation 5," 2005). VMware Workstation software emulates the hardware necessary to run multiple virtual machines under a host operating system, such as Windows XP. The virtual machines do not know that their I/O requests are being redirected through the host operating system or being multitasked with other operating systems or programs running on the host operating system. Each virtual machine may use physical or virtual disks on the host machine. Physical disks are faster. However, virtual disks are transportable. To prepare for a class, a virtual hard disk image can be created and each student can get a copy of the image to run on his/her machine without hurting any other users.
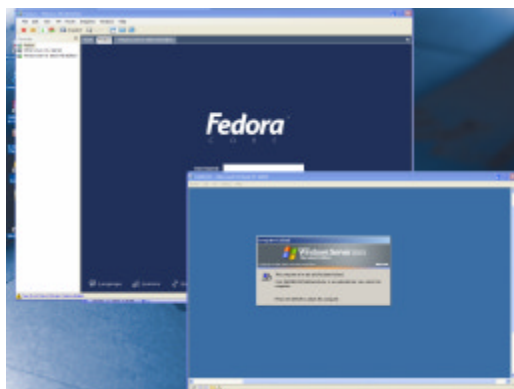
Figure 5 VMware running Fedora and Windows Server 2003

More recently, Microsoft has developed a similar product, Virtual PC. The software works well with Microsoft operating systems. However, it requires patches to run Linux. Figure 6 shows

Virtual PC being used to test a student's ASP server project. On the left hand side, the server (marked as COIN331) is the student's virtual machine. On the right side, the host is accessing the server over the network. The server is collecting packets that are being sent on the network with Ethereal (Combs, 2005).
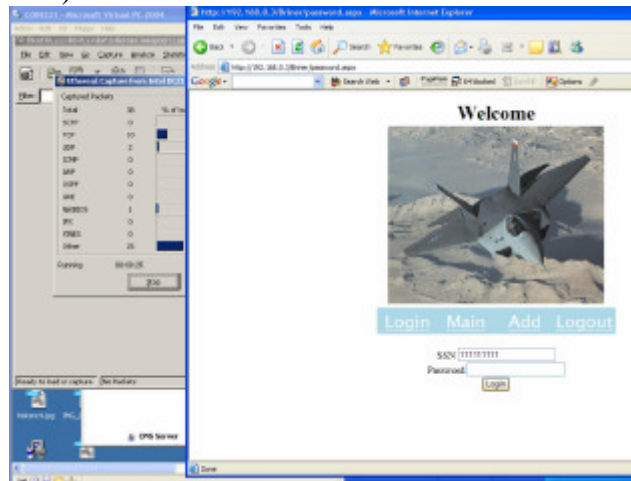
Figure 6 Virtual PC Running as a Server to Host Machine

The primary advantage of Microsoft's Virtual PC is that it is available under the Microsoft Developer's Network Academic Alliance ("MSDN Academic Alliance Developer Center," 2005). MSDNAA allows the department to purchase the right to distribute software development software to departmental students, faculty and staff. Student's may check out software or may purchase a copy for minimal production and mailing costs. Software includes Microsoft operating systems, compilers and development tools (such as Project, Visio, and Access). Software distribution is controlled by software provided by Microsoft (see Figure 7). Students are given an account to login which allows them to obtain keys and ask for software to be delivered or to reserve a copy to borrow. Software costs are minimal, $799 for the first year and $399 for subsequent years.
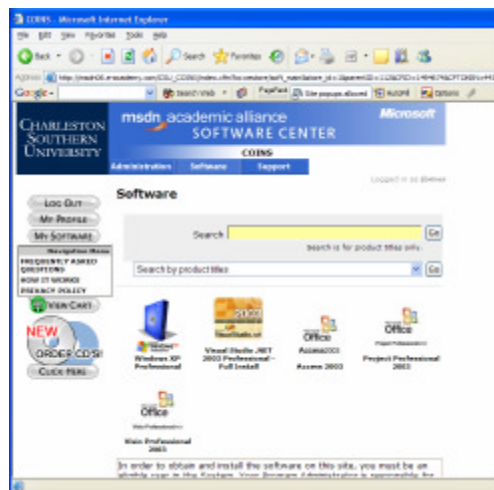
Figure 7 MSDN Academic Alliance Software Center

The Next Five Years

The next five years look bright. The department is in the process of hiring its third Ph.D. in computer science. A new science building on campus has left the department room in an older building to outfit two new laboratories with state-of-the-art networking equipment and computers. More importantly, the department will have the infrastructure completed to allow it to proceed towards ABET-CAC accreditation. The curriculum has been designed to meet the curriculum suggested by ACM/IEEE and the requirements of ABET. After the first two years of graduates complete the new computer science degree, the department will seek accreditation. Based on reports from an outside reviewer, we have a good chance to achieve accreditation.

Acknowledgements

Linux is a registered trademark of Linus Torvalds. Microsoft and Windows are registered trademarks of Microsoft Corporation. Red Hat and Fedora are registered trademarks of Red Hat, Inc. Unix is a trademark of the Open Group. VMware is a registered trademark of VMware, Inc.

References

Combs, Gerald. *et al.* (April 20, 2005) "Ethereal: A Network Protocol Analyzer". http://www.ethereal.com/

Computing Accreditation Commission. (November 11, 2004) "2005-2006 Criteria for Accrediting Computer Programs," ABET.
 http://www.abet.org/images/Criteria/C001%2005-06%20CAC%20Criteria%2011-29-04.pdf

"Fedora Project". (April 20, 2005) Red Hat, Inc., http://fedora.redhat.com/

Joint Task Force on Computing Curricula. (December, 15, 2001) "Computing Curricula 2001 Computer Science, Final Report," IEEE Computer Society and Association of Computing Machinery,
 http://www.computer.org/education/cc2001/final/cc2001.pdf

"MSDN Academic Alliance Developer Center". (April 20, 2005) Microsoft, Inc. http://msdn.microsoft.com/academic/default.aspx

Naylor, David and Hambrick, Patty. (May 28-31, 2003) "Improving Learning in Higher Education: An Overview of Charleston Southern University's Title III Grant," CCCU Conference on Technology, Union University,
 http://www.uu.edu/events/cccu/tech03/schedule.htm#Naylor

"Networked Classrooms With NetSupport School". (April 20, 2005), NetSupport, www.netsupportsoftware.com

"Red Hat Enterprise Linux - Academic Editions". (April 20, 2005), Red Hat, http://www.redhat.com/solutions/industries/education/products/

Roberts, Mary Lou. (February 1, 2005) "Some Schools Still Struggle to Interest Students in iSeries Education, While Others Come on Board," iSeries Network, Article 19966, http://www.iseriesnetwork.com/news/nwn/story.cfm?ID=19966&channel=news

"VMware Workstation 5". (April 20, 2005) VMware, http://www.vmware.com/products/desktop/ws_features.html

Uncommon Uses for Common Tools in an On-line Environment

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Both on-line and face-to-face courses rely on textbooks as an important source of information for students. A challenge for instructors in an on-line setting is to insure that students are learning from their textbooks. One way to address this challenge is to use productivity software tools to develop assignments that promote student thinking and interaction with course content. This paper gives examples and directions of activities that are easy to design and relatively easy to grade, but require thought on the part of the students to complete. The assignments are based on graphic organizers discussed in K-12 reading methods textbooks such as those by Gunning (2004) and Vacca & Vacca (2005). Graphic organizers are typically designed for students to complete using paper and pencil. With slight modifications, higher education faculty can design challenging assignments based on graphic organizers that can be distrubuted to students and completed by students electronically.

H-Chart

An H-Chart is similar in function to a Venn Diagram and is used to compare and contrast two items. The sample below asks teacher education students to compare and contrast two major theorists, Vygotsky and Piaget after reading the appropriate chapter in their textbook.

Piaget	*Both*	*Vygotsky*
• Thinking evolves through a series of hierarchical stages •	• Children need to interact with their world	• Difference between actual and potential development is known as Zone of Proximal Development •

Directions for Creating: Use the Table feature of your word processor to create the H-Chart.
1. Type directions for the activity at the top of the page.
2. Insert a table with three columns and three rows.
3. Merge the cells in the first and last columns.
4. Hide the top border of the top row of the center column. Hide the bottom border of the last row of the center column.
5. Label the three portions of the "H".
6. Provide statements under the chart that students copy and paste into the appropriate spot. Alternatively, ask students to come up with a specified number of points for each section of

the diagram. Providing statements in random order makes the assignment very easy for the instructor to grade.

7. Students upload the completed diagram to the course management system drop box.

Sorting

Sorting activities are good for reinforcing concept development. Sorts can be open or closed. In a closed sort, the instructor provides the categories and the items to be sorted. In an open sort, the instructor provides the items to be sorted and the students determine the categories. Alternatively, the instructor could provide the categories and the students provide the items that fit the categories. Students can be asked to write a paragraph explaining or justifying why they sorted the items the way that they did. This gives the instructor insight into the students' thinking and reasoning. The sample of a closed sort below asks teacher education students to sort a series of statements under the philosophical approach to reading that the statements represent.

Philosophical Approaches to Teaching Reading Sort

Copy the statements below the chart and paste them under the approach that they illustrate. **Note:** The columns will not necessarily be even!

Top Down	*Interactive*	*Bottom Up*
Mistakes in oral reading should be ignored unless they change the sense of the passage.	Teach phonics and then teach students to apply this skill to real reading.	Oral reading should be accurate.

Directions for Creating: Use the Table feature in your world processor to create sorting activities.

1. Determine how many categories you need for the activity and draw a table with that many columns.
2. Type the categories at the top of each column.
3. Add enough rows to accommodate the largest number of statements/words under each category.
4. Use the borders and shading features to "dress-up" the table.
5. Add statements or words under the table that students copy and paste under the appropriate category.

Frames

Frames (also called Chart Diagrams or Matrix Diagrams) are useful if you want your students to condense and organize data about the traits of multiple items. When completed, students have a succinct summary of a unit of instruction. Frames can be used in any subject area, but are espe-

cially useful in the sciences. Completed frames make wonderful study guides for exams. The following frame has comparative religions students determine how each religion views the questions posed in the first column.

Comparative Religions Frame

Directions: Complete the frame by describing how each of the religions views the questions listed in the first column.

	Buddhism	*Hinduism*	*Islam*	*Judaism*
Nature of the Divine				
Problem of Evil				
Problem of Suffering				
Issues of Justice/ Ethics				
Righteousness (Right Doing)				
Rewards for Justice/ Righteousness				
Afterlife and Its Nature				

Directions for Creating: Use the Table feature in your world processor to create the frame.
1. Determine how many items and traits for which you wish students to collect data.
2. Insert a table with the appropriate number of rows and columns.
3. Type the items as column headings and the traits as row headings. (If you have numerous items and a few traits you can put traits as column headings and items as row headings.)
4. Use the borders and shading features to "dress-up" the table as appropriate.

Semantic Feature Analysis

Semantic Feature Analysis uses a grid to examine the similarities and differences among a group of items, people, events, concepts, etc. Students think about each item listed in the top row of the table and determine if the item has the feature listed in the first column of the table. They put a "Y" in the box if the feature is present, an "N" if the feature is not present, and an "S" if the feature is sometimes present. The following example asks teacher education students to compare the major approaches to teaching reading.

Major Approaches to Teaching Reading

Directions: Place a "Y" in the square if the approach in the top row has the feature listed in the left column most of the time. Put an "N" in the square if the approach in the top row does not usually have the feature. Put an "S" in the square if the approach has the feature some of the time.

	Basal	*Literature Based*	*Individualized*	*Language Experience*	*Guided Reading*
Book Based					
Writing Based					
Self-selection of materials					
Individually paced					
Strong emphasis on decoding					
Primarily for beginning readers					
Primarily for remedial readers					

Directions for Creating: Use the Table feature in your word processor to create the SFA Grid.
1. Determine how many items and features you wish students to use as points of comparison. Insert a table with the appropriate number of rows and columns.
2. Type the items for comparison in the top row.
3. Type the features in the first column.
4. Add borders and shading as appropriate.

Concept Maps

Concept maps help students understand the relationships between main ideas and supporting details. They are arranged in a hierarchical manner with the most general concept first at the top of the map and the most specific details last at the bottom of the map. There are a variety of ways of using concept mapping in the classroom. One is to have students construct their own maps illustrating their understanding of the topic under study. Another approach is a cloze concept map where the instructor creates the map and then deletes certain elements from the map. The students complete the map by placing the missing elements in the correct spot. This technique is useful for assessment and for checking general understanding. When completed, the concept map serves as a graphic organizer with a pictorial representation of the content for a specified unit of study.

Directions for creating a concept mapping exercise:
1. Identify a unit of study that lends itself well to concept mapping and create the map. An outline of a chapter is a good way to start.

2. Develop the map by using an appropriate application.
   a. One of the easiest ways to create a concept map is to use the *Inspiration* software package, a commercial application designed to create concept maps. (Available at http://www.inspiration.com/)
   b. There are other applications (some free) that create maps. See, for example, Cmap available free for downloading at http://cmap.ihmc.us/.
   c. Use the organizational chart feature in PowerPoint or Word to develop the map.
   d. Use the drawing tools in PowerPoint or Word to develop the map.
3. Save your completed map; it becomes your answer key.
4. If using *Inspiration*, select the entire map and copy it. Open *Excel* and paste the map. *Excel* lets students drag and drop graphic items easily.
5. Determine which items you want deleted. Use the drawing tools to cover up the items on the map that you want deleted. One way is to use the rectangle tool to draw a box over the text in the item you wish to hide. Fill the box with the same color as the item on the map, and choose No Line to eliminate the black line around the box.
6. Once you have hidden all of the items you wish to hide, select all of the graphic elements and Group them. They now become one item and students won't realize that the answers are actually hidden on the map.
7. Return to *Inspiration*. Select an individual item that you want students to move on to the map. Copy it and paste it to the side or below the map on the *Excel* worksheet. Repeat until you have all the items you want students to place on the map moved to the *Excel* worksheet.
8. Add a text box and write directions for your students.
9. Save and post the file in a course management system.
10. Students download the file, open it, and complete the map by dragging and dropping the individual elements to their location on the map. They save the completed file and return it to you via the drop box. Use your answer key to check their work.

Concept Map of Comprehension Strategies

Directions: Drag the boxes right of the red line to the place where they fit in the diagram. Save the file as Last-name_Comp_Strategies and upload it to the assignment drop box. Hint: You may want to reduce the size to 75% to see more of the diagram at one time.

Comprehension strategies

include — include — include — include

Organizational — Elaboration — Monitoring

which occur — which occur — which occur — which occur

during and after reading — at all stages of reading

which include — which include — which include — which include

activating prior knowledge — which include — which include — determining important details — imaging — which include — which include — regulating

which include — which include — which include — which include — checking

predicting — which include — which include — summarizing — evaluating (critical reading) — which include — which include — checking

strategies may be applied through

which includes — which includes — which includes — which includes

questioning — summarizing

Move the pieces below to the correct location on the concept map.

previewing | Reciprocal Teaching | organizing details | making inferences | during and after reading | repairing | Preparational

knowing one's self as a learner | primarily before reading | predicting | setting a purpose and goals | comprehending main ideas | clarifying | generating questions
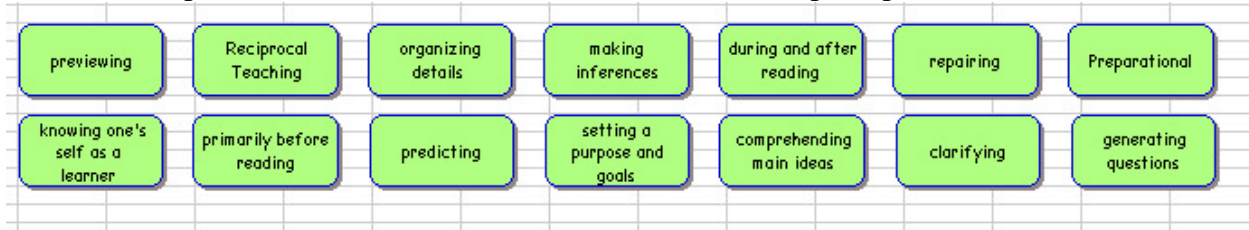
According to Vacca and Vacca (2005), graphic organizers such as those presented here "help students interact with and outline textually important information" (p. 399). This helps students comprehend and retain information from their textbooks, a goal of both on-line and face-to-face classes. Additional ideas using word processing, spreadsheet and presentation software, samples of assignments, and directions for creating the assignments are available at the author's web site at: http://homepage.mac.com/cecires/Workshops/index.html.

References

Gunning, T. (2005) *Creating literacy instruction for all children*, 5th ed. Boston: Allyn & Bacon.

Vacca, R. T. & Vacca, J. L. (2005) *Content area reading: Literacy and learning across the curriculum*, 8th ed. Boston: Allyn & Bacon.

Web resources for further reading and ideas

Enchanted Learning Graphic Organizers (http://www.enchantedlearning.com/graphicorganizers/)—Site contains numerous graphic organizers and an explanation of when to use them.

McKenzie, Jamie. Grids Organize Thinking for Decision-Making and Choices (http://www.fno.org/oct97/grids.html) —Site has examples of frames with questions to answer based on data collected.

Semantic Feature Analysis (http://www.litandlearn.lpb.org/strategies/strat_3fa.pdf) —Links to a PDF file that explains what Semantic Feature Analysis is and how to use it with students.

Concept Mapping (http://www.litandlearn.lpb.org/strategies/strat_concept.pdf) —Links to a PDF file that explains concept mapping and how to use it with students.

Graphic Organizers: Concept Map http://www.graphic.org/concept.html

Novak, Joseph. *The Theory Underlying Concept Maps and How To Construct Them* (http://cmap.coginst.uwf.edu/info/)—Article that discusses the theory behind concept mapping.

IHMC Cmap Tools (http://cmap.ihmc.us/)—Free concept mapping software that is available for downloading.

Information Literacy and Research Skills Program at USC Sumter

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Abstract

This session will demonstrate how USC Sumter's Anderson Library recently developed information literacy and research skills program uses information technology available through the library introduce students, faculty and patrons to the methods and ethics of information research, with an emphasis on analyzing and defining information needs and resources by presenting it in multiple formats.

During the Spring 2005 semester we used Camtasia™ to record both image and voice for instructional use outside the classroom. Our goal was to reach every student member of our campus and educate them on the offerings available in the library. Selected faculty received a CD tailored to their specific needs in the library. We used previous bibliographic instruction records to select the initial group of educators for the CD system. The library intends to provide this type of resource for any faculty member based on their feedback and their needs.

Students who are skilled in assessing and exploring their informational needs and defining what type of information will benefit their needs are well on their way to academic success. Using Camtasia™ we are able to reach the USC Sumter community in a familiar format.

Using the technology available in the library we will create a classroom setting to begin Fall 2005, which will allow participants to attend scheduled classes to aid in discovering the technology available and will provide assistance in navigating through the vast amount of information available.

Introduction

The American Library Association defines information literacy as a "set of skills needed to find, retrieve, analyze and use information." ALA also states that "information literate people are those who have learned how to learn. They know how to learn because they know how knowledge is organized, how to find information and how to use information in such a way that others can learn from them. They are people prepared for lifelong learning, because they can always find the information needed for any task or decision at hand." It is our goal at USC Sumter's Anderson Library to give our university community the tools to become efficient, lifelong learners that can navigate the sea of ever-changing information with ease and stealth.

As a small library with limited resources, we are constantly looking for cost effective technology that can produce the most "bang for our buck". We simply do not have the resources to adopt every new technology that is out there, but we are not satisfied to become technologically obsolete. "It is important that small libraries operate strategically, adopting only those technologies that are the most beneficial to their patrons" (Roberts). In an attempt to put our money where our mouth is, we have chosen Camtasia as our vehicle to promote information literacy and the plethora of other services that are available to our students, faculty and staff. We also hope to produce media for our community, two public school districts, partners in our specialized programs and other special interest groups that utilize our services. Camtasia™ provides the opportunity for every patron in our library, both traditional and non-traditional, to have the library staff at their fingertips through a detailed tutorial of the services and search techniques available to them online either from their personal computer or in the library.

The presentation is up to date, not on the bleeding edge, but certainly compatible and recognizable to our new students that are no longer simply online, they are constantly connected in one form or another to information 24/7. It is important for our university and community to see us as the connection to all that is interactive, both online and in print. It is vital that our learning community not forget the power of the written word on the leaves of a bound page. Our students, faculty, and staff must recognize and evaluate material more efficiently than ever.

Library vs. WWW

As librarians and university professionals, we often hear students and colleagues alike say "I don't need to come into the library for anything, it's all on the web." Although we recognize this as a gross exaggeration, it is not altogether untrue in the eyes of our patrons. Research has shown that 80% of people have never been in a library.

Many of our learning communities do not see the necessity of the traditional bricks-and-mortar institutions. They are often perceived as mausoleums of out-dated, historical rhetoric that is dutifully maintained by old ladies with reading glasses and sensible shoes.

This perception is fueled by information providers that have placed holdings online for consumers to access from just about any web accessible device obtaining a signal from anywhere in the world. In fact, the library is capable of providing millions of pieces of media at any given time to those same devices with the same signal requirements. Our life's blood depends on our ability

to advertise, package and present the information in a vehicle that would rival any commercially produced interface with blinking lights and scrolling banners.

Many of our patrons feel that the task of leaving the comfort of their home, getting into the car, walking into the library and physically searching the stacks is more labor intensive than the end result is worth. They consider their time better spent browsing the web and letting their favorite search engine handle the task of sorting the information into order by rank. What the patron does not consider is that the information classified and sorted on the web "has the feel of a universe sorted by bulldozers and the Shopping Channel" (Plotnik). The surfing patron spends their time filtering through thousands of questionable citations and then begins their research. The library has this same information organized by a universal system that is user-friendly and provides staff to answer questions and evaluate patron's needs a lot quicker and more effectively than Jeeves (although he does have impeccable manners).

In an attempt to be self sufficient, the patron uses one of numerous search engines to start a search on any given topic. What the user does not often consider is the time spent filtering through erroneous retrievals because of the "human element". It is inevitable that a user will misspell a word, use a term or string of terms that the search engine does not combine as a phrase and spend valuable time trying to guess what terms to use to find the highest ranking link for the information. When the search is complete and the results ranked the user must then begin to peel away the layers of each link in a desperate attempt to filter through information that is irrelevant and just plain incorrect. The web is not governed nor regulated for accuracy of content. In an age where a majority of our learning communities have never known life without the Internet and immediate information, it is vital to equip them with the tools to evaluate and verify the information they receive. After all that digging the user may still come away unsatisfied and the search begins again. The old adage, "Trying to find a needle in a haystack" has never been more appropriate than in this very situation.

Of course the landmines do not stop there. The user may attempt to locate a website that carries the name of the company, location, association, etc. and the user simply types www.fillintheblank.com and may end up on a very explicit site that has more pop-up advertisements simply because the wrong end tag was used in the address. The website that is found can turn the search into a seek and destroy exercise and the user will again loose valuable time sorting through the endless quantities of useless information and dead links/link rot that the web administrator has not updated since the day the site was published. However, with only a few key strokes and clicks, users can have at their fingertips valuable information that is stored within the walls of the library, virtual or concrete, and not the large quantities of incorrect information.

Arthur Poltnik makes our case with this statement:

> **No one denies the Web is a miracle for [users] and a barmy alternative to certain research drudgery. Even its so-called 'advanced' searches are like pumping brewskies from a barrel. But take it from an avid Web user with career backgrounds in writing and library service: The true font of inspiration, knowledge and reliable, in-depth information is still the library—better than ever and, more than ever the [user's] best friend.**

Reaching Our Patrons

Does it feel like we are spoon-feeding our patrons? Making it too easy? They aren't learning how to perform research because they don't have to click more than 4 times? That's GREAT! We don't want them to work too hard or the user will head straight for their favorite search engine and perpetuate the myth that libraries' can not keep up with technology. Spoon feed the patrons until they are sick! They will know where to come the next time they get hungry for knowledge!

> **"Only librarians could love the concept of drilling down in some hierarchy or other—or search return—to find hard data. For mere mortals it is confusing and frustrating to have to click through three or four screens of a web catalog [to find viable information]" (Weissman).**

Our modest goal as "user-friendly information experts" should be to have our library's web page at the top of our patron's favorite list or dare we dream and become the home page!

Camtasia™ provides a slick, edited, production quality venue to display our library's media both print and electronic. We also use it as our "librarian in a box" for our students and faculty. If our patrons are doing research in the wee hours of the morning, they can pop in the Camtasia CD and find research tools, search tips and locate subject specific databases with pin-point accuracy all the while being guided by the voices of their university librarians. The voice over adds a personal touch and allows the instructor/librarian to talk about what is happening on the screen without cluttering it with unnecessary text, bubbles or blinking buttons. The user is a patron of the library as soon as the disk begins to play. They can review it over and over again until they are familiar with the most effective techniques for research and information literacy.

The applications of this software are only limited by the user's imagination. The presentation can be produced as a PowerPoint slide show, streaming video, web based tutorial, CD, DVD, etc. The creator can produce live searches to show the viewer exactly how to do proper research. As an educator, professional, instructor or any other group we find ourselves identified with, we have the opportunity to create tutorials that showcase skills, procedures or services that are otherwise repeated and begin to expand the student's skills for more in depth research.

We began our production by using the combined programs of SnagIt® and Camtasia™ to record Anderson Library's home page and placing the captured image as the first in a series of files that will introduce the viewer to the library. SnagIt® works in tandem with Camtasia™ to offer the producer the opportunity to capture text, pictures, streaming video, live navigation and other media to place into Camtasia™ to edit and produce. SnagIt® also provides options to highlight important information using colors or shades of light and dark insert text bubbles or insert graphics that emphasize points of interest.

After the library's home page was inserted we used a recording device to insert voiceovers that introduce the student to our schedule and some of our basic services. This voiceover adds a personal touch and the viewer will hopefully come to know the person behind the voice. The next series of images began at our home page and we recorded a live navigation to the database

screen. It is put into the presentation as streaming video and we were able to edit the information, speed or look of the page easily. Once we entered the databases we were able to tailor the searches to the specific class requirements. Viewers seem to like having specific information about the searches they were expected to perform instead of generic search techniques that may take them through numerous databases before finding useful information. Professors are able to send us information a few days in advance and the library staff can produce a CD for their classroom instruction and have the option to loan it to students who are absent or need to see the information for reinforcement. This approach frees up the library instructor's time to produce new media and offers the professor's the flexibility to use the information when it is appropriate for the class and not try to work around a busy bibliographic instruction schedule.

Camtasia™ and SnagIt® are opening new doors for Anderson Library. Our library and the services offered are in a medium that is familiar to the technical generation and makes us available all hours of the day and night. This format allows educators, professionals and paraprofessionals to streamline information and present it in a way that is convenient and efficient for the user and the creator. Time is a waning commodity and may professionals simply can not afford the time to create and recreate information for every instance that is required. Camtasia™ and SnagIt® allow time for revision, editing and production to be perfected and effective.

References

"Information Literacy." *Borough of Manhattan Community College.* 2004.
        http://lib1.bmcc.cuny.edu/lib/help/glossary.html.

Plotnik, Arthru. "Who loves you like the library? Even in the Internet age, libraries
        give writers the edge." *The Writer*, Nov 2003: 28-33.

Roberts, Gary. "Small libraries, big technology." *Computers In Libraries*, Mar 2005:
        24-27.

Weissman, Sara. "Back to school: Sara Weissman finds that teaching can be one of the
        best learning experiences around." *Library Journal*, Jan 2002: 32+.

Portable 3D Stereographic Displays

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Abstract

Have you ever wanted to "spice up" a presentation with a futuristic feel, or give a lecture that really captures your student's attention? This tutorial describes how to construct 3D images that literally appear to "pop out of the screen", using a commonly known technique called linear light polarization. Stereographics are found in nearly all virtual reality projection systems, and simple stereographic displays can easily be constructed from equipment available on most college campuses. This paper discusses the basics of stereo viewing, the construction of a simple stereographic display system, generation of both static and dynamic stereo images, and some applications of 3D displays in a college environment.

Introduction

From industry to entertainment, stereographics are becoming increasing prevalent in today's society. At the heart of most virtual reality environments is a stereo viewing system that helps users to "see" applications in 3D. These heightened sensory environments increase the feeling of realism, and can be used to improve a number of tasks from training to virtual prototyping. Hollywood has even seemed to rediscover this appeal of stereo viewing, releasing a number of 3D movies in recent years [1]. Stereographics help to grab the attention of an audience, and make presentations more exciting and entertaining.

The purpose of this paper is to provide an overview of stereographics. First, the basics of stereo viewing will be presented, with a description of the human viewing system. Next, three methods for presenting stereo images to an audience will be explained: anaglyphs, light polarization, and active stereo. A few ideas for making these stereo image presentations portable using a laptop computer and an external PCMCIA video card are then discussed. Generation of stereo images (both static and dynamic) will be covered, followed by a brief discussion of applications for 3D images in an academic environment to conclude the paper.

The Human Viewing System

Our ability to perceive depth is due primarily to the fact that we have two eyes. There are other visual cues our eyes pick up on (like shadows and object occlusion), but the different perspectives our eyes perceive of the world provide the best information to the brain for determining relative distances of objects. As a simple experiment, try holding your index finger about one

foot from your face, then look at your finger with one eye closed. Now, close that eye and open the other. You should notice that the perspective of your finger is slightly different for each eye. If you are not convinced, then observe that the background view behind your finger is dramatically different between the eyes when you try and keep your finger in focus. Our brain takes these two images from the eyes and merges them into one, with a dramatic sense of depth. Figure 1 shows the basics of the human viewing system.
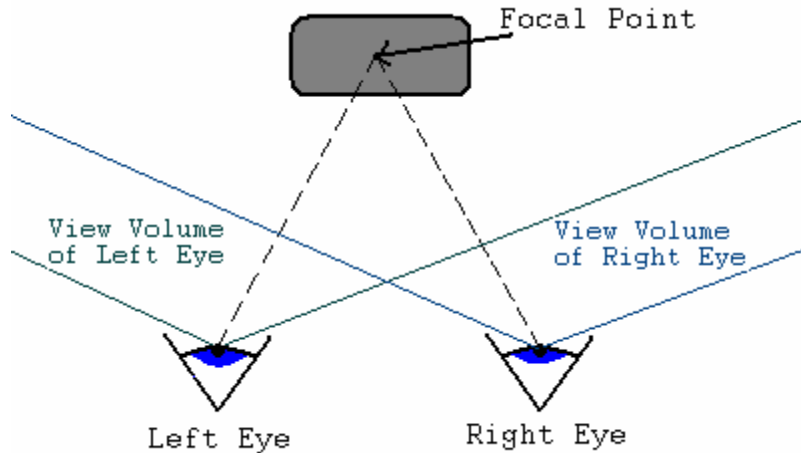
FIGURE 1

The view volume (the part of the world the eye is able to see) is different for each of our eyes. Most of the eye view volumes overlap, meaning that for the most part, our eyes are able to see the same objects in the world. The parts of the view volumes that do not overlap are the portions very close to the eyes. Try placing your index finger just to the right of your right eye so that it is barely visible. Now, close your right eye and you will notice that your finger is not visible by the left.

These view volumes can adjust depending on where your eyes are focused. Again, try holding your index finger about one foot from your face, but this time focus on an object several feet past your finger. While keeping this object in focus, you should notice that a double image of your finger is visible (since each eye perceives the finger to be in a different place). The focal point in a scene is the exact location where both eyes are focusing. This is the one place where your eyes try and generate a single image of an object. All other places in the world should appear slightly out of focus. Generally, you do not notice this phenomenon because your eyes can refocus very quickly. As your gaze travels from object to object, your eyes are constantly adjusting trying to bring the image into focus.

Creating graphical displays with the illusion of 3D requires the generation of two different views (which correspond to the different views of each eye) that focus on the object of interest. If these images are displayed in a manner such that each is visible to only the intended eye, then our brain will merge the images into one, and we will get the sense of viewing a 3D display. The next section focuses on techniques for making sure that each eye "sees" only its intended image.

Presentation of Stereo Pair Images

There are a number of techniques for presenting stereo pair images to an audience. One of the simplest approaches is to use *anaglyphs*, which is based on the principle that if you view an image through a certain color filter, that filter's color will disappear in the image.

Separate left and right eye images can be generated using shades of colors that will not be visible to both eyes. These views can then be merged into a single image using image processing software, and displayed with a typical projector. However, when the audience dawns the special glasses with the funny red and blue lenses, each eye will actually see the image in a different way, producing the 3D effect. The children's movie, "Spy Kids 3" was made using this technique [2]. The drawback with anaglyphs is that the color in these types of displays is poor at best – each eye is unable to see one of the primary colors of light! The advantage with this approach, however, is that in order to project the 3D image, you only need a single projector.

Another approach for presenting stereo pairs is to use *light polarization*. With this technique, the left and right eye images are projected through separate projectors that have opposing polarizing light filters in front of their lenses. The audience watches the presentation while wearing special sunglasses with the corresponding filters. Each eye, then, is only able to "see" the image that was projected through the same filter as the one in front of it in the sunglasses. This makes it possible for both images to be projected on the same screen, but for each eye to view only its intended image. There are two types of polarizers, linear and circular. The linear polarizers are considerably cheaper than their circular counterparts, but are subject to more crosstalk (one eye is able to see some of the image that was supposed to be visible only by the other eye). However, the circular polarizers eliminate a great deal more light than linear ones, resulting in a much darker image on the display screen. For this reason, most 3D movies choose linear polarizers and try to model the scene with color intensities that result in less crosstalk. Generally speaking, the brighter a color, the more crosstalk it will produce. Light polarization also requires the use of a silver projection screen. The standard white matte projection screens common today have diffuse surfaces that scatter the light evenly in all directions, destroying the polarization of the light. The older silver screens are very directional and preserve the polarization. The major advantage of this technique over anaglyphs is that the color is much better in the final 3D image. The obvious drawback is that two projectors are required in order to produce the display, meaning that movie theatres require a special projector to show 3D movies created using this technique. The IMAX version of the "The Polar Express" was the most recently released 3D movie that used light polarization [3]. Figure 2 shows two projectors with linear polarizing filters and the corresponding glasses.

FIGURE 2

The final technique for generating stereo pairs is to use an active stereo approach, where the display for each eye alternates in coordination with special LCD shutter glasses worn by the users. When the left lens is open, the display for the left eye is on the screen. Then the left lens closes and right one opens while the right eye image is on the screen. Our brain once again fuses these images producing a 3D display. This alternation of the images must take place approximately 120 times per second, or users will see a "flicker" in the display. This approach can be very pricey! The LCD glasses themselves can cost as much as $600 per pair, and the CRT projectors needed to achieve such high refresh rates can cost well over $15,000. This approach was popular with early virtual reality systems like the CAVE [4], since it does not make the images darker (as does light polarization) or reduce the color spectrum (as do anaglyphs). However, this is by far the highest price option, particularly for large audiences. If single user displays are desired, then much cheaper glasses that connect to a standard desktop computer can be purchased for only around $150.

Making 3D Presentations Portable

The trickiest part of setting up a stereo projection system is actually getting the images to the projector(s). In the case of linear polarization (the preferred method of the author) two projectors are needed, one for each eye. In the case of 3D movies, two separate films are created with the left and right eye images. With a computer generated display (digital images or even dynamic computer graphics), these two separate images must be sent from a computer (or computers) to the different projectors. Generally speaking, it is easier to run a presentation of this sort from a single computer, and thus it would be very nice to have the computer capable of generating multiple displays that could be sent to more than one projector. Two options exist here, a dual-headed video card, or multiple video cards in a single machine. Windows supports multiple video cards in a PC and allows the user to spread the desktop out over all the display devices [5].

For a stereo viewing presentation, the computer can be attached to LCD projectors that are used to display the left and right eye images [6]. Then, all that needs to be done is to get the appropriate images on each display device.

Unfortunately, PCs are not very portable, particularly PCs that have a number of video cards inside them. This became very obvious to the author a few years ago when he was giving a paper at a conference and had hoped to demonstrate a multi-monitor display system [7]. The conference was about 500 miles from campus and he drove the entire distance with the multi-monitor modified computer in the trunk of his car. When he tried to boot up the computer at the conference, the operating system would not load. This was a few minutes before the talk was to begin, and thus, the presentation had to be given without the demonstration. As it turned out, one of the video cards had "jiggled" slightly out of its slot during the long drive, preventing the computer from starting up correctly. The author had been wandering how to make these types of systems more portable, until he attended a presentation by Robin Snyder at ASCUE 2004 [8]. Snyder discussed the use of a device from Margi Systems called the Display-to-Go that attaches to the PCMCIA slot of a laptop computer [9]. The Display-to-Go card makes it possible to attach a second monitor (or video projector) to a laptop computer. Since laptops are considerably easier to transport from one location to another, the author thought this would be a much better approach for creating portable 3D presentations than carrying his multi-video card computer from venue to venue. A Village Tronic VTBook 32MB graphics card [10] was purchased specifically for this project, at a cost of around $250. The VTBook was chosen over the Display-to-go since it has considerably more memory (32MB as opposed to 4MB). With the second video head available through the VTBook, two LCD projectors can be attached to the same laptop providing both left and right eye views. Figure 3 shows the setup.
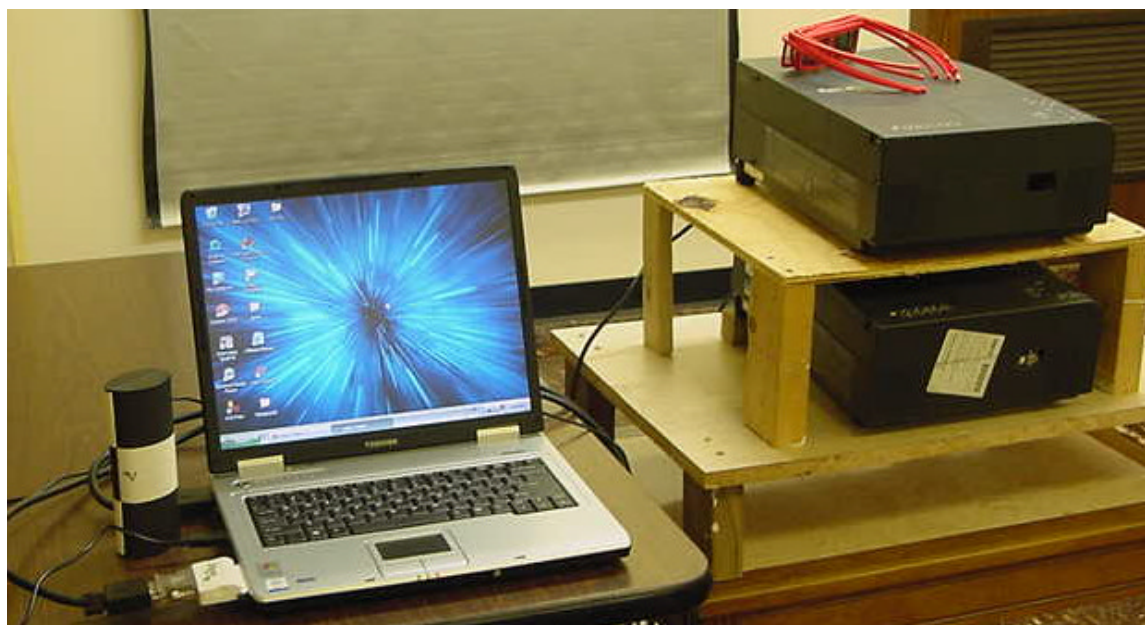
FIGURE 3

If your presentation does not need to be portable, it is probably easier and cheaper to build a dedicated stereo projection PC. NVIDIA [11] has excellent video cards and drivers for multi-

monitor display systems. Interested readers should see [5,6,7] for more information on setting up a multi-monitor stereo projection environment with a single PC and multiple video cards.

Generating Stereo Pair Images

Once you have a computer and two projectors in place, all that remains are the stereo pair images to present. Essentially, you can display static (or still) images, or try and create something with dynamic content (like a 3D video game). In many ways, the still images are easier. Theoretically, if you take two cameras and hold them apart a distance equivalent to the space between your eyes (the interocular eye distance), focus them on the same object, and then take two pictures, this will create stereo pair images. Initially, the author thought that this would be quite easy. He purchased two cheap digital cameras and proceeded to photograph a number of items holding the cameras a short distance apart. However, he found it very difficult to get photos that were very close at all to the views of the eyes. The cameras must be held almost perfectly level with exactly the same focus to get images that produce the desired stereo effect. The author ended up editing the pictures in an image processing program to get stereo pairs that were "workable". Several models of professionally constructed stereo image cameras are available for purchase. A simple web search for the phrase "stereo cameras" will produce a number of options. If high quality images are desired, the author strongly recommends the purchase of a special stereo camera. The left side of figure 4 shows stereo images being projected on a silver screen. Notice that the image is blurry. This is because both the left and right views are concurrently being projected on the display screen, and the polarization glasses are not being used to view the image.
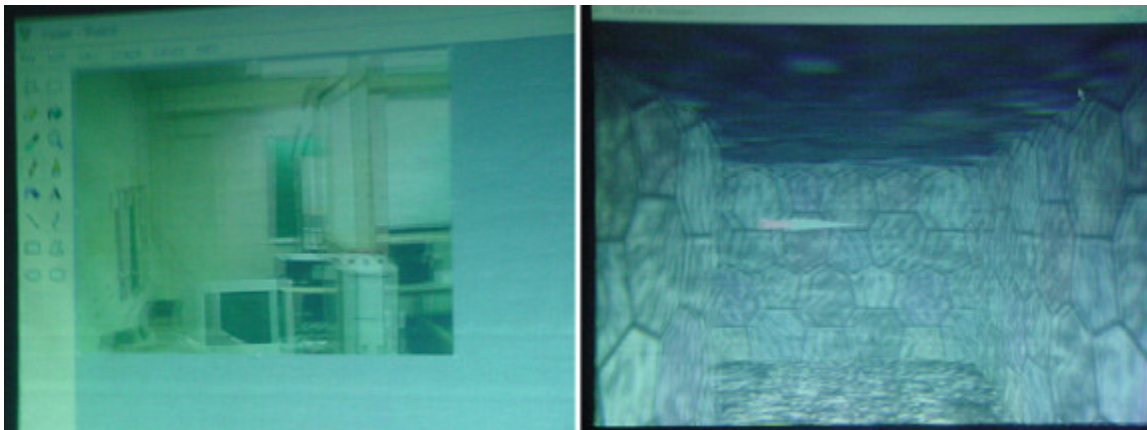
FIGURE 4

Generating dynamic stereo images takes considerably more work. Of course, one approach would be to use two video recorders held a distance apart equal to the interocular eye distance. Creating a stereo computer graphics application (which is essentially what is done with virtual reality) requires knowledge of a high level 3D graphics application programming interface (API). Modern day graphics APIs like OpenGL [12] use a camera analogy when determining the viewing position. The camera orientation is based on three parameters: the eye position, the aim point, and the up direction. Generating stereo pairs simply involves shifting the eye position to the location of the left eye, calculating an image, and then doing the same for the right eye. A complete description of the mathematics behind stereo viewing calculations is outside the scope

of this paper. Interested readers are referred to Paul Bourke's excellent web tutorial on "Calculating Stereo Pairs" [13].

The author and his students have been developing virtual reality applications to run in this type of stereo viewing environment for a few years now. The right side of figure 4 shows a virtual reality video game running from the laptop computer using the VTBook. The display drivers for the VTBook are not quite as "friendly" as the NVIDIA drivers. With the laptop, all windows must be created on the primary display and then dragged to the appropriate projector. With the PC and NVIDIA cards, it is easy to create windows in full screen mode that pop up on any projector [7]. However, the ease of traveling with the laptop is probably worth the inconvenience of dragging the windows if a portable stereo viewing environment is needed.

Uses of Stereo Displays

Stereo images have a number of exciting uses in an educational environment. They can make a presentation more fun and entertaining, and its not that much work and extra cost to set up the equipment needed to project a 3D presentation. A number of vendors are available that sell the glasses and filters for very reasonable costs (the author has purchased most of his equipment from Berezin Stereo Photography Products [14]). End of the year organizational "get-togethers" (like for your local computer club) would be a great venue for this kind of presentation.

Stereoscopy makes a great instructional example for teaching about optics and the human viewing system. This material could be appropriate in a number of disciplines. The author and his students gave a presentation at ASCUE 2004, describing a number of computing camps put on for local elementary age students [15]. One of the courses at these camps was on virtual reality, and students were taught much of the material described in this paper as part of that course. The visual nature of the information helped to keep the young students' interest.

These stereoscopic viewing environments can also serve as the foundation for a virtual reality display system. A number of resources are available describing the use of low cost stereographic displays as the basis for a virtual reality environment in an educational setting [6,16,17]. These environments make it possible to teach about virtual reality and to develop interesting applications, even if very little funding is available.

Stereo images are a lot of fun, and can add some extra "spice" to a lecture, presentation, or even an entire course. The mechanics of stereo viewing are really pretty simple, and anyone with the desire and motivation can build an environment at their home institution. If you are looking for something to grab your audience or students' attention, stereo viewing might be just the thing.

References

1. Porter, S., Video Goes Stereo. Computer Graphics World, August, 2003.

2. Spy KIDS 3D, http://www.spykids.com.

3. The Polar Express, http://polarexpressmovie.warnerbros.com/.

4. Cruz-Neira, C., Sandin, D., DeFanti, T., Kenyon, R., Hart, J., The CAVE: Audio Visual Experience Automatic Virtual Environment. Communications of the ACM, vol. 35, no. 6, 1992.

5. Smith, W., How to Configure a Multi-Monitor Rig. Maximum PC. May, 2002.

6. Cliburn, D., Virtual Reality for Small Colleges. The Journal of Computing Sciences in Colleges, Vol. 19, No. 4, 2004, pages 28-38.

7. Cliburn, D., GLUMM: An Application Programming Interface for Multi-Screen Programming in a Windows Environment. The Journal of Computing Sciences in Colleges, Vol. 18, No. 4, 2003.

8. Snyder, R., The use of multiple monitor and KVM (keyboard, video, and mouse) technologies in an educational setting. Proceedings of the 37th Conference of the Association of Small Computer Users in Education (ASCUE 2004), June 6-10, 2004, Myrtle Beach, South Carolina.

9. Margi Systems, http://www.margi.com/.

10. Village Tronic, http://www.villagetronic.com/.

11. NVIDIA, http://www.nvidia.com/.

12. OpenGL Architectural Review Board, OpenGL Programming Guide. Reading, Massachusetts: Addison Wesley, 1993.

13. Bourke, P., Calculating Stereo Pairs, http://astronomy.swin.edu.au/~pbourke/stereographics/stereorender/, 1999.

14. Berezin Stereo Photography Products, http://www.berezin.com/3d/.

15. Cliburn, D., Weisheit, T., Stormer, K., Richey, E., Rackley, H., Jones, M., Griffith, J., Increasing the Interest of Elementary Age Students in the Computing Sciences Through Day Camps. Proceedings of the 37th Annual Conference of the Association of Small Computer Users in Education (ASCUE 2004), June 6-10, 2004, Myrtle Beach, South Carolina.

16. Bennett, D., Farrell, P., Lee, M., Ruttan, A., A Low Cost Commodity Based System for Group Viewing of 3D Images, Proceedings of Visualization Development Environments 2000 (VDE 2000), 145-149, 2000.

17. Zelle, J., Figura, C., Simple, Low-Cost Stereographics: VR for Everyone, Proceedings of the 35th Technical Symposium on Computer Science Education (SIGCSE 2004), 348-352, 2004.

Service Learning in a Systems Analysis and Design Course

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Abstract

Systems Analysis and Design courses are usually centered on team projects. Such projects, if chosen with care, can meet the goals of the course and serve clients from the campus community. This paper discusses how such projects could be selected. Specific examples of both projects which worked and projects which did not are included.

Service Learning

The Corporation for National and Community Service defines service learning programs as ones that provide educational experiences in which students learn through active participation in organized service experiences which meet actual community needs. The Corporation envisions a nation in which service is promoted and valued by educational organizations (among many others), and problems in communities are solved in part through problem solving initiatives in education[1]. The key to making service learning opportunities both valuable and educational is cooperation between the community organization being served and the academic unit planning the learning activities. A Systems Analysis and Design course which involves team projects can certainly provide the educational framework for information systems development. If the projects are selected with care, they may well also provide real service to the community.

Basic Parameters

Students who work through a standard text in Systems Analysis and Design are presented with a great deal of information. As the authors of one such text point out, students really need to practice the application of concepts, not just read about the application of concepts[2]. Team projects provide a golden opportunity to do this, although time may limit what is possible. At Saint Mary's, this course is a one semester course. Hence fully implemented solutions to projects are not usually possible, but complete prototypes are quite appropriate. When a full year is devoted to the course, more complete projects solutions are possible. An additional basic decision about the source of the projects also must be made. At Saint Mary's, students would find it difficult to work extensively with off campus clients, due both to time and location. Hence we have decided to serve on campus clients through the projects selected.

Learning Objectives

Any service learning project must begin with well defined learning objectives. A systems project is no exception. At Saint Mary's, the Systems course is expected to provide students with experience in analyzing and designing an entire system in a cooperative team environment. Stu-

dents learn about information systems, the system development life cycle and methodologies used to implement the life cycle. Students also must learn how to communicate with clients whose are not computer savvy, analyze their current system, propose new systems, and write and test a prototype of the new system.

Project Selection

Any academic community has many individuals, departments and divisions with information systems needs. These needs range from getting computer shy individuals comfortable with the technology they must use to major systems redesign in such areas as the admission department, the registrar's office and financial offices. The projects needed for a Systems course need to meet the learning objectives of the course, but they can also provide real service to some of the groups in need on campus. Student projects at Saint Mary's must follow a series of milestones; the credit for this organization belongs with Prof. Peter Smith (ASCUE Public Relations Director), who designed the course. The required milestones are as follows:

1. A project proposal, including a letter of transmittal and an abstract for the project.
2. A project charter, including a problem statement explaining why the system is needed by the requesting department. The charter also addresses the initial scope of the project, the project vision, business and technology constraints, and the methodology to be used. Also included are the interview guide prepared for the initial interview with the system owner and a follow up memo to the interviewee.
3. A problems, opportunities, objectives and constraint matrix.
4. Data modeling. An entity relationship diagram forms the heart of this milestone.
5. Development of a context data flow diagram and a functional decomposition diagram.
6. Process modeling. This milestone includes a use case list, the event decomposition diagram, event data flow diagrams and a system diagram.
7. A full system proposal. This proposal includes a feasibility study of the alternative solutions and includes design units which document the general design of the system.
8. Input and Output design.
9. User interface design.
10. A technical and professional report, made to the client with questions asked both by the client and the course instructor.

With the right project, these milestones guarantee that students achieve the learning objectives of the course. However, projects must be selected with care.

This presents the instructor of the course with a two fold challenge: find projects which will meet the learning objectives and at the same time provide real service to some members of the community. The instructor at Saint Mary's began the hunt for projects by sending an e-mail to all faculty and staff. The note began by asking if the reader would like to rethink how the work flows in the reader's department, division or group. Does the reader have an uneasy feeling that there are better ways to handle the information system used, perhaps making use of technology, but is sure that he/she does not have the time needed to explore this? The note went on to explain the course and that there would be teams available to work with campus clients, examining their business requirements and designing information systems which would meet those requirements. The note explained the time commitment on the part of the client and explained that

student teams would be developing prototypes by the end of the semester. This invitation produced a minor flood of ideas and proposals, ranging from "We need help!" to rather well thought out descriptions of current problems. Part of the service to the community involves helping those whose projects are not really suitable find the help they need. This past year at Saint Mary's, that was possible in most cases. Proposals which were not accepted included one which was essentially just a web page design project and one which was essentially a data base design project. The instructor spent some time directing those whose projects could not be used to possible other resources on campus. In a couple of other cases, projects came in too late to be used this past year but are possibilities for subsequent years. The selected projects were ones in which the student teams could experience all phases outlined in the milestones, beginning with conversations with the client about the client's information needs.

Examples of Projects

This past year there were three student teams at Saint Mary's; hence three projects were selected. The client for one of the projects was the Center for Spirituality at Saint Mary's. This office runs multiple programs for students, faculty and staff and people from outside the College. There are multiple sources of funding, depending on the program; hence the office has to keep track of multiple budgets. The office also needs to keep information on people interested in their programs. The Director requested help with updating the whole mailing system and implementing a different marketing strategy. She also needed help overhauling the budgetary organization and developing one systematic way of formulating a time-line for each project. The Director wrote a page explaining her needs, which was given to a student team at the beginning of the project. This team worked with the Director over the semester and was able to develop a new system for her, which her office was able to implement. Of the three projects, this one was probably the most successful in terms of real service to the client and appropriate learning for the students. The team needed to go through all the phases outlined in the milestones, starting with interviewing the client to get a better understanding of the needs. Even that first conversation started the creative juices of the students flowing; they came up with good ideas and earned the gratitude of the client.

A second project had a single faculty member as a client. The professor of Art History at Saint Mary's was on sabbatical with a golden opportunity in front of her. An alumna had just donated funding for ArtStor, a 300,000 digital image library. Up until this year, art history courses has been taught with 35 mm slides, chosen from a department collection of about 40,000 slides. The time required to make the slides, pull them from the collection, arrange them and then refile them has been enormous. The client wanted help making the transition from the 35mm collection to the digital image library. Both the client and the student team working on the project identified many areas of concern. Not only were there questions about how to integrate ArtStor images, scanned images from the slide collection and images from the client's personal collection, but there clearly were technical computer questions to be considered. The client was concerned about the reliability of the network for classes; what would happen if the entire class presentation was stored on the network and the network failed just as class started? The first challenge for the project team was to become familiar with the old scheme of class preparation and with the capabilities of ArtStor. Since ArtStor is relatively new, the student team had frequent e-mail exchanges with those in charge of ArtStor as they attempted to resolve problems. At one point

the team uncovered a problem that ArtStor had not known about; the team unexpectedly ended up serving a client beyond the campus! Although the project was quite successful and the client went on the next semester working on implementation, it was not the perfect project for the course. A great deal of the student time was spent working with the new software and learning how to put presentations together; some of the process modeling that should be part of a project did not really apply to this project.

The third project was actually one held over from the last time the course was offered. One of the members of the mathematics faculty frequently runs regional conferences for the National Council of Teachers of Mathematics. Over the years he has been frustrated by the way in which information about presenters and their topics has been organized. The system in use has made it difficult to locate quickly all the information a presenter might need in advance. For example, to answer a question from a presenter about the assigned room or time, he might have to sort through all the numbered proposals. Since these are large conferences, a better system was indicated. It was clear from the beginning of this project that the team could only make suggestions; the information was recorded in a national office, not in the office of the campus client. It would be up to the client to pass along ideas for changing the system. This team had more trouble with this project; in retrospect, it really is more suitable as a database project. Nevertheless, the team did go through all the milestones and present possible solutions to the problems. Again, this team had much more data modeling work to do and less process modeling. In terms of service learning, the team probably provided less service to the client than the other two teams.

Assessment

As a result of surveying the campus for ideas, the instructor was able to get a much better idea of the service needs of many groups and individuals on campus. The projects selected this past year clearly demonstrated the need to look carefully at each proposal to be sure that the information systems being explored and changed require both data design work and process design work. Although client contact was increased over a previous offering of the course, the instructor feels that even more direct consultation between the team and the client is necessary. The client in the ArtStor project was particularly helpful in exchanging ideas and information, and she was quite grateful for the work of the student team. The other two teams should have spent more time with their clients. Although we can not promise more than a student team can deliver, it seems clear that there is a golden opportunity to be of real service to the community while achieving the desired learning objectives. Combining service to the community with student learning is the heart of service learning. The instructor is excited by uncovering even better projects for the next offering of the course, both because the student learning is so effective and because the students can begin to serve the community in which they live and work.

References

1. http://www.nationalservice.org/about.vision.html Corporation for National and Community Service.

2. Systems Analysis and Design Methods. Whitten, Bentley and Dittman. McGraw-Hill. 2004.

Information Technology at Small Colleges

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Small colleges have unique challenges with respect to their information technology environ-
ments. It's easy to forget sometimes that small colleges are not simply small big colleges, and
that IT needs to be considered in a particular way, especially because of its associated costs. For
one thing, the senior administration at a small college may be less likely to be fully aware of
what's going on in higher-ed IT than their counterparts at larger institutions.

Right now, technologies that are receiving increasing attention at small colleges include all of the
following:

Wireless connectivity. There is a growing demand for ubiquitous computing and access. One of
the ways this is being manifest is through the deployment of wireless access to the campus net-
work and the Internet. Most notebook computers and other devices (including PDAs and even
cell phones) are coming with wireless access. This is a major player in making "anytime and
anywhere" access possible.

Administrative computer systems (sometimes referred to as ERP [Enterprise Resource Planning]
systems). Administrative computer systems are increasingly integrated systems. As these sys-
tems become more sophisticated, integration makes sense. The IT people who maintain these
systems need special skills. Non-integrated systems represent a potential for the systems people
being segmented or the need for more people. A single integrated system can be managed by
fewer people than can two or more disparate systems.

Notebook computers. Students, faculty members and administrators are choosing to purchase
notebook computers in ever-increasing numbers. Notebook computers provide great conven-
ience, enabling a person to have a portable desktop/presentation/research workbench. Prices con-
tinue to fall, and coupled with new capabilities (e.g. built-in wireless capabilities) the conven-
ience of a notebook is attractive to many who are no longer confined to work in a given space at
a desktop computer. This increase use of notebook computers brings up issues about who is re-
sponsible for their upkeep and maintenance, especially as their use is increasingly integrated into
classroom work.

Tablet computers are also receiving increased attention. The convertible models have a keyboard
so they can be used as notebook computers, but they also have the capability of being used as a
slate tablet. In the latter mode they can be used much as a notepad to take notes. Further, they
can be used in a text-recognition mode, or they can be used to take notes much as one would use
a notepad with a pen or pencil. Tablet PCs are just beginning to hit the consumer market, which
should produce lower prices. They may be the computers to best meet students needs since they

can be used in class to take notes more easily and less intrusive than using a keyboard. A key issue is battery life. Students in class and attendees at conferences would like to be able to go a whole day without having to recharge the battery.

Multimedia creation, including video and video editing. There is an increased emphasis on video for classroom use. Video is also being provided over the web – for marketing purposes (e.g. college recruitment videos), for online instruction, and for training.

Electronic classrooms. Increasingly, classrooms are being fitted with permanent data projection equipment, VCRs, DVD players, speakers, network connections and a computer or a place to plug in a notebook computer. New classrooms are being constructed as electronic classrooms, while older classrooms are being retrofitted with electronic capabilities.

Online learning. Even at residential colleges where there are no totally online courses or programs offered, there is an increased use of online components. These components supplement or complement in-class lectures. The popularity of Course Management Systems is providing instructors with new tools that make it easier to integrate the use of technology. These systems facilitate the use of course discussion lists, collaborative student work, the use of multimedia materials outside of classroom time, and submission and collection of "papers" and assignments electronically.

Security issues. Much time is being spent by IT staff at most small schools in dealing with security issues, including viruses, spyware, denial-of-service attacks, and malicious hacking and break-ins. A recent informal survey of several liberal arts colleges estimates that 10-20 percent of IT resources (including staff time) is spent on these and related issues. With a growing dependence on the Internet and the web, it is unlikely that these issues will go away in the near future. This provides a challenge for institutions of higher education that seek to provide an open environment in which to encourage discovery and learning.

In addition to the threats posed, there are Federal regulations that make it mandatory for institutions to follow safe practices in key areas. FERPA, HIPAA, and the Gramm-Leach-Bliley (GLB) Act all require policies with respect to how information is collected, disseminated, and discarded.

Staffing and the increased use of "Student Technology Assistants (STAs)." With demands outpacing increases in staff sizes, STAs are used to supplement an institution's fulltime IT staff. In addition to providing valuable help, this also gives the students the benefit of valuable experience to draw upon when they graduate. STAs do not come without costs, and one of the biggest is in managing student workers. Someone must manage and schedule these workers who can usually only work short shifts for a limited number of hours per week, and they "disappear" at regular times during the year (semester breaks, vacations, etc.).

Online library resources. In a little over ten years, the web has caused a revolution in thinking about libraries. On one hand, it has provided unparalleled access to materials from all over the world. It has allowed small libraries to have access to a tremendous amount of journals that before would have been impossible. On the other hand, it has caused many to speculate that the days of print materials are numbered. However, in reality, good libraries are still measured by

their overall holdings, both in quality and quantity. There is an excellent discussion of this is in chapters 9 ("Once and Future Library") and 10 ("In the Stacks") of Nicholas A. Basbanes' *Patience and Fortitude*. There is a balance that needs to be made between print materials and online resources. One issue of concern is in the area of access to online journals. When these materials were purchased in paper form, the institution owned the print material for life. However, in the case of some online subscriptions this is not true. An institution may only have access (even to previous issues) as long as the subscription is purchased ("licensed" is the commonly used term for this arrangement).

With the growth in online subscriptions and access we are faced with the reality that a growing amount of our library's resources are not housed on campus. While access to these library resources is not restricted to hours when the physical library is open, a network interruption means that part of the library becomes inaccessible. The network has become the gateway to many of the library resources.

Training and online training. Technology is constantly changing, and with this change comes the need for individuals to be trained and re-trained. In fact, it is in reality a continuity of training rather than a series of discrete sessions or classes. Most students are already acclimated to this, and they just accept it. New staff, faculty and administrators at small colleges are increasingly being provided with "technology orientation" training, an introduction to what is available at the college as well as opportunities for training on specific programs. Online training resources can be licensed and then be made available online for faculty, staff, and students. The institution picks the courses that it wants to license from a long list of courses, ranging from elementary to advanced. Given the typical shortage of training staff, small colleges have used these tools to provide courses for professional development for IT staff and student workers, as well as for more basic topics for the user community.

The "webification" of everything. In the 1980s, people involved in technology were hoping that there would be a convergence of technology – in particular that there would emerge a common interface that would be available to access information. This common interface has emerged, and it is that of the browser and the access it provides to material on web pages. Access to everything is being driven by web access. Not only is it an almost universal interface, but it also provides a ubiquitous access. "Access anywhere, anytime" has become the achievable goal.

Linux. A main attraction of Linux and related products is that it is developed and made available through the "Open Source" movement, developed by volunteers and made available to the public at no cost. Support for these products comes from those in the open source community or it can be purchased from companies. Linux provides an attractive alternative to commercial UNIX products. It is especially attractive to consider in those situations where UNIX systems have been used. Its current weakness is in the desktop. It has not yet penetrated much of the Microsoft Windows desktop market (usually running Microsoft Office products, such as Word, Excel, PowerPoint, etc.). In today's world, graduates will be much more likely to see and use Microsoft Windows and related products when they graduate. Linux servers are being used or considered for use as replacements for UNIX servers.

Windows servers. Servers running the Windows operating system are becoming serious contenders for a multitude of tasks, from small systems running single-task applications to those running enterprise applications (such as the institution's ERP system).

Thin-client devices. These devices, typified by having no hard-disk storage, are usually much less expensive than personal computers (up to half the cost of a personal computer). They do require a computer monitor. In addition to being less expensive, another advantage is that they have no moving parts (no hard disk) so they are less likely to break down. All storage of documents is done on a remote server (which is backed up regularly), and software is run from the server. Since software is run from the server, there is less maintenance needed to upgrade or restore software. At many small colleges, thin clients have been extremely successful in administrative offices and many schools are either already using them or reviewing them for use in computer labs. Since they require access to a server, they require robust and fast network access.

The above represent issues and technologies with which the small college is confronted. These technologies need to be watched. Many will prove to be here for the long-haul. All will evolve, and some may disappear to be replaced by other "next new things." Other issues and technologies on the radar screen are: electronic portfolios, web portals, document imaging and new technologies for storing mass amounts of data.

Underlying the increase in all of these technologies on the typical small college campus is the issue of funding and budget. Small colleges typically have far less flexibility for IT purchases and maintenances, not to mention staffing, than a larger institution does. Nevertheless, many of the needs are the same. As new technologies come along, they need to be evaluated and appropriated when they make sense for an institution. Small colleges, especially, cannot afford to spend scarce resources on technologies that may prove to be only a passing fad. However, there is a time when it becomes apparent that a certain technology can be used to contribute to the mission of the institution. There are also technologies that must be adopted if the institution is to be competitive in attracting and keeping quality students and faculty. Tracking and adoption of new technologies needs to be an ongoing process. It also needs to be a permanent part of any information technology planning process. This requires individuals with vision combined with a good dose of common sense. It also requires a clear focus on the goals and mission of the institution. Technologies must never be purchased just because they are the "next new thing." It is always in the context of meeting a need or solving a "business" problem for which we choose to deploy any technology. It is the IT leader to best match the needs of the institution with the technology.

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Glimpsing the Future: Technology, Reading and the Library of the Future

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Abstract

Technology has changed and will continue to change the library. This presentation will look at technology developments and how they are changing and will change the library. Also, what will reading be like in the future. This is not the first technology revolution to impact the library – is it the most dramatic? We are at a point in history when it is possible to carry around in our pocket what was once thought to be a fairly decent sized library. How is technology changing our reading habits? Is reading increasing of is it in danger of becoming extinct? The statement often quoted

"So many books, so little time"

Can be paraphrased as

"So many books, so much RAM, still so little time"

[This presentation is based on a talk revised and presented annually for the past 7 years at the New York Library Association conference.]

Note: The author has not prepared a paper for this session. Perhaps he will make available the presentation slides in print, on the web, or in response to an email request.

Implementing and Teaching with WebWork at Mercer University

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Abstract

WebWork is a free, online homework delivery and grading system developed at the University of Rochester and used at Mercer University for the past three years in teaching calculus. We discuss the features of WebWork that make it preferable to other online homework systems, the technical aspects of using WebWork, and the ways in which faculty and students have been supported in their use of the system.

Introduction

Prior to the 2004-2005 academic year, the mathematics department taught calculus as a three-hour lecture course with a one credit-hour lab that met three hours per week. Materials for the labs were written collaboratively by a committee of mathematics and engineering faculty. The labs were taught by faculty from both mathematics and engineering; therefore, students often did not have the same lab instructor as lecture instructor. In the 2004-2005 academic year, the mathematics department moved to a four-hour class model with no lab. In order to address the desire for a common base to the calculus curriculum, the mathematics department decided to require common online homework sets in all calculus courses. The goal of these homework sets would be to ensure that all calculus students would master a collection of 150-200 computational problems. Thus, we would gain uniformity by using online homework, rather than using common labs, as before, or common exams, as done at larger institutions. Moreover, material on these online homework sets would be cumulative throughout the semester to help students retain material from early in the course. Concepts and comprehensive understanding of the course material would continue to be evaluated via exams, projects, and group work assignments. For the homework delivery the department adopted WebWork, a system that Denny and Yackel had been using with their classes since 2002.

Choosing WebWork

WebWork and Its Features

In 1995, Arnie Pizer and Michael Gage of the University of Rochester began developing WebWork to support lower-level calculus courses at Rochester (Jackson, 1997). Using a web interface, WebWork delivers each student the same collection of problems with coefficients randomized for each student. Problems are arranged in "sets" that can be easily designed and modified by an instructor. As a student submits his/her solutions online, the system instantly responds with "correct" or "incorrect." The student can then continue to attempt the problem until the due

date and time are reached. This option of repeatedly trying a problem has been shown to encourage students to develop persistence when solving problems (Hirsch and Weibel, 2003).

The web interface for WebWork is compatible with most common browsers and presents students with several key options. As in Figure 1, each student can reset his/her password and e-mail address so that the password is convenient and e-mails from the instructor go directly to the e-mail account used. In addition, students can read messages from both the system administrator and from the instructor.
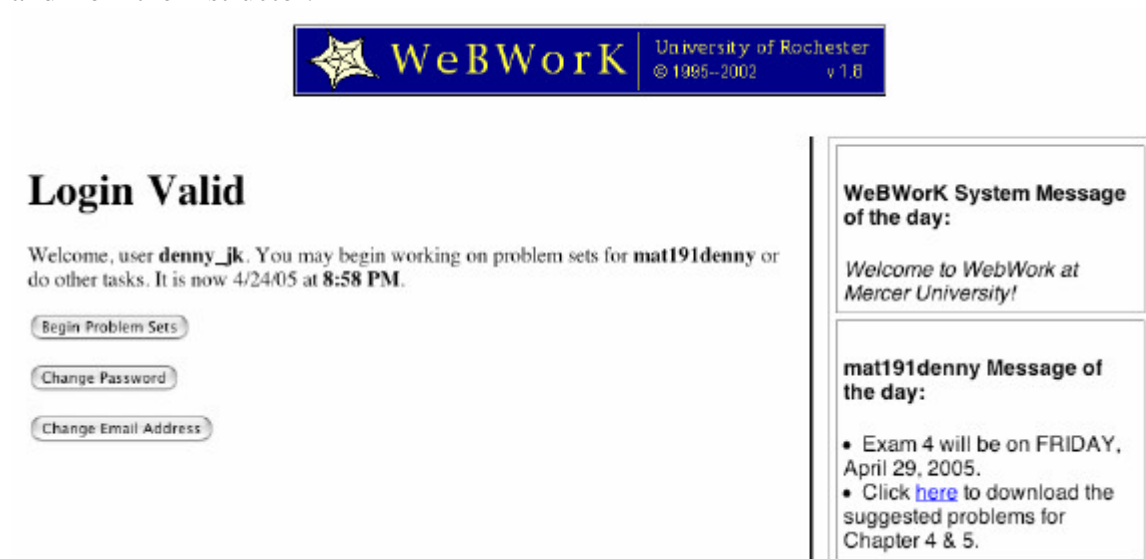
Figure 1: At the WebWork login screen, a student can see the message of the day and update his/her password or e-mail address.

In Figure 2, the screen shows the sets for the course and their due dates. Students may download a PDF of each set, which they can bring to class and the instructor's office hours. Indeed, WebWork students can be identified on campus by these omnipresent printouts of homework sets, usually with notes covering the margins. After the due date, the correct answers are available to the students.

Figure 2: WebWork lists the homework sets with due dates and times. Students can also download copies of the homework sets in PDF files.

Figure 3 shows a screen at which a student enters an answer. Notice that the student is responsible for using appropriate syntax. The Preview Answer button allows students to view the usual formatting of what has been keyed in. This helps students understand how the computer is interpreting their input.
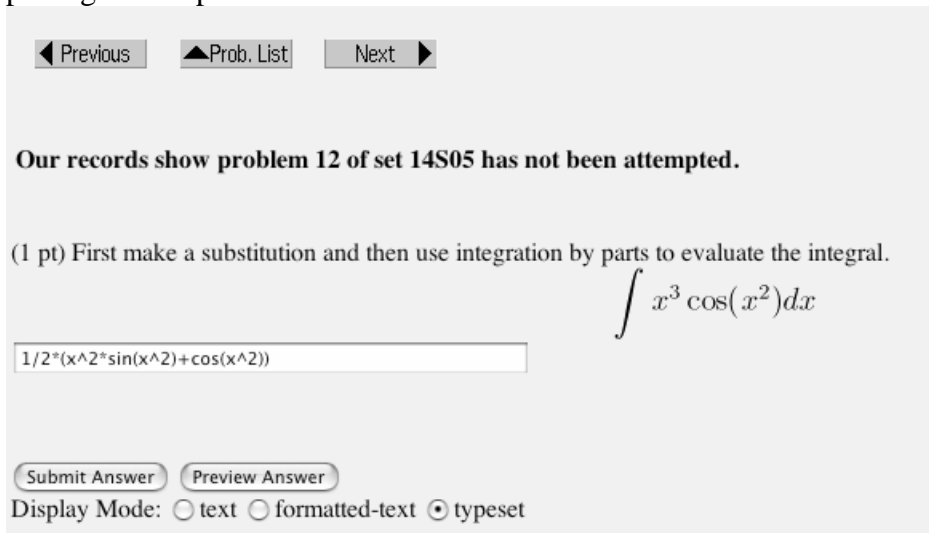
Figure 3: This is a typical screen showing the problem statement and answer box.

Faculty teaching with WebWork have a host of options for customizing their courses. They can change due dates for all or a few students, send e-mails through the system to the class, download grades into Excel, and post daily messages to the class on the login screen.

Advantages of WebWork Over Other Systems

WebWork has several critical features that influenced the Mercer Mathematics Department to choose it over other online homework systems such as WebCT, Blackboard, MapleTA, and MathZone.

1. WebWork allows students to enter algebraic expressions as answers and will recognize equivalent expressions. This feature is vital in mathematics courses, as multiple choice and matching problems significantly alter the approach students take to problem solving. For example, multiple choice questions can be answered by partially solving the problem and then eliminating unlikely answers. In contrast, a problem that requires an algebraic answer must be worked out completely, as the typical answer is nearly impossible to guess.

2. The existing repository of problems was a key factor in our choice of WebWork. Problems are available for pre-calculus, calculus I-III, differential equations, discrete mathematics, probability, statistics, and linear algebra. These questions have been tested at universities across the U.S. and are sorted by topic, making homework sets easy to tailor to accompany any textbook or syllabus.

3. An initial study of WebWork in calculus and pre-calculus courses at Rutgers University showed that students in classes using WebWork made slightly higher grades than those in non-WebWork classes. In addition, those who attempted over 80% of the WebWork problems earned nearly a full letter grade higher in calculus than students who did less than half of the WebWork problems (Weibel and Hirsch, 2002). Moreover, this study demonstrated that students who are taking calculus for the first time benefited the most from WebWork homework. The potential for WebWork to improve our students' performance played a significant role in the department's adoption decision.

4. WebWork is free to educational institutions. Our only departmental costs for running WebWork have been the purchase of a server and the annual academic license fee for Red Hat Linux. Although there is little documentation for the system, the WebWork community maintains a strong and useful support system through a bulletin board at the University of Rochester. The originators, Michael Gage and Arnie Pizer, along with undergraduate and graduate students at Rochester are also excellent sources of help. In addition, the WebWork team at Rochester maintains a concurrent version system (CVS) repository from which system updates can be downloaded and homework problems obtained.

5. WebWork webpages load rapidly. Indeed, WebWork's operations are all executed using a collection of Perl scripts, making the commands run quickly. Moreover, the web interface is not graphics-intensive, ensuring that students and faculty have fast access over any internet connection.

Technical Aspects of WebWork

Purchasing a Server

In 2002, Denny and Yackel first used WebWork in calculus courses by taking advantage of the University of Rochester's offer to host courses on their server for a trial period. When the department adopted WebWork, we negotiated the purchase of a Dell server with dual Xenon processors, a RAID system, a back-up power supply, and one gigabyte of RAM. The university technology support team agreed to maintain and manage the system for us. With the system in place, the unix system administrator installed WebWork and got the web services running.

Technical Support Personnel

The unix system administrator continues to support our system, including WebWork upgrade installations, security management, and operating system upgrades. This person also trouble shoots any problems we encounter. Typically, the problems involve configuration details and changes in settings due to software upgrades. In general, the system administrator commits a few days in the summer to upgrades and a few hours each semester for support.

A faculty member, with the help of a student assistant, does the main work of managing the WebWork system and courses. This faculty member, the WebWork system manager (WWSM), has a wide range of responsibilities. The WWSM enters the homework sets, creates the Web-Work courses on the server, maintains supporting webpages, loads the students into each course, edits homework problems, and provides training and support for faculty and students. In addition, he coordinates with the registrar's office to receive files of registered students for each course prior to the start of the semester so that he can load the students into the appropriate courses. As the member of the department most in touch with both the technical and pedagogical aspects of WebWork use, he plays a vital role in coordination of WebWork with the Calculus sequence, as described in section 4.1 below.

Using funds from the Dean of the College of Liberal Arts, a student assistant has been hired each year to aid in the management of the WebWork system. These student employees have been math/computer science double majors who are highly skilled with a variety of interfaces and programming languages and can work in a fairly independent manner. They have been invaluable for writing scripts and programs to simplify routine tasks. The assistant also provides support to faculty and students and edits the homework problems and sets.

Scripts for Course Management

Our courses are organized on the unix system so that each professor has one directory for his/her calculus I courses and one directory for his/her calculus II courses. This means that a professor can easily make changes for all of their sections of a particular course at one time. To simplify the management of these directories, the WWSM and the student assistant have written several scripts and programs, which we would gladly share. (E-mail denny_jk@mercer.edu for more information).

Before each semester, there is a checklist of tasks that must be accomplished, which is given in Table 1, and most of our scripts address some aspect of this list. Some of the scripts are only useful for setting up courses prior to the semester, while others (update191 and update192) are useful throughout the semester.

Task	Script / Program	Description of Script
1.Create new WebWork Courses on the unix server.	WWSetup	Automates much of the copying and formatting necessary for setting up the directories for a WebWork course.
2.Load faculty into courses.	Use web interface	
3.Set professor permissions.	setperms	Sets permissions for WWSM, student assistant, and instructor to "professor."
4.Copy files for login page.	copyindex	Copies index.html file and graphics files to customize Mercer's WebWork pages.
5.Update index.html files for each.	None	
6.Update the due dates in the sets.	None	
7.Update course and semester in header files	None	
8.Copy problem files, sets, header files into each course.	update191, update192	Copies all files and directories from a prototype course directory into the working directories.
9.Update supporting webpages.	None	
10.Load the students.	MakeClass.java	Converts students' data from Registrar's script into format suitable for WebWork to import.
11.Build the sets.	Use web interface	

Table 1: Checklist for starting a new semester with scripts

When setting up a WebWork course for the first time, there are several files and directories that must be copied, a number of unix permissions that must be set, and a few links created. A student assistant created the WWSetup script which automates this process and calls the course_webwork_setup.pl script that comes packaged with WebWork to initialize new courses.

Once the courses are created, one of the most important steps is obtaining the students' names and registration information from the registrar. The staff at the Registrar's Office at Mercer developed their own script for extracting the data that WebWork needs for each student. The WWSM e-mails the Registrar's Office each semester to ask for the script to be run on a given list of classes. The Registrar's Office then simply e-mails one file for each section back to the WWSM. The program MakeClass.java, written by a student assistant, efficiently converts the

Registrar's information into the format that WebWork requires, and the students can then be loaded into the courses via the web interface.

In the future, we hope to develop scripts for updating the login webpages, the homework set due dates, and course/semester information in header files (steps 5-7 from Table 1). Each semester, these are particularly tedious updates that merely involve changing a few lines in text files and so should lend themselves to automation.

Using WebWork

Educating Faculty

For our department's shift to WebWork to be a success, the faculty needed to be introduced to the system, to have an easy reference on hand, and to have personnel available to answer questions. The WWSM led a brief workshop on WebWork in which he walked the faculty through the student's screens and the instructor's screens in WebWork. He explained the login name and password schemes and demonstrated typical operations that an instructor would need to do on a daily basis. The WWSM also provided handouts that the faculty could give their students on the first day of class to make the students' introduction to WebWork go smoothly.

For quick reference, the WWSM wrote a brief manual for WebWork (version 1.8) that gives step-by-step guidance on how to manage a course (Denny, 2004). The manual includes the department's rationale and goals for using WebWork and addresses how to log onto WebWork, add and drop students, review student progress, send e-mail to a class through the system, change due dates, download grades into Excel, and set the "Message of the Day."

At first, the WWSM and student assistant had to field a fair number of questions about the operation of WebWork. Most commonly, instructors needed help with dropping and adding students into their courses. Other problems focused on students who were logging in with the incorrect password or whose login names in Mercer's registration system differed significantly from their actual names.

The most daunting problem came at the end of Fall 2004 when the WebWork grades for two students in different classes were lost for one of the last homework sets. The instructors were generous in dealing with these situations, and the WWSM worked to find the root of the problem. The source of the problem remains a mystery, although there is suspicion that deleting a student from a course rather than dropping them may cause errors in the grading files.

During Spring 2005, instructors have had relatively few questions about WebWork and have had few complaints. Most appear very comfortable with navigating and managing their WebWork courses and are ready to begin critiquing the homework sets for content and teaching issues.

Due to his detailed work on the WebWork system and the calculus courses, the WWSM has had a particularly focused view of our calculus sequence. Based on his experience, the department's calculus committee has recommended changes in the topics taught in the courses, in the Web-Work homework sets, and in the arrangement of exam dates within the syllabus. Having one

faculty member so closely involved in the calculus sequence has provided significant continuity for the courses, as other faculty members rotate through teaching the courses.

Supporting Students

Students have received help with WebWork difficulties through their instructor and through the WWSM. On the first day of class, the students receive two handouts. One describes how to log onto WebWork, and the other describes the syntax for typing mathematics into WebWork. In addition, many faculty insert a paragraph about syntax into their syllabus to help when students get an "incorrect" response on an answer they know is "correct." At the first attempt to log on, there are usually several students who are not using the correct username or password. Instructors can typically correct this problem with a quick phone call or e-mail. On the whole, modern students adapt very quickly to the system.

The bulk of students' problems with WebWork occur as the semester proceeds. For example, the campus network in the dorms has had reliability issues this Spring, preventing access to the WebWork courses from the dorms at various times. Typically, instructors have been willing to extend due dates to accommodate such problems. Another common problem is difficulty with typing algebraic expressions into a computer. This skill takes patience and practice on the part of the student, and instructors work throughout the semester to remind students to use parentheses carefully and to use WebWork's preview option before submitting solutions. The root of this problem is usually in the student's fundamental lack of understanding of order of mathematical operations. Finally, some of the WebWork homework problems have contained errors, which the WWSM and student assistant have worked to fix. However, since WebWork problems are written in a mix of Perl and LaTeX commands, there have been a few homework problems that we have been unable to fix and have had to eliminate from our standard homework sets.

Conclusion

While the management of WebWork is a time consuming job, the overall effect of using the system appears positive. The ease with which course instructors can make use of this technology accounts for a massive overall time saving in the department, because now there is no need for grading routine problems or labs, though some instructors still assign and grade problems requiring explanations. In addition, the students attempt the WebWork homework at high rates, because they know that every problem will be graded and recorded. Moreover, we allow students to attempt homework problems repeatedly until the due dates with hopes of developing tenacity in problem solving that will translate to persistence in attacking difficult mathematics problems and will even benefit students in courses beyond mathematics. Finally, our requirement that all sections of calculus use WebWork helps ensure that all of our students master a large collection of computational problems and establishes a common set of basic skills for our courses. Given these benefits, we plan to continue using and refining our WebWork homework sets.

Acknowledgments

References

Denny, J. (2004). *Mercer Faculty Guide to WebWork*. Retrieved April 21, 2005
from http://mathww.mercer.edu/webwork/fac/guide.pdf.

Gage, M., Pizer, A., and Roth, V. (2005) *WebWork at the University of Rochester*. Retrieved April 21, 2005 from http://www.webwork.math.rochester.edu.

Gage, M., Pizer, A., and Roth, V. (2002). WebWork: Generating, Delivering, and Checking Math Homework via the Internet, *Proceedings of the Second International Conference on the Teaching of Mathematics*. Retrieved April 21, 2005 from
http://www.math.uoc.gr/~ictm2/Proceedings/pap189.pdf.

Hirsch, L. and Weibel, C. (2003) Statistical Based Evidence that Web-Based Homework Helps. *Focus: Newsletter of the Mathematical Association of America*, 23(2): 14.

Jackson, A. (1997) Whatever Happened to Rochester? Two Years Later, Mathematics is Getting Accolades. *Notices of the American Mathematical Society*, 44(11): 1463-1466.

Weibel, C. and Hirsch, L. (2002). *WebWork Effectiveness in Rutgers Calculus*. Retrieved April 21, 2005 from http://math.rutgers.edu/~weibel/ww.html.

Creating a Collaborative Environment: Instructional and Learning Services

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Abstract

Instructional technology consists of many elements, including information technology, knowledge of pedagogy and faculty needs, technical support, and training. DePauw University has recently reorganized its Information Services staff to include several staff areas, including technicians, library staff and help desk, as well as faculty support staff. As part of this reorganization, a new group, entitled Instructional and Learning Services, was formed. We will discuss the elements of this group and the decision to meld these individual areas together, our vision for this group and its identity on our campus. We will also talk about how collaboration within the group has been a catalyst for our successful integration. This discussion will appeal to those trying to integrate disparate staff groups, as well as those interested in collaboration within departments.

Introduction

DePauw University is a private, residential, undergraduate liberal arts college located in Greencastle, Indiana, with an enrollment of just over 2300 students, and 800 faculty and staff members. With the aid of a grant from the Lilly Endowment, in 2001 DePauw established an initiative named 361° to describe the University's commitment to preparing graduates to lead in the digital age.

The 360 degree symbol illustrates that DePauw students are confident to pursue any direction after graduation; the additional degree symbolizes that graduates are empowered to pursue new and innovative directions. As a part of this initiative special programs for faculty members and students were designed to support, enhance, and transform teaching and learning at DePauw. These programs include:

- Information Technology Associates Program (ITAP)
- Student Technology Assessment, Resources, and Training (START)
- Faculty Instructional Technology Support (FITS)

- Digital Media Lab (*dml*)
- Music Instructional Technology Center (*mitc*)
- Community Technology Enhancement Program (CTEP)
- University Libraries
- Eugene S. Pulliam Center for Contemporary Media (PCCM)
- Technology Center, Percy L. Julian Science and Mathematics Center
- Richard Peeler Art Center
- Opportunity Through Collaboration Program

Although each of these programs was established to provide distinct services, there were commonalities among them. For instance, some programs focused mainly on tools, others on facilities, and others on instructional learning (including multimedia development) and training. These services are spread across several buildings on campus, and some functions or groups have changed locations over the last few years. Over time, it became apparent that collaborative efforts between the different programs that had common focus areas would be much more efficient and productive if they formed a larger team. One such team, Instructional & Learning Services (I.L.S.) under the leadership of Carol L. Smith, Associate CIO of Instructional & Learning Services, is a result of this reorganization. In addition to the 361° programs of START, FITS, *dml*, and *mitc*, I.L.S. also is comprised of the campus Technical Training Coordinator and Special Projects Team.

In this paper, we will discuss the elements of this group and the decision to meld these individual areas together over the past year (summer 2004 to the present), our vision for this group and its identity on our campus. We will also talk about how collaboration within the group has been a catalyst for our successful integration.

Building Team Spirit

As this group was being created, it was decided to physically move the majority of the group together to share a common space. As space was becoming available in the basement of the Roy O. West Library, this became the home for Instructional and Learning Services (with the exception of *mitc*, which remains in the Performing Arts Center). One of the stated goals of co-locating these services was to draw from the expertise and experience of the different individuals in the group.

We knew there were many similarities in what we did (for instance, a FITS specialist might help a faculty member learn how to create a website, while a START consultant would help a group of students learn the same tools, and a *dml* staff member would provide the digital resources to incorporate into the website), so why not benefit from our similarities by working together as a team?

As we began to work and meet together, it became clear that we could collaborate on a number of projects, and perhaps share or distribute certain assignments so that we were not constantly "re-inventing the wheel". In fact, we have come to realize that collaboration and cooperation are probably our greatest strengths as a group. Learning to collaborate has provided a kind of synergy that truly gives our group more abilities than we would experience individually.

Another event that drove us to consider the importance of collaboration was second reorganization on our campus. Shortly before the beginning of our fall 2004 semester, the decision was made to merge our Information Services (IS) and Library staff into one organization. In a letter from our CIO, Dennis Trinkle, the announcement and some of the reasoning were described. He wrote:

> "I have recommended that we consolidate several mid- and senior-level managerial positions to create a flatter organizational structure that gets more staff members engaged with planning and decision making and that helps put faculty, students, and staff closer to the final decision makers. We anticipate that this will help improve communication, coordination, and, we hope, responsiveness to faculty, staff, and student needs, desires, and concerns."

With Instructional and Learning Services already located in the main library building, we had a unique opportunity to begin to collaborate in an even greater way with Library staff, particularly the Instructional Librarians.

Additionally, there are other benefits that have grown from this merger that we had not originally foreseen. For example, the reorganization of our student staff program that is currently taking place. Although most of our student workers are participants in ITAP (an honors program), we also hire several work-study students to provide support for the services offered by each of our departments. A concern of ours is that two students working in the same lab doing very similar roles do not communicate with one another simply because they have different job titles and report to different departments within I.L.S. Since we feel compelled to provide our students with the opportunity to interact with one another in order to share their experiences such as common challenges, solutions, and knowledge they have gained through supporting the DePauw campus, we are currently re-structuring our student staff organization so it focuses on functionality rather than the department for which they report.

Defining Who We Are

Since we were a newly organized team, Carol Smith provided us with the opportunity to define who we were. At a staff retreat at the end of the fall semester, the Instructional and Learning Services group met to discuss our core values and our vision for our team. The ultimate goal of this meeting was to produce a mission statement that we could use to quickly describe what we, as an organization, were committed to providing for the campus. In discussing our core values, we focused on three main questions:

1. How do people best learn and what elements/methods of teaching them help them learn most effectively?

2. What key elements of client service do you think are most important as it relates to our effectiveness as a department?

3. What do you see as the core factors that give life to our group?

Furthermore, we brainstormed a complete list of all the services and resources we provide to the campus. After much discussion and "thinking outside the box", we arrived at a condensed list that succinctly describes the functions of I.L.S. The final list includes:

♦ Engage in dialogue to promote awareness about instruction and informational technology
♦ Research emerging technologies
♦ Offer workshops
♦ Maintain our (including Library and Information Services) web sites
♦ Collaborate
♦ Support faculty projects
♦ Compile and create documentation, guides, and references about instructional and information technology
♦ Provide technical training and production support
♦ Support ITAP and our student employees
♦ Provide support for the career development of others
♦ Manage I.L.S. lab facilities
♦ Exhibit our citizenship within Library and Information Services
♦ Promote relationship / community building within I.L.S.
♦ Engage in our own professional development / individual growth
♦ Participate actively and be visible in the professional community

We also created a mission statement that described I.L.S.:

"Instructional and Learning Services collaborates with our clients – the faculty, students and staff – and with each other, exploring ways that instructional and information technology can support a learner-centered environment. We recognize the importance of dialogue and partnership in the effective integration of technology and support this philosophy by providing training and production support, researching new technologies and methods, managing our technology facilities, participating actively in the University professional community, and engaging in our own professional development."

We arrived at this mission statement after several weeks of discussion. It took much discussion and compromise to produce the final version. This process in itself was a sign of far we had come in learning to work together and value each other's opinions.

Obstacles Or Opportunities – Next Steps

When reorganization occurs, there are always obstacles ahead of you. By being aware of the obstacles, you can be proactive in overcoming them. One way to do this is to look at each obstacle as an opportunity for growth. Immediate opportunities for us to embrace are:

♦ Maintaining the feeling that we are "One Team" and conveying this to our student staff members
♦ Communicating our vision across the campus

♦ Collaborating with individuals and groups outside of I.L.S.
♦ Supporting a campus laptop initiative that will be implemented this fall
♦ Promoting new technology that focuses on pedagogical innovation that reinforces the University's values and strengths

Furthermore, cooperation and collaboration are key factors to improving the effectiveness of the services provided by I.L.S., particularly in managing and balancing the projects for which we are responsible. This leads to an important next step which is for everyone to stay on track as far as our new philosophy of approaching projects functionally instead of departmentally. This can be achieved by promoting a team environment where each member of the team understands, respects, and relies upon the expertise of one another. Also on our agenda is the reorganization of the student staff program, development of a method to organize and coordinate projects between all departments within I.L.S., development of a mechanism to facilitate the communication of project status reports so everyone is aware of what is going on in I.L.S., expansion of our client base in order to increase the number of individual clients with whom we work over the course of the year, work more closely with the campus Web Team to provide consistent support for our clients, and to grasp onto opportunities for collaboration with other Library and Information Services providers.

Conclusion

Seeing the many support needs on our campuses, from both a pedagogical as well as a technological standpoint, can be daunting. It is critical that we learn new ways to collaborate, in order to better meet the needs of our faculty and students. It is profoundly rewarding and exciting to be at the beginning of a reorganization such as this, as it leaves us open to all kinds of possibilities. Collaborating to form a mission statement and list of what we do as a team was certainly not the final step in our reorganization. There are many steps ahead of us in which we must continue to pool our resources and work together, in order to form us into the successful team that we envision becoming.

Database Systems and Oracle: Experiences and Lessons Learned

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Abstract

In a tight job market, IT professionals with database experience are likely to be in great demand. Companies need database personnel who can help improve access to and security of data. The events of September 11 have increased business' awareness of the need for database security, backup, and recovery procedures. It is our responsibility to prepare our students to meet the challenges of database development and system administration. This knowledge of creating, manipulating and analyzing data for decision making purposes is fundamental for those managers making business decisions. Our decision to change to Oracle is a perfect example of the need to make students more aware that a company's database platform may change and they must be capable of meeting the challenges of the change. This paper will focus on the pedagogical changes necessary to teach fundamental database concepts and the current technology needed to implement a system using Oracle.

Introduction

In the final report of the Computing Curricula 2001 project, a set of recommendations for an undergraduate program in Computer Science was identified [1]. The task force identified the *body of knowledge* as the fundamental topics which are essential for an undergraduate degree in computer science. Each of the areas was further subdivided into units that were categorized as either being part of the minimal *core* or an *elective*. During the development of the report, several principles were articulated to guide the task force, one of which was the acknowledgment that we "must recognize the importance of remaining abreast of progress in both technology and pedagogy" [1]. In addition, it was desirable to keep the body of knowledge small enough that it could be supplemented at the individual institution level to include other topics. Due to the constantly changing nature of technology, many topics have emerged (and will continue to do so) that some might be tempted to include in the body of knowledge. The quandary lies in the decision as to what should be removed to accommodate a new topic. Therefore, it is commonly recognized that the body of knowledge does not dictate an entire curriculum. It merely represents those topics for which there is a broad consensus that the information and concepts should be part of an undergraduate curriculum.

As computer science educators, our goal is to (1) produce students with a strong background in the discipline and (2) equip them with the tools necessary to be productive and remain current in the field. We are able to achieve the first goal by providing them with topics that are part of the fundamental body of knowledge. The second goal is achieved by supplementing our courses with those topics that emerge as technology changes. The specific area in the body of knowledge that

will be addressed in this paper is that of Information Management. The methods employed to achieve the first goal will be discussed briefly. The emphasis will be on the methods utilized to accomplish the second goal.

Course Structure

In recent years there have been a number of discussions targeting the content of database systems and the database course [2, 5, 7]. The topics identified by the task force as core topics are information models and systems (3 hours), database systems (3 hours), and data modeling (four hours) [1]. The general consensus seems to be that these topics are fundamental to any database systems course and it is reasonable to expect them to be covered adequately. The elective topics and pedagogy used to convey the information are typically what seem to differentiate a database systems course at one institution from that of other institutions.

Like many other institutions [6], we have elected to cover selected topics more extensively, including relational databases, database query languages, and relational database design. Included in this coverage are topics such as relational algebra, SQL, PL/SQL, functional dependencies, and normalization up to Boyce-Codd normal form. It is standard practice to adopt some type of database management system with which to implement many of the theoretical concepts covered in the course [5, 7]. Recent surveys [7] and panel discussions [2, 5] seem to indicate that Access and Oracle are the database management systems used most extensively in the academic community.

Environment

Prior to our move to Oracle, we utilized Access in the database systems course. In the spring of 2001 the decision was made to introduce Oracle into the course and use it as the primary database management system for the undergraduate course as well as the graduate course. Initially we hosted Oracle on a Sun machine running Solaris, but our system administrator was dissatisfied with the performance after the first year. The following year we were able to acquire new hardware and since the spring of 2003 we have been hosting Oracle 9i Release 2 on a Gateway 975 server running Redhat Enterprise Linux 3. We experienced a variety of problems in the initial setup, most of which had to do with Java and the Java libraries. The Oracle Technology Network provides a substantial amount of documentation for installing and administering Oracle 9i on Unix systems, as well as information regarding many of our subsequent issues. In addition, the system administrator located a web site that acted as an excellent resource for our initial setup [4]. The web site was our primary guide during the installation process. The fall of 2004 was our first opportunity to design and implement student projects using our new configuration.

Team Projects

The purpose of the team project is to provide students the opportunity to put theory into practice and gain proficiency using current database management software. It is used as a mechanism for helping the students learn and actually implement different components of database languages (in the form of SQL and PL/SQL) and different features of a database management system. More recently, the students are given the opportunity to build web applications if they so desire.

As stated earlier, the database management system of choice for this course is Oracle 9i. The students are provided with the requirements specification, which was adapted and modified from one of the textbooks used in the course [8]. It states that each project will typically go through the following phases:

1. Design the database using entity-relationship diagrams.
2. Create the tables, including constraints such as primary keys, foreign keys, check constraints, and any other constraints.
3. Create triggers and active elements to maintain the integrity of the database and to perform appropriate actions on database updates.
4. Populate the database using SQL **insert** statements or by writing programs.
5. Design and create any necessary queries.
6. Design and create any necessary forms and reports.
7. Write applications programs in Visual Basic, Java, or PL/SQL.
8. Document the project.

The project specification includes the requirement that the students construct the application programs to implement some form of user interface. The students are provided with descriptions of several projects that are similar in functionality and complexity. Each project must differ in the combination of project description/database application interface utilized. For example, two teams may select the same project description, but the application interface has to be different. Given three different project descriptions and three different choices for application interfaces, this provides the opportunity for nine distinct types of projects to be implemented, which is usually more than adequate for a typical class size.

Experiences

The objective of the undergraduate database course was to blend the theoretical framework of database systems with the practical application of a real-world database implementation experience. With this in mind, two textbooks were selected for the course. The Kifer [3] text and the first several chapters of the Sunderraman [8] text were the basis for much of the lecture material. However, one of the primary reasons for selecting the Sunderraman text was to provide a reliable, tangible reference for the team projects, regardless of the application interface selected. The students were encouraged to utilize those chapters that were applicable to their particular project. While Sunderraman's text does not include a reference for connecting to Oracle using Visual Basic, many of the students enter the course with some Visual Basic experience, including database access and manipulation.

Prior to the course, several small experimental projects were implemented and a set of notes was developed for connecting to the Oracle database. One lecture was spent demonstrating these projects and connecting to the database using each of the interfaces. What follows is an example of the type of information and the notes with which the students were provided in order to connect appropriately. Comments have been inserted where our server or database name was specified.

 Establishing a connection to the Database using Java and JDBC.

1) Add the path to the Java Virtual Machine to your PATH environment variable
    a. /u01/app/oracle/jre/1.4.2/bin
    b. Make sure this is earlier in the list than any other JVM paths
2) Add the path for connecting to the database using Java to your PATH environment vari-able
    a. /usr/java/j2sdk1.4.2_03/bin:/u01/app/oracle/product/9.2.0/jdk/bin:$PATH:$HOME/bin
3) Add Oracle Library paths to the LD_LIBRARY_PATH environment variable
    a. /u01/app/oracle/product/9.2.0/lib:/lib:/lib/i686
    b. Oracle provides three different JDBC clients – some require these libraries, some do not.
4) Add required classes to the CLASSPATH environment variable
    a. $ORA-CLE_HOME/jdbc/lib/ojdbc14.jar:$ORACLE_HOME/jdbc/lib/classes12.zip:/u01/app/oracle/product/9.2.0/lib:$ORACLE_BASE/jre/1.3.1/lib/i386:/u01/app/oracle/prod-uct/9.2.0/jdbc/lib:/u01/app/oracle/product/9.2.0/jdk/lib:/u01/app/oracle/product/9.2.0/JRE/lib:$CLASSPATH
    b. For Swing, AWT, etc, you may need additional entries in the CLASSPATH
5) Be sure to export all of your environment variables, source .bash_profile, and check for errors in typing if you have any problems getting connected to the database.
6) Run a simple program to make sure you can connect:

Establishing a connection to the Database using VB and OLE DB.
1) Go to Start->Programs->Oracle-OraHome 92 -> Configuration and Migration Tools ->net configuration assistant
2) Select Local net service name configuration
3) Select Add
4) Oracle 8i or later (We run 9i.)
5) The service name for your database is {our database service name}.
6) Connect using TCP to {our server} on the standard port.
7) Perform a test (You'll probably need to change the username/password)
8) Set a net service name (this is what you will use to connect with ADO.NET)

In VB, to get a new connection:
- Go to the first tab and select OLE DB provider for Oracle. The server name is {our server}.

Now you have your connection, and you're off. Enjoy!

Establishing a Database Access Descriptor for use with PL/SQL server pages.
1) Go to {we provided the link to our server}
2) Select Gateway Database Access Descriptor Settings
3) Select add new Database Access Descriptor (default)
4) Set the name to be an appropriate subdirectory for your site
5) Set the Oracle User Name and Password to be your account on {our database}
6) Use {our connection string} for the connect string

7) Leave all other values blank.
8) Access your page via {link to our server} (whatever name you gave to your DAD)/(PL/SQL module you created)

Lessons Learned

Most database instructors would agree it is difficult to cover the traditional database concepts in a three-credit hour course [9]. Some believe it is unrealistic to include the addition of a full-blown real-world database project in a course whose content is steadily increasing [5]. Others may even argue that using a database management system such as Oracle is more difficult to learn [7].

With this in mind, our students were instructed to experiment and implement as many different features, or "bells and whistles", without worrying about creating an entire working system. In other words, implementing one trigger, one stored procedure, and one update query is much more beneficial than implementing one update for a customer, one update for an inventory item, and one update for an employee.

Lesson #1: Students *want* to create an entire working system. They are uncomfortable submitting a project that is, in their opinion, incomplete.

Solution: It must be emphasized that they are being given a broad learning experience rather than focusing on project completion. Their database skills increase as the number of features they implement and/or are exposed to increases.

As in many other database courses [7], the number and complexity of projects was a concern. As stated earlier, it was decided that the teams would implement one of a variety of projects using one of a variety of interfaces.

Lesson #2: Due to the disparity in the background and experience of many of the students, some of the database applications required much more work than others.

Solution: In order to level the playing field as well as improve the learning experience, all of the students should be exposed to the same set of database application interfaces. Again, this only serves to augment the database skills of the students.

Summary and Future Plans

As a result of this experience, the next database systems course will be a bit different. The topics that are currently being taught in the course will remain. We believe it is important that the students receive a solid background in concepts as well as practical development of database skills. We will continue to use Oracle as the primary database management system. In addition, a brief overview of Access will be incorporated into the course.

It is important that the team project approach continue to be utilized. However, it will be modified in a number of different ways. First, it is essential that the students have the experience

gained by implementing a variety of system mechanisms. This might be better accomplished by assigning several small project components rather than assigning a project that is perceived by the students as a complete system. Second, it may be more feasible to assign small projects and provide each group the opportunity to implement portions of a project using different application interfaces. Regardless of the implementation, the earlier stated goals, (1) producing students with a strong background in the discipline, and (2) equipping them with the tools necessary to be productive and remain current in the field, can be met by utilizing a project-based pedagogy.

Acknowledgements

References

1. ACM/IEEE-CS, *Final Report of the Joint ACM/IEEE-CS Task Force on Computing Curricula 2001 for Computer Science*, http://www.computer.org/education/cc2001/final/index.htm

2. Adams, E., Goelman, D., Granger, M., and Ricardo, C. Managing the Introductory Database Course: What Goes In and What Comes Out?, *SIGCSE Bulletin*, Volume 36, Number 1 (March 2004), 497-498.

3. Kifer, Bernstein, and Lewis, Database Systems: An Application-Oriented Approach, 2nd Edition, Addison Wesley Publishing, 2005.

4. Puschitz, W. Oracle-Linux Web Page, http://www.puschitz.com/InstallingOracle9i.shtml

5. Robbert, M. The Database Course: What Must be Taught, *SIGCSE Bulletin*, Volume 32, Number 1 (March 2000), 403-405.

6. Robbert, M. and Ricardo, C. Trends in the Evolution of the Database Curriculum, *SIGCSE Bulletin*, Volume 35, Number 3 (September 2003), 139-143.

7. Springsteel, F., Robbert, M., and Ricardo, C. The Next Decade of the Database Course: Three Decades Speak to the Next, *SIGCSE Bulletin*, Volume 32, Number 1 (March 2000), 41-45.

8. Sunderraman, *Oracle 9i Programming: A Primer*, Addison Wesley Publishing, 2004.

9. Urban, S. and Dietrich, S. Advanced Database Concepts for Undergraduates: Experience with Teaching a Second Course, *SIGCSE Bulletin*, Volume 33, Number 1 (March 2001), 357-361.

Building the Wireless Campus

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Abstract

This prototype is a continuation of a series of wireless prototypes which began in August 2001 and was reported on again in August 2002. This is the final year of this prototype. This continuation allowed Saint Francis University's Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA) to refine the existing WLAN for the Saint Francis University (SFU) campus and attempted to show if computer modeling software was a legitimate tool for designing wireless campuses.

The prototype was divided into two distinct divisions. The first portion of the prototype consisted of verifying that the access points were located in optimal locations on the SFU campus. Previous wireless prototypes consisted of doing base wiring of the SFU campus. The second current portion of the prototype consisted of wiring the greenspaces of the campus, and testing "leaky wire" antenna technology as a viable option for indoor wiring applications.

For the 2003-2004 funding year, the testing of the greenspaces on the SFU campus was the main thrust of the research. Additionally, experiments were done with various wireless technologies.

Background

Implementing wireless computer networks in buildings has its challenges, but setting up a wireless network outside, in green areas, presents its own set of problems to overcome. One has to not only consider artificial structures like buildings, but natural ones like hills, trees and landforms. Additionally, weather patterns, trees, and bushes can make a difference in signal propagation. CERMUSA has published the lessons learned and best practices for the set-up of a wireless network within campus buildings, the conclusions of which were, "Creating a wireless campus is a difficult task. Using computer modeling techniques provides the precision and flexibility for creating multi-building, multi-floor, and multi-channel wireless connectivity."

In May of 2003, CERMUSA commissioned GROK Technology, Inc. to do an outdoor survey of wireless networks at the campus of SFU. To summarize, expanding the SFU wireless network to the quads and outdoor areas of the campus was feasible, so CERMUSA set-out to find a cost-effective and sustainable way to "light up" the outdoor areas.

Variables to consider are the effectiveness of powered versus un-powered antennas, foliage, land forms, physical structures, and weather.

Methods and Materials

Outdoor Coverage

The placement of antennas outdoors presented several challenges. The first task was to specify and purchase the antenna equipment needed for the installation. GROK had identified viable options for the project, the previous year, during their site survey. The information gathered by GROK provided a basis to build on for the equipment list.

Three different types of antennas were used on the project, as shown in the following figures:

Figure 1
7 Decibels Isotropic (dBi) Omni-Directional Antenna
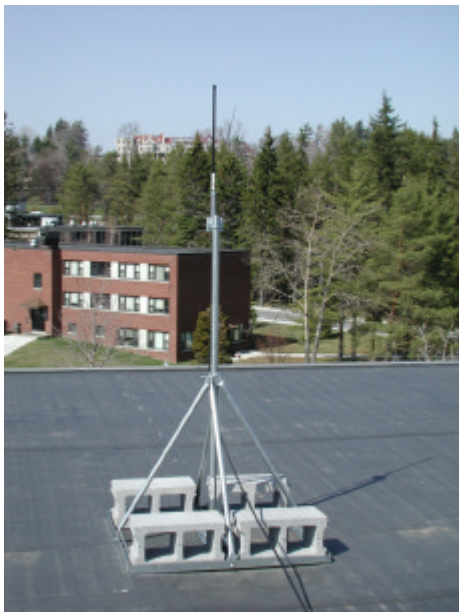
Figure 2
12 dBi Flat-Panel Amplified Antenna

Figure 3
16 dBi directional mast

Once the equipment arrived, the antennas were placed on the roofs of three buildings throughout the SFU campus in locations determined previously from the GROK site survey. To connect the antennas with the access points, which remained sheltered inside a wiring closet within their respective buildings, LMR-400 coaxial cable was utilized. Because signal is lost as it travels through a cable, it is ideal to keep the cable length between the antenna and the access point as short as possible. LMR-400 cable provides an acceptable 6.8 dB of signal loss per 100 feet (Flickenger 2003) while still priced at an affordable cost. Cable runs between 60 and 100 feet were used in the project. Additionally, a grounded lightning arrestor was placed inline with the cable between the access point and antenna. Should lightning strike one of the outdoor antennas, this arrestor will aid in preventing damage to the more expensive access point.

The antenna was connected to a Proxim Orinoco AP-2500 access point. A survey team then surveyed the area of intended coverage to verify that signal strength was adequate throughout the coverage area. To measure signal strength, a free software application called NetStumbler was used. This software measured several vital signal statistics, including signal strength, amount of noise, and signal-to-noise ratio as shown in Figure 4.

Figure 4
Screen Capture of NetStumbler
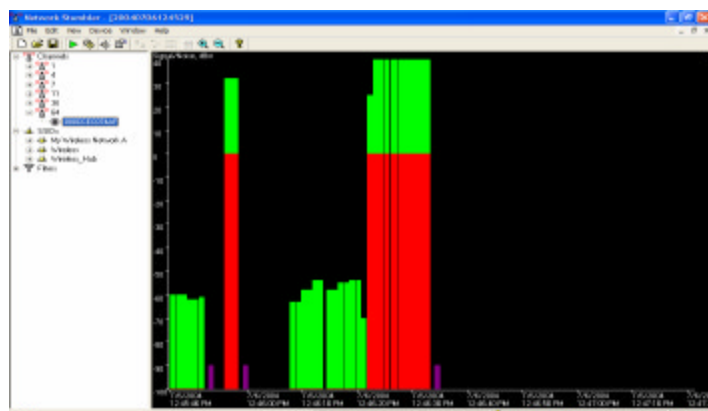
The survey team was outfitted with laptops nearly identical to those used by the SFU students, so that the results would not be significantly different from the results the students would experience.

Additionally, one computer on each survey team would perform a "continuous ping" test by establishing and constantly sending network traffic to a computer known to be connected to the campus's hard-wired network. This test verified that network connectivity was established and maintained throughout the testing period. If connectivity dropped because degraded signal strength, the survey team marked their location on a campus map.

Leaky Cable

The leaky cable portion of this prototype was undertaken when the SFU Wireless Committee discussed placing wireless access points in the dormitories of SFU. Because the dormitories had been hardwired shortly before the academic buildings on campus went wireless, the university's dormitories had not been converted to wireless. However, the students had been requesting wireless in the dormitories, and the SFU Wireless Committee searched for economical methods of placing wireless within the dormitories.

The SFU Wireless Committee researched Rubytron (http://www.rubytron.com) as a provider of "leaky" 2.4 GHz wireless antennas. These antennas work on the principle of "surface wave" technology. In brief, the idea is to send radio signal down the outside of a cable, rather than the traditional coaxial cable, where the internal metal core is surrounded by an insulator. As the radio signal travels down the antenna (cable), it radiates in all directions. Therefore, a leaky cable acts as a conductor to broadcast a radio signal instead of focusing it in one direction. According

to the manufacturer's installation instructions, the radiating wire should have a "virtual tube" with a diameter of 4-inches, void of any metal objects existing in the entire length of the cable.

To research whether or not the leaky cable solution would be a viable method to place wireless coverage in the dorms, two campus dorms which are architecturally similar were selected to act as the test bed. Both dormitories were fairly simple two-story buildings without any angles present. Amici Hall would be outfitted with a leaky cable solution, while Giles Hall would be set up with traditional access points. Once the wireless was turned on in the dorms, surveys would be completed by residents to compare the results of the two methods.

Installation of the leaky cable took place in June of 2004. To prevent student damage and theft, the installation plan included placing the leaky cable above the ceiling tiles in the dormitory. This proved to be a challenging install. Approximately 150 feet of cable was run above the ceiling tile. Additionally, "collector" horn antennas were placed at the two ends of the cable. Unfortunately, the space between the ceiling tile and the actual tile was already crowded with existing cabling, rebar, and conduit, which prevented the 4-inch "virtual tube" from existing as shown in Figure 5.

Figure 5:
Leaky Cable Installation in Crowded Ceiling Space
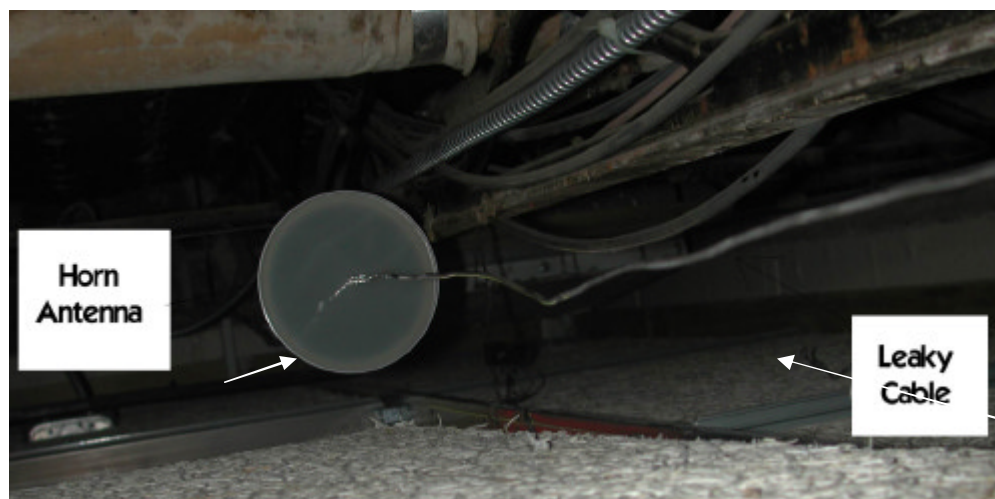
A method similar to measuring the outdoor signal strength was used. NetStumbler was installed on a survey team's laptop. Once the Proxim Orinoco AP-2500 access point was connected to the cable, the survey team traversed throughout the dormitory measuring signal strength and network connectivity. Attention was paid to the rooms furthest from the physical location of the access point.

Results of the Research

Outdoor Coverage

After the testing phase had concluded, the results were aggregated into overhead campus maps of the reported signal coverage for each antenna as shown Figures 6 through 10.

Figure 6:
Coverage Pattern of Omni-Directional Antenna on Pasquerilla Library

Figure 7:
Coverage Pattern of Directional Antenna on Pasquerilla Library

Figure 8:
Coverage Pattern of Directional Antenna Facing the Pine Bowl on Schwab Hall

Figure 9:
Coverage Pattern of Directional Antenna Facing the Mall on Schwab Hall

Figure 10:
Coverage Pattern of Directional Antenna on Torvian Dining Hall

Additionally, a composite map was created that shows signal coverage for the entire SFU campus as shown in Figure 11.

Figure11:
Composite Coverage Area of all Antennas

In July of 2004, the SFU Wireless Committee met to evaluate the coverage maps. Coverage was deemed acceptable, however, it was noted that radio signal did not propagate to the two largest parking lots on campus. In the future, these areas may be covered. The SFU Wireless Committee decided to turn on the antennas and begin collecting data.

To collect the data, the access points were configured to direct the users to a brief survey (Figure 12) before being allowed to continue to connect to the Internet. The survey would simply ask the location of the user, when he or she connected to the access point. A list of predefined locations would be presented, with the option of an "other" field, if the location was not shown. This data would provide CERMUSA with usage statistics as well as, specifying whether the users were actually using their computers outdoors or if they were connecting from indoor locations using "bleed-over" signal.

Figure 12:
Outdoor Wireless Location Survey
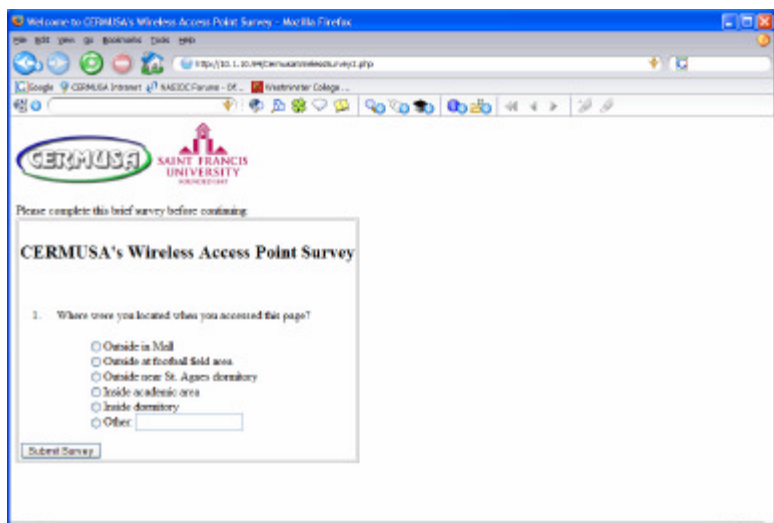
Figure 13:
The Results as of July 14th, 2004
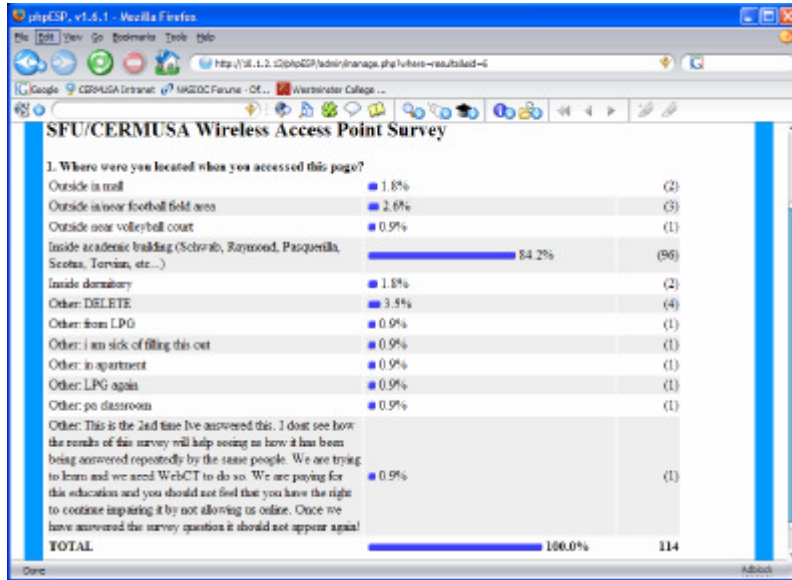
Leaky Cable

The leaky cable in Amici Hall, when placed in the space above the ceiling tile and the actual ceiling, performed poorly. The signal dropped significantly the further the survey team traveled from the access point. The network connectivity dropped approximately 100 feet from the source access point. This poor performance was attributed to the fact that four-inch "virtual tube" did not exist down the entire length of the cable.

After viewing the results, the SFU Wireless Committee decided to remove the leaky cable from above the ceiling tile and install it below the tile. Since this installation method left the cable placed in a visible location to be easily tampered with, the installation would not be permanent. After the cable was installed and tested, it would be removed from the dormitory.

This test proved to be much more successful. The leaky cable propagated enough usable signal to cover the entire dormitory. Both the first and second floors of the dormitory received a strong signal. The coverage from the leaky cable as it was hung from the ceiling was adequate for Internet usage. However, during the school year, there would be 120 students in the dormitory. One access point for 120 potential users is taxing the aggregate Internet connection speed. Giles Hall, the dormitory that is the same as Amici in terms of floor layout and number of students, had two access points throughout the dorms tested. Findings were similar in terms of coverage, with the main difference being that only 60 potential students per access point, thus raising the aggregate Internet connection speed. Cost of the leaky cable kit came to $463.50 plus one access point at $540.15 totaling $1003.65. Cost for the two access points, at $540.15 per unit came to $1080.30.

Conclusions/Discussions/Lessons Learned

Some conclusions that were drawn from this year's research:

- Powered antennas make a difference in signal propagation – When sending the signal through trees and over great distances, amplification of the wireless signal goes a long way to provide a decent signal-to-noise ratio (2:1 and higher) and a higher quality of service than with a non-amplified antenna. They also limit on the number of additional repeater antennas that add costs to implementing a wireless solution.

- Outdoor setups of wireless network need to take into account the factors that are different than indoor wireless networks – Landforms can block a signal and create valleys, as well as degrade the signal. Buildings can block wireless signals and introduce interference. Trees can block the 2.4 GHz RF with their leaves and trunks. Weather can disrupt a signal. All of these factors need to be taken into consideration when setting up an outdoor wireless network.

- Leaky cable shows promise, however is limited in certain arenas – While disappointed with the performance in the dormitory, leaky cable show promise in areas that are open and with regard to cost. Remember that an unobstructed 4-inch "tube" is necessary for the antenna to work. However, if a signal is needed in an area like a hallway or through a tunnel, leaky cable is a reasonable alternative. Considerations need to be taken with regards to the potential number of users that will be using the leaky cable and the associated access point.

- Consideration of the interaction and possible inference of indoor and outdoor wireless networks – If there is a chance that an indoor and an outdoor network will mesh; network administrators need to make sure that there is no harmful interference that can cause one or both networks to fail.

References

"CERMUSA Rural Health Annual Progress to the Navy," August 5, 2002 to March 31, 2004. Attachment Q, 802.11b Standard Wireless Campus/Bluetooth.

"WLAN Report: CERMUSA/St. Francis University," Grok Technology Inc. wireless report.

Flickenger, R. (2003). Building wireless community networks, 2nd edition. Sebastopol, CA: O'Reilly and Associates.

Rubytron Installation Instructions, Rubytron, Inc. 2003

Portable and Mobile Classroom, Year 2: Deployment, Education, and Operation

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Abstract

The Portable and Mobile Classroom (PortMoC) began as a prototype to bring Internet connectivity to places where there was none for education and healthcare, as well as to keep the connection cost-sustainable. Under the "Delivery of Education to Rural Areas (DERA)" prototype, Saint Francis University's Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA) developed and deployed a trailer combining a small form factor with a satellite dish, self-contained power and IP distribution, and twenty-two 802.11b standard laptop computers. The PortMoC has evolved into a platform that utilizes different technologies to bridge the communications gap prevalent in rural areas. CERMUSA will use the PortMoC for Weapons of Mass Destruction (WMD) training for police, firefighters, and other first responders. The research will determine: 1) The efficacy of WMD training to first responders, 2) The efficacy of this method of deployment, and 3) "Best practices" for technology deployment. CERMUSA will use this research to determine the educational, medical, and technological best practices for rural and medically under-served areas.

Background

The threat of a possible terrorist attack on the United States has made it imperative that first responders be trained to recognize and properly respond to potential attacks. The RaPiD-T for Rural First Responders course educates first responders to recognize WMD involvement in a situation, correct protection and decontamination sequences, and proper triage and treatment procedures. Since training on this subject is vital, CERMUSA has previously conducted a research prototype entitled "WMD: RaPiD-T for First Responders at a Distance" in collaboration with the University of Pittsburgh (Pennsylvania) Medical Center's (UPMC) Center of Emergency Medicine. This research prototype looked at best practices in providing this essential training to rural first responders via distributed learning methods.

The educational materials in the WMD prototype consisted of recorded sessions that incorporated a lecture, PowerPoint slides, and handout materials that students could use for reference. These recorded sessions were then streamed to computers in the fire or ambulance stations. The authors of the content were Michael Allswede, D.O. and Joseph Suyama, M.D., both from UPMC's Center of Emergency Medicine.

One important lesson learned in the previous research project is that the technology available to provide education to first responders in rural areas is limited. A technology assessment completed in March 2003 with 99 first responders' stations within Cambria County (Pennsylvania), indicated that many stations (95.4% of the survey respondents) have computers available; however, these computers have:

- o Out-dated computers and operating systems
- o Limited bandwidth
- o Limited memory
- o Little utilization by members

According to the Pennsylvania Emergency Management Agency (PEMA) report (PEMA, 2002), the majority of first responders within Pennsylvania are volunteers. Funds are not available for high-tech computers and the Internet. Available funds are utilized for essential emergency response equipment. This has major implications for rural first responders. With limited technology, rural first responders may have difficulty accessing the educational information available via the Internet through emergency response centers such as PEMA and Federal Emergency Management Agency (FEMA).

In an effort to bridge this technology availability gap, various methods of delivering the technology to the rural first responders were evaluated within this prototype. The utilization of a kiosk and the PortMoC provided the technology to access these sites for this essential training.

The PortMoC consists of a HaulMark trailer outfitted with the technology needed to connect a remote classroom or area with the Internet. Testing in the past showed average speeds in the 40 to 60 Kbs range, which is similar to a dial-up connection. Testing is currently in progress to determine what level of Internet interaction and instruction is feasible through the bandwidth allotted from the PortMoC's Internet connection.

Materials and Methods

There were three pieces of technology used in the DERA project to deliver the content: The PortMoC, the kiosk, and a server-based streaming solution.

The PortMoC

As stated in the ASCUE 2004 report, the PortMoC trailer is a platform that has a satellite dish for Internet connectivity, a routing system and 802.11b wireless network for IP distribution, and 22 laptop computers that are equipped to work with the PortMoC's 802.11b network. Figure 1 shows the interior layout of the PortMoC.

Figure 1: PortMoC Layout
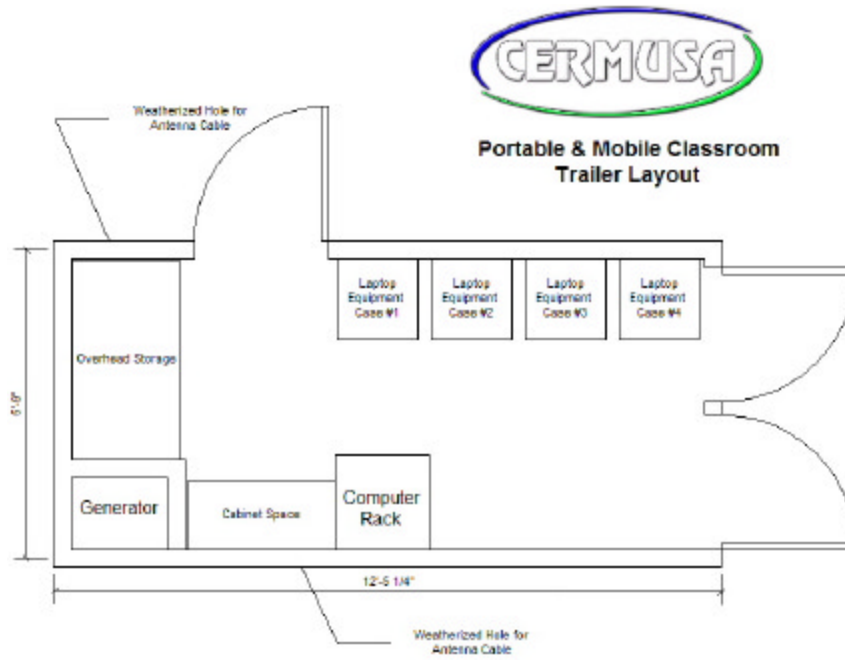
Figures 2 and 3 show the trailer at the East Hills Ambulance Association, Johnstown, Pennsylvania, and the Emergency Medical Technicians (EMT) utilizing the technology, respectively.

Figure 2: PortMoC in Johnstown, PA   **Figure 3: EMTs Utilizing the PortMoC laptops**

The cost associated with the construction of this prototype was approximately $60,000. Monthly satellite connection fees, maintenance fees, and fuel for the generator are approximately $220/month.

The Kiosk

Kiosks are used in a variety of commercial places; Wal-Mart and Target use them as a convenience for customers. The kiosk CERMUSA utilized for the DERA prototype was programmed as a web-server, with all of the online course material loaded into the onboard computer; thus, an Internet connection was not necessary. All course information, grading, and records were kept within the kiosk, and were later downloaded by CERMUSA technicians. The grading information was forwarded to the appropriate continuing education organizations. The kiosks were placed in eight rural first responder stations. Sixty-three participants completed the course requirements in this fashion. Figure 4 shows a close up of the touch screen web interface. Figure 5 shows a CERMUSA staff member setting up the kiosk at the Berlin (PA) EMS station.

Figure 4: Close-up of the Kiosk Touch Screen
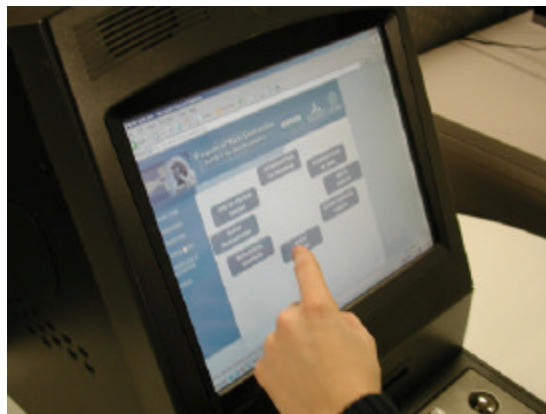
Figure 5: Gabrielle Cronin, CERMUSA staff member, and EMS Staff from Berlin, PA, EMS with the Kiosk

The Streaming Server Solution

The streaming server solution could be considered a hybrid of the PortMoC and the kiosk, as well as a backup to the PortMoC. In times when satellite connectivity is lost due to weather or equipment failure, the streaming server will take over. This server is a laptop loaded with the WMD web session. This laptop issued as a streaming server which is then channeled into the PortMoC's wireless network. The students each had individual PortMoc laptops, ensuring no interruption of the class. Student information, grading, and other data were downloaded from the streaming server by CERMUSA staff after the class.

Implementation of the Technology

Utilization of the technologies in the DERA prototype brings its own issues and practices. As part of the research, CERMUSA has determined the best approach, from both an anecdotal and technical point of view, for deploying various kinds of communication technologies.

Research found that Emergency Medical Service (EMS) stations with a small crew utilized the kiosk best. The students need to allot a specific amount of time to do each class section. However, leaving the kiosk at a station for a week lengthened the amount of time each student had to complete each course.

The PortMoC was better suited to one-time, full-day events, due to the number of staff needed to support the trailer and other technical matters. However, more students could take the course at the same time because of more computers being made available.

Content Presentation

In the initial offering of the "WMD: RaPiD-T to First Responders at a Distance," the students completed the course in the following manner:
1. A pre-test was administered to the students to determine prior knowledge.
2. The students then participated in the course by watching video segments on the course topics.
3. Following the completion of the course videos, the students were administered a post-test.

Completion of the course took over four hours. Many participants indicated that this was too long. Also, since the students completed the post-test after the course completion, there was a time delay at testing for some of the content. The data collection indicated a large increase in knowledge for the topics covered closer to the post-test. It is possible that this increase was partially due to the fact that they just completed that section of content.

When revising the course for the current funding year, the material had been "chunked out" and presented in smaller learning modules. When entering a section of the course, students took the pre-test, watched the corresponding video, and then took the post-test. This allowed first responders to complete either a couple of sub-sections or the entire course at each sitting.

Pre and Post Examination Results

The training consisted of five distinct sections: Biological Agents, Blast Injury, Chemical Agents, Nerve Agents, and Scene. For each section, a test was administered to all participants prior to receiving the training to measure the degree of WMD knowledge each possessed. Those participants that scored above 80% on any of the five sections of the pre-test were exempted from that particular section of the training. Those that failed to meet the 80% minimum requirement on any section were administered the relevant training. Once this training was completed, the same test was then re-administered.

The results of the pre- and post-tests for these participants were stored and a comparative analysis of the results for both tests was conducted. This comparative analysis will be used to evaluate the effectiveness of the training.

Please note that the scores of the participants that were exempted from the training based on their proficiency on the pre-test were also stored. However, these scores are not used in the comparative analysis, as they do not allow for measurement of the effectiveness of the training itself. Nonetheless, the percentage of exemptions for those that passed the pre-test can give insight as to what sections of the training are most needed in the first responder community.

Biological Agents Section

Of the 52 participants that took the pre-test, 53.85% demonstrated requisite proficiency in Biological Agents and were exempted from this section of the training. Those that were administered the Biological Agents section of the training, Figure 6, show that, on average, respondent's scores on the Biological Agent section of the WMD test increased from 48.83% (light grey) to 77.01% (dark grey), an average increase of 28.18%.

Figure 6: Biological Agents Test Scores
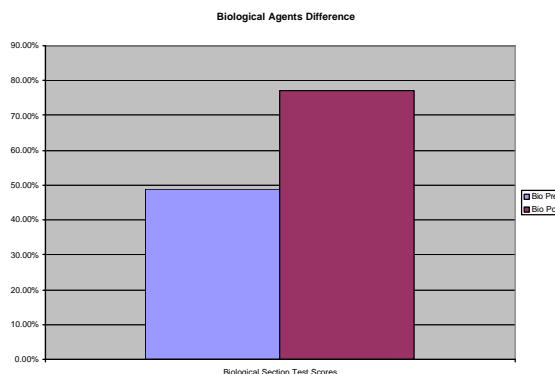
Blast Injury Section

Of the 57 participants that took the pre-test, 31 (54.39%) demonstrated requisite proficiency in Blast Injury and were exempted from this section of the training. Those that were administered the Blast Injury section of the training, Figure 7, show that, on average, respondent's scores on the Blast Injury section of the WMD test increased from 60.97% (light grey) to 78.84% (dark grey), an average increase of 17.84%.

Figure 7: Blast Injury Test Scores
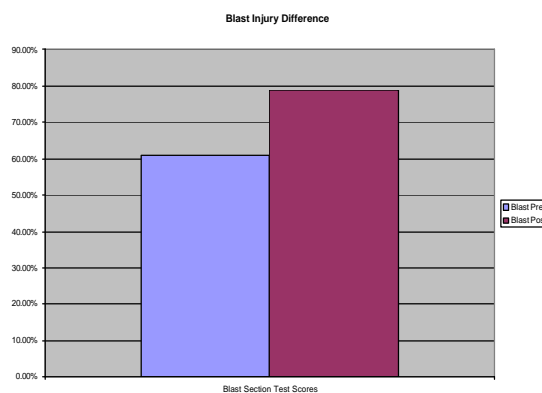
Chemical Agents Section

Of the 57 participants that took the pre-test, 28 (49.12%) demonstrated requisite proficiency in Chemical Agents and were exempted from this section of the training. Those that were administered the Chemical Agents section of the training, Figure 8, show that, on average, respondent's scores on the Chemical Agent section of the WMD test increased from 53.35% (light grey) to 82.41% (dark grey), an average increase of 29.06%.

Figure 8: Chemical Agents Test Scores
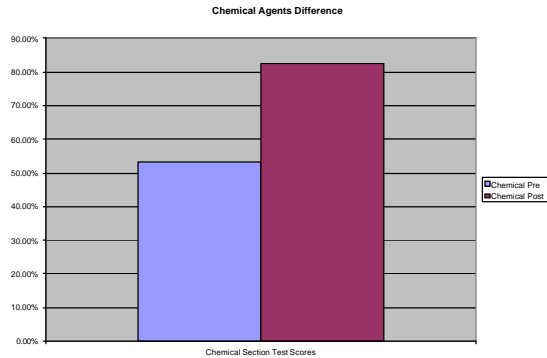
Nerve Agents Section

Of the 60 participants that took the pre-test, 20 (33.33%) demonstrated requisite proficiency in Nerve Agents and were exempted from this section of the training. Those that were administered the Nerve Agents section of the training, Figure 9, show that, on average, respondent's scores on the Nerve Agent section of the WMD test increased from 54.97% (light grey) to 77.96% (dark grey), an average increase of 22.99%.

Figure 9: Nerve Agents Test Scores
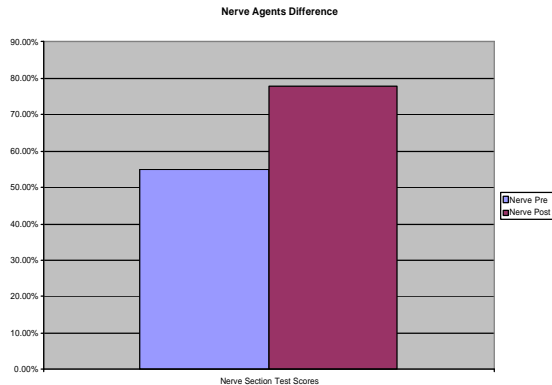
Scene Section

Of the 58 participants that took the pre-test, 22 (42.31%) demonstrated requisite proficiency in Scene Conduct and were exempted from this section of the training. Those that were administered the Scene Conduct section of the training, Figure 10, show that, on average, respondent's scores on the Scene section of the WMD test increased from 62.97% (light grey) to 84.52% (dark grey), an average increase of 21.55%.

Figure 10: Scene Test Scores
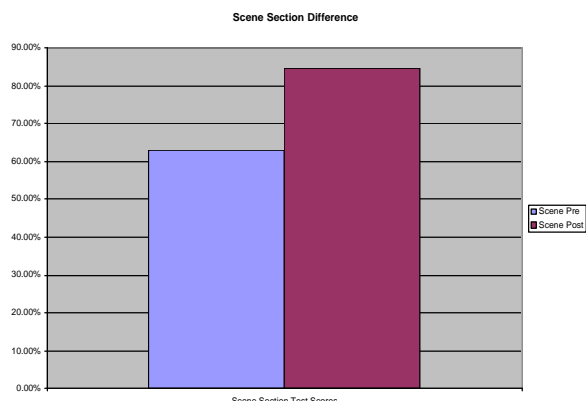
Conclusions/Discussions/Lessons Learned

CERMUSA's mission is to find sustainable healthcare and education solutions for deployment in rural areas. Often times technology is a major factor in what can be done, especially in communication technology. Conclusions learned from the DERA research:

- This method of deployment is effective for education.
- Upgrades would be needed to facilitate higher-speed applications.
- Minimal staff operation is necessary.

The DERA prototype found that the use of this technology was effective in delivery of educational materials as well as enhancing user knowledge. As indicated in Figures 6 through 10, an increase of knowledge in each section has occurred. The PortMoC and the kiosk have proven themselves capable to deliver education effectively to rural and under-served areas.

CERMUSA is finding that the PortMoC, in its current configuration, is a reliable means of providing education in a low- to medium-bandwidth situation; however, the costs to bring higher-speed connectivity would include a new satellite dish and the connectivity fees involved. The last estimate received in April of 2005 to purchase a 1.5 Mbs/500Kbs uplink/downlink was $23,000 for the dish and another $1300/month for connection fees. This higher speed would provide real-time collaborations and Internet2 demonstrations. It would also necessitate a higher cost to construct and utilize on a monthly basis.

Another issue with the PortMoC is finding sufficient staff to operate it. While the satellite operation is a simple procedure, setting the trailer up, bringing the computers into a building, and parking the trailer are all tasks that can require two or more people. Possible solutions would be to convert a station wagon or small sport utility vehicle to the operations vehicle, mount a satellite dish and wireless equipment to its roof, and stow the computers inside the vehicle. This would increase costs as a vehicle, whether new or used, would have to be purchased. However, lower staffing costs, plus ease of use and ease of equipment set-up/tear down, would make the communication technology even more accessible to areas that would not normally have it available.

What applications are appropriate for the PortMoC in its current configuration? These authors would 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 Internet2 access could be possible, bringing a new level of collaboration to students in areas where Internet connection is currently poor or non-existent.

References

American Red Cross (2001). Terrorism – Preparing for the Unexpected.

Bio-Terrorism Intervention (2003). Welcome to BT 101 (online training). Retrieved from http://www.pemba.utk.edu/bt101/.

Bioterrorism Learning Center (2003) (online presentations). Retrieved from http://bioterrorism.digiscript.com/.

CDC (2003). Smallpox: What Every Clinician Should Know (online training). Retrieved from http://www.bt.cdc.gov/agent/smallpox/training/clinician-know/index.asp.

"CERMUSA Rural Health Annual Progress Report to the Navy," August 5, 2002 to March 31, 2004. Attachment GG, Portable & Mobile Classroom.

"CERMUSA Rural Health Annual Progress Report to the Navy," August 5, 2002 to March 31, 2004. Attachment KK, Weapons of Mass Destruction (WMD) to First Responders at a Distance.

Council on Foreign Relations (2003). Nearly Two Years After 9/11, the United States Still Dangerously Unprepared and Under funded for a Catastrophic Terrorist Attack, Warns New Council Task Force [Press Release]. Retrieved July 1, 2003 from http://www.cfr.org/publication.php?id=6086.

DREAMS™ Saving Lives in Real Time [Electronic version]. Retrieved from http://www.dreams-project.org/.

FEMA (2003). Are You Ready? A Guide to Citizen Preparedness (online training). Retrieved from http://www.fema.gov/areyouready/.

Flickenger, R. (2003). *Building wireless community networks, 2nd edition.* Sebastopol, CA: O'Reilly and Associates.

Fraser, M., R., & Fisher, V. S. (2001). Elements of Effective Bioterrorism Preparedness: A Planning Primer for Local Public Health Agencies. NACCHO, Washington.

Gruber, Amelia (2003). FEMA offers first responders instant messaging service [Electronic version]. GovExec. Retrieved June 5, 2003, from http://www.govexec.com/dailyfed/0403/040903a1.htm.

Lee, Jennifer (2002). Response Center at forefront of first responder's technology [Electronic version]. FOCUS. Retrieved June 3, 2003, from http://cyberbuzz.gatech.edu/technique/issues/fall2002/2002-10-11/14/html.

Macintyre, A., Christopher, G., Eitzen, E., Gumm, R., Weir, S. DeAtley, C. et al. (January 12, 2000-Vol. 283 No 2). Weapons of Mass Destruction Events With Contaminated Casualties [Electronic version].   JAMA.   Retrieved from http://jama.ama-assn.org/cgi/content/full/283/2/242?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=Weapons+of+Mass+Destruction&searchid=1059589392527_3266&stored_search=&FIRSTINDEX=0&journalcode=jama.

Monterey Institute of International Studies (2002). Experts discuss weapons of mass destruction in live webcast [Press Release]. Retrieved February 18, 2003 from
 http://www.nti.org/f_wmd411/f_index.html.

Nova Online (2003) (online presentations). Retrieved from
 http://www.pbs.org/wgbh/nova/bioterror/.

OARNet, (n.d.). Satellite project. retrieved Jul 21, 2004, from OARNet: Satellite Project Web site: http://www.oar.net/satellite_project/satellite_project_15.shtml.

Office of Emergency Services [Electronic version].   Retrieved from http://www.co.san-diego.ca.us/odp/resources/show/default.htm.

Pennsylvania Emergency Management Agency with the assistance of Governor Schweiker's Fire and Emergency Services Task Force (2002). A Study of Volunteer Fire and Emergency Medical Services in the Commonwealth of Pennsylvania.

Public Health Foundation (2003) (online presentations). Retrieved from
 http://trainingfinder.org/serach.cgi.

Torok, T., Tauxe, R., Wise, R., Livengood, J., Sokolow, R., Mauvais, S., et al. (1997). A Large Community Outbreak of Salmonellosis Caused by Intentional Contamination of Restaurant Salad Bars. JAMA. August 6, 1997 – Vol 278. No.5.

Waeckerie, Joseph F. (January 12, 2000-Vol. 283 No 2). Domestic Preparedness for Events Involving Weapons of Mass Destruction [Electronic version]. JAMA. Retrieved from http://jama.ama-assn.org/cgi/content/full/283/2/252?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=Weapons+of+Mass+Destruction&searchid=1059589392527_3266&stored_search=&FIRSTINDEX=0&journalcode=jama.

Whiotv (2003). New Tech Tools For First Responders [Electronic version]. Retrieved June 3, 2003 from http://ia.whiotv.com/technology/2087436/detail.html.

Sales interview with TracStar Systems, March 24, 2004

Special Topics in Information Systems Class
Building the Human Component First

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Abstract

Most information systems classes focus on the study of hardware, software, data, communication, procedure, and employees. Employees usually are divided into end-user, IT people, and management. There is a need to teach classes in information systems directly related to the progress of the human as the most important component in any information system. The class invites the students to examine themselves as employees in an ever-changing field. The class attempts to relate many topics to the study of information systems. Students' feedback and input are encouraged at the beginning of the class to form the list of topics to be covered. These may include creativity, critical thinking, obstacles to learning found in one's self or the environment, the difficulty in maintaining a productive relationship in the workplace, impact of the global market on IT, and cultural difference and appreciation, among many. Experienced people were invited as guest speakers. Based on the feedback from the students over the last few years, this class is much needed to position us, as humans, as the most important building block in any information system and, as a result, the rewards to the students have been phenomenal.

Introduction and the Problem Statement

Most information systems books discuss information systems by including six major components. These include hardware, software, data, telecommunication, people, and procedures. The people are divided into end-users, management, and IT Staff. This type of study usually includes a systematic approach with great emphasis on the interdependency among these elements.

This approach is important to understand the essence of these relationships among these elements. Of course, technical skills are essential to a student's success in the field. The need to understand software development and the existing difference among the major categories within the software industry is vital to any student who will become a systems analyst.

What is missing in the process of educating and preparing students who pursue a degree in information technology goes beyond these components. A student who majors in information systems study needs to understand additional concepts and skills. What are these skills and concepts that are critical to a student who is majoring in computer information technology? To answer this

question and to fulfill this gap, the Department of the Computer Information Technology at Florida Keys Community College (FKCC) offers a Special Topic in Information Systems. The focus of the class is on building the human component. Students are exposed to a variety of topics. These include the distinction among data, information and knowledge, computer literacy vs. information literacy, evolution of information systems, critical thinking vs. creative thinking, problems and how to deal with them, outsourcing of information technology and its impact on employment, basic philosophy applied to the instruction in the class, and finally the support of administration.

Research Background

The use of technology for the sake of technology is a losing battle especially when dealing with the unexpected and ever-changing requirement of the business world. Through our experiences as educators and administrators, we hear many stories where impressive and capable technology ended up as an expensive paperweight in somebody's office or basement. People performance undeniably increases by the use of technology, however, if the problem is not clear, no super-computer can produce a desired outcome. We can truly automate a tedious task and save ourselves incalculable number of hours by using the proper technology. If this automated task was not well planned and its processes were not explicitly understood, we obtain undesired outcome.

To rely on technology mainly to solve a business problem without putting the human first is a call for an undesired result. From an interview by Business Management Asia with Dr. Yogesh Malhotra titled "Is Knowledge the Ultimate Competitive Advantage?" Dr. Malhotra stated, "to thrive in this environment, businesses need to rely not only on the data processing capacity of IT but also on creativity and innovation of people - both inside and outside the organization."

Shapiro and Hughes (1996) invited us to look at information literacy from many angles. The author did not deny the importance of taking classes in Microsoft Windows or knowing how to search the Net, however, they stated that:

> "…new curricular framework: one that equips people not only with a bunch of technical skills but with a broad, integrated and critical perspective on the contemporary world of knowledge and information, including its origins and developmental trends, its redefinitions of experience and social life, its philosophical justification, biases and limits, its potential for human emancipation and human domination, and for growth and destruction."

It is clear that the problem of relying on systematic and technical solutions is not an adequate answer to most business problems. This paper shows that the need to teach the course in Special Topics in Information Systems with the emphasis on building the human component with essential skills is an assuring factor to the success of any information systems. After all, as stated by one of my students, "humans don't get obsolete."

Common Objectives of the Class

This section discusses the topic usually covered in the class. Before confirming the syllabus objective and due to the nature of the class, the students have a week to come up with additional

items to be added to already selected items by the instructor. Usually, students are happy with the selected list. However, what students come up with add an additional dimension to the class. The following objectives are usually suggested by the instructor, and students are asked to agree or disagree with the list. The syllabus states:

Upon successful completion of this course, the students will possess the knowledge and ability to:
1. Understand the types of information systems, their evolution, and their application
2. Understand what is meant by creativity to IS environment
3. Understand problem-solving techniques and how to apply them in real-technical environment
4. Apply brainstorming, mind programming, and mind mapping
5. Clarify what critical thinking means and how to apply that understanding to everyday situation (when needed)
6. Understand the barriers to critical thinking.
7. Deal with cultural, psychological, and environmental barriers to creative problem solving and critical thinking
8. Understand the philosophical roots for new technological innovations such as object-oriented technology and database management
9. Put all or some of the learned ideas in a website
10. Guest speaker will be invited for an outside discussion
11. The instructor will work closely with the Vice President of Instruction and the Dean of Businesses and Technology for additional help

Discussed List in Class 2004

Since this class is covered only one time a year, the class of the year, 2004 included the discussion of multiple topics. The length of this paper does not allow for all the discussion that took place in the class, therefore we selected the major topics. These include information and systems, evolutions of information systems, computer literacy vs. information literacy, critical thinking vs. creative thinking, and finally, outsourcing of information technology and its impact on employment.

Information & Systems

The first lecture of the class starts by defining the two terms: Information and Systems. To understand the significance of the term information, a need to relate information to data and knowledge is very important.

Data. For the students to understand the full meaning of the term information, the discussion starts by asking whether data and information are interchangeable? Or, in a simple term, if both terms refer to the same concept. Most students agree that the two terms have the same connotation. When the question is asked, "Can input and output mean the same thing? the students become aware of the difference when input is associated with data and the term output is associated with information. Data become information through the conversion state known as the processing stage. The processing stage includes the set of rules that converts data (the raw facts) into more meaningful result, that is information. It becomes clear to the students that by correctly processing lots of data, we obtain information.

Information. The next question "…whether, as a human race, have we accumulated lots of information?" the subject of the question that leads to a debate and an interesting lecture. Some students feel we do not have enough information, while others complain about the vast amount of information we generate every year. When the students were confronted with the fact that we double the amount of information every few years, they realize the problem. We generate too much information, but we still deal with too many problems in every social and scientific field. The amount of information could add an additional confusing element, especially when we have to deal with an incredible and unfiltered amount of information.

Knowledge. The following question is that "if we process information further by applying additional rules what do we obtain?" After multiple guesses, students agree that knowledge is the right term. Knowledge has a deeper meaning and adds awareness to any condition. Even though information can answer questions such as who, where, what, when, and how, it cannot really explain why a condition exits. For example, when a student registers for Introduction to Computer Application class, we can tell the student's name, what time the student will attend the class, where the class is held, who teaches the class, and we also can tell how the class will be taught by reading the syllabus. With all that, we could not tell why the student chooses this specific class with that particular instructor, or why the student prefers that period of time. Unless we are able to answer these questions, we will not be able to know every detail about the student's condition and any advice provided to the student might be incomplete.

Systems. A system is made up of at least two or more components that must interact to provide a specific purpose. After naming the parts, it is critical to understand the relations among these parts. The class shows that an information system is not made only of its components, but also relations that link them. The more we understand these relations, the easier it is to deal with the system.

Computer Literacy vs. Information Literacy

Students should be able to tell the difference between computer literacy and information literacy. One major goal of the class is to create a full understanding as to what it takes to become information literate and how to maintain it. By reviewing the literature to find a satisfactory distinction between the two phrases, there were many characterizations. On the Penn State University web site, a page titled, "Information Literacy vs. Computer Literacy—One University's Definition," the author defined computer literacy as "the understanding of what computers can and cannot do, and the ability to use both hardware and software appropriately and skillfully." The author defined information literacy "as a group of critical thinking skills which consists of individuals' abilities when they have an informational need and to use necessary technology to access, evaluate, and use information effectively."

It is clear from the above definitions that information literacy requires additional skills beyond understanding how hardware and software work together to accomplish a specific task such as writing a term paper. Information literacy involves critical thinking and the ability to choose among many alternatives. Further, information literacy requires the evaluation and application of information to solve problems of different scales. These problems range from personal to prodigious ones.

We can add that for students to become informational literate, they have to look consciously to additional components other than the technological ones. In addition to critical thinking, a student needs to think creatively in many situations. A student needs to understand the nature of problems and how to deal with them effectively.

Evolution of Information Systems

This lecture covers all type of information and how they evolved over the last 60 some years. Students will realize how a transaction information system is used on a daily basis to collect data from customers, employees, and any input in the accounting systems. These collected data from the transaction system can be used to produce summaries and to generate a variety of reports that help the management in their decision making, thus creating the Management Information Systems (MIS).

The Decision Support System (DSS) is discussed as the next progression in the field of information systems. DSS allows for ad hoc reporting. The main focus of DSS is to enhance the decision making rather than replace it. The next generation of information systems is an expert system (ES). ES can replace a human expert in the decision making since it includes a knowledge base. The knowledge base is usually extracted through a knowledge engineer who puts the experts' knowledge in a set of rules for later access. Both DSS and ES are considered intelligent information systems given that they incorporate human intellect.

The discussion moves to cover executive information systems. This information system assists top management in their strategic decision making. These systems come with an easy interface and include highly critical information gathered internally and externally by the organization. The last information systems discussed is the virtual office or automation systems where multi-

ple technological innovations are used to solve everyday business problems. The dialogue in the class covers the convergence of the technologies ranging from word processing to two-way/video-two-way-audio videoconferencing. Further, we discussed how Internet has reshaped our communication, our manner of buying, and the way we get educated.

These are comments from the class regarding the evaluation and obsoleteness of computer systems:
1. "One of the things that I really enjoyed about the conversations in the class, even though we are all pursuing a computer degree, is that the human element [in an information system] will not soon become obsolete."
2. "When an information system needs to be attuned, a programmer has to write and enter new coded instructions. Our brain does this work automatically both in the early childhood and in adulthood."

Critical Thinking vs. Creative Thinking

Understanding different types of thinking is critical to the success of an information systems student. Students are handed two problems. The first one requires critical thinking skills to be solved. The second requires creative thinking. The instructor asks for individual answers. Most students tend to find a solution to one of the two problems. Students are asked to state which one of the two problems is easier to solve. By identifying their style of thinking, students will be able to tell initially whether they like to solve problems critically or creatively.

Students are asked to write a paper by researching critical thinking. By defining, discussing, and listening to each student, the group understands and agrees on a general definition to critical thinking. Students also are encouraged to apply critical thinking to suitable situations in their future projects.

The next week students are asked to write a paper about creative thinking. Again, the students are expected to read and debate their findings. Once there is a consensus, the instructor asks students to revisit the earlier discussion about critical thinking and ask for comparison and contrast between the two types.

The following section contains comments from students after their research and involvement in discussing the different aspects of critical and creative thinking. These comments indicate the extent of students' involvement in discussing and applying the learned concepts:
1. "We [must] set aside our beliefs, fears and way of thinking and approach [problems] objectively, analytically, logically and clearly."
2. "A treat which I found second only to Julie's cupcake and pumpkin pie! The best way to change negative thinking, the biggest hindrance to creative thinking, is to become aware of it. Like trouble shooting and problem solving, we cannot fix anything until we know what is broken…"
3. "Once you know where you are, creating your own behavior becomes less difficult to change."
4. "We can change our world and the way we perceive it. We can do much with less effort…if we only remain aware of our thoughts."

5. "Just to make meaning out of thinking was fascinating."
6. "I learned about red and green thinking and how being open minded is very important."
7. "Distinguishing between facts and opinions…and making valid statements are all criti-cal."

Problems and How to Deal with Them

To assist students to see problems as a potential opportunity for growth and a motivation for change in an environment that is constantly evolving, students are asked to define the term "problem." Students tend to introduce a negative connotation to the term problem. The students are reminded that the concept of problems we are seeking in our field, information systems, is not all adverse. Problems are the root of new learning paths that might lead in the long run to huge savings and productivity.

Students are asked to distinguish between symptoms and problems and try to evaluate situations and avoid dealing with symptoms, and to tackle the problem at hand with an open mind and a desire to achieve a solution. Students also are asked to avoid the assumption that they already know the solution and they should avoid arriving at the solution without thinking first (Problem Solving, 2000).

There are many thoughts provided by students on the nature of problems and how to deal with them that prove that they applied a high level of concentration:
1. "In dealing with my problems, I learned that sometime my critical thinking can stagnate my creative thinking which can turn out to be a problem for me. Well guess what, I have come to an agreement with myself to solve this problem. I need to take a deep breath, slow my thought patterns down some, and realize that everything doesn't always have to be so urgent."
2. "So looking at our problems as opportunity is excellent advice."
3. "Therefore, as long as we live, we need to try to develop our problem solving skills."

Outsourcing of Information Technology and Its Impact on Employment

Students are aware of the fact that globalization and outsourcing are reality. Some tend to be fearful that they may not get a job after finishing their degree. As a result, students are asked to research the impact of outsourcing technical skills to employees overseas. The challenge is there and students must understand how to prepare themselves for a competition that is no longer re-stricted to any geographical area. The world has become the community. The class discusses the skills that are needed to find and maintain their employability.

In the article "Challenges in Outsourcing and Global Development: How will your job change?" Dennis Mancl stated that people such as software developers can be threatened by outsourcing. In order for these people to keep their jobs, they must possess valuable skills such as "domain knowledge," "productivity," and "soft skill." Further some additional skills are:
1. Ability to deal with people including end users and customers
2. "Cultural empathy (ability to work across the teams with folks in different coun-tries/cultures)"

3. Ability to deal with uncertainty

The following comments were selected from the students' papers to show their understanding of the requirement of globalization and the need to be aware of the changes that impact the business world. Persistence in pursing knowledge and understanding cultural differences can help students cope with the issue of globalization:

1. "Knowledge is indeed available from some quality and reliable sources. It just takes a little time and perseverance."
2. "Another feature that fascinated me about the class was factors we discussed. Issues such as cultures and languages. We discussed also how these things influence computer professionals."
3. "While we are able to pick up a new language, a new culture is far more difficult to understand."
4. "For example, Aborigine culture has no written form of communications. Do we keep them out of the computer circle? Well, no, because Art was the most effective language of communication for them and the most universally understood. Let us incorporate that somehow in information systems. Therefore, culture and language sometimes can present a challenge to computer specialists."

Basic Philosophy of the Class

Learning From the Students

As for the instructor in computer information technology, he can easily state that his best teachers have been his students. With the emphasis on this idea and the constant reminder that he is in the class also to learn, students tend to value this approach by showing a greater desire to learn. Students usually show pride and high confidence in the learning environment once they hear that they are also in the class to convey their thoughts, experiences, and judgment.

Perpetual Knowledge

Lifelong learning is the belief that students learn in the class. Truth is a relative concept and what is considered as a suitable solution today might lose its glamour in the near future. Keeping that in mind, students are encouraged to value learning and avoid becoming obsolete in their reflection on issues and to learn and unlearn ideas on a regular basis. The students are told that the only time people stop to learn is when they cease to breath.

Discussion style

Every student is asked to research the same topic with no more than a single typed page. The references of their finding should be cited using the American Psychological Association's style (APA). The length of the paper provides a student with two main advantages. First, a student must be able to select the most important points related to any topic and still be able to present to the class. Second, the short paper gives other students a chance to present their own findings with the allotted time for the class.

The following comments regarding the discussion style of the class:
1. "The open discussion had its advantages; it made some members of the class open up and voiced their opinions more. Their participation becomes apparent that they were enjoying the class. I even thought that some of the students changed their perspective when they began to read and put thoughts down on paper."
2. "Doing research for each project was entertaining in itself since it required research, reading and having to view different websites to accumulate the needed information."

Non-threatening Environment

The first assignment is to ask the students to indicate, to the best of their ability and on a volunteer basis, their strengths and weaknesses. If a student wishes to share their list with other students, s/he is encouraged to do so. Most students tend not to think about their strengths and weaknesses in clear terms. The students usually take this opportunity to draw a self-analysis on their abilities. To some students, this assignment seems an awkward one. The instructor assures the students that part of this class is to reduce the weak points and accentuate the strong ones. At the end of the class, students tend to revise the list and examine the extent to which they have dealt with their points of limitation.

A relationship between an instructor and a student should be based on trust, genuine feeling, and high level of enthusiasm for learning and accepting guidance. The students should believe that the instructor wants the best possible learning outcome for them. This usually does not go smoothly and different approaches can be applied to resisting students. The instructor may call for individual meetings and support sessions with students who need assurance. Usually the discussion stresses the fact that the students must try their best, to come prepared to the class, and ask any questions, regardless of how they view the questions themselves.

Most students fear public speaking. To deal with this issue is to create a non-judgmental atmosphere. Students are encouraged to discuss their fears about public speaking and to what extent they dislike it. The shared feeling and the acknowledgement that many students resist public speaking help them to realize that they are not alone in their reaction. To alleviate the problem further, the instructor usually shares with students some of the difficulties he has experienced during an earlier time when public speaking was an unpleasant and undesired task.

By the end of the classes, some students provided these comments:
1. "I tend not to speak out and voice my opinions. This class has definitely brought me out of my quiet nature to some extent."
2. "All in all, this class taught me about some of the things about Information Technology I didn't know and also about some of the wisdom I gained about myself I didn't know."

Any Failure Is Welcome

Students are encouraged to examine their failing attempts in a project or arriving at an ineffectual outcome as an opportunity to understand the situation better in order to deal with it effectively in the next attempt. Failure, if it is not a consistent behavior, is viewed as a positive and as a learning tool.

The following comments were stated by the students:
1. "One of the things I learned was to overcome the fear of failure."
2. "Although competence, diligence, and a sense of personal satisfaction are important, negative feelings, such as fear of failure, result…[into] unreachable goals."

Collaborative Learning Is Encouraged

Students are encouraged to work together on special projects. In addition to the weekly assignment, there is a weekly presentation that a student may want to share with the class. This year, students presented interesting topics such spyware, ad-aware, viruses, worms, nanotechnology, and future innovation in the information systems, to name a few. The collaboration helps students work in a team, accept or argue different approaches, and learn new techniques on how to communicate a subject.

The following are some comments by the students' concerning the learning process itself:
1. "As to this class I really enjoyed that I saw improvement in many of my classmates. Some were extremely quiet and at early stage in the class they did not provide much input but as time progressed they came out of their shells and really gained a lot of knowledge."
2. "It helped me to communicate my feeling with 'strangers' and get to know them as persons. I have implemented these communications skills at my place of employment, and I think it has helped me."

No Single Way to Learn

Students are encouraged to present their findings in different media. This gives them the chance to discover their learning style and the degree of comfort with a certain approach vs. another. Some students like to use an abundance of graphics and animation to present their ideas, and other students did exceptionally well verbally.

Administrative Support

The instructor shows that, to instruct a class, there are additional components at FKCC beyond what they see at the classroom. The educational system at FKCC is a friendly and cooperative one. To practice these ideas in the class, the Vice President of Instruction and the Dean of Business and Technology are asked to contribute to the class. The relationship between the Vice President of Instruction and the faculty is a contributing factor to the success or failure of a class. The Dean of Business helps and supports to bring a realistic and innovative input to the class. To draw on his vast experience in the business world has been a great advantage to the students.

Vice President of Instruction.

Students need to realize that in order for any information systems to succeed, the top management in their workplace should support the project. The relationship between a system analyst and a chief information officer should be based on support and understanding. To apply these

concepts to class, the instructor discusses styles of management and leadership with The Vice President of Instruction to bring the value of these discussions to the classroom.

The input of the Vice President of Instruction focuses on the relationship between an administrator and a professor. The Vice President of Instruction's role is accomplished by creating a climate that supports the risk-free attitude of its employees to pursue organizational change through individual and collective pursuit of what is best for the organization.

The following points are made by the Vice President of Instruction to assure the smooth operation of instruction and to provide the necessary support to classes that require a degree of flexibility:

1. Leadership strives to foster understanding, respect, dignity, and a climate of cooperation and freedom to take risks.

2. Leadership works hard at keeping these procedures at a minimum to insure the flexibility necessary to adapt to constant change. It is this factor of change and the ability to adapt to it that ultimately define the continued growth and health of the organization.

3. Leadership's responsibility to provide a meaningful work place to all employees with the opportunity for personal and collective satisfaction and success

4. Leadership through its relationships is built on trust and respect and provide the necessary environment at FKCC to insure that individual professors may pursue projects with their students that are timely and relevant.

Dean of Business and Technology.

The Dean of Business at FKCC has been an integral part of this class for the last five years. Every year this class is taught, he helps by demonstrating to the students that succeeding in the business world involves more than understanding the business and technological processes. The Dean of Business and Technology presents his material in two meetings with the students. At the first meeting, he becomes familiar with the students background by handing out a questionnaire. The questions tend to trigger a reflective and forward thinking process. For example, "What could students do if they have access to an unlimited amount of money?" Another question is to list their priority in life. There are additional questions mostly to trigger critical and creative thinking in the students' evaluation to the immediate period of their life.

Next meeting the Dean of the Business and Technology discusses the students' answers to the questionnaire. The discussion is very revealing and edifying since students have the chance to express themselves. The students also share and hear the other responses and compare them to their own. The discussion finishes with a presentation on "How to Unleash Your Subconscious Creativity." The following items are the highlights of the presentation:

1. Defining creativity
2. Connecting our creative ability to our dreams. If we can dream it, we can do it.
3. Knowing our comfort zone. How much is enough? What are our choices in friends, families, work, salary, and environment? How are we limiting ourselves? Eliminating blocks to creativity by applying affirmations, programming the mind, positive thinking, neuro-linguistic programming, to name a few.
4. The power of negative thoughts and how we control those thoughts

5. Knowing the type of our personal strategy by understanding main representational systems such as auditory, visual or kinesthetic.
6. How to unleash our creativity
7. A call for action on our dreams.

After finishing the presentation, the students are asked to write what they have learned from the discussion and the presentation made by the Dean of the Business. The following are comments regarding the presentation made by the Dean of Business:

1. "One of the questions was 'what I do if I have only six months to live?' My family comes to mind first and the pursuit of inner peace and just finding old friends and reacquainting myself with them. The same thing that I have forgotten and been sidetracked. I have since gotten in touch with many of my old friends, some from as far back as twenty years."
2. "The Dean has showed us that to succeed in using technology effectively, we need to focus on our inner abilities first."
3. "The Dean has showed that creativity and innovation comes from within the human first and then from the machine."
4. "Computers cannot solve every problem."

Conclusion

There is a clear conclusion that building the human component is the most important aspect of designing and implementing information systems. Understanding the relations among the parts of an information system is essential to the success of any information system. However, we need to go beyond the obvious and try to train and foster students who are pursuing a degree in information technology to develop additional concepts and skills to their technical ones. These skills and concepts include information and systems, evolutions of information systems, computer literacy vs. information literacy, critical thinking vs. creative thinking, and finally, outsourcing of information technology and its impact on employment.

This research paper includes basic philosophy about how the instructor taught the class. These subtitles for this section include learning from the students, perpetual knowledge, discussion style, non-threatening environment, a failure is welcome, collaborative learning is encouraged, and finally, no single way to learn.

The paper also discussed the collaboration that takes place between the instructor and the administration. The Vice President of Instruction is asked to help define leadership and provide insight on communication skills. The Dean of Business and Technology presents the value of building communication and provides the class with a presentation on how to effectively program your mind in order to deal with the changes in the business and the technical worlds.

References

Dennis Mancl(n.d).   Challenges in Outsourcing and Global Development: How will your job change? *Retrieved April, 2 2005 from http://csc.noctrl.edu/f/opdyke/OOPSLA2004/outsourcing_report.html*

Information Literacy vs. Computer Literacy—One University's Definition (n.d). *Retrieved April, 2 2005 from* http://www.libaries.psu.edu/instruction/schools/create1.htm

Is knowledge the ultimate competitive advantage (2003)? Retrieved March 30, 2005 from http://www.kmnetwork.com/BMA.html

Problem Solving *(200). Retrieved April, 3, 2005 from http://literacy.kent.edu/salt_fork/prob_solv/define_intro.html*

Shapiro, J. & Hughes, S. (1996). *Information Literacy as a Liberal Art: Enlightenment proposals for a new curriculum.* Retrieved July 3, 2004 from http://www.educause.edu/pub/er/review/reviewarticles/31231.html

Innovative Use of Technology for Online Learning

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Abstract

Through the use of web-based technologies, Educational Technology Services (ETS) has been able to successfully support and grow distance learning programs and enhance teaching and learning.

This session presentation is designed to introduce participants to ways to enhance the overall online teaching/learning environment through the use of view on-demand presentations (asynchronous communication) and emerging audio/video technologies (synchronous communication).

Participants will see examples of asynchronous and synchronous sessions hosted by Clemson University faculty and staff for both academic courses and training sessions. Also, there will be an open discussion of lessons learned by ETS and Clemson University faculty, including bandwidth, file size, video and other considerations.

Note: The author has not prepared a paper for this session. She will make available the presentation slides in print, on the web, or in response to an email request.

A Few Common Misconceptions about Distance Learning

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At present, with new technologies emerging daily and the growing need for more flexibility in scheduling, there seems to be an overall drive towards the need for distance learning. According to PBS Campus, 67% of colleges and universities agree that online education is a critical, long-term strategy for their institution. As a result, 49% of public colleges and universities and 34% of all higher education institutions offer complete online degree programs (PBS Campus, 2004). In addition, according to the National Center for Education Statistics, "in the 12-month 2000–2001 academic year, there were an estimated 3,077,000 enrollments in all distance education courses offered by 2-year and 4-year institutions.   There were an estimated 2,876,000 enroll-ments in college-level, credit-granting distance education courses, with 82 percent of these at the undergraduate level (*see Appendix A for tables*)" (Waits & Lewis, 2003, p. 1).

The fundamental premise of distance learning was to create and widen access to education and to improve its quality, using distance education techniques and associated technologies to meet the particular requirements of individuals who were unable to participate in the traditional classroom environment.

The purpose of this paper is to explore factors related to common misconceptions about distance learning, including: faculty preparation time, effective use of appropriate technology, learning styles of students, the need for orientation, training and support, and cost.

Most are familiar with the traditional, face-to-face classroom environment, where there is syn-chronous (or real-time) communication between the instructor and student. The instructor usu-ally serves as the leader, responsible for the class goals, objectives and methods of evaluation. Instructors also make use of a whiteboard (or chalkboard), overhead projector, handouts, and open class discussions.

However, the distance learning environment is somewhat different. According to the American Society for Training and Development, Distance learning (also called Distance Education), is an "educational situation in which the instructor and students are separated by time, location, or both. Education or training courses are delivered to remote locations via synchronous or asyn-chronous (happening with a time-delay) means of instruction, including written correspondence, text, graphics, audio- and videotape, CD-ROM, online learning, audio- and videoconferencing, interactive TV, and FAX." (Kaplan-Leiserson). With this in mind, faculty and students have to make some adjustments to ensure the success of a distance learning environment.

One factor is related the amount of time faculty members actually spend preparing to teach a dis-tance education course. A common misconception is that courses of this nature are easier for faculty, because of the increased responsibility placed on the student. However, these courses

require a great deal of development and preparation time on the part of the faculty member. Alford and Engelland suggest a strong need for faculty training before course preparation and delivery. "As a result of training, instructors learn that they may have to change their standard teaching approach. Instead of the 'sage on stage' approach used in more traditional education, they likely must become more like a 'guide on the side'" (Alford & Engelland, 2001, p. 1). It is vital for faculty to consider activities to engage students and a contingency plan in case the lines of communication are broken and the technology being used does not function as expected.

In addition, it is important for faculty to consider their content and the type of technology being used. According to the Center for IT Accommodation, section 508 requires that federal agencies give disabled persons information that is comparable to the access available to others. Since most colleges and universities received some form of aid from the federal government, they must comply with section 508 standards. Therefore, faculty may have to modify (or in some cases, totally restructure) their course materials. In additional, all technologies do not meet section 508 standards, causing faculty to make additional accommodations for students (i.e., changing the type of technology used, offering a text only version of course website, allowing more time on exams, etc…).

Finally, students participating in distance education courses usually expect fast responses from faculty, much faster than the traditional learning environment. The general thought is that faculty are available 24hours a day, seven days a week to provide feedback on student assignments and to offer some level technical support for students. This level of communication places a high demand on faculty time, more so than in the traditional classroom. Therefore, many faculty members find themselves relying heavily on email or using a course management system to facilitate class discussions (via discussion board or chat room), generate and grade assignments, and post lecture notes (usually PowerPoint files), study guides, study guides, and additional resources (web links, etc….). With this in mind, faculty members discover that additional time is spent on learning how to use the system (or technologies) properly, determining which tools/resources will work best for their content, developing online assessments (quizzes, tests, and/or surveys), and converting files to appropriate format(s).

A study was conducted at a large, mid-Western university, to measure the effects of teaching in a distance learning environment had on a faculty member's time and teaching. The results revealed that 50% of the faculty surveyed reported having to spend more than 30hours extra time preparing for the semester due to the technology. In addition, even though preparation time needed declined over time, the study showed that 37% of the faculty reported spending more than ten hours of time on hardware/software training alone ((Pachnowski & Jurczyk, 2003, p 1-8). Even though some colleges and universities provide funding for course development, it does not necessarily equate to the amount of time needed to properly plan, develop, and implement a successful distance education course (or program). In addition, due to budget constraints, many colleges are no longer able to offer faculty members stipends or other types of funding.

Another factor to consider is the effective use of appropriate technology. The common misconception is that distance education equals the use of a particular type of technology, namely the Internet. This leads many to believing that by making materials available to students online, the job is done. However, according to Rossen, "access to data does not automatically expand stu-

140

dent's knowledge; the availability of information does not intrinsically create a framework of ideas" (Rossen, para. 3). Granted, faculty should learn the technology and gain a complete understanding of its strengths and weaknesses, but concentrate on the education. In general, the technology used should be supplemental to the classroom as a means of enhancing learning. It should be fairly transparent to the student. In other words, at the end of the day, discussions should be centered on the actual course content, instead of the technology used for delivery. Therefore, faculty should make sure participants are comfortable with the technology at the beginning of the course or program so that they can concentrate on the actual learning process.

Porto and Aje's research focused on factors relating to the decision-making process during curriculum, course development and delivery of online courses. They referenced Bates' 'Lone Ranger and Tonto's model, dealing mostly with the technology and the need for faculty to understand the overall potential of the technology without loosing focus of their classroom goals. The authors note that because there is a variety of technologies available for use with online courses (video IP, audio/video conferencing, internet, audio-graphics, etc…), it is important that decision makers include definitions, limitations, and cost for the various medias in the decision-making process (Porto & Aje, 2004, 1). Therefore, many schools are finding the need to employ instructional designers and instructional technologist, those individuals responsible for assisting faculty by reviewing course content and applying the appropriate tools and technology to enhance the learning experience. These individuals may serve as a consultant, web developer, technical writer, and/or a researcher. They help faculty find innovative ways to involve students at a distance.

A third factor to consider involves the various learning styles of students. The misconception here is usually on the part of the student. The general thought is that the class will be easier, because they can work at their own pace. In addition, the workload will be lighter so they will not have to work as hard. However, Forbes estimates the online student dropout rate at around 35% while the average attrition rate for college freshman at U.S. universities is around 20%. This is in part due to the fact that it takes much more discipline on the part of the student to be successful in a distance education course and the work load is usually heavier than in a traditional classroom.

Although there are many online resources that try to help students determine if distance education right for them, they all agree that students must first address the issue of how they learn most effectively. Students need to consider characteristics of each type of learner: visual, auditory and kinesthetic. Visual learners learn through seeing, auditor learners learn through listening and kinesthetic learners learn through moving, doing and touching. With this in mind, students are able to determine best ways to prepare for synchronous (i.e., chat) or asynchronous (i.e., discussion board) class discussions, quizzes, and exams.

In addition to the traditional learning styles, most agree that all distance learning students need to be self-directed learners, in that they have to take responsibility for their own actions. A study conducted to compare the learning of two online health education classes with an on-campus face-to-face class at a community college revealed that students enrolled in the online class were more independent in their styles of learning than those enrolled in the on-campus class. According to the study, "the on-campus students seemed to match the profile of traditional students who are willing to work in class provided they can obtain rewards for working with others, and for

meeting teacher expectations. Online students appeared to be driven more by intrinsic motives and clearly not by the reward structure of the class" (Diaz & Cartnal, 1999, 130-135).

The advantages of self-directed learning include: immediate feedback, learners work at own pace, individual choice of material and method, and reduced cost. However, some of the disadvantages include the need for more learner preparation. This raises a major issue in that all learners are not comfortable with being "left on their own".

A final factor to consider is cost. The misconception is that distance learning is a way to save money. Most administrators see distance learning as a way of bringing in more money without spending more in resources (in terms of faculty and facilities). Unfortunately, studies have shown otherwise. Distance education is more expensive to set up and if implemented properly, the student/teacher ratio will actually be smaller than that of the traditional classroom (averaging a ratio of one to twenty-five). Administrators have to carefully consider the cost of development, training, support and technologies and weigh them against the outcomes.

For example, a substantial amount of additional time may be needed for faculty to properly prepare for a distance education course. The cost of that time should be taken under consideration. As mentioned in the study cited earlier, faculty spent more than 30hours preparing for a distance education course due to technology. Due to the additional preparation time needed, some institutions are offering faculty stipends ranging from $1,000-$5,000 per course. In addition, many institutions are employing instructional designers and technologists to assist faculty with course development, support and training. The cost of hiring additional staff must be considered. According to Pay Scale, the median salary of an instructional designer at a college or university in the U.S. is $42,000.

Also, the need for various technologies must be considered. Those institutions implementing satellite communication need to consider the cost of having a coordinator (or technician) available at each remote site and the main campus, "air time", telephone/fax usage and contractual fees paid to remote location. For example, four-year institutions pay $25 per hour of use for satellite air time.

The institutions that choose to use a course management system need to consider the cost of servers, possible changes to the network infrastructure, support personnel, and software cost. For example, Blackboard and WebCT are the two most leading course management systems today. The average software cost of these packages for some institutions is over $100,000 per year.

Those institutions making use of video tapes, CD's and/or DVD's, need to consider the cost of mailings, actual media, and hardware/software needed to create the content placed on the media. For example, the average cost of a CD/DVD burner with the ability to burn 119 CD-R's or 28 DVD-R's per hour is $2,500. In addition, the average cost of the media ranges from one to two dollars each, depending on type.

In summation, there are several common misconceptions about the distance learning environment, including: faculty preparation time, effective use of appropriate technology, learning styles

of students, the need for orientation, training and support, and cost. These myths tend to lead the administration, faculty and students into danger when determining if distance learning is right for them and their respective institution. However, a successful course is good, because it is well designed. A distance learning course can be just as successful as a face-to-face class, as long as all involved spend the necessary time to prepare, use technology appropriately, become aware of the various learning styles, and have resources in place to properly support the programs.

Appendix A

Table 4. Number of 2-year and 4-year Title IV degree-granting institutions that offered distance education courses, total enrollment in all distance education courses, and enrollment in college-level, credit-granting distance education courses, by institutional type and size: 2000–2001

Institutional type and size	Total number of institutions	Number of institutions that offered distance education courses	Total number of enrollments in all distance education courses	Number of enrollments in college-level, credit-granting distance education courses		
				Enrollment in courses at both levels	Enrollments in undergraduate courses	Enrollments in graduate/first-professional courses
All institutions..............	4,130	2,320	3,077,000	2,876,000	2,350,000	510,000
Institutional type[1]						
Public 2-year......................	1,070	960	1,472,000	1,436,000	1,435,000	‡[2]
Public 4-year......................	620	550	945,000	888,000	566,000	308,000
Private 4-year....................	1,800	710	589,000	480,000	278,000	202,000
Size of institution						
Less than 3,000................	2,840	1,160	486,000	460,000	368,000	91,000
3,000 to 9,999..................	870	770	1,171,000	1,132,000	932,000	197,000
10,000 or more..................	420	400	1,420,000	1,284,000	1,049,000	222,000

‡ Reporting standards not met.

[1] Data for private 2-year institutions are not reported in a separate category because too few private 2-year institutions in the sample offered distance education courses in 2000–2001 to make reliable estimates. Data for private 2-year institutions are included in the totals and in analyses by other institutional characteristics.

[2] Two-year branches of public 4-year institutions occasionally offer graduate/first-professional level courses.

NOTE: Enrollments may include duplicated counts of students, since institutions were instructed to count a student enrolled in multiple courses for each course in which he or she was enrolled. Detail may not sum to totals because of rounding, missing data, or because too few cases were reported for a reliable estimate for private 2-year institutions. (See appendix A for details.)

SOURCE: U.S. Department of Education, National Center for Education Statistics, Postsecondary Education Quick Information System, "Survey on Distance Education at Higher Education Institutions, 2000–2001," 2002.

Figure 1 – (Waits, T. & Lewis, L., 2003)

Figure 2. Percentage distribution of enrollment in college-level, credit-granting distance education courses in 2-year and 4-year Title IV degree-granting institutions, by level of course offerings: 2000–2001

Enrollments in graduate/first-professional courses[2]
18%

Enrollments in undergraduate courses[1]
82%
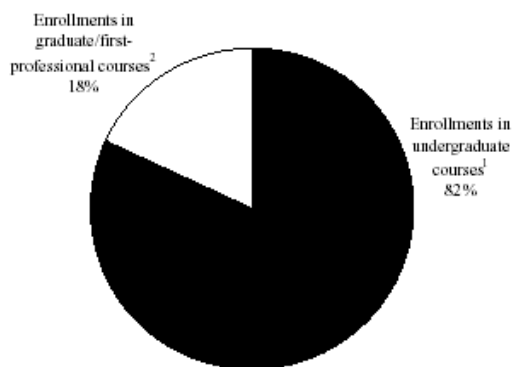
[1] Percent based on the 2,350,000 enrollments in undergraduate distance education courses out of 2,876,000 total enrollments in college-level, credit-granting distance education courses.

[2] Percent based on the 510,000 enrollments in graduate/first-professional distance education courses out of 2,876,000 total enrollments in college-level, credit-granting distance education courses.

NOTE: Enrollments may include duplicated counts of students, since institutions were instructed to count a student enrolled in multiple courses for each course in which he or she was enrolled. Figure derived from data in table 4. Enrollments in undergraduate and graduate/first-professional distance education courses do not sum to the total enrollment because of rounding and missing data. (See appendix A for details.)

SOURCE: U.S. Department of Education, National Center for Education Statistics, Postsecondary Education Quick Information System, "Survey on Distance Education at Higher Education Institutions, 2000–2001," 2002.

Figure 2 – (Waits, T. & Lewis, L., 2003)

References

Alford, B.L., & Engelland, B.T. (2001). Delivering Distance Education via Interactive Television: Considerations in Faculty Preparation, Course Administration and Student Evaluation. *Journal for Advancement of Marketing Education*, 1, 13-18.

Bresica, W., Miller, M., Ibrahima, P., Murry, J. (2004). Orientation practices for effective distributed learning coursework: students speak their minds. *Online Journal of Distance Learning Administration*, 7(3). Retrieved November 5, 2004, from http://www.westga.edu/%7Edistance/ojdla/fall73/kosak73.html.

Center for IT Accommodation. (n.d.). *Section 508: The Road to Accessibility.* Retrieved Nov. 18, 2004, from http://www.section508.gov/

Diaz, D. P., & Cartnal, R. B. (1999). Students' learning styles in two classes: Online distance learning and equivalent on-campus. College Teaching 47(4), 130-135.

Forbes.com. (n.d.). *The Virtual Classroom Vs. The Real One.* Retrieved Nov. 19, 2004, from http://www.forbes.com/best/2000/0911/050_print.html

Guglielmino & Associates. (2004). *SDLRS.* Retrieved Nov. 21, 2004, from http://www.guglielmino734.com/prod01.htm

Kaplan-Leiserson, E. (n.d.). *Learning Circuits Glossary.* Retrieved Nov. 12, 2004, from http://www.learningcircuits.org/glossary

Pachnowski, L.M. & Jurczyk, J.P. (2003). Perceptions of faculty on the effect of distance learning technology on faculty preparation time. *Online Journal of Distance Learning Administration*, 6(3). Retrieved November 11, 2004, from http://www.westga.edu/~distance/ojdla/fall63/pachnowski64.html.

Pay Scale. (2004). *Pay Scale - Salary Survey, Salaries, Wages, Compensation Information and Analysis.* Retrieved Nov. 21, 2004, from http://www.payscale.com/salary-survey/vid-26028/fid-6886

PBS Campus. (2004). *PBS Campus: Advice Center.* Retrieved Nov. 12, 2004, from http://www.pbs.org/campus/003_Advice/003-01.html

Porto, S. & Aje, J. (2004). A framework for operational decision-making in course development and delivery. *Online Journal of Distance Learning Administration*, 7(2). Retrieved November 8, 2004, from http://www.westga.edu/%7Edistance/ojdla/summer72/porto72.html.

Waits, T., & Lewis, L. (2003). Distance Education at Degree-Granting Postsecondary Institutions: 2000–2001. *National Center for Education Studies, 2003017,* 1-15. Retrieved November 19, 2004, from http://nces.ed.gov/surveys/peqis/publications/2003017/.

Beyond Point and Click:
Taking Web Based Pedagogy to a New Level

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Introduction

A group of faculty that currently teach asynchronous online courses were motivated to ensure that course quality remained high. Many of us have seen the online courses that throw some written content up on the web and then have some tests and quizzes and call it an online course. To us that is not suitable in many ways on many levels. Our goal was to look at how we can maintain and help others maintain high quality, media rich, interactive courses. We started by receiving an Ohio Learning Network Learning Community Initiatives grant and this is our story.

We received an Ohio Learning Network Learning Community Initiative Grant. The initiative was to take place over a period of one year beginning with spring of 2004. There were also some other requirements such as a kick-off event and workshops for all of the state's learning communities for us to attend.

The purpose of our project was to investigate and review various types of software that could be used to create online modules. Our community consisted of five faculty members from various departments: Beth Dietz-Uhler – Psychology, Amy Fisher – Math/Statistics, Ellenmarie Wahlrab – English, Janet E. Hurn – Physics, Tammy Allen – Spanish. We also had three staff members: Teri Newton – Computer Center, John Burke – Library, Andrea Han – Educational Technology Center. In addition we had two students: Gabe Campbell, Jessica Cope.

As with any project our initial goal changed and evolved. As we investigated different types of software, we continually had to address the question, "What can we do with that?" We realized that no one was getting especially excited about any of the technologies we were finding. Then we realized that we were going about things all wrong. At one of our frequent meetings, we decided to discuss what it was that we had problems with in our courses that might be solved with technology. We made a list of our pedagogical needs and started there.

Why a Learning Community?

We found that our learning community had many benefits. It allowed us to find solutions to problems more efficiently. It allowed us to share thoughts and ideas. Other members forced each other to clarify and explain their ideas which served to make clear those thoughts. It kept us all accountable for our work. We all have great ideas that do not ever seem to materialize. Some of us in the sciences would think we had a great idea and then the humanities folks would make us find a way that it could be used in their discipline. This was a very useful and eye-opening exer-

cise. The students were useful in that we faculty would have a "great" idea and the students would give is an honest perspective on how truly "great" it really was or was not in some cases.

Structure

The Ohio Learning Network suggests a kick-off even for each Learning Community. Our core group of four members planned a technology show case and invited faculty and staff to show technology that they used in their classrooms and how they used it. This was helpful in getting members excited about various technologies. It was also very beneficial to the campus. We had 10 short presentations with over 30 people attending. We served breakfast as well. Our group of 10 members then met over lunch and engaged in several technology-based activities to get to know one another better.

We began the next fall with a lunch and ice-breaker activities. We scheduled biweekly meetings for the rest of the semester. As members explored their pedagogical needs we formed teams that focused on four specific projects.

- Web-based Critical Thinking Module
- Online Spanish Modules
- Problem Based Research Module
- Statistics Online Modules

We will explore these modules in detail.

Web-based Critical Thinking Module

This project arose out of the need for Dr. Beth Dietz-Uhler to enhance her students' ability to analyze information critically. She has many activities that require her students to analyze information and sources, and she found many of her students were unable to do that. She did not want to spend valuable class time in her Introduction to Psychology Course or her Social Psychology class to teach them this. She ultimately used a php script on a web site to have her students respond to various questions and then apply some critical thinking to several situations.

The module consists of four assignments. Each small assignment contains instructions, objective(s), background information, and then an activity to illustrate the concepts covered. There is also a grading rubric included so the students know what is acceptable and what is not. The first assignment is on the scientific method. The background explains the scientific method and the parts included in the method. The activity asks the students to choose from several hypotheses and it guides them through each step of the process. They then submit their responses which goes to the instructor's e-mail.

The next assignment is about critical thinking. The students are given background information once again. They then have a series of statements that they are to critically analyze and choose which one is more convincing and why. They again submit their answers in a form that sends the answers to the instructor's e-mail. After they complete this second assignment, they are directed to another script that serves as an evaluation tool for the assignments.

Part three of the module is a long-term assignment. The students are asked to participate in a discussion board on their Blackboard site. Here questions are posted that the students must respond to and support their responses. The instructor randomly "grades" the students' responses all semester to see if they are thinking and communicating critically.

The fourth module was only for the Social Psychology classes to complete. This module is also all semester long. It instructs the students that when they read short articles they will be assigned that they need to answer five basic questions. These questions lead them through a critical evaluation of the articles.

Dr. Uhler was pleased with the outcomes in her first two courses. She found the students were better at recognizing critical thinking than explaining why it was critical thinking. The students scored better that a nine average on recognition and a seven on rationale. She also asked them about their confidence level with the scientific method and critical thinking prior to the activity and after the activity. They showed an increase in confidence post-activity. Keep in mind the questions were all asked post-activity. The students reported a minimal increase in knowledge as a result of both activities. As far as the student's skill in engaging in critical thinking discussions, the Intro course showed a high use of critical thinking after the activity but it declined as time went on. After being reminded that they needed to use critical thinking in their discussion boards, the use increased again. In the Social Psych course, the use increased as the class wore on. Dr. Uhler considers it a worthwhile module and will continue to use it with her classes.

Online Spanish Module

Tammy Allen, our Spanish instructor, wanted to engage her students more out of the classroom in Spanish activities and discussion. She wanted to get away from the typical workbook kind of assignments. She has explored two different paths to that end. Her first and most simple idea was to put some of the workbook kind of activities on-line to reach the more technology-driven generation and to make it a little more fun. She used Hot Potatoes from Half-Baked Software to do this. This software allows the instructor to create crosswords, multiple choice quizzes, fill-in-the-blank quizzes, and scrambles to then be put on the Web. The students can then work on these assignments anywhere they have an Internet connection. Tammy linked them to her Blackboard site.

Her second idea was to improve the students' vocabulary and conversation skills through a virtual Spanish experience. Several options were explored. The one still being explored is to modify the Sims to have a Spanish speaking world with English hints. There is also the option of possibly creating a world that would be housed on our campus servers. The team also explored several companies that "rent" virtual world space.

Tammy reports that her students enjoy the on-line activities. They find it a much more enjoyable method to learn vocabulary. Her group is exploring other options for on-line learning of vocabulary such as flash cards.

Problem Based Research Module

The goal of this project is to assist students in collecting, organizing and sharing information for group research projects through a variety of online communication tools. The original project utilized a web-based program named Furl which allows users to store, share, and evaluate online resources including web pages, graphics and multimedia. Some other resources were also investigated. Currently the students are using Blogs to share and reflect on the research paths they are using. They have found that students are more willing to share on a Blog as opposed to in class. They also find it more convenient and valuable if class time is not used for projects. The goal is to have the students post their projects to the Blog and share their research with a larger population.

Statistics Online Modules

Dr. Amy Fisher jumped into our learning community with both feet. Her goal was to create media-rich online modules for an online statistics course. Her group discussed multiple ways to accomplish this but settled on Microsoft Producer to create her modules. Producer is free if you have PowerPoint and is fairly versatile. She broke her course up into modules and set up three students to do an independent study and critique her modules. One of the students was a member of the learning community. Her next job was to create PowerPoints for each module. Some modules ultimately needed to be broken into smaller lessons.

Microsoft Producer allows one to use a multitude of templates to deliver content. She chose to primarily use a small video and large slides format. After a short lesson she was off and running. She would give her lectures into a video camera and sync this video to her slides. She then burned the finished lecture to a CD for the students. The students are able to view the lectures at their leisure and run them as slow or fast as they want. They can rewind and cover difficult topics more than once.

The pleasant surprise for Amy with Producer was that she could also do screen capture with Producer. She made several lessons with Excel and showed some statistics that way. The students saw exactly how to do the spreadsheets themselves. She used audio with it. Another template she used was large video which allowed her to video her TI calculator and show students how to perform statistics on their calculator. They see each step and can do it as she does it. These are things we once thought could only be done in the classroom. The students reacted very positively about these lessons. She can now use these modules for this class or as part of her other courses. They took a lot of time to create but the results were worth it.

Lessons Learned

This learning community has been so beneficial for us as a group as well as individually. We have learned a lot, made new friends and colleagues, and produced some useful materials. We do have some suggestions for a successful learning community.
- Frequent meetings – We tried to meet every two weeks if possible.
- Assignments – Give the members small assignments to bring to the next meeting. That is how work gets done.

- Fun meetings – Have a theme or small contest, door prizes or games. Keep it fun.
- Food – This is a no brainer. Food is always good. We had a lot of lunch meetings. It also helped to combine lunch and meeting for people's busy schedules.
- Diverse group – Choose people for the learning community that do not normally work together. Also choose people that are not as comfortable with technology as everyone else is. It gave us another perspective. We also chose people from different disciplines. The students were a huge asset.
- Project flexibility – The projects were dynamic. They evolved over time. This was a good thing. Do not handcuff your members.

I recommend the learning community structure to jump start any projects or initiatives you are working on.

Resources

Examples - http://www.mid.muohio.edu/oln/oln.cfm

Hot Potatoes - http://web.uvic.ca/hrd/halfbaked/index.htm

Microsoft Producer –
        http://www.microsoft.com/office/powerpoint/producer/prodinfo/overview.mspx

Members

Amy Fisher -- *Associate Professor, Department of Mathematics and Statistics*
Andrea Han -- *Educational Technology Coordinator*
Beth Dietz Uhler -- *Associate Professor, Department of Psychology*
Ellenmarie Wahlrab -- *Visiting Instructor, Department of EnglishCoordinator,*
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Tammy Allen -- *Senior Instructor, Department of Spanish and Portuguese*
Janet E. Hurn -- *Senior Instructor, Department of Physics*
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The Changing IT Curricula

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Abstract

With the ever-changing nature of hardware and software, academic IT departments have a large dilemma—constantly changing with the current direction of the prevailing wind (Considering emerging technologies, certifications, private academic institutions and expense), or to maintain traditional courses of study based in teaching theoretical concepts, while adopting some of the newer technologies. Other considerations are that IT changes can't happen overnight and that there is administrative red-tape with which to contend; additionally, sometimes there is resistance to change from established faculty who don't wish to expend the time and energy to learn newer technologies. Furthermore, Two-year college IT departments must constantly evaluate High School curricula and articulations with traditional four-year colleges so a fit is made for the student, whether it is a two-year graduate who wants to enter or re-enter the workforce, a student who wants to complete an undergraduate degree, or one currently in IT who wants to learn new skills. Our paper and presentation will consider the above questions and will discuss what academic changes should occur in academic IT, what should stay the same, and how these departments can effect the changes necessary to survive, while also considering what possible steps can be taken to alleviate the significant strain constant change puts on faculty and resources.

History of IT at Columbus State

The Computer Information Technology (CIT) Department at Columbus State began in 1963 focused on training students in data processing outcomes used in the local economy. Subjects such as Assembly Language, CICS, JCL, COBOL and other batch oriented programming was taught in conjunction with accounting and other business-oriented classes in order to produce graduates useful to local companies (especially insurance) and state government agencies.

The PC and minicomputer revolution that began in the eighties and exploded in the nineties fundamentally changed the nature of work and the definition of what was possible. Due to this, productivity sky-rocketed in the nineties and seemingly everyone was online. Departmental changes were made to incorporate networking and word processing and general productivity based software, but the focus of the curricula was still on batch programming. Refinements were constantly made and C++ and Visual Basic were added in the mid-nineties as nice-to-knows, but the emphasis remained on COBOL and other related courses. Given the nature of the local economy, the emphasis on COBOL prior to 2000 was warranted and supplied students with ample opportunity to find well-paying positions.

A few years later, the boom went bust and experienced programmers, network administrators and other IT professionals with many years of experience could not find work in their chosen field. The challenge to us is to identify that which industry and higher education has not yet been able to put its finger on—what is the definition of an educated, prepared, IT graduate. In other words, "where do we go from here"?

Soft Skills

One of the areas that employers seem to desire are so-called "soft-skills." An article in *Career Opportunities News* defines soft skills as "the cluster of personality traits, social graces, facility with language, personal habits, friendliness, and optimism that mark each of us to varying degrees." An employer in the article was quoted as saying, "Don't worry so much about the technical skills. We need you to teach them how to show up on time, how to work in teams, and how to take supervision." We have a variety of corporate employees on our CIT advisory board who tell us that in addition to technical skills, we need to produce graduates with these abilities of communication (both written and oral), teamwork, punctuality, and a strong work ethic.

We've taken this advice to heart and have tried to incorporate these kinds of skills in our technical classes. Writing and presentation skills are fairly easy to include. Making students write in all of our courses is becoming the norm. Many of us in the department use group work or essay questions on tests that compel a student to work well with others to solve problems, or to express his or her opinion. For example, one team-building exercise Mary Insabella uses is to have students break into groups of four each, and solve a problem by building a three-dimensional structure, as high as possible, with only a balloon and masking tape. Each member of the group is given a role that corresponds to a real life group encounter. So one person will be a leader, one person will be a nay-sayer, etc. The goal of the exercise is not about who builds the best structure, but about how well the team interacts.

Another way to promote soft skills in our classes is to use presentation projects. These projects can be individual or team based. Students are urged to dress in business attire when doing their presentations. We emulate workplace presentations so they understand what might be required of them on the job. The skills required for these presentations are the summation of all the general soft skills we believe employers want to see in graduates.

Computing Environment

One of the major areas of disagreement in our department is over technical curricula. Many senior faculty take the position that computer learning is in essence theoretical and cognitive because the technology changes are so frequent that no one can teach to a particular vendor or product, although those products may be used in the course of teaching general theory. For example, some take the position that Assembler should be taught as a first language to teach basic computer logic. This is also seen as a weed-out tool. How serious are students and how hard are they willing to work at a difficult language?

Other faculty argue that specific tools currently used in the industry are more relevant to teach. Visual Basic is seen by this group as a better entry level language because graduates are more likely encounter VB in a work situation, and it also provides an environment in .NET that paves the way to other languages such as C Sharp, C++ and J Sharp. The argument can be made further, that being a two-year school, Columbus State's mission is to provide associate degree seeking students the ability to secure well-paying jobs in their chosen field.

Some of these issues with which our department is struggling are addressed by a document entitled "Computing Curricula 2001" (hereinafter referred to as CC2001), published by an association of the Institute for Electrical and Electronics Engineers (IEEE) known as the IEEE Computer Society. This publication discusses what core courses had traditionally been taught in Computer Science, what core courses should be taught going forward, and the general topics necessary for graduates to take throughout the remainder of their education. Even though the document is almost four years old, its relevance speaks to much of the technology in the world today. The association's most recent previous curricula document, CC1991, mentioned only six hours of networking in most IT curricula, and none of the issues of web computing were touched. Add to this the focus on object-oriented versus batch programming, and their resultant effects on systems, and one realizes this is a different world of computing as compared with a relatively short time ago.

Further complicating curricular decisions is our locality. Columbus, Ohio is a banking and insurance hub, and the state capital. These industries and government agencies tend to use a lot of COBOL and the question is what will happen as those COBOL programmers start to retire? Will the records be converted or will there be a new need to train COBOL programmers? And, as a college, how much should the local environment influence our curricula?

Also, proprietary tools are more complicated to choose. They seem to come and go with regularity. We often get calls from prospective students asking if we teach a tool that their company is now using. As often as not, it is the first time we're hearing the name of this package. It is often some obscure piece of software that someone in their company has decided to try out. Of course, it's impossible for us to teach every piece of software on the market.

Essentially, as CC 2001 makes clear, the body of knowledge in Computer Science is increasing so rapidly "that the restrictions of most degree programs make it difficult to add new topics without taking others away. It is often impossible to cover new areas without reducing the amount of time devoted to more traditional topics whose importance has arguably faded with time. The CC2001 task force has therefore sought to reduce the required level of coverage in most areas so as to make room for new areas."

Burdens on Faculty, Burdens on Budgets

The on-going discussion also has some political and business implications. For every new thing on the market, someone in our department needs to expend effort to try to understand it. As many of us know, each computer language can be a universe unto itself, and learning a new one requires extensive effort and study. The political realities are that IT faculty in our institution are remunerated the same as other faculty in the college, and some don't want to have to constantly

retool in order to stay cutting edge. This is understandable, especially for faculty who are nearing retirement. After all, academics in English or Mathematics or History deal with some changes in subject matter as well as changes in educational theory and practice, but nothing on the order with academic IT departments.

However, faculty must realize "this is the business we've chosen," and that curricular changes must be considered as an on-going part of a department's mission. The days are gone where people worked on mainframe computers with predictable software. Web, networking, object-oriented programming, and changes in business models and systems require us to make necessary changes if we are to survive.

Additional issues revolve around budget constraints, which can limit practical teaching exercises in computer academics. The essential need for specific labs in which to do networking and computer repair, as well as the specific equipment and software required for students to experientially learn the material, mean that extra capital is needed in IT departments. This is not always readily understood by administrators who sometimes look at academic departments from a traditional Arts and Sciences viewpoint.

Other Considerations for Curricula in 2005

Ethics

In his paper on *Integrating Computer Ethics into the Computer Science Curriculum*, Keith Miller writes about the plausibility of incorporating ethics into our classes. He brings up the following issues:

- *"The curriculum already is overcrowded. Including ethical issues requires that important technical issues be ignored or given less attention than they should be given.*
- *Computer science faculty have little experience in ethics, and they are uncomfortable teaching in this area.*
- *Professors unschooled in formal ethical techniques may fall into the trap of preaching a moral code (an abuse of their position) instead of raising questions, elaborating possible answers, and exploring justifications (activities which properly belong to ethics).*
- *Any ethics taught will be diluted at best and possibly erroneous"*

Dr. Miller proposes some of the following ethical questions: "Who is responsible for the accuracy of stored information? Who owns information? When is sharing ideas stealing products? How do we distinguish between technical judgments and moral choices?" Some of these are questions can easily be incorporated into computer classes, but others might take us into murky waters. Do we want to engage in social and political commentary?

Operating as a two year institution further constricts how much we can add to the mix. We often have to restrain ourselves as we are discussing what can be added to our curricula. Many times we get carried away with possibilities and someone has to say the number "110." We all know what that means. That is the maximum number of credit hours we can squeeze into a degree pro-

gram. It would be nearly impossible for us to create a course specifically in computer ethics--There simply is not room. So in order to address these issues, we have to try to incorporate them as outcomes in individual courses.

Articulation Agreements

A major focus in any college technical program's curricula should be content being taught on other planes of a student's experience. The Ohio Board of Regents is working on changing minimum computer outcomes requirements for all post secondary graduates. In effect, they are saying that high school programs need to teach to a different and higher level, which means that our program's introductory courses will be at a higher level.

Teaching to a higher level is not new to many in our discipline, as many high schools in our area are teaching courses for A+ and networking certifications, and are teaching programming languages. With higher skill and knowledge levels, some students are able to use some high school courses to satisfy a few College requirements. Ohio's tech Prep Consortium has articulation agreements with area high schools and some community colleges that reflect this partnership. While college educators need to be wary of accepting certain courses because they may not be up to our standards, we can no longer say that a high school student must start from scratch.

Likewise, four-year colleges must be willing to make a serious effort to fully articulate a community college student who has earned an associate degree. The quality of education that student received at an accredited community college should be assumed to be equal to that of the first two years of a four year institution. There may be a few differences in practical IT courses from the four-year institution, but the number of courses needed to transfer in at junior level should be minimal. Indeed, statistics show a seventy percent graduation rate at a four-year college for those who received an associate degree from a community college, versus a sixty percent graduation rate for students who started at the four year college

Conclusion

How can we best serve our students? That's the question for us at Columbus State. In a community college environment, especially, one must ask that question regarding his or her students vis-à-vis the locality. Workforce development needs to be preeminent in our experience in Columbus Ohio and creating a program with regard to transferability to a four year institution is secondary. But each college needs to answer this for themselves. Our goal in Columbus, Ohio may be the opposite from Columbus, Georgia..

Defining ultimate student goals, however, is only part of the solution. The other part is tackling those issues raised herein. How do we motivate faculty to constantly stay current in their field and integrate this learning into revised or new courses. What should be the role of articulation agreements with regard to the future of computer education between High Schools, two-year colleges and four-year colleges and universities? How do we make administration realize the importance of our programs and the need to fund them? These are questions our paper is raising, and one that our presentation will hope to answer.

References

"Integrating Computer Ethics into the Computer Science Curriculum," Keith Miller, the Research Center on Computing & Society, Southern Connecticut State University, 2004. http://www.southernct.edu/organizations/rccs/index.html

"Measure your Soft Skills Smarts," Peter Vogt, MonsterTRAK, 2005. http://content.monstertrak.monster.com/resources/archive/jobhunt/softskills

"'Soft Skills' a key to employment today," Career Opportunities News, October 2002, Volume 20, Number 2, Ferguson Publishing Company, www.fergpubco.com

"The Curriculum Foundations Workshop in Computer Science," Allen Tucker, Curriculum Foundations Workshops, Bowdoin College, October, 1999. http://ww.maa.org/cupm/crafty/focus/cfwcs.html

"Computing Curricula 2001," Computer Society of the Institute For Electrical and Electronic Engineers (IEEE-CS), December 15, 2001.

"Memorandum of Understanding—2004 Program Review of Computer Science Department, College of Arts and Sciences," University of Hawaii, October 15, 2004.

"Resources to Support the Information Science and Technology Initiative." Pennsylvania State University, 1998. http://www.psu.edu/ufs/IST/resources.html

A Decade of Mobile Computing for Students

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Grove City College, a small, private, liberal arts institution in Western Pennsylvania, has entered their second decade of mobile computing for students in this school of about 2200. Each incoming freshman receives a laptop computing and inkjet printer during the fall orientation, all a benefit of the College's $15,000 room, board, and tuition.

The company that has succeeded yearly in supplying the freshmen computers has been Compaq (HP/Compaq) throughout. Compaq has worked hard to keep their presence at GCC, and in that relationship GCC has supplied Compaq with valuable maintenance data about each system, and in recent years, we have had an influence in the design of future models. GCC maintains its own repair shop with staff who are Compaq certified technicians. Average turn-around time for system problems is 24 hours.

Since the first year of the laptop program in 1994, the systems have evolved significantly since the first 25 MHz Compaq Contura 4/25c was handed out to students and faculty. As in most institutions of higher ed, the network has grown, covering classrooms, offices, and dorms. Intranet and Internet applications for teaching and learning have evolved as well. We currently have, for example, users of WebCT, Blackboard, and LMS (a course management system from Jenzabar, our administrative system provider.) Our network has grown and now features wireless hotspots in our major classroom building, student union, and intervening courtyard.

Note in the table that follows the systems that have been used in the GCC laptop program. The first year's system featured 4 MB RAM, a 120 MB hard drive, and no CD-ROM drive!

Year	Model	Processor	Display	Memory	Hard Drive	Optical Drive	First Year For:
1994	Compaq Contura 4/25c	486SL/25 MHz	9.5" Color VGA	4 MB	120 MB	none	.
1995	Compaq Contura 410	486DX2/50 MHz	9.5" Color Dual Scan	8 MB	350 MB	none	.
1996	Compaq Armada 1120	Pentium 100 MHz	9.5" Color Dual Scan	8 MB	810 MB	none	.

1997	Compaq Armada 1510	Pentium 120 MHz	11.3" CSTN SVGA	16 MB	1 GB	10X CD-ROM	PCMCIA Network Card (NIC)
1998	Compaq Presario 1230	Cyrix 233 MHz	12.1" HPA	32 MB	3.2 GB	24X CD-ROM	.
1999	Compaq Armada 1750	Pentium II 333 MHz	12.1" CTFT	32 MB	4.3 GB	24X CD-ROM	video output port, 56K V.90 modem
2000	Compaq Armada E500	Pentium II 500 MHz	12.1" CTFT/SVGA	64 MB	6 GB	24X CD-ROM	integrated NIC
2001	Compaq Armada E500	Pentium II 800 MHz	14.1" CTFT/XGA	128 MB	10 GB	24X CD-ROM	.
2002	Compaq Evo N600c	Pentium III 1.2 GHz	14.1" CTFT/SXGA	256 MB	30 GB	DVD/CD-RW	no floppy drive, 32 MB video RAM
2003	Evo N620c	Pentium M 1.6 GHz	14.1" DTFT/SXGA	512MB	60 GB	DVD/CD-RW	Wireless 10/100/1000 NIC, Pentium M Processor
2004	Compaq tc-1100 tablet	Pentium 1.1 GHz	10.4" XGA TFT	512 MB	60 GB	DVD/CD-RW	TabletPC, 56Kv92 modem

To start our second decade of mobile computing, the College decided on a significantly different system for the 2004-2005 incoming freshmen – the Compaq tc100 TabletPC. The Tablet with its Windows XP TabletPC Edition operating system, digital ink, and Microsoft's OneNote software, has been an exciting addition to the computing mix here at GCC.

The freshman system features Pentium 1.1 GHz processor, 10.4" XGA TFT display, 512 MB RAM, 60 GB hard drive, and DVD/CD-RW drive in a multiBay adapter. The faculty system has in addition to the basic TabletPC system like the freshmen's, a wire less mouse and keyboard, 17" flat screen external monitor, and docking station. Not all faculty have received a TabletPC last fall, but a core group of about 17 people from a variety of disciplines – those who were interested in trying out the TabletPC – or those who were scheduled to receive a new system anyway. (The Computer Science Department, for example, is scheduled to receive a new system every three years. Other departments may have varying schedules according to their needs.) Departments involved in the initial TabletPC offering were Computer Science, Religion & Philosophy,

Education, Business, Economics, Psychology, Education, Engineering, Chemistry, Biology, and Sociology.

The TabletPC with MS OneNote and the ability to use digital ink in Office applications has had significant impact on faculty and the way that they use the computer in the teaching/learning process. Following are examples of that impact.

1. Digital Ink is much more convenient and lends greater flexibility in PowerPoint. The stylus used with the TabletPC enables writing, drawing, commenting on PowerPoint slides in a manner much easier than with other pointing devices. Of course, the annotations can be saved or deleted.
2. With OneNote on the TabletPC with Outlook, the Tablet becomes my PIM and Handheld all in one. OneNote makes paper & pencil note-taking (with the inherent lost piece of paper). One can flag items that are ***Important, To Do, Question***, etc., and they are indexed and can be pulled into a summary with the click of the stylus. On top of that any word or phrase can be searched throughout the OneNote notebook, creating an index to every occurrence of the word. Phrases are found even when made in your natural cursive hand-writing! The natural, notebook size of the Tablet makes it very convenient to take it while traveling, long distance or short.
3. Grading papers becomes paperless! Student papers, created in Word and email or deposited into a digital drop-box of some sort, can be written on in digital ink with extensive markup in various colors. The file can then be emailed back to the student for review.
4. A math professor now uses the TabletPC and a blank PowerPoint instead of the chalkboard. When the notes are digital, they are easy to modify and share with students, if desired.
5. Education professors have to complete a myriad of forms during the student teacher supervision process. In the past, the forms had to be written out by hand during the observation process, then re-typed once back in the office. Now the forms are filled out in the field using the professor's TabletPC Input Panel in a Word form in which the cursive handwriting is automatically converted to typed text. This obviates the need to re-type the form at a later time. The form only needs to be saved and printed.

Students, in my opinion, need additional training either via workshops or in information technology classes in order to fully leverage the power of the Tablet. Faculty have an advantage in that orientation and workshop have been given to them in order to shorten the learning curve of using the Tablet. Student training is minimal at best at this point.

Pervasive laptop mobile computing certainly has had its advantages for the student: convenient access for research for their classes, convenient extensive communications, and a suite of application software than can be used in and out of the classroom. But computer-using students in the classroom during lectures has caused some concern on the part of faculty about the nature of the activities of the computer-using students. Students have been known to be chatting, checking email, gaming, surfing the net, etc. – the list goes on. Concerned faculty members have met to discuss strategies and policy concerning unwanted classroom computing activities. Strategies range from the extreme (banning computers) to zero-tolerance for misuse of systems, to denying letters of recommendation to offenders.

Here is one example of a "Computer Etiquette in Class," found in the syllabus of Dr. James Dupree, Business & Entrepreneurship, Grove City College:

1. I welcome your use of your personal laptop/tablet PC in class for taking notes, etc.
   a. I expect you will turn your wireless capability OFF during class and not be plugged into the Internet.
2. As a future professional "in training" I expect you will adhere to the following guide-lines.
   a. Use your computer for note-taking or other class-relevant activities.
   b. You may access the Internet or other web sources if they are of immediate relevance to our discussion, i.e., accessing elements of an online discussion we had via Black-board.
   c. All use of your computer should be subtle and non-distracting to classmates.
3. Do not:
   a. E-mail, IM, etc., while in class.
   b. Work on any assignment or project not immediately relevant to the ongoing class.
   c. Surf the web while in class. E-bay, Hollywood.com, etc., are not acceptable searches.
4. Violation of this policy will result in your being permanently banned from using your computer in class.
   a. Zero tolerance, one violation, and permanent ban for the semester.

5. Judgment as to the appropriateness of your action is at my discretion and is not subject to debate.

One of the machines that the College is considering for next year's freshmen is the newer HP Compaq Tablet PC tc4200, a "tabletPC" that resembles it laptop cousins yet features a larger display (12.1") and digital ink and handwriting.

The mobile computing initiative has been largely successful at GCC. Our graduates have a step up being able to use a computer in their discipline and careers. The newly added TabletPC strengthens this advantage and gives each student and faculty member a powerful teaching/learning tool.

Email Journaling for Teacher Candidates

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Email Journaling for Teacher Candidates
"What greater or higher gift can we give than to teach?"   Cicero

Student Teacher Journaling

Colleges and university pre-professional field experiences usually require student teacher journaling. In dialoguing about journaling, student teacher supervisors have agreed with me that daily journal entries often become just a tedious litany of classroom activities in which the student teacher and their students have engaged. The innovative format that I have designed for journal entries has revolutionized my field experience supervision practices and those of other supervisors with whom I have shared this format. It has vastly improved the quality of the teacher-candidate's classroom experiences as well as the depth and quality of their reflections. Now, journal entries are distinguished, thoughtful, and sharply focused on the themes and domains involved in becoming an exemplary teacher.

There are continuous challenges of learning that teaching poses in the areas of leadership, diversity and technology. It is widely recognized that pre-service teachers must demonstrate necessary competencies within these themes if they are to become exemplary teachers.

The journaling format that follows is also driven by identified domains such as: becoming an instructional leader, becoming an expert in a school context, becoming a learning theorist, becoming a curriculum designer as well as becoming a master practitioner. A work sample of an authentic electronic journal entry and an accompanying rubric appear at the conclusion of this paper for readers to reflect upon how the format enhances the quality of pre-service teacher journals and empowers pre-professionals as they purposefully journey towards becoming exemplary teachers.

Teaching Domains

On the journey to becoming a teacher, candidates will meet challenges and be required to make choices. Student teaching will provide various opportunities. It is the student teacher's responsibility to learn from these opportunities. An exemplary teacher is a person who accepts the challenge of lifelong learning experiences in the following domains:

The Domain of Diversity: An exemplary teacher is an advocate of creating learning experiences that demonstrate sensitivity to others. He/she acknowledges learners of differing abilities and

demonstrates a valuing of human differences in race, nationality, ethnicity, religion, and sexual preferences. An exemplary teacher understands that as human beings, we are all evolving physically, cognitively, socially, emotionally and spiritually.

The Domain of Leadership: An exemplary teacher is a lifelong learner who inspires classroom communities of learners to pursue continuous improvement and growth.

The Domain of Technology: An exemplary teacher is adept in technology and constructs learning environments that respect and integrate the power of technology where appropriate.

As student teachers work toward the goal of becoming exemplary teachers, they will need to demonstrate competencies in these identified themes:

Instructional Leader: An exemplary teacher develops leadership skills and self perception in relationship with other learners, the group, the community, and society.

Master Practitioner: An exemplary teacher develops competence in instructional strategies, reflective practice and the home-school-community partnership triad.

Learning Theorist: An exemplary teacher understands cognitive, physical, and affective development as well as pedagogical theory that address the learning needs of multi-age learners.

Curriculum Designer: An exemplary teacher bases curriculum decisions on research, theory, and informed practice.

School Context Expert: An exemplary teacher comprehends the social, intellectual, cultural, economic, ethical, political, and government influences upon schools including traditional and emerging stakeholders.

Making the commitment to become an exemplary teacher is a choice student teachers should make with care because it is a decision that will affect the way that they live their lives and the way others will live theirs. The demands of a teaching career are great. The demands of becoming an exemplary teacher are even greater. In order to lead and inspire others, student teachers will become the facilitator of their own learning and professional growth. In the process, they will become role models for others to emulate. The challenge is given, but the choice is their own.

Reflective Email Journal Assignment*

As student teachers, it is their responsibility to submit a weekly reflection to me of their learning via a reflective Email Journal. Journal entries should contain no spelling, grammar or punctuation errors.

- ♦ All email journal entries must be emailed to me at Geraldine.Jenny@SRU.edu
- ♦ The subject line of each email must read Journal Entry #___ and your full name.
- ♦ Weekly entries must be emailed by 8am each Monday throughout student teaching.

♦ Late entries will not receive full credit and will be an indication of performance of student teaching responsibilities.
♦ Journal entries provide a demonstration of student teacher learning, reflection and ability to communicate clearly. They demonstrate writing competence and must be prepared with the same care that should be shown in all other written work.

Each weekly email entry MUST address the four statements.

A. In student teaching this week I learned…
B. My new learning connects to the domains and themes of becoming an exemplary teacher in the following ways…
C. Before my learning and reflection this week, I used to think…
D. As a result of my learning and reflection, I now believe…

The following rubric for email entries provides useful information to guide student teacher learning and evaluate their performances. It identifies the level of excellence that is the hallmark of Slippery Rock University's College of Education. It will help student teachers to plan and evaluate the content, organization, and writing performance that is required. They are to use the rubric as they write journal entries. Notice that a high level of reflection, meaning-making and clarity is expected. After all, they are in the process of becoming exemplary teachers!

*Note: This assignment has been adapted and modified from an undergraduate assignment from the Duquesne University College of Education Department with the permission of Father Naos McCool.

Rubric for Reflective Email Journal Entries:
Outstanding:
♦ All four sections of the entry are addressed with sharp and distinct focus.
♦ The student teacher provides substantial and specific statements of learning supported by illustrative examples.
♦ Overall, the student teacher demonstrates sophisticated ideas that are well developed and result from careful reflection and personalization.
♦ The writing is free from mechanical and word usage errors.

Competent:
♦ All four sections of the email entry are addressed with adequate focus.
♦ The student teacher provides general support for statements of learning.
♦ Overall, the student teacher demonstrates basic reflection on learning and makes general connections to the themes and domains of becoming a leading teacher.
♦ The writing demonstrates some mechanical and usage errors.

Unsatisfactory: (An entry of this quality will be returned for further polishing)
♦ The email entry does not address all four required sections.
♦ The content of the report is superficial and merely lists ideas
♦ There are limited demonstrations of reflection and meaning-making.
♦ The writing contains repeated weaknesses in mechanical and usage errors that seriously interfere with the student teacher's purpose.

By responding to journal entries electronically, I also have more time to reflect on their content than when I am making a classroom Observation Visit. During a typical visit I must also be pre and post conferencing with the student teacher, writing an Observation Report, reading student teacher lesson plans as well as evaluative notes and reports from the cooperating teacher, checking the student teacher's Materials File, critiquing the classroom bulletin board, reviewing a thematic unit, a portfolio and/or a resume and conferring with the cooperating teacher on the student teacher's progress! I admit that in the past, I just skimmed journal entries and provided scant input to the student teacher. My classroom visits were more "hit and run" and then I was scurrying off to my next Observation appointment. By digital journaling, the student teacher and I are in continual communication and the student teacher also has time to reflect on my comments more thoroughly. I am a lifeline to each student teacher and we learn to know each other more personally as we share thoughts and ideas to improve professional practices.

Reflective Email journaling demonstrates student engagement in educational practices that are known to be empirically linked with high levels of learning, meaning-making and professional development.

Reflective Email Journal Sample

A. This week in student teaching I learned that a teacher needs to be very sensitive and aware of the background of all of their students. They need to know what goes on in their student's lives outside of school in order to be sensitive to their feelings and needs when creating lessons and activities that are done with the students. They also need to know what goes on in the student's lives so that the teacher can provide help and support to the student when they need it and may be too afraid to ask. This week in Reading class we were reading "Keepers", a story about a boy who listens to stories from his grandmother. So, for homework I had the students do the "Write About It" from the book, which wanted the students to write a story that a family member had told to them. Now, it's not uncommon for me to hear whining and complaining from the students when I assign writing work. So when one student started complaining and saying he didn't know what to write about, I just told him to sit down and think of something that his parents told him, maybe about when he was a baby or when his family did something together, etc. He went to his seat and did what he has been doing best lately. He pouted. I left him alone for a few minutes and walked around to work with other students. Then most of my students left and I was there with this boy two other students from his room. There he was, still sitting with nothing on his paper.

I went over to him to try and help him think of something. I asked him "What is something that your dad has told you? He responded, "Once a fruit loop always a fruit loop". Out of frustration I said, "O.K. then, write about it and tell me why he told you that". I walked away to let him work and a few minutes later he was still sitting there with nothing on his paper. I asked him why he wasn't writing anything because now he had something to write about. He said that he didn't so I told him to come up to where I was sitting and we'd work together. I went through every idea I could think of like, "Doesn't your dad tell you any stories about your family?" He said, "No, he works until 8 p.m. every night and doesn't have time to". I asked him about his mother telling him stories and he said that his mother works until nine.

I asked him if he stayed with his grandparents and he said yes, so I asked if they tell him any stories and he said that they didn't. I asked, "Don't you and your parents ever go on any family vacations that maybe you would like to write about?" He said that he couldn't remember the last family vacation that they ever went on. So I asked him if they ever did anything together as a family that they could write about, like going to dinner or whatever and he said that anytime that he would ask his parents to do something with him that they would just start fighting about it and they wouldn't end up going anywhere. At that point he started to cry. I felt horrible. Here I was trying to get this child to write some nice little family story when he felt like his family was falling apart. I did my best to console him and I told him that they are probably just fighting because they are stressed out and tired from working so much and it's not because they don't love him or each other. I also told him that when I was little I had to stay with my grandparents all the time because my mom had to work. I told him that I was with my grandparents so much that people used to, and sometimes still think, that they are my parents and my mom is my sister. It brought a smile to his face. However, I still felt bad about not being sensitive to what was going on in his life, so I told him that he didn't have to do the assignment and I let him draw to let out some feelings.

I know that I can't know everything, but I should have asked my cooperating teacher who knows more about the kid's backgrounds, before I gave an assignment like this. I know that the kids in my room don't all have the best home lives; I just didn't think that it would provoke such emotion from my student. I am glad though that he was able to share his feelings with me and that I was able to find out what had seemed to bother him lately.

B. My new learning connects to the domains and themes of becoming an exemplary teacher in the following ways:

Diversity: An exemplary teacher is an advocate of creating learning experiences that demonstrate sensitivity to others. He/she acknowledges learners of differing abilities and demonstrates a valuing of human differences in race, nationality, ethnicity, religion, and sexual preferences. An exemplary teacher understands that as human beings, we are all evolving physically, cognitively, socially and emotionally. I see now how important it is going to be for me, as a future teacher, to communicate with my students and make sure that they always feel comfortable in talking to me. For the past couple of weeks this student has seemed out of sorts and I couldn't figure out why. I just thought that he was being difficult and didn't like school anymore. If I would have just sat him down and asked him what was going on, maybe he could have opened up to me before I gave that assignment that made him break down. I know that one of my students lost his mother in the second grade, so I am very aware not to say things to him like "Why don't you have your mother help you with your homework" or "Don't make me call home and tell your mother about this". I also didn't have any assignments that would have to do with mothers. I would be mortified if I didn't know this student lost his mother and I did something like that. I don't want to stir up sad feelings or make my student feel left out because everyone else has a mother and he doesn't. That's how I felt about this child. Here he is feeling like his family is falling apart while everyone else is able to sit down and write nice little stories about their families. That is why when I'm a teacher I want to know all that I can about my students so that when I assign something or do activities

in class I don't upset my students and make them feel badly. I want them to feel happy and comfortable in my classroom. I think that when I become a teacher I am going to do a few things to make sure I know about my students. I am going to go to their previous teachers and ask about their backgrounds. I am going to have Open House as early as possible so that I can meet parents and caretakers. I am also going to have my students come in on the first day and have them write me a few paragraphs that tell me all about them. Lastly, I would make it clear to my students from the start that I care about them and I want them to succeed and if there is ever a time that they need to talk to someone that they can come to me and I will listen. Teachers aren't just there for children's educational needs, they are there for their emotional needs as well. Children are very sensitive and delicate and teachers can't do things in the classroom that might affect them negatively.

Curriculum Designer: An exemplary teacher bases curriculum decisions on research, theory, and informed practice. I think teachers need training in child psychology. That way they can create lessons and activities that won't just benefit children educationally but emotionally as well. In Special Education I see that most of my children are dealing with a lot of emotions and struggles. They are dealing with problems at home, problems with fitting in with others and problems with staying on top of all of their work. As a teacher, I want to be able to address all of their needs through the curriculum that I use. If I am aware of their needs and aware of what works well with those needs, I can create a curriculum that not only boosts them educationally, but emotionally as well. At the school district I am in, there is only one guidance counselor for all three of the buildings. The elementary school only gets the counselor for one day a week, if they are lucky. That means that teachers are depended upon to help a student when a crisis occurs in their life. I need to equip myself with the skills to be able to help my students with things that are occurring in their lives. I think that I can best do that through the lessons that I teach. I want to integrate life skills into their basic skills. I need to do my research, take classes, get to know my students, and do all that I can to create a curriculum that addresses their emotional and educational needs without making them feel worse than they already do. I'm going to need to be a very sensitive and aware person so that I can benefit my students.

C. Before my learning and reflection this week, I used to think that the school guidance counselor would be the one dealing with the students emotional problems and would be the one to fill me in on what is going on in the child's life. I didn't expect to give an assignment and then end up having a student break down because it affected him so personally. I also thought that if something like that occurred, I could just send that child down to the counselor and it would be out of my hands. However, it was in my hands, I needed to make my student feel better, to talk him through his problem and let him know that everything was going to be all right. I also had to make the executive decision that he could do the assignment in an alternative way because it brought up bad feelings and thoughts to do it as originally planned. I never thought that having a child write a family story would bring up such emotion. I thought there had to be at least one family member, whether it be a sister, mother, aunt, or grandpa whom they could write about without getting upset. I was wrong and I need to be more aware of my own classroom community.

D. As a result of my learning and reflection, I now believe that every student need has to be addressed by the teacher. There isn't going to be someone that a teacher can just dump a child on when he/she feels unable to deal with the situation. Teachers need to be educators, supporters, listeners, mentors, counselors and whatever else falls under that umbrella. A student's welfare is the teacher's first responsibility. Becoming a teacher means more than just writing lessons and grading papers. There are children with lots of problems that need the love and support of a teacher to help them just get through. They need teachers who are going to be sensitive and aware of their needs and who are going to create classroom environments where they feel comfortable, safe and able to learn.

Add a little Serious Magic to your next presentation

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Research in both educational theory and cognitive psychology tells us that visual learning is one of the best methods for teaching students of all ages how to think and how to learn. With this basic understanding, it is only natural that we teach and let students experience the power of visualization. Visualization can assist students to clarify their thinking, and to gather, organize and prioritize various forms of visual information. Empowering students and staff to employ visualization also helps stimulate creative thinking.

Computers and digital cameras make the production and distribution of images available to almost anyone at an incredible speed. More than any other technological innovation, these two technologies are responsible for the explosion in images. Today you can create digital images with your cell phone, PDA, and even a small wrist watch. More and more digital capture devices are allowing you to record both still and motion sequences. Today we have video cameras that take still pictures and still cameras that can record video sequences. This choice of either still or motion capture challenges us to think how we can best visualize what it is that we wish to show.

How can we manage all the digital visual information that is available to use as we plan and produce a presentation? Most presenters turn to Microsoft's PowerPoint presentation software to assist them in enhancing their presentation using various digital images. During this presentation you will observe the similarities and differences between Microsoft's PowerPoint and that of Visual Communicator software developed by Serious Magic. A basic difference between Power-Point and Visual Communicator is that Communicator does not provide the graphics capability such as word visuals or graphs. One key feature of both the Pro and Studio version of Visual Communicator is its ability to import your existing PowerPoint files. This compatibility makes is very easy and efficient to convert your PowerPoint presentation into a dynamic narrated video by simply using a basic camcorder along with Visual Communicator. Most PowerPoint presentations are given before a live audience and narrated, but not recorded by the presenter. Visual Communicator is chiefly designed to digitally record a presentation, even though the latest studio version provides for speaker-controlled live presentations. With today's need to provide information or presentations online for easy access, Visual Communicator is a simple way to create a video stream or file that can be linked to a web page. Visual Communicator's focus is on recording the digital graphics along with the audio and video of the presenter. The graphical interface design of Visual Communicator is the digital version of the traditional paper based "storyboard." With visual communicator you drag and drop your visuals along a timeline that is locked to your complete narration. The timeline, narration, and visuals scroll together to provide a synchronized teleprompter for the presenter.

The recent popularity growth of e-portfolios among colleges has sparked the need for students to develop a digital story telling ability to provide faculty and employers with a better representation of what they have learned and experienced during their study. The term "Digital Story Telling" is defined by Bernajean Porter as," taking the ancient art of oral storytelling and engaging a palette of technical tools to weave personal tales using images, graphics, music, and sound mixed together with the author's own story voice." Modern digital authoring technology provides the features necessary to produce a content-focused message that is self-directed (presenter controlled). If software technology is going to effectively assist us and our students in telling our story, it must provide a simple way to bring the presenter and digital information together into a fluid and seamless presentation, without becoming technophile and without using a studio filled with equipment and production staff. Software programs that support this need are either so basic that they don't have the power and features to accomplish the job, or they are so complex that they are hard to use and apply. Visual Communicator is one of the software products that strike a balance between ease of use and a variety of powerful features.

Planning a presentation around the capabilities of a software program such as Visual Communicator requires the user to apply good visual literacy. Students are required to combine their verbal and video message along with many other visualization options into a coherent and effective presentation. Visual Communicator helps defeat the talking head syndrome along with the human less PowerPoint talkie. Students who have used Visual Communicator in producing a digital story for an e-portfolio comment on the challenge in making the video, the reward of seeing the impact of their final presentation, and the power of the medium.

At North Dakota State College of Science freshman and sophomore college students are encouraged to plan well in advance of presenting their e-portfolios by gathering digital visuals that can be incorporated into their final production. In order to better plan and understand, students need to see examples and how the final process (Visual Communicator) works. This is not to say that students need to master the use of the software, but rather need to decide what to use and how will it work within the software.

Up to this time, a staff member has helped students place their digital information into the software and assisted them in managing the program. Even though the learning curve for Visual Communicator is reasonable, it was decided that the student's time could be better spent developing their verbal message and visual reinforcement. As students in other departments begin to utilize video in their e-portfolios, we would highly recommend that a student employee be trained in the operation of the software and therefore assists other students in efficiently applying the software.

Students find it challenging to develop a written script that they can easily read and that represents the way they would extemporaneously speak. Most students find it very difficult to relax and read their script while incorporating simple non-verbal facial communications. Showing students short clips of local and national news anchors can assist them to seem more relaxed and appear to be talking rather than reading to the camera. This on-camera recording also provides the students with a self evaluation of their appearance and how well they appear to communicate to others.

The power of the current Pentium processor has allowed software developers, such as Serious Magic to replace thousands of dollars worth of video production hardware with Visual Communicator software, thus making professional visualization capabilities such as chroma keying, teleprompting, and mixing visuals into live video available at a fraction of the cost. By utilizing chroma keying technology presenters can interact with their visuals to better emphasize their messages and at the same time remain on-screen to maintain a more humanistic approach that is sometimes lacking through distance delivery techniques. The teleprompter feature of this software provides a professional (those who make their living in front of video cameras) looking product by allowing the presenter to maintain natural eye contact with the video lens while delivering a well scripted message. The teleprompter script timeline in Visual Communicator also provides a way of coordinating the precise timing for visuals to appear on the entire screen or along with the presenter.

The digital studio in a box, Visual Communicator, can work on any Windows-based computer and webcam or camcorder to merge live video with complex transitions, titles, graphics, and virtual backgrounds. The entire system can be as simple as a laptop and an inexpensive webcam, or as sophisticated as a desktop workstation, firewire digital camcorder, and a Holoset chroma key system. Depending or your needs, Visual Communicator is available in three versions from the inexpensive web version for producing Internet compatible video files such as Real and Windows Media, to the Studio version that provides a large array of professional features including three camera inputs and full screen live output for speaker support.

The following is a comparison chart of the three software versions of Visual Communicator.

Visual Communicator 2 Version Comparison Chart

	VC 2 Web	VC 2 Pro	VC 2 Studio
Base Features			
Visual Communicator software and manual	x	x	x
Real-time green-screen functionality	x	x	x
Foldable green-screen backdrop material	x	x	x
Professional-quality clip-on microphone	x	x	x
Built in Teleprompter	x	x	x
Flex Recording	x	x	x
In-Place Trimming	x	x	x
On-The-Fly Editing	x	x	x
Audio Fade In/Out	x	x	x
Review Anywhere	x	x	x

Real-Time Scrubbing	x	x	x
Output Format and Resolutions			
Publish standard AVI video files (uncompressed)	x	x	x
Publish Internet-ready videos (Windows Media / Real)	x	x	x
Web resolution (320 x 240) for websites, email and streaming	x	x	x
Publish video-embedded web pages. Choose from numerous web page templates to coordinate the graphics with your video.	x	x	x
High resolution (720 x 480) for video projectors, TV, CD-ROMs, recordable DVDs and corporate/educational networks		x	x
DV output for direct print-to-tape to DV camcorders		x	x
Live video streaming to the internet			x
Live Full-Screen Output to Other Monitor, Projector, TV or VCR			x
Advanced Features			
Integrate web links to "trigger" graphics, web pages or slides	x	x	x
Add chapters to your videos	x	x	x
Turn PowerPoint shows into narrated videos		x	x
Pro FX - over 100 instantly customizable video effects such as tubes, blinds and rotating wedges		x	x
MegaMove FX - pan, tilt, zoom and fly-by motions including position, rotation, reflection, shadow & more		x	x
Spark FX - unique effects based on animated particles such as fire, smoke and sparks		x	x
Pro template and media library - 50% more style templates & 100 royalty-free graphics & music tracks		x	x
Multiple camera support			x
Integrate charts, graphs and slides (OLE objects)			x
Full screen teleprompter capability			x
Expanded graphics library			x
Advanced peel effects			x

Serious Magic makes the following Visual Communicator version recommendations based on your school's needs.

You need Visual Communicator Web if:
- You want students to conduct project-based learning in the classroom only.
- You want a few graphic themes but primarily will use your own content and backgrounds.
- You want to post presentations to a Website or burn to a CD only.

You need Visual Communicator Pro if:
- You want students to conduct project-based learning in the classroom and give them the ability to share with their family.
- You want to import PowerPoint presentations into a Visual Communicator video project.
- You want more themes, soundtracks, and special effects.
- You want to post presentations to a Website and to burn to a CD & DVD.

You need Visual Communicator Studio if:
- You want to create live morning announcements that allow you to directly plug into your Channel 1, closed-circuit system.
- You want students to conduct project-based learning in the classroom and give them the ability to share with their family.
- You want to import PowerPoint presentations into a Visual Communicator video project.
- You want a lot more themes, soundtracks, and special effects.
- You want to stream video presentations live over the Internet.
- You want robust Web features to conduct distance learning and/or online training for professional development.
- You want to create interview-style talk shows with multiple cameras.
- You want to post presentations to a Website, burn to a CD & DVD.3

The North Dakota State College of Science has found a niche need for this product in producing student e-portfolios, and recording short supportive message from our Deans and Vice Presidents on college issues. Several college friends and alumni wrote their own script and were recorded to lend support to a capital fund drive. Using their own words and Visual Communicator's teleprompter, those beyond the age of eighty provided outstanding testimonials in short video clips that were incorporated into a PowerPoint presentation. The president of the college has used Visual Communicator to record short messages for student recruitment, to inform staff on critical issues, and to provide a video substitute at functions she is unable to attend.

When working with students and others who are uncomfortable presenting in front of a video camera, this software provides the tools necessary to allow them to focus on *what* they want to say, *how* they want to say it, and *how* they want to visually enhance that message with various titles, photos, graphics, and video. Whether you have a need to record a visually supported self directed e-portfolio… or to communicate a precise high impact message, using Visual Communicator can help you achieve that goal without a major investment in technology.

References

http://www.inspiration.com/vlearning/index.cfm, Inspiration Software.

English, David. "Serious Magic's Visual Communicator Studio." *AV Video Multimedia Producer* December 2004: 38-42.

Salpeter, Judy. "Telling Tales with Technology." *Technology & Learning* February 2005: 18-24.

http://www.seriousmagic.com/comparisonchart.cfm, Visual Communicator 2 Comparison Chart.

http://www.seriousmagic.com/products/vc/education/whatversion.cfm, Which Visual Communicator would be good for my school's needs?

Communication Problems Resolved Through Portal Implementation

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Problem

Loras College is a technology rich campus with a ubiquitous learning environment and about 1800 laptops in the hands of students, faculty, and staff. With a focus on the incorporation of technology into the curriculum the laptop program has been embraced by the campus since its inception in the fall of 2000. In 2003 a new campus strategic plan identified the need to im-prove communication, develop a spirit of cooperation, create an easer way to solve problems, and instill respect and innovation between faculty, staff, and students. We desire the institution to be perceived as transparent, helpful, and supportive and we concluded that technology could assist us in reaching this goal.

With this in mind we began to look at solutions that would combine, link, and create interactions with various functional areas on campus utilizing our existing technological infrastructure. The solution we felt would best serve these needs was to revamp our intranet and develop a portal that would facilitate collaboration and improve communication.

Project

Historical background

Loras College is a laptop campus with 80% of our classrooms technologically enhanced (with projectors, VCR, DVD, and sound systems). In addition, we utilize BlackBoard as our course management tool, give each student, faculty, and staff email accounts, and we offer network and web or e-portfolio storage space. In the spring of 2004 we were in the process of implementing online registration and also wanted to give students access to their schedules, grades and account information. With all this technology on campus we felt we needed one central location from which to garner this information. Coupled with this we needed to find a better communication tool for our community and allow for a way that everyone could share this information as needed.

Who was involved?

The overall communication challenge was identified by the strategic planning committee consisting of general campus representation. The president and cabinet endorsed the strategic plan and goals for the institution. The Vice President of Information Technology asked the Web Developer and the Director of Technology Support Services to develop a vision and investigate solutions for a portal. As the investigation advanced the cabinet was privy to all information and the portal was presented as an organizational tool to improve communication, provide better support and service, consolidate applications and information into one central location, ease use and reduce costs. We also included the marketing department early in our implementation because they bring an important perspective on communication and continue to be key players in the ongoing management of the portal.

Goals and objectives

We ultimately had two main objectives: to find a better communication tool and to develop a "doorway" to everything a user needs (wants) at their fingertips. We felt that in order to accomplish these objectives we needed to streamline information and services, reduce costs through consolidation and simplification, eliminate traditional methods of delivery and provide access in one central location.

The project: researching, analyzing, testing, and developing governance

With these goals and objectives freshly in our minds we began our research. We evaluated articles on portal applications and reviewed and assessed vendors who could assist us with the various applications and implementation. The vendors provided references for their products so we visited some reference sites and at the same time defined more of our goals and objectives from what we learned.

The next step was to identify details to meet our goals and objectives for implementation. The detailed tasks were given priority levels and timelines for implementation.

Priority goals implemented first were as follows:
- Centralize a location for announcements that needed to be pushed to the desktop (eliminate mass emailing)
- Links to applications and priority resources (Blackboard, email, Citrix, library resources, IQ [student records], Human Resources information, campus calendar, etc.)
- Provide a discussion board (threaded discussion) and bulletin board [for sale, ride sharing, lost & found, etc.] (also eliminate mass emailing)
- A customizable area for the user to define their own links, shared files and portlets (MySite)
- Constituent (audience) content – different look for students, faculty, and staff.

Second tier goals include the following to be implemented as appropriate:
- Single sign on
- A place to initiate surveys and results

- Form and document sharing
- Chat (instant messaging)
- Training and other information via streaming video and audio

We then listed items that would become our third tier goals. We wanted to make sure we purchased the right product, so we needed to know what we envisioned for the future. This next set of goals included the following:

- Access to portal for users outside Loras community
    - Define outside user constituents (parents, board of regents, alumni, perspective students)
- Course management – replace Blackboard
- Terminal services – replace Citrix
- Allow "my site" customization – change colors and schemes

Our final decision was based on which product best fit our needs, was most manageable, easy to use, allowed us to do more of the implementation and administration ourselves, and obviously total costs.

In the end we chose Microsoft's SharePoint Portal Server 2003 for several reasons. Our campus LAN is Microsoft and we have a campus license agreement for their client software solutions. SharePoint integrates seamlessly with the Office suite improving collaboration and organization. Our IT staff's familiarity with the server products meant we had internal and external expertise already in place for support. The existing client licensing costs included pieces required for SharePoint so we did not have to spend any additional dollars on client licensing. One particular reference contact we met proved to be a huge benefit to us in that they were also a higher education account who had implemented the product and were willing to talk with us and offer suggestions and help when needed. The intuitive ease of use and administration reflected positively on our decision. The cost of SharePoint itself was reasonable because of our current academic licensing contracts with Microsoft. We did have to purchase SQL Enterprise and a couple of servers, but this was already one of our long term goals.

Outcomes

We had a comprehensive list of goals and problems which we believed the portal would be the ultimate solution for. Of course we are the first to admit, we still have a ways to go before all our problems are solved. Let's look at some of the objectives we feel we are moving in the right direction on and others that are still problematic.

- The announcement section of the portal is working well even though we have not accomplished the task of pushing them to the desktop.
    - We've defined guidelines for submission of announcements
    - Set up gatekeepers for approval
    - Currently running in parallel with mass e-mail on some announcements to get users used to looking at announcements page of portal
    - Set this site as the home page on all laptops and desktop

- The portal has provided one location for accessing applications and resources. This has saved considerable time for current employees searching for information and saved training time for new employees.
    - IQ has been heavily used because of on-line registration, access to grades and schedules, and student workers electronically recording their time for payroll
    - Other applications also launched regularly from within the portal since we removed the icons from the desktop and "forced" them to launch from inside the portal
    - A – Z section from intranet was implemented inside the portal and is heavily used by all. This section includes internal departmental information that is shared by the entire community and the various areas are being converted from standard web pages to portal pages
- The discussion boards are in place and operational but not being used by the general population
    - Users don't want to make the extra effort to look to the boards for discussion
    - Faculty are using this for special classes that they have set up here
    - We are looking for ways to promote this use

- The MySite is up and operational
    - minimal training has been offered and we must find a way to encourage its use
- The content on the portal is managed by audiences which allows us to target announcements to students, faculty or staff
    - This works great and has helped cut down on information clutter
- Shared documents and shared "sites" are slowly being developed and heavily used within the IT department

We have not started to implement any of the second or third tier goals due to time and budget constraints however they will continue to be a part of our short and long term objectives.

Challenges

One of our biggest challenges was to find a third party developer to assistance us as we implemented the framework of the portal. The developer we finally used was located in another state and we never had anyone on-site. All communication was done via telephone or computer and we found this to be interesting at times. This developer was actually hired after we worked for a few weeks with a local vendor who was trying to learn the application as we were implementing, needless to say, in our time crunch we agreed to dissolve our arrangement on that particular project and moved on to the other vendor who had a great deal of experience and a team that supported the lead programmer.

Another challenge for us, as mentioned before, has been getting a portion of the portal, specifically the announcements portion, pushed to the desktop. The administration felt that if we are going to move away from mass emailing, we need to push the information out to the users because they aren't always reliable at going and getting it themselves. We tried several different options for pushing a "widget" to the desktop and have not found it to be reliable with all our

different types of users. We continue to test policies and expect to push the final solution out soon.

Finally, our third major challenge has been in finding someone or some office to keep up with gate keeping of the announcements. The IT department does not feel like we should be responsible for managing content and have tried to push this responsibility out to the marketing department but they are often too busy to make internal communication their priority. We have trained a number of people to do this so as to make it less of a burden in any one area.

Lessons Learned

One of the most important aspects of this project is to garner approval from the top by getting the president and vice presidents on board to promote and encourage its use. This is usually true for any project of this magnitude and the fact that the administrative team has a group site has certainly helped even the less technical people in that group see the benefits.

Another thing to remember is that large projects, especially development of a portal, needs to be implemented in stages. Think big, start small. The key is to make sure you begin with enough content so it is perceived as something useful and valuable. Also make sure it is highly flexible and customizable in order to meet current and future business needs. You want to make sure it is more than simply a glorified electronic newsletter. We feel we have done this and we will provide examples and links to our portal site.

This presentation will be beneficial for "slightly" technical and non-technical people who are curious about how they would use a portal or those who are thinking about developing or are in the process of implementing a portal.

Academic Honesty Through Technology

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Over the past two decades, technology use has increased in the classroom. What started out as a single computer in a classroom has evolved into a laptop or handheld for every student, with a wireless connection to the Internet and other network resources. Cell phones, PDAs, and other electronic tools have opened up new horizons for utilizing technology in the classroom to better educate students. With these advancements have also come the inevitable drawbacks. With ubiquitous connections to the outside world, students have even more resources to share information, knowledge, and work with each other. These same connections also allow students to access unprecedented means for plagiarism and cheating.

Today's students are in a "always connected" or "always on" mode where they have access to many different methods of communication. On most college campuses, there is an ever-present wireless network that students can use to access Internet resources. Students also use cell-phones, PDAs, and PIMs to converse and communicate. With these different ways of communicating, they have the responsibility to use these resources wisely. Many times, students continue to use these tools during class time, even though they should be focusing on class work. The larger issue is using these communication devices during a test or quiz. How do educators keep students from sharing questions and answers?

This problem can be resolved in many different ways. It is difficult to say that any particular method will completely resolve these issues, but there are many steps to be taken that will mitigate these issues. Even though technology can play a big part in this process, standard, procedural methods can help also. If a student brings in a cell phone or a PIM, usually there is not an academic use for that equipment in the classroom, especially during a test or quiz. By banning those types of gadgets, and doing a spot check during an assessment, this issue can be quickly resolved. The larger issue, then, is keeping students honest when you don't have control over the situation.

Many times, it is beneficial to have access to word processing programs, in order for the students to submit good work. By using a word processor, students are usually able to work quicker, turn in multiple drafts of work, plus have the ability to spell check. The final result from a word processor is a much better product for both the student and the professor, in terms of readability and clarity. This becomes an issue in a classroom with desktop or laptop computers. The same tool used to word process also has access to outside resources (the Internet, local network, etc.) that can be used to dishonestly pull in previous work from various sources. While it is relatively easy to stop a student from using a cell phone in a classroom, it is hard to track a students' work on individual machines, especially when it is very easy to open a browser and gather information

from the Internet. It is not very obvious when students are cheating in this situation, which further complicates the matter.

In the summer of 2004, we faced this issue at Franklin College. There had been some demand over several previous semesters to find a solution to these issues. We discussed several possibilities, and originally had a difficult time finding a solution. One of the first requests was to turn off the network (wireless for the laptops, and wired connections for the desktop lab) in the classroom areas, so that students taking tests wouldn't be able to access outside resources. This was quickly dismissed, due to the overhead and time involved. Also, this had the added side effect of stopping legitimate network services. (Login, storage for backup, printing, access to others not in that class.)

The next idea was to create a solution using Linux or other open source software. The idea was to create a proxy server that would stop a particular lab from accessing the Internet and network drives, so students wouldn't be able to cheat in that manner. This was dismissed due to the complexity of setting up the proxy solution, and the added disadvantages of limiting network drive access for backup and long term storage for the files. Also, students would still be able to keep files on the local machines, which would still allow them to cheat.

A third solution was to look at using Perfigo, which we already had in place at Franklin College. This would function in a similar manner to the proxy – allow students access to certain services, but limit others. This still had the drawbacks of local storage ability, plus had some management overhead. (We were only able to lock out certain students, not physical machines. This was a problem for those students done early, as they would not have network access until the end of class time.)

In the fall of 2004, during a conversation with an adjunct professor, this issue came up again. The professor (who coincidentally is the Chairman of the Board of Trustees for the College) mentioned that he had heard of software called Securexam that would essentially lock down the computers and keep students honest. We did a quick evaluation and rollout to students to see how the software worked.

Securexam is a product released by Software Secure (http://www.softwaresecure.com). This product locks down Microsoft Word in such a way that the user is unable to access ANY resources on the computer, except for the MS Word program. The end user still has full capabilities of the word processor, but cannot access the Internet or any local files, until the student is finished. When the student is finished, the Word file is encrypted. The student cannot later open the file and make changes, since the file is encrypted. Once you exit Securexam, full capabilities are restored to the computer. The encrypted file can then be transferred to the instructor through any traditional file transfer means. Once the instructor has the file, there is a secondary program that decrypts the file back into a standard Word file. Along with the student's work, there is a header on each page that has the student's information, date, and time. There is a final page added on that gives usage statistics to show how long the student was using the program, and if the student tried to exit the program and re-enter later.

This solution proved to be very successful. Students were able to use word processing software to type their responses to a test, and professors could ensure that the students did not have access to resources typically found on a computer. The software is very robust, and even has built in features to help recover the file if something happens to kick the student out of the program. (This happened two or three times, and the student was able to fully recover every time.) The software will automatically save a copy every minute, which ensures that there will only be minimal data loss in the event of a power outage.

The software turned out to be relatively user-friendly, and students were able to quickly learn how to start and end the program. To collect the files, we had students submit the finished files to Blackboard, where the professor could later retrieve them. Then, the professor would de-crypt the files, and be able to print them or grade on-screen. This solution turned out to work well for faculty, since they were able to reliably control the resources available to the students, while still getting papers from students that were easy to read and retain.

This solution takes care of issues of academic honesty during an in-class test or quiz, but what about writing assignments outside of class time? Students still have access to the Internet and other sources. Students may be tempted to loosely copy other's work, or even plagiarize entire papers. Many times, professors can catch plagiarism through standard methods of comparing student work, but this doesn't always catch copied work, especially over time. Once again, technology can assist with this issue.

There are many resources and solutions for this issue on the market. At Franklin College, we have used the Wcopyfind program over the last several years. This is a free program provided by Lou Bloomfield at the University of Virginia (http://www.plagiarism.phys.virginia.edu/). This software does a great job of comparing files that you have access to on your computer, and it is free. However, it will only search local files (network drives, removable drives, or hard drives) on that specific computer. There are several other options that will scan against larger pools of work to detect plagiarism.   One of the most popular is turnitin.com (http://www.turnitin.com). This program is web based, and allows professors to scan works submitted by students to check for plagiarism. At Franklin College, we evaluated this, but found it to be too expensive and harder to manage since it required a separate username and password. A resource that we are currently evaluating is called SafeAssignment (http://www.mydropbox.com) which is an add-in to Blackboard. This will allow students to use their current usernames and passwords to submit work, while still allowing the professor to compare the files to a large pool of work. The pricing for this solution is cheaper than turnitin.com, and is easier to use and administer than some of the other solutions. We are still in the process of evaluating this solution.

Technology continues to give new ways of teaching and learning. By implementing some of the above methods, it is possible to make sure that technology is used in a beneficial manner, and not in a way to further academic dishonesty.

Web sites:

Securexam – http://www.softwaresecure.com

Wcopyfind - http://www.plagiarism.phys.virginia.edu/

turnitin.com - http://www.turnitin.com

SafeAssignment - (http://www.mydropbox.com

Making Global Connections: The Virtual Classroom Project

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During the spring of 2004, the College of Staten Island (CSI) undertook an exciting project to connect our campus in New York City with three international partners in China, Turkey and South Africa using internet based videoconferencing. Based on a model developed by East Carolina University and funded by the State Department, the plan was to travel to each of the partner universities and set up the curricular and technical groundwork for the upcoming semester (Fall 2004). The College partnered with Shanghai Television University (China), University of Port Elizabeth (South Africa) and Kadir Has University (Turkey). A team comprised of a content expert and a technical lead, traveled to each University and met with their counterparts to develop the curriculum and deploy the technology to create the "virtual classroom".

CSI was invited to participate in the Global Experience Through Technology Project (GETT) via a videoconference that took place in April, 2004 between CSI and ECU (East Carolina University). The principle directors from ECU, Dr. Elmer Poe and Dr. Rosina Chia, explained the project and the GETT model. The conceptual model of GETT is to "harnesses commodity internet technology to bring students from different cultures together in a common classroom."[1] Simply put, the model utilizes videoconferencing over the internet using video over IP (internet protocol, H.323[2]) technology and an inexpensive desktop based videoconferencing system to create a "virtual classroom" where all the participants can engage in a meaningful and pedagogically sound lecture and discussion regardless of geographic location. In addition, the project incorporated the use of Internet Relay Chat (IRC) and e-mail to further enhance student to student communications.   The goal of the project is to allow the 98%[3] of the students, who cannot participate in any study abroad programs, have a valuable international experience. The technologies employed by the GETT model are both inexpensive and easily deployed since they consist of a desktop based videoconference system[4], freely available chat client[5] and the internet. Funding for the project was provided by a grant from the U.S. State Department's Bureau of Educational and Cultural Affairs. The grant covered travel, hotel stay and equipment cost for each of the participating colleges in the project.

Recruiting International Partners

Recruiting International partners is a formidable challenge even in the best of circumstances. With less than six months until the start of the course, the time pressure was very significant.   In

order to get the project going in this short time, CSI sought international partners with whom it already had an established relationship. The first partner, Shanghai Television University (SHTVU) in Shanghai, China had a long standing faculty exchange program with CSI and a member of the CSI faculty was teaching at SHTVU during that spring. SHTVU was also a good fit because of the many similarities between CSI and SHTVU. SHTVU is part of China's Open University system which is comparable to CUNY in many ways, including its open enrollment policy. In addition, the educational model of SHTVU makes heavy use of distance education. The second partner, Kadir Has University (KHAS) which is located in Istanbul, Turkey was brought about by personal contacts between Vice President Michael Kress and KHAS administrators. KHAS' focus on international education also made it a good choice to join the project. The final partner, The University of Port Elizabeth (UPE) located in Port Elizabeth, South Africa was chosen because CSI's President, Marlene Springer recently visited South Africa and established a professional relationship with UPE.

The Course, International Partnership and Technology

With all the international partners selected, the project team composed of Dr. Michael Kress, Professor Ngolet and Mr. Mark Lewental, focused on the course curriculum, technical details and travel itinerary. The CSI course that would serve as a 'vessel' for the project was a CUNY Honors College course, HSSH 206, The Non-Western Experience: Social Sciences. This course met the thematic criteria of focusing on World Culture and Globalization as designed by Professor Ngolet and other faculty partners. In addition, honors college courses have small student enrollment, thereby conforming to the project course cap of a maximum of 15 enrolled students at each participating college.

Preparations for each visit included gathering all of the necessary equipment that would be needed at each site to conduct the course. This included the Polycom Via Video desktop videoconferencing system, accessories, software, etc.[6]

The project team prepared a travel itinerary allowing them to spend a week with each partner in the project. During the first visit to Kadir Has University, Dr. Kress and Professor Ngolet met with faculty and administrators and developed a formal agreement to collaborate on the virtual course and developed the core curriculum. From there, they flew to Port Elizabeth and met with representatives from UPE fine tuning the course materials and trouble-shooting the videoconferencing equipment. The last leg of the journey to SHTVU was covered by Mr. Mark Lewental and Professor Ngolet. They met with faculty and administrators in Shanghai and tested the video conference facilities.

Challenges Faced

The project as conceived divided the semester into thirds. Since there were four institutions involved, the objective was to have two partners work together for one-third of the semester and then switch to work with another partner and finally switch once again for the final third. As designed, the sequence would have been as follows:

1/3 Semester	1/3 Semester	1/3 Semester
CSI – SHTVU	CSI – KHAS	CSI - UPE
KHAS – UPE	SHTVU – UPE	KHAS - SHTVU

The CSI team arrived in Istanbul in July and were met by a delegation from Kadir Has University. As planned, both team members began to focus on their perspective area for the project. Professor Ngolet met with KHAS faculty and began fleshing out the curriculum. Dr. Kress worked closely with KHAS' technical group and conducted several tests connecting to CSI's videoconference system. Both team members successfully completed all that was required to prepare for the upcoming Fall semester. Upon the teams' arrival at UPE, two problems surfaced. First, UPE's Fall semester did not correlate to CSI's or KHAS', making it impossible for any formal scheduled inclusion of UPE in the Fall semester. An agreement was reached however, for faculty members from UPE to participate in several sessions in the fall as observers, with their full participation expected in spring semester. The second challenge was a technological one. South Africa's limited network infrastructure would not support the use of internet based videoconferencing. Instead, UPE used a videoconference system based on Integrated Services Digital Network (ISDN), which is a type of high speed digital telephone network similar to standard phone service. Fortunately, the videoconferencing equipment[7] at CSI could accommodate both ISDN and video over IP so CSI bridged the three way sessions. With both these problems solved, the team worked with their counterparts and fulfilled the goals of the project.

To visit the last partner, SHTVU, Mr. Lewental flew to Shanghai and met Professor Ngolet. The workflow at SHTVU was the same. Professor Ngolet worked with the faculty on the curriculum and Mr Lewental worked with technical representative to make sure that we could connect CSI with SHTVU. The CSI team was apprehensive, but hopeful that we could successfully complete the task at hand, despite the challenges we faced. The most pressing one was time since our visit came in August and the semester for both CSI and SHTVU was two weeks away. They managed to carry out several tests with CSI confirming our ability to conduct videoconferences over the internet. Professor Ngolet did not have much success in meeting with SHTVU faculty to work on the course content, but felt that the material he left for them was sufficient to get started. He was confident that by using e-mail and the telephone, he could collaboratively resolve any difficulties that might arise. Although we left Shanghai with confirmation that SHTVU would participate, in the end the layers of bureaucracy needed for official approval, did not allow them to join CSI for the fall semester.

In an effort to preserve the project, CSI went ahead with KHAS as our partner for the whole semester. Although we were not able to meet the ambitious goals we had set to have a "round robin" pairing of four countries, the course that was held would proved the project a huge success.

The Virtual Classroom: Fall 2004

The class was composed of eleven CSI students, majority of whom were from the Honors College. To make the course work for our international partners, it met at 8 A.M. EST on Monday and Wednesday, which was 3 P.M. in Istanbul. The class was held in the Library's Videoconference Lab since all of the necessary equipment was housed there. To facilitate the Internet Relay Chat, laptops were provided for each student to use during the class. In addition, a course site was set up on the College's Blackboard server, thereby making it possible to provide all course readings to the students. This was extremely useful since the course readings, assembled from many sources, were not readily available to our international partners.

The format for the course was to have each faculty member give one lecture during the week. Usually, CSI conducted the lecture on Monday and KHAS would do the same on Wednesday. To further enrich the course, Professor Ngolet had several guest speakers come and present on specific topics in the course. This greatly enhanced the variety of ideas that were presented. After each lecture, which lasted about 45 minutes, the students had the opportunity to interact with the lecturer, as well as, each other and discus the ideas that were presented using the videoconference system. In addition to using the videoconference system for face to face discussions, student could also use the Internet Relay Chat to chat with their partners at KHAS. This tool brought mixed results as it made the foreign students more comfortable in 'talking' to our students, but the topics would not always stay on the course content.

The technology proved to be challenging at times. The idea of using the internet for video conferencing is not new, but the technology still needs to be perfected. At times during the class, we would loose connection to KHAS and have to wait for them to reconnect. Since this was a lecture based course, sound was absolutely critical, yet sometimes the audio would be garbled to the point of inaudibility. During those times, patience and the request to repeat the question or comment, usually saved the day. As the semester progressed, everyone involved, faculty, staff and students learned how to interact and make use of the technology in order to have a meaningful class session. The course was extremely content rich. There were weekly reading assignments and written assignments were done by the students at the end of each major section in the course. In addition, toward the end of the semester, several students from CSI and KHAS were asked to give class presentations on a topic covered during the semester. In spite of the fact that the course was conducted in English, the presentations done by the KHAS students, who are non-native English speakers, were outstanding.

Pre and post surveys were conducted. At this time, we are analyzing the data which we expect to publish at a future date. Here, we present the results of two of the summary questions in the post survey:

Of the nineteen students who responded fifteen strongly agreed and four somewhat agreed on a five point scale to the question:" I am satisfied with my experience in the course?"

Of the eighteen students who responded eleven strongly agreed, six somewhat agreed and one neither agreed nor disagreed on a five point scale to the question: "I would participate in a class with a similar format in the future?"

Both groups of students showed a great deal of enthusiasm and dedication to the course. This was evident in the low level of absenteeism during the course of the semester. On the final day of the semester, Professor Ngolet organized a farewell party for our partners that included poetry readings, music and songs by both CSI and KHAS students. This amazing culmination of the semester was an incredible site to behold as the several thousand miles separating the classrooms seemed to disappear and the students were suddenly in 'one' room enjoying each other's company. Here are some excerpts from feedback sent to Mr. Lewental by the students:

CSI Student
"It was such a pleasure being surrounded by intelligent people who are willing to have a free flow of ideas and opinions on any range of topics. It was particularly interesting that half of those people were thousands of miles away yet expressed similar viewpoints as ours. It seemed as if we were seeing the workings of globalization firsthand. This experience also helped highlight a point that I have learned from years of working with international students: cultural differences don't make much of a difference if you're just willing to listen to each other."

CSI Student
"The virtual classroom project is the best educational experience I've had so far. Though my partner and I did not have an ideal working relationship, it was still beneficial. My partner and I had interesting conversations regarding the US actions in Iraq, music, literature, globalization, etc. Through our chat sessions, the differences between my partner and I lessened. Our conflict was not based on cultural differences; rather, it was similar to the types of conflicts I experience with classmates here when we work together as a group."

KHAS Student
"In fact we have learned too many things. It was an amazing lecture but, because of the speaker phones we couldn't hear the presentations very well, if we could it would be much better."

As these brief comments indicate, the students from both countries benefited from participating in the course. In the post 9/11 world, students may be unable, due to financial or other reasons, or unwilling to participate in travel abroad programs, so the Virtual Classroom project offers them the opportunity to be exposed to different cultures and ideas.

CSI will again be conducting the course in the Spring 2005 semester and making improvements to the technology in order make it as transparent as possible. Our participation in the project has been a tremendous learning opportunity and we are looking forward to the new semester, Spring 2005.

Acknowledgements

CSI. His scholarly perspective on Globalization and jolly personality will be long remembered by all of us. Many thanks, also, to our partners at Kadir Has University: The academic components of the course were brought together through the dedicated efforts of Dean Nulifer Narli, PhD; Professors Levent Soysa, PhD and Muberra Yuksel,PhD. Key in the development of the collaboration was the efforts of Mr. Ethem Kok, Director Emeritus of Computing at Borough Manhattan Community College; Erol Ucdal, PhD, Special Assistant to the Rector, and the Rector, Dr. Yucel Yilmaz who personally supported the project. Also key in the implementation of the technology was Professor Taner Arsan, PhD.

We also acknowledge our gratitude to Dr. Nico Jooste and Ms Alize Naude of The Nelson Mandela Metropolitan University, formally University of Port Elizabeth, as well as, Vice President Wang Min and Professors Xia Qian and Randy Zhang from SHTVU for there collaboration. We look forward to their continued collaboration in the Virtual Classroom Spring 2005.

Most of all, we thank Dr. Rosina Chia and Dr. Elmer Poe from East Carolina University and our President, Dr. Marlene Springer and Provost, Dr. David Podell for providing us with such an exciting opportunity.

Notes

1. Rosina Chia and Elmer Poe, "Creating the Global Experience Through Technology: The ECU Model", A Manual Created for the Workshop Cosponsored by the U.S. Department of State and East Carolina University, June 2-4 2004, Preface.

2. International Telecommunications Union. "Packet-based multimedia communications systems." http://www.itu.int/rec/recommendation.asp?type=folders&lang=e&parent=T-REC-H.323

3. Nancy McGillicuddy, "Electronic Farewell Ends Global Classroom Session.", Pieces of Eight, May 2004, http://www.news.ecu.edu/poe/504/global.html.

4. Polycom Incorporated. "Via Video Product Highlights."
   http://www.polycom.com/products_services/0,,pw-186-3027,00.html.

5. mIRC. "mIRC Home Page." http://www.mirc.com/

6. Rosina Chia and Elmer Poe, "Creating the Global Experience Through Technology: The ECU Model", A Manual Created for the Workshop Cosponsored by the U.S. Department of State and East Carolina University, June 2-4 2004, 19-2.

7...Polycom Incorporated. "VSX 7000 Product Highlights."
   http://www.polycom.com/products_services/0,1443,pw-35-185-4363,00.html.

Utilizing a Broadcast Quality Video Production Facility in a Distributed Education Environment

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Introduction

The Distance Learning Prototype Lab (DLPL) at Saint Francis University's Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA) was established in 1999 to explore and demonstrate how the merger of a variety of telecommunications technologies (video production, computer graphics, the Internet and teleconferencing) can improve the pedagogy, quality, and distribution of education and training in distributed learning environments. While the specific numbers have varied from study to study, there is general agreement among researchers that people retain approximately 20% of what they hear, 40% of what they see and hear, and 75% of what they see, hear, and do (Amthor, 1996). Simply adding visual content to existing lecture material and classroom activities would seem to be a simple way to take advantage of that potential for increased retention, but that has not been the case.

The Infrastructure

Development of the DLPL began in 1998 and grew out of the perceived need to improve the appearance and method of distance learning courses, particularly those delivered synchronously via video teleconference, through the use of professional-quality video production equipment and techniques. The major components of this facility were to include a studio area with a "green screen", a control room, and a post-production unit built around a non-linear digital video editing system.

Once funding was in place, bid specifications were prepared and submitted to several vendors. The final specifications eliminated the digital non-linear editing system, replacing it with a linear system utilizing two Panasonic DVCPro format video tape recorder/players already included in the proposal.

In January 1999, a specialist in broadcast video production was hired to manage the DLPL project and equipment installation commenced. Figure 1 illustrates the earliest iteration of the facility's control room. During this phase, a number of changes to the original specifications were made to correct operational deficiencies and to improve ease of use. In the original design, only the three studio cameras and the far end video from the teleconferencing unit were available as possible backgrounds when using the "green screen" effect. The addition of a passive video switcher routed to the

Figure 1
The DLPL control room as it appeared in 1999.

digital effects switcher allowed any video source to be used. Because so much archival video was stored on VHS format tape, and because that format remains in common use at the consumer level, an additional S/VHS-VHS video recorder/player was added to the production console.

Over the next several years additional equipment was acquired and added to the system as needed for specific applications. These upgrades included a fixed studio lighting system to improve the quality of "green screen" effects and overall video quality, a video writer for on screen annotation, a prompter system, and a nonlinear video editing facility.

By 2003 it became apparent that the additional technology had greatly outstripped the initial infrastructure design and a professional broadcast engineering firm was hired to redesign the DLPL to meeting current and projected future needs as a multipurpose production facility. That study resulted in a complete rebuild of the facility in early 2004 that included a complete reorganization of the audio and video cabling throughout the studio and control room, as well as providing connection points for exterior connections to two adjacent classrooms and other CERMUSA facilities on the Saint Francis University campus; installation of additional equipment, particularly a video synchronization generator to better manage and "condition" video signals to retain quality; and the introduction of an audio/video electronic routing system to provide a more robust and flexible method of distributing multimedia content, as shown in Figure 2.

Figure 2
The DLPL control room following the 2004 renovation. The encircled area shows one of the routing switchers that provide a higher level of flexibility than had earlier been possible through the use of patch cords and similar temporary measures.

The renovation provided an immediate and visible improvement to the overall output quality. More importantly, it better accommodated the growing demand for electronic delivery of video and audio assets. The system is also far more efficient from the standpoint of human resources. It is possible for a single operator to simultaneously manage a live video production, record classroom lectures, produce multiple copies of existing media assets, and manage live streaming media.

In the post production environment, the DLPL allows content to be produced for delivery on a variety of platforms, including physical media (tape, CD, DVD) as well as data streams as large as Internet2 or as small as a PDA. The video signal quality improvements inherent to the renovations allow producers to far more easily develop content that can be formatted to this wider variety of delivery platforms without the need for totally different production values.

Appropriate Technology Applications

Yale University Emeritus Professor Edward Tufte suggests visual presentation tools are generally misused in both educational and corporate settings (2003). While his focus is the traditional classroom and the corporate boardroom, the extension of his criticism into the arena of distance education is clear. One of the goals for implementation of the DLPL was to make more effective use of the available multimedia tools and to show educators that effective visual communications techniques that work in a studio setting can also provide value in a traditional classroom environment. As Tufte suggests, "If your words or images are not on point, making them dance in color won't make them relevant. Audience boredom is usually a content failure, not a decoration failure" (2003). For this reason, the DLPL has emerged as a multi-purpose tool capable of delivering appropriate multimedia content using a wide range of delivery methods, for instance streaming video that can be viewed over a low-bandwidth connection on a PDA, to very high quality multiple streams transmitted over the ultrahigh broadband Internet2 – but a tool that is effective only when utilized effectively, as part of a broader instructional strategy.

The body of research into the efficacy of electronically connecting discontinuous groups of students with an instructor is sparse, and is generally based on older levels of technology that have evolved considerably in the past several years. A 1995 Australian study, for example, cited frequent technical difficulties as significant distractions that reduced satisfaction levels compared to traditional methods (Freeman, 1998). Over the course of five years and several different distance education research projects, the focused use of multimedia produced in and/or distributed from the DLPL has provided further support for the notion that quality, in terms of the visual element of learning, contributes to improved learning. However, simply incorporating technology does not automatically translate into improved distance education learning outcomes. Adding the tools to improve visual content must be utilized within a pedagogically sound setting. This implies a need for greater collaboration among instructors, content experts, instructional designers, and specialists in areas such as video, audio and web production. The success of the *Bringing the Museum to the Classroom* videoconference prototype can be attributed to the collaboration between experts in content and in multimedia presentation (Davis, 2001). This was one of the earliest sustained uses of the DLPL: a three-year partnership among CERMUSA, the Southern Alleghenies Museum of Art, and a group of K-12 school districts spread along Pennsylvania's

Appalachian Mountains. Lessons learned in this project have been integrated in subsequent CERMUSA Distance Learning prototypes.

To fully leverage the interactivity capabilities of a robust video conferencing system, such as what is available in the DLPL, instructors ideally would choose an instructional method that makes the instructor both an information provider and a facilitator of active student participation, creating an environment where students can hone critical thinking skills. A growing body of research bears this out. MacIntosh (2001) demonstrated how this approach worked effectively in a RN to BSN program offered at a distance to practicing nurses in Canada's Maritime Provinces. The same study examined the appropriate selection of technology for use within a distance environment. The course was then delivered to both locations by two-way interactive video conference.

The integration of multimedia, the increased reliance on stimulating students' minds through multiple sensory inputs is perhaps new in terms of the technology utilized; however, the underlying learning theory is traditional. The 1930s pedagogy of psychologist Kurt Lewin, for example, offers an excellent basis for effective distance education delivery. By implementing Lewin's principles of active learning and cohesive teaching, Stahl argues, educators can vitalize distance learning (1999). It is just as easy to fall into the trap of allowing multimedia to follow the passive paradigm of entertainment television, using it solely to provide students with visual stimulation. Tufte argues strongly against the frequently seen misuse of visual content, specifically the now nearly ubiquitous PowerPoint presentation, suggesting that rather than enhancing educational content, often presentation slides disrupt, dominate, and trivialize content (2003).

The research studies utilizing the DLPL have focused on a total course development model rather than simply adding rich media to the mix. Whether the DLPL is utilized for synchronous or asynchronous content delivery, it represents only one part of the technology toolkit. CERMUSA's distance and distributed learning research efforts have included comparative tests of course management software systems, with a variety of student and instructor populations. One such study makes use of video-based case studies produced in the DLPL studio and post-production facility and delivered online as on-demand continuing medical education for practicing pharmacologists. Another project involved the production of supplementary content for an undergraduate level physics course, allowing students to review in-class demonstrations of such topics as wave propagation or the effect of gravity on items of varying mass.

A Documentation Tool

The DLPL serves as the principal electronic documentation tool for all CERMUSA activities. Major organizational events are documented, and video products are produced for use in a variety of presentations and public expositions. Individual CERMUSA research projects that do not utilize the DLPL directly for content development make use of the facilities for documentation of research activities.

Administration and Logistics

Aside from the application of the technology, there exist the administrative challenges of balancing the research and operational elements, as well as agreeing on the appropriate division of responsibilities between IT and Operational staff in the maintenance and management of the DLPL. The former is resolved through effective project management processes; while the later is a reflection of similar debates throughout the commercial telecommunications industry, and is a product of the convergence of telecommunications and computer technologies. Depending on one's perspective, the DLPL is either a television production facility heavily invested in computer technology, or conversely, a robust Information Technology environment that produces multimedia content requiring considerable IT resources.

This convergence remains both the DLPL's greatest opportunity and its most significant challenge. Related to that is the storage and management of the growing volume of video products residing on a variety of media in several formats. Digital Asset Management (DAM) systems exist in the commercial sector, but have not yet reached a mature point in the development cycle. This remains a fertile area for future research and development.

Conclusion

As one of many tools in the educator's toolkit, the DLPL provides the opportunity to enrich existing courses and expand the reach of instructors from the traditional classroom to anywhere on the planet. The larger question remains, is it worthwhile?

One of the earliest DLPL projects offers some insight into that question of value. By leveraging the advantages of visual learning, while respecting the boundaries imposed by technological limitations such as narrow transmission bandwidths, a willing "buy-in" by instructors and administrators at participating schools, the SAMA/CERMUSA *Bringing the Museum to the Classroom* project reveals the potential of this delivery mode and these multimedia tools as an adjunct to conventional classroom instruction (Davis, 2001). While outside funding was available to deliver this course to rural schools, demand was intense. Demand dropped to zero when local school boards were asked to pay a share of the delivery costs for what they viewed as an electronic field trip.

Other DLPL projects have focused on the comparative costs of multisite synchronous delivery by video conference versus the use of adjunct instructors at remote sites. The recent advances in video conferencing over IP-based networks, allowing institutions to leverage already existing (and fixed cost) broadband connections, has finally established a cost parity allowing university administrators to measure the two delivery modes on qualitative criteria.

The ongoing value of the DLPL rests in its ability to perform a variety of missions in a cost, time, and quality effective manner. For educators, the lessons learned here in the development and deployment of multimedia content have direct application whether that content is developed by a similar production facility, self-made (creating and editing one's own video is a topic in itself), or obtained as part of a textbook bundle. As we watch a new generation become ever more

immersed in digital content, we must look at how best to integrate these new channels of communication into a wider array of teaching and learning modalities.

References

Amthor, G. *"Multimedia in Education: An Introduction."* <u>International Business Magazines</u>. "n. page" 1996.

Davis, Lisa & Mainhart, Robert. (2001) "Bringing the Museum to the Classroom: An Innovative Videoconferencing Prototype". In Griffin, R., Williams, V., Lee, J. (Eds.) *Exploring the Visual Future: Art Design, Science & Technology.* International Visual Literacy Association, 83-89

Freeman, Mark. (1998). "Video Conferencing: A Solution to the Multi-campus Large Classes Problem?" *British Journal of Educational Technology* 29 (3), 197-210

MacIntosh, Judith. (2001) "Learner Concerns and Teaching Strategies for Video-conferencing". *Journal of Continuing Education in Nursing*. 32 (6), 260-265

Stahl, S., (1999, Mar). Bringing Old Ideas to New Times: Learning Principles of Kurt Lewin Applied to Distance Education. *The Technology Source* from http://ts.mivu.org/default.asp?show=article&id=38

Tufte, E. (2003). PowerPoint is evil. *Wired*, 11.09. Retrieved May 09, 2005, from http://www.wired.com/wired/archive/11.09/ppt2.html.

Technology – From the Campus to the Public Schools

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Abstract

This presentation will examine the relationship between Pikeville College Education Program and its professional development school located in rural Pike County. The presenters will show how the use of laptop computers, obtained by the Booth Teacher Training Initiative, contributed to gains in overall learning of those public school students helped by Pikeville College education students. The Pikeville College Education students worked in this school, five days a week for the entire Fall 2004 semester. Results of this joint effort will be documented.

 Note: The authors had not submitted their paper at the time the proceedings went to press. They will bring copies to the presentation or make them available via the web or email.

Reaching a New Audience:
Development of Computer-Centric Minor

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Abstract

The number of students enrolling in computer science programs is decreasing. The number of women enrolling in computer science is also decreasing. What isn't decreasing, however, is the need by companies for their employees to enter the workforce with computer knowledge. In answer to these decreasing numbers and increasing demands, computer science programs need to re-examine what constitutes a computer science program as well as how to meet the technical demands of employers.

Introduction

Computer Science Enrollments

The Department of Computer Science at the University of North Carolina Wilmington (UNCW), as well as the Department of Information Systems and Operations Management, have seen a decrease in the number of students enrolling in their programs. They are not alone. The number of first-year students entering computer science programs across the U.S. is decreasing. Yet, the number of students enrolling in college is on the rise. Figure 1 shows college entrance figures from 1990-2004.
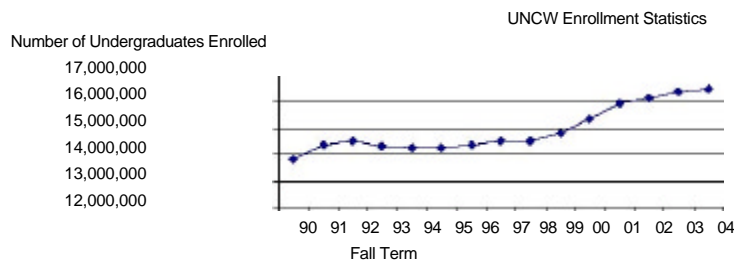

Figure 1. College enrollment statistics, U.S. [1].

Computer Skill Demand by Employers

While enrollment in colleges and universities is on the increase, enrollment in computer science is on the decrease. Figure 2 shows computer science enrollment statistics. The expected trend for enrollments is expected to continue to decline over the next ten years [2].

While the number of students entering computer science is decreasing, the demand for students with computer knowledge is increasing. Admittedly, "computer knowledge" may not mean as extensive a knowledge as a computer scientist may have. In two surveys conducted at UNCW, employers were asked about their hiring needs.
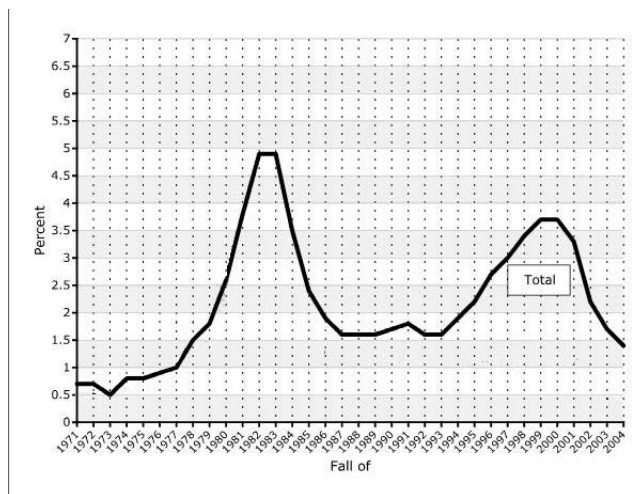

Figure 2. Computer science listed as probable major among incoming first-year students [2].

The first survey was conducted by UNCW's Information Systems and Operations Management (ISOM) Department. Local businesses were asked to estimate their hiring needs within a variety of computer technical areas such as database knowledge, graphic design, and networks [3]. Although this survey does not provide a clear indication of their technical needs, it does suggest that companies have a need for employees with "some" level of computer skills. Results of this preliminary survey follow in Table 1. This survey was further supported by the second survey which was conducted by UNCW's Department of Computer Science [4]. In this survey, local and regional employers were asked what specific computer skills were needed by all entry-level employees. Employers were provided with an existing list of computer skills. The list was compiled from the skills identified by ISOM's survey as well as those identified by the first Conference on Information Technology Curricula (CITC) in 2001 [5]. Table 2 provides an alphabetical list of the identified skills.

Companies are finding they need employees with computer skills to remain competitive. Companies are faced with having to rely upon a smaller, skilled workforce (as the "baby boom" generation ages and retires) as well as finding ways to use technology to aid their businesses [6]. Although the expectations are for a smaller workforce, employment projections for the U.S. between 2000 and 2010 show an increase of 22.2 million people [6]. Most of the employment will occur in positions dealing with computer and/or data processing areas. Much of the increase in these two areas (1.8 million jobs) stems from the need for companies to update new computer systems and to meet the Internet expectations of their clients. Of the thirty fastest-growing jobs, one-third are related to computers [6].

**Table 1. Computer Information System Knowledge
Needs: Current Employees and Hiring Expectations**

Expected number of hires 2003-2004

Topics	Current employees	Entry level	One to two levels above entry
Database	1.8	0.4	0.4
Graphics design	1.4	0.6	0.3
Help desk	3.4	1.1	0.9
Networking	2.8	1.0	0.3
Programming	6.8	1.3	0.8
Systems analyst	4.0	0.7	0.5
Technical	6.8	0.8	0.5
Web development	1.6	0.5	0.5

Employers, regardless of their area of work, believe that the lack of IT skills within their work-force is a threat to U.S. global competitiveness [7]. Since a company's workforce no longer has to live within an easy commuting range of the office, with the use of communication technology, employees can live virtually anywhere [8]. If the U.S. has a shortage in skill workers, companies can look outside the country's boundaries for the requisite skills [9].

Table 2. Computer Skills Needed by Entry-Level Employees

Topic
Database
Data security and privacy
Digital communication
Graphics design
Help desk
Human-computer interface
Networking
Programming
Software
Systems analyst
Technical
Web design and development

As the use of technology continues to increase and change the work setting, employees must learn new technologies to maintain their current positions. Basic skills for using the technology are becoming a standard job requirement [10]. The entire company must become a learning or-ganization. Employees, and hence the company, must remain flexible and able to respond to new

technological demands and needs [6]. To remain competitive, a company (and its employees) must be able to respond more quickly than its competitors [6].

Options Available To Departments

For many departments, a portion of their annually allocated budget is tied, in some part, to the number of students who are enrolled in their courses. For departments that have a high number of "service" courses or courses that are used to fulfill basic electives, a decrease of students majoring in their programs may not have a drastic effect on their budgets. For computer science departments, however, a decrease in enrollments can affect their budgets.

Service Courses

For some computer science departments, increasing the number of service courses is an option. In North Carolina, students are expected to graduate with a level of computer competency. This level of competency means, at UNCW, that graduates have an "understanding of campus use policies, facility with standard applications, and awareness of legal and ethical issues." Many departments created or identified their own courses that met this need. For some of these departments, the fact that a student used a computer for email or to write a term paper meant the student had a minimal level of competent computer use.

Many departments in computer science or management information systems were looked to to provide this service to other departments. At a minimum, these departments created one course that taught computer concepts and standard computer applications such as Internet usage and Microsoft productivity applications such as Word, Excel, PowerPoint, and Access.

At UNCW, for example, an average of 28 sections of their computer concepts course (CSC 105) during an academic year, reaches approximately 1,000 students. The ISOM department offers four sections of essentially the same course during an academic year, reaching another 250 students.

There are a few other courses that could also be considered service in that they are required courses for other majors. For example, some accounting departments require their majors to take a course in programming. The number of students reached by these service courses are small, almost negligible, when compared to the number of students reached by the computer concepts course.

Expanding the Audience through the Introduction of Minors

Another option for computer science departments is the introduction of minors that require students to take courses in the computer science department. Two minors that are popular and attracting students to computer science courses are Information Technology and Computational Sciences. The Information Technology minor is known by many names besides IT. It can also appear as Information Systems and Information Literacy.

Information Technology Minor

What constitutes an IT minor is different for virtually every IT minor that has been developed. To aid in understanding what might constitute an IT minor, the definition of Information Technology must be understood. The definition of IT comes from a site dedicated to understanding computer terminology. IT is a term that encompasses all forms of technology used to create, store, exchange, and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived) [11].

The IT minors that are available can be computer science intensive or have a small amount of computer science and be an interdisciplinary minor. Since the desire is to increase the number of students enrolling in computer science courses, examples of both minors will be described.

University of Massachusetts Amherst
The IT minor at UMass is recognized as a model of an innovative interdisciplinary minor [12]. Established in fall 2002, it is an interdisciplinary minor including a variety of departments throughout the UMass system. Departments include art, computer science, English, marketing, comparative literature, biology, journalism, and forestry, among other departments. In addition, support for the minor came from all of the university's ten colleges and schools [12]. At a minimum, one required course is a computer science course with up to four computer science courses required before a student takes any elective courses.

The UMass IT minor requires completion of five courses totaling fifteen credits. Two of the courses are technical courses with a prerequisite in computer literacy. Once the prerequisite is completed, a student can choose two technical courses from two of the following categories. The first category, principles of object-oriented programming, focuses primarily on software programming with Java, Visual Basic, or C++ languages. The second category, representing, storing, and retrieving information, focuses on courses in data structures and systems analysis and design. The third category, Introduction to Internet technology or multimedia systems, focuses on Internet technologies and multimedia systems [13]. In addition, at least one course must come from a category described as broadened inquiry. These courses focus on the impact of IT, the history of IT, emergent technologies, and legal and ethical issues in IT [13].
The UMass minor is considered the forefront curriculum of the CITI program. One area that makes the UMass minor so noteworthy is the extent of the program and the range of courses included in the minor. The goal of the minor is to create IT generalists across the curriculum and, as such, is administered by an interdisciplinary group of faculty from disparate departments [13].

Nova Southeastern University
The Nova Southeastern University (NSU) minor is an interdisciplinary minor as well; however, it does not include the breadth of departments of the UMass minor. The NSU minor includes courses on IT; business; computer and information science; education, including early education; management; and philosophy.

The NSU minor requires completion of 18 credits. Twelve of those credits are constituted by four required courses, all of which are technical courses. These courses focus on current technol-

ogy, the impact of technology, the Internet, and multimedia. Three of the remaining six credits come from a broad range of courses focusing on computer programming, business, web design, databases, classroom technology, ethics, and business applications. The remaining three credits come from the completion of a student's project in the field. In many regards, this last course is a capstone course for students to engage in either original research or implement the technology they have learned [14].

The NSU minor is intended for students who wish to acquire some knowledge in IT as a complement to their major course of study. Students in this program have some flexibility in that they can focus some of their required courses on a specific area of interest. The NSU IT minor has many purposes. It allows students to solve problems with the use of technology, provides them with skills to perform research, imbues them with an understanding of the hardware and software used in their respective professions, and makes them more valuable and appealing as candidates in the job market [14].

George Mason University

The purpose of the IT minor at George Mason University (GMU) is to give students the opportunity to show they are IT literate in their chosen majors. IT literacy may have different meanings that are dependent upon the discipline. GMU's goals for the students are linked to computer literacy. Student outcomes from this minor include an understanding of operating systems, basic computer application use, information searching and retrieval, as well as programming and database knowledge. In addition, other forms of IT literacy may be required based upon the student's choice of major. This minor, however, is not intended for or available to students majoring in computer science, information technology, or engineering at GMU [15].

GMU's IT minor requires three core courses and two elective courses for a total of 15 credits. The three required courses are also technical courses. The topics include an introduction to IT, a course that teaches the fundamentals of computing (such as hardware, software, and applications), and a course in computer programming. The elective courses come from a broad array of departments, including computer science, decision science, electrical and computer engineering, geography, government, information sciences, math, and music. This list of elective courses is frequently reevaluated [15].

Students must identify a focus for their minor that is different from their choice of major study. If there are more than two courses that will be used for both the major and minor studies, students must identify these courses and seek approval to include them before their minor course of study [15].

University of Minnesota

The minor at the University of Minnesota (UofM) is also an interdisciplinary minor that includes four schools at the institution. The core courses come from the Institute of Technology (the school for science and engineering at UofM) and are computer science courses. The elective or breadth courses come from the College of Human Ecology, the College of Liberal Arts, and the College of Architecture and Landscape Architecture. The primary intent of this minor is to provide technical skills and knowledge to students in nontechnical fields of study [16].

The remaining credits of this minor come from a variety of courses. Courses from the Department of Communication Studies focus on electronic media and communication and courses from the Department of Design, Housing, and Apparel include the digital environment; interactive media, including animation, sound and video; and illustration. English composition courses focus on electronic texts. Geography courses focus on GIS or geographic information science. Finally, journalism courses focus on mass communication [16].

University of North Carolina Wilmington
The IT minor at UNCW was developed after a study to compare other IT minors was conducted. This minor is an interdisciplinary minor that requires three computer science courses as part of the core courses. Students are required to take a course in the Fluency of Information Technology, a course in programming, and one other computer science course of their choosing.

The fourth required course is a course from the library. This course was created specifically for this minor and focuses on the use of computer technology to conduct research.

The remaining two courses come from a variety of courses from other departments. Courses involving computer technology as a component of the course (and not as a mode of instruction) were included in this minor.

The popularity of this minor is already evident. Although the minor does not officially start until Fall 2005, several students already are working to complete the minor. Several others have delayed graduation for another semester so that they will graduate with the minor [4].

University of Arkansas Little Rock
The IT minor at UALR was developed after a study was started to create an engineering program at UALR. During the development process of the engineering program study, members of the study committee met with other educational institutions that focus on technology, such as Michigan Technological University and George Mason University. In addition, the committee met with business, industry, government, and education leaders to discuss the possible engineering program. A major outcome of the study was the recommendation for integrated computer technology in the proposed engineering program. Based upon this recommendation, UALR's chancellor requested the development of the IT minor [17].

Course requirements for the UALR minor are minimal. Only three courses constitute the minor; however, students must complete 30 credit hours before applying for the IT minor. Students must also identify how the minor would complement their academic major. All three courses are technical courses [17].

University of Connecticut
The University of Connecticut (UConn) developed its minor in response to the demand for employees with IT capabilities. This minor, however, is specifically for engineering students and focuses more on the computer science side of IT. General topics covered by the curriculum for this program include algorithms, software engineering, and numerical methodologies for solving problems [18]. All courses are computer science or engineering courses.

Computational Sciences Minor

What constitutes a computational sciences minor is also difficult to identify. There are very few of these minors or majors available; most programs in computational science are graduate-level programs. Computational science is usually defined as the use of computer science as a part of scientific investigations [19]. It also tends to be an interdisciplinary program [20].

The development of a computation science minor would incorporate other sciences, such as physics, chemistry, biology, and engineering. It could also include the social sciences, such as psychology. The idea behind this minor would be to apply computational methods. Students would use this minor to further their research and to find solutions to problems. It is an applied science program; not a theoretical science minor.

Computational science expands the use of computers outside of computable processes and structures to the application of computer processes to further science research. This is the new area of computer science…yet to be developed and designed. Yet to be fully defined.

For examples of the value of this program, look at the growth of biotech fields, bioinformatics, computational chemistry. In a quick search of job websites, these are expanding fields. At Hire-Health.com, a search for "bioinformatics" produced five hits. A search of Monster.com produced 138 hits. A search of "biotech" produced more than 1000 hits.

Why aren't there more minors in computational science? Computer science faculty like to focus on "pure" computer science or the study of computable processes and structures. A review of computer science courses available at several institutions shows that the course offerings do not change to a large degree. The biggest change for many departments was the switch from one programming language to another. Non-traditional courses are slowly making their way into the curriculum, but not without a fight. From informal discussions with computer scientists from around the country, the question of whether courses such as computer graphics , computer animation, and Macromedia programs (such as Flash and Action Script) is "pure" computer science continues.

Conclusion

There are ways to increase student participation in computer science. More students can be recruited to the program; however, based on National Center for Education Statistics, the number of students enrolling in computer science will decrease over the next decade.
Departments can offer service courses. These courses, however, are time- and labor-intensive. Still, they are necessary. Students need computer skills and must have a level of computer competency to effectively compete for jobs. And computer science departments need students enrolling in their courses. With the high demand for technological skills and society's reliance on computers, now is not the time for computer science departments to lose funding and slowly disappear.

In addition to offering service courses, departments could expand their student base through the offering of minors that incorporate other computer science courses. From a review of IT minors,

many of the "other" or elective courses used in conjunction with the minor are liberal arts or non-science courses. This is a minor that provides computer skills to students in the humanities. The computational science minor provides computer skills to students in the sciences. Students who graduate and plan to work in the sciences will probably need computer knowledge to perform their jobs effectively. Computational science courses provide that knowledge and experience specific to the students' majors.

References

[1] National Center for Education Statistics. (2003). Retrieved April 20, 2005, from http://nces.ed.gov/programs/digest/d03/tables/dt003.a sp

[2] Vesgo, J. (2005, May). Interest in CS as a Major Drops Among Incoming Freshmen. *Computing Research News 14*(3).

[3] Janicki, T. N. (2003). *Summary of survey to date.* Retrieved May 2, 2003, from http://tomj/survey/survey3.asp

[4] Patterson, L. J. (2005). *Development of an Interdisciplinary Information Technology Minor at a Major University.* Unpublished doctoral dissertation, Nova Southeastern University.

[5] Thomson Course Technology. (2004). Super major! *I.T. Link, 3*(1), 3-7.

[6] Goldberg, B. (1999). *Overcoming high-tech anxiety: Thriving in a wired world*. San Francisco: The Jossey-Bass Business and Management Series.

[7] Office of Science and Technology Policy. (2002). Networking and information technology research and development. Supplement to the President's budget for FY 2002. Washington, DC: National Science and Technology Council.

[8] Knoke, W. (1996). *Bold new world: The essential road map to the Twenty-First Century*. New York: Kodansha International.

[9] Galbreath, J. (1999, November-December). Preparing the 21st century worker: The link between computer-based technology and future skills sets. Educational Technology, 39(6), 14-22.

[10] State University of New York, Albany. (2001). I.*T. in the workplace: The impact of information systems technology on the education and training needs of hospital workers in New York City.* New York: State University of New York, Albany.

[11] TechTarget Network. (2004b). *Look it up*. Retrieved March 29, 2004, from http://whatis.techtarget .com/definition/0,,sid9_gci212591,00.html

[12] The Reinvention Center. (2004). *Envisioning undergraduate education at The Reinvention Center*. Retrieved August 2, 2004, from
http://www.sunysb.edu/reinventioncenter/index.html

[13] University of Massachusetts Amherst. (2001). *The information technology program at UMass Amherst*. Retrieved August 2, 2004, from http://www.umass.edu/ itprogram/

[14] Nova Southeastern University. (2004). *Information technology minor*. Retrieved August 2, 2004, from http://www.undergrad.nova.edu/MST/itminor/index.c fm

[15] George Mason University. (2003). *GMU catalog 1998-1999: Minor in information technology*. Retrieved May 6, 2004, from http://ite.gmu.edu/degree/it_minor.htm

[16] University of Minnesota. (2003). *Information technology minor: Institute of technology*. Retrieved May 6, 2004, from http://www.catalogs.umn .edu/ug/it/it20.html

[17] University of Arkansas. (2002). *IT minor @ UALR*. Retrieved August 3, 2004, from
http://itech.ualr.edu/it_minor.shtml

[18] International Conference on Computational Science. (2003). *International Conference on Computational Science.* Retrieved April 20, 2005 from
http://www.science.uva.nl/events/ICCS2003/

[19] University of Illinois at Urbana-Champaign. (2005). *Computational Science and Engineering*. Retrieved April 5, 2005 from http://www.cse.uiuc.edu/

Future Educational Programs and
Employment Prospects in Information Technology

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Abstract

Over the past several years, we have experienced a rather dramatic downward turn in demand for entry level information technology (IT) professionals. However, reports of trends at the end of 2004 indicated that job postings for IT workers reached their highest levels since 2001. This occurs at a time when the number of four year degree programs in IT has increased while the students interested in studying IT has decreased. The consensus among many recruiters is that there is a general lack of interest in pursuing an IT degree, and this will lead to shortages in qualified IT professionals.

This paper will examine the future of our technology-related educational programs as well as the projected employment prospects in the IT field. The paper will attempt to match competencies developed in our educational programs with projections for growth areas and shortages in the job market.

Introduction

The Information Technology (IT) workforce in the U.S. has been on a roller coaster of sorts over the past seven years. From a period of high demand, high salaries and worker shortages leading up to Y2K to the devastating dot-com bust in 2001 to the dramatic increase in offshore outsourcing and corporate downsizing in early 2004, employment prospects have been pessimistically unpredictable. Prospects for new positions and the lucrative salary offers of the late 1990's became a distant memory. The high tech boom and bust raised very serious concerns about the future of IT. The U.S. Bureau of Labor Statistics reports that in excess of 100,000 Americans left the IT labor force in late 2001 and 2002 and nearly 70% have not returned. There are expressed concerns that many people do not view IT as a long-term career path (Chabrow and McGee, 2005).

Following the boom period of Y2K and dot-com growth, enrollment in technology-related programs in colleges and universities has decreased substantially. The annual Computing Research Association's Taulbee Survey reported that undergraduate enrollment in programs for computer science and computer engineering dropped from 23,033 in 2002 to 17,706 in 2003 (Malykhina, 2005). Many students with aspirations for the technology arena decided to dedicate their talents to other more predictable fields of study. Students see employment reports that indicate that some companies are electing to forego full-time hires and use contract workers for projects and

support requirements to hold the line on expenses (Hoffman, 2004). Add to this the threat of layoffs and falling wages as a result of offshore outsourcing, and the decision to study an information systems related field is further compounded (Baker and Kripalani, 2004). Students are concerned that advanced technical degrees are expensive and may not provide the skills they need in the job market; therefore they are seeking business degrees as they feel safer from outsourcing threats if they have business qualifications (Verton, 2004).

To further confuse matters in a positive sense, however, Rich Stockfield of Atlanta-based Talenthire.com recently cited strong demand for IT auditors and IT security experts to respond to needs created by the Sarbanes-Oxley Act (Hoffman, 2004). Agents at the Recruiting 2004 Conference held in New York in November indicated that job postings for IT workers reached the highest levels since the 2001 dot-com bust (Hoffman, 2004).

Concerns for Higher Education

The convoluted scenario presented above creates a rather serious dilemma for the range of technology-focused programs found in colleges and universities. Many programs have experienced enrollment declines commensurate with the declining market place opportunities. The author has always been a firm believer in monitoring the marketplace that accepts its graduates, and adjusting content according to regional needs.

More importantly however, is the need to make our technology curricula "living documents." With the rapidly evolving pace of technological change and the dramatic changes in the needs of the technology marketplace, curricula for technology-oriented programs must be dynamic and flexible enough to react to the needs and demands of that changing marketplace. This is not to infer that our programs should become too vocational in nature, content or concept. Instead, the inference is that an information systems/computer science curriculum cannot be committed to paper and offered without change year after year. As educators, we must remain astutely aware so as to accurately assess the marketplace and maintain currency and relevance. To that end, we must also accurately define and communicate the objectives and expected learning outcomes of our programs. We must not mislead our students but instead clearly define the types of opportunities they will be prepared for upon completion of our programs. The ever-present threat of preparing a student for employment in an area that is a candidate for offshore outsourcing is another reason to closely monitor our marketplace.

All is not gloomy, however. Many analysts believe that the IT field will be facing worker shortages within the next several years. In an online article in TechRepublic, Joe Santana (2003) reports that there will be a huge shortage of IT workers due to the retirement of millions of baby boomers. Santana's projection is based on data provided by the Bureau of Labor Statistics. The Bureau of Labor Statistics also projects that eight of the ten fastest-growing occupations in the foreseeable future are technology-related. These job classifications include computer software engineers, applications; computer support specialists; computer software engineers systems software; network and computer systems administrators; network systems and data communications analysts; desktop publishers; database administrators; and computer systems analysts (Harper, 2003).

Although offshore outsourcing remains a threat to entry level employment opportunities, some analysts believe that the outsourcing movement is healthy because it may create more sophisticated jobs and eliminate less productive ones. These same analysts admit that many jobs remaining in the U.S. could be prone to lower wages (Paramasan, 2003). Add to this the risks involved in outsourcing because of language difficulties between customers and service representatives and the skill sets of some foreign workers. In a November 2003 announcement (Gonsalves, 2003), Dell indicated that it had withdrawn technical support for two corporate computer lines from India back to the U.S. following complaints from commercial customers. Although the going rate for a recent college IT graduate in Shanghai is 10-15% of that required in a major American city, there are also pitfalls to overcome. Training is expensive and time consuming, language is a major obstacle, and to function smoothly much support for quality assurance, documentation, and technical support is required (Evans, 2004). The salary costs are far from the total costs.

In the meantime, there are some executives such as Jamie Dimon, CEO of J. P. Morgan Chase and formerly CEO of Bank One Corporation who simply believes that technology is better done in-house. He cancelled a $2 billion IT outsourcing deal with IBM while at Bank One, and he has now cancelled a $5 billion 10 year deal with Chase and IBM. The Chase statement accompanying the cancellation stated "We believe that managing our own technology is best for the long term growth and success of our company" (McDougall, 2004).

Concurrently, another form of "homegrown IT outsourcing" is emerging as competition for those jobs going offshore. These options are sprouting up across rural America and are being referred to as "rural IT sourcing." Lower cost and underemployed workforces in rural areas have appeal to large and small companies alike. The CIO of McKesson Corporation estimates a $10 million annual savings in salary costs after relocating its primary data center and about 75 IT jobs from San Francisco to Dubuque, Iowa. Similarly, the Mattel Inc. CIO estimates a savings of 33% by outsourcing a portion of web-based software development to Jonesboro, Arkansas (King, 2005). Although the current capacity of rural sources is inadequate to compete with Wipro of India, this innovative movement may gain momentum and allow IT professionals in these areas to be paid well by local standards, and keep employment opportunities in the U.S.

Finally, there are analysts who believe that we should stop worrying about IT positions going offshore and concentrate on generating new jobs in new industries in the U.S. Investing in education and innovation and a willingness to take risks will lead to success in America. We must revive the interest in Ph.D. programs in science and engineering as the number of doctorates awarded to Americans in these critical fields has dropped by 16% since 1997 including a 25% decline in mathematics and computer science (Mandel, 2003). A Purdue University study reported to Congress that of 5,500 doctorates in computer science and engineering awarded by North American universities between 1992 and 1997, only eight were awarded to U.S. citizens. These are distressing indicators that we may face future shortages in these critical areas (Verton, 2004).

The Present and the Future

In December of 2004, the American Institute of Certified Public Accountants (AICPA) released a Top 10 Technologies list that included an unprecedented seven first-time entries. The AICPA Top 10 list along with a brief description for as follows (AICPA. Org, 2004):

1. **Information Security.** The hardware, software processes, and procedures in place to protect organizations' systems. It includes firewalls, anti-virus, password management, patches, facilities, etc.

2. **Spam Technology (new).** The use of technology to reduce or eliminate unwanted e-mail. Technologies range from confirmation of the sender via ISP lookup to methods where the recipient accepts e-mail only from specific senders.

3. **Digital Optimization (new).** Also known as The Paperless Office. The process of capturing and managing documents electronically in PDF and other formats.

4. **Database and Application Integration (new).** The ability to update one field and have it automatically synchronize between multiple databases.

5. **Wireless Technologies.** The transfer of voice or data from one machine to another via the airwaves without physical connectivity.

6. **Disaster Recovery.** The development, monitoring, and updating of the process by which organizations plan for continuity of their business in the event of a loss of business information resources due to theft, weather damage, accidents, or malicious destruction.

7. **Data Mining (new).** The methods by which a user can sift through volumes of data to find specific answers.

8. **Virtual Office (new).** The technologies, processes, and procedures that allow personnel to work effectively, either individually or with others, regardless of physical location.

9. **Business Exchange Technology (new).** The natural evolution from EDI to greater business transaction and data exchange via the Internet using datasets that are transported easily between programs and databases.

10. **Messaging Applications (new).** Applications that permit users to communicate electronically, including e-mail, voicemail and instant messaging.

The AICPA initiative also identified five emerging technologies. The expectation is that these technologies will affect businesses and individuals over the next several years. The technologies identified include the following (AICPA, Org 2004):

1. **ID/Authentication.** Verifying either the identity of a user who is logging onto a computer or the integrity of a transmitted message.

2. **Radio Frequency Identification (RFID).** RFID tags, which consist of silicone chips and an antenna that can transmit data to a wireless receiver, could one day be used to track everything from soda cans to cereal boxes. Unlike bar codes, radio tags do not require line-of sight for reading.

3. **3G wireless.** Designed for high-speed multimedia data and voice.

4. **Simple Object Access Protocol (SOAP).** A message-based protocol based on XML for accessing services on the Internet.

5. **Autonomic Computers.** Tools and strategies to manage and maintain all systems across the enterprise, including system maintenance, upgrades, automatic patching, and self-healing. This is an approach toward self-managed computing systems with a minimum of human interface.

The preceding lists may prove helpful as we proceed with efforts to update our curricula. Awareness of the technologies and emphasis on related course content in our curricula can pay handsome dividends for our students. It is healthy to have a sense of current and future market needs as we strive to retain relevance in our programs. It is also helpful to be aware of current Bureau of Labor Statistics. For example, in the eight IT job categories tracked by the Bureau of Labor Statistics, unemployment has been lowest among database administrators (1.8%) and network and system administrators (2.9%) over the last four quarters. Worst on the list were network and data communication analysts (5.2%) followed closely by support specialists (4.5%) and programmers (4.1%). At the end of the 12 months ending March 31, 2005, there were a reported 131,000 unemployed IT professionals, the lowest level since the 112,500 reported in the third quarter of 2001 (Chabrow and McGee, 2005). Recruiters have tracked the beginning of the upturn back to the summer of 2004. Lest we become too optimistic; however, many feel that a number of companies have simply decided to invest and increase beyond skeleton staffs that had been in place for the past several years.

Recommendations

As one can readily determine, we, as educators, are faced with a very complex set of circumstances. We must be prognosticators of sorts to ensure that what we teach is relevant and forward looking. We can examine the earlier stated recommendations of the AICPA, and decide whether our graduates are qualified to address some of the identified needs.

The research, however, does identify some rather specific areas of need now and for the near term future. What skills do the practitioners claim are desirable for entry level employment? Based on current research, the author of this paper will recommend those areas or practices that appear to be most promising for the immediate future.

1. At the very top of our list, our curricula should have a formidable communications requirement. A 2004 report by the National Commission on Writing reported that 33% of employees at blue chip companies can't write well. Communication skills, more so than technical skills can eventually catapult people to top management positions (Morsch, 2005). Leslie Bonner of business consulting firm Solutions 21 opines "My experience is that it's (communication skills) the number one aspect employers look for. It's just like your appearance. It's the most noticeable thing about you. If you are a poor communicator, more than likely you're not going to make it through the interview process" (McKay, 2005).

2. Emphasize project management in your program. Though project management skills have been in high demand for the past several years, the demand continues to increase. Companies realize the importance project management plays in successfully deploying technology solutions. In addition to addressing the basics of planning, organizing, staffing, and managing a series of technical tools, it's also important to address the business aspects such as business process flows, requirements gathering, user acceptance testing, and most importantly business change management (Eckle, 2005).

3. Marry IT studies with other disciplines, especially business. The goal is to develop professionals who can take a multi-disciplinary approach to solving complex problems. Tracy Nakahura, senior manager of IT at the Gap, Inc. stated "People that can bridge the communication gap between IT people and business partners-they're valuable but rare to find" (Malykhina, 2005). The marriage of technical, business, and communication skills makes for a bright future (Malykhina). This marriage of technology to other disciplines in not limited to business however, as there are equal advantages to be realized in the liberal arts, music, biology, etc.

4. Provide coverage of the security aspects of technology. Pastore (2005) reports that a potential long-term cure for the recent insecurity in the IT job market might be a job in security. In addition to being in demand, organizations are very reluctant to offshore outsource security jobs or to use temporary employees to fill these increasingly important positions (Pastore).

    Related to the demand for employees in the area of security, many organizations are taking trusted in-house people and getting them certified for security positions. There was a 185% increase in jobs that required a security clearance in 2004 (Pastore). Somewhat related is the increased demand for positions that require secure networking and Linux developers and administrators (Pastore).

    There is a direct connection between data security and availability. An increasing number of organizations are emphasizing business continuity planning and are devoting budget and human resources to enhance disaster planning and recovery initiatives (Mearian, 2005). This is another area that we may want to introduce in our programs.

5. Include coverage of IT system auditing and the Sarbanes-Oxley Act in your curriculum. Rick Stockfield, managing partner at Atlanta-based Talenthire.com indicated there is a particularly high demand for IT auditors to comply with Sarbanes-Oxley Act guidelines and also IT security experts (Hoffman). A CIO Magazine poll reported that nearly half of the large companies surveyed will divert more than 15% of their budgets to Sarbanes-Oxley compliance in 2005 (Beach, 2005). Knowledge of Sarbanes-Oxley guidelines can serve to differentiate applicants for a position.

6. Where possible, orient your curriculum toward professional certifications. Somewhat alarming to colleges and universities, some organizations are only hiring people with four year degrees and additional formal training such as certifications and credentials (Chabrow and McGee). Others suggest that job opportunities for those with training and experience in project management and business analysis techniques are very good. PMP certification awarded by the Project Management Institute would provide a significant advantage (Eckle, 2005). Dan Garrow, CIO of Mohegan Sun Casino in Uncasville, Connecticut stated "Knowing someone has at least studied the concepts and has taken the steps to obtain certifications gives that person a step over someone who hasn't" (Hoffman, 2005).

   In a survey conducted by Foote Partners LLC., with Human Resources and IT executives, it was reported that a three year downward trend in IT salaries was reversed. The overall median average pay increased 1% for 62 non-certified skills and 4% for 62 certified skills. This followed three years which saw median pay for certified skills shrinking 6% annually while non-certified declined 8% annually (McGee, 2005).

7. Use corporate advisory boards to counsel faculty about current IT needs and trends (Verton). To ensure the success of our graduates, we must eliminate the disconnect between what most universities teach and what is needed in the job market (Verton). Many regional universities are committed to keeping graduates in their geographic area by insuring entry level job opportunities. An advocate of this thinking is North Dakota's Valley City State University president Ellen Chaffee. "We talk to corporations and ask them what their entry level skills and experience requirements are so we can tailor our curriculum for our graduates to have those skills" (King, 2005). Of course, this thinking raises the age old question of whether it is our responsibility to provide a solid education for the sake of education or provide an education for the sake of securing an entry level position. This paper will not pursue this discussion.

8. Include training on change management in your program. The IT-related professions are in a constant state of change, and we as educators must be aware of those changes and react to them with appropriate curriculum revisions. More importantly, our students must be prepared to manage the change process, as technology frequently changes the way work is performed. Pearlson and Saunders (2004) stress that managers must actively manage the change process and gain acceptance for proposed changes. They present Davis' Technology Acceptance Model that advocates man-

aged involvement of employees in the development process to ensure that proposed changes will gain acceptance. Also, see number two in this list.

Conclusion

Much has been presented for your consideration in this paper. Perhaps the most significant conclusion that can be drawn is that we in the higher education community must constantly evolve our curriculum content. SAS Institute CEO Jim Goodnight advocated keeping a rather short horizon for IT. He stated: "Our horizon is about two years…if you have a big five year plan, you're going to get about halfway through and the world is going to change" (Whiting, 2004). Also, we do not want to prepare our students for jobs such as the basic programming jobs that have already been outsourced according to Patrick Hynds, CTO of Critical Sites Inc. (Whiting).

We have many areas to consider as we prepare the IT leaders of tomorrow. As the IT industry continues to mature, many jobs as we know them will go away or become commodities while new, more advanced jobs are created (Evans, 2004). Analysts are predicting that high level design and development positions will become available as low-level jobs disappear or go offshore (Verton, 2004). The need for skilled developers, researchers and project managers is not going away (Evans, 2004). To ensure success, we must continue to develop skills in problem solving, innovation, communication, and team work. Blending technology, liberal arts, and business is a very healthy approach for universities (Malykhina, 2005).

As we accept the challenge of deciding how to prepare our students to be the future leaders of the IT world, it would be helpful if we had the answer to the following two questions:
- What jobs exist today that will not exist in five years?
- What jobs do not exist today, but will exist in five years?

The technology world is certainly full of uncertainties!

References

Anthes, G. (2005). The View(s) Ahead [Electronic version]. Computerworld. Retrieved March 10, 2005, from http://www.computerworld.com/printthis/2005/0,4814,100158,00.html

Baker, S., Kripalani, M., Hof, R., Kerstetter, J. (2004). Software [Electronic version]. BusinessWeek. Retrieved March 15, 2004, from http://www.businessweek.com/magazine/content/04_09/b3872001_mz001.htm

Beach, G. (2005). Repeal Sarbanes-Oxley. [Electronic version]. CIO. Retrieved April 18, 2005, from http://www.cio.com/archive/040105/publisher.html

Betts, M. (2005). 2005 Career Planning Guide [Electronic version]. Computerworld. Retrieved April 19, 2005, from http://www.computerworld.com/printthis/2005/0,4814,101096,00.html

Chabrow, E. (2004). Services Firms Muscle Up. [Electronic version]. InformationWeek. Retrieved July 12, 2004, from
http://www.informationweek.com/shared/printableArticleSrc.jhtml?articleID=54800133

Chabrow, E., McGee, M. (2005). Good News. Great Future? [Electronic version]. Information-Week. Retrieved April 19, 2005, from
http://www.informationweek.com/shared/printableArticleSrc.jhtml?articleID=160503550

Eckle, J. (2005). Career Watch. [Electronic version]. Computerworld. Retrieved March 7, 2005, from http://www.computerworld.com/printthis/2004/0,4814,100003,00.html

Evans, A. (2004). IT Manager's Journal. Tracking the Evolution of IT. Retrieved March 18, 2005 from http://management.itmanagersjournal.com/print.pl?sid=04/08/27/209255

Gosalves, A. (2003). Dell Pulls Some Corporate Tech Support From India. TechWeb. Retrieved February 26, 2005, from http://www.techweb.com/wire/26802944

Harper, P. (2003). Will Your Job Move to India? MSN Money. Retrieved March 29, 2004, from http://moneycentral.msn.com/content/invest/extra/P62115.asp?Printer

Hoffman, T. (2004). CIOs, Recruiters Split on IT Job Prospects. [Electronic version]. Computerworld. Retrieved January 12, 2004, from
http://www.computerworld.com/printthis/2004/0,4814,97874,00.html

Hoffman, T. (2005). Demand for IT Certifications on the Rise. [Electronic version]. Computerworld. Retrieved January 12, 2004, from
http://www.computerworld.com/printthis/2004/0,4814,99903,00.html

King, J. (2005). Homegrown. [Electronic version]. Computerworld. Retrieved March 31, 2005, from http://www.computerworld.com/printthis/2004/0,4814,100632,00.html

Malykhina, E. (2005). New School of Thought. [Electronic version]. InformationWeek. Retrieved March 18, 2005, from
http://www.informationweek.com/shared/printableArticleSrc.jhtml?articleID=60400089

Mandel, M. (2003). Commentary: Meeting the Asian Challenge [Electronic version]. BusinessWeek. Retrieved March 15, 2004, from
http://www.businessweek.com/magazine/content/03_49/b3861011_mz001.htm

Mearian, L. (2005). IT Execs Must Fight for Disaster Recovery Money. [Electronic version]. Computerworld. Retrieved March 31, 2005, from
http://www.computerworld.com/printthis/2005/0,4814,100645.html

McDougall, P. (2004). Chase Cancels IBM Outsourcing Deal, True To Its President's Form. [Electronic version]. InformationWeek. Retrieved September 20, 2004, from
http://www.informationweek.com/shared/printableArticleSrc.jhtml?articleID=47208515

McGee, M. (2005). IT Paychecks Rose In 2004 After Three-Year Slump. [Electronic version]. InformationWeek. Retrieved September 20, 2004, from http://www.informationweek.com/shared/printableArticleSrc.jhtml?articleID=60404301

McKey, J. (2005). Employers Complain About Communication Skills. [Electronic version]. Pittsburgh Post-Gazette. Retrieved February 7, 2005 from www.post-gazette.com/pg/pp/05037/453170.stm

Morsch, L. (2005). Math and Science Degrees More Valuable Than Liberal Arts?. MSNCareers.com. Retrieved April 14, 2005 from http://www.msn.careerbuilder.com/Custom/MSN/CareerAdvice/513.htm

Parasuram, TV in Washington (2003). US Divided Over Outsourcing of Jobs, rediff.com. Retrieved March 15, 2005, from http://www.rediff.com/money/2003/nov/14bpo.htm

Pastore, M. (2005). Is a Job in Security the Cure for Job Insecurity?. DATAMATION. Retrieved February 26, 2005, from http://itmanagement.earthweb.com/career/article.php/3454891

Pearlson, K. & Saunders, C. (2004). Managing and Using Information Systems. A Strategic Approach. (2nd ed.). New York: John Wiley & Sons, Inc.

Santana, J. (2003). Two Steps to Protecting Your Job from Offshore Outsourcing. Retrieved March 29, 2004, from http://techrepublic.com.com/5102-6316-5074311.html

Verton, D. (2004). Anything but IT. [Electronic version]. Computerworld. Retrieved January 1, 2004, from http://www.computerworld.com/printthis/2004/0,4814,97839,00.html

Whiting, R. (2004). Industry Leaders Look To Software's Future. [Electronic version]. InformationWeek. Retrieved July 12, 2004, from http://www.informationweek.com/shared/printableArticleSrc.jhtml?articleID=54201361

Faculty Computer Fhobes Anonymous:
Helping Fearful Faculty Conquer Technophobia

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Abstract

Faculty Computer Phobes Anonymous (FCPA) consisted of a small group of self-selected, computer phobic, faculty. These individuals participated in a learning community to overcome their computer anxiety and improve their computer skills. Through a series of ten workshops over the 2004-2005 academic year, basic computer skills were acquired and fears shattered.

This session will describe the FCPA program, its workshops, how these faculty members' 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 participants.

Note: The author has not prepared a paper for this presentation. He may provide his presentation slides in print or via the web or email.

Open Source Course Management Systems: a Case Study

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Abstract

In Fall 2003, Randolph-Macon Woman's College rolled out Claroline, an Open Source course management system for all the classes on campus. This document will cover some background on both Open Source in general and course management systems in specific, discuss technical challenges in the introduction and integration of the system and give some survey and usage results over the past two years at R-MWC.

Background:

Randolph-Macon Woman's College is a four-year traditional liberal arts college for women in Lynchburg, Virginia. Founded in 1893, the college now enrolls about 760 students from 39 different countries, of which about 700 are traditional students and 60 are "Prime Time" adult learners. The college is residential and has no distance education department. A student-faculty ratio of 9:1 results in very small classes and a great deal of direct student-faculty interaction.

The college did not have a course management system (CMS) until two years ago. There was a perception by the faculty that "Blackboard was for big schools" and wasn't necessary for a college where students live on or near campus and everyone knows everyone else by their first name. On-campus demos of Blackboard and WebCT in 2002 drew some limited interest by a group of faculty, but a budget crunch during that year coupled with price hikes by the two companies left some faculty questioning the wisdom of locking R-MWC into paying a lot of money for a piece of software few people would use.

An additional complication was our use of SCT PowerCampus, the college's student information system (SIS). Neither Blackboard nor WebCT salespeople seemed knowledgeable about interfacing their products with PowerCampus, and a request for a list of schools running the PowerCampus and Blackboard/WebCT combination drew no responses from either company.

PowerCampus ships with a web interface called IQWeb, which introduced some CMS functionality in 2002 (file sharing, student mailing/announcements, gradebook). After some testing, it was determined that this package was not stable and capable enough to use for production.

Open Source Software

One of the biggest stories in computer technology over the past 5 years has been the phenomenal growth of Open Source software projects. The best known of these have been the Linux operating system and the Apache web server which have grown into serious competitors for Microsoft,

Sun and other commercial companies, but common Open Source software also includes office suites (OpenOffice), web browsers (Mozilla/Firefox), image editing programs (The GIMP) and many others.

Open Source software differs from normal commercial software only in that the human readable source code is available to the user so that they can inspect and modify it. Many Open Source projects also have computer-readable executable files available for easy installation. In contrast, most commercial companies will carefully guard the source code for their products, treating the source as a trade secret. The user receives only a computer-readable executable and may not look at or modify the internal code.

There are a number of different Open Source licenses (see Appendix 1) with some important distinctions in how the code may be used and modified. Most but not all of these packages cost nothing. (Free Software is a confusing term here-see the Appendix)

The development philosophy of Open Source is different than for closed source products. Rather than having a dedicated team of developers working at a central company, carefully managed to produce a saleable product, the Open Source ideal is that thousands of users will download and inspect the code as it is released. The users themselves will find the bugs and fix them, as well as adding features that they feel are necessary. These small fixes should occur quickly, enabling rapid and steady growth in a software package as a whole: "release early, release often". The Internet allows users distributed around the globe to collaborate almost as easily as if they were in the same room. The best known explanation of this philosophy is Eric Raymond's *The Cathedral and the Bazaar.*

Many companies are beginning to open some of their source code as part of their overall strategy. Blackboard has opened parts of their closed source CMS so that users can connect other pieces of software such as a virtual laboratory.

Open Source Course Management Systems

Over the past few years, a number of schools have written their own course management systems. Frequently, these have been treated as commercial entities, with the college spinning off the software and selling it to other colleges and universities. The best known example is Prometheus, which was developed at George Washington University. After developing the software in-house, GWU sold the software to 65 schools before Blackboard bought the project in 2002. Prometheus was itself somewhat Open Source, allowing paying customers to view and modify the source code under a model they referred to as "Community Source".

Other schools have chosen instead to develop similar products under Open Source licenses and give the code away. The best known of these is Sakai, a collaboration between Indiana University, the University of Michigan, Stanford, and MIT, supported by a large grant by the Mellon Foundation.

Open Source does not prevent these projects from going commercial. Both Dokeos and Moodle are developed by companies which sell support, customization and site hosting even though they allow the full source code to be downloaded free of charge.

Advantages to Open Source

1. Users can modify the code to support what they need.
2. Turnaround times on modifications can be much faster: no waiting for Blackboard to add a desired feature.
3. A potentially much larger development community: chances are that someone somewhere has the same problem and may have already fixed it.
4. Potentially better support: even if the support avenue is an online forum, you generally talk directly to the primary developers and not a poorly trained support technician.
5. Frequently (but not always) zero cost.

Disadvantages to Open Source

1. Features are not at the level of Blackboard/WebCT. Dokeos, for example, does not have a virtual whiteboard that may be shared by many users, and the audio/video conferencing tool is nowhere near the capability of the ones in commercial products.
2. Users can modify the software. This often means they **must** modify the software: chances are that it won't do what they want out of the box. Integration with other software products is almost nonexistent for most Open Source programs.
3. Users will require a higher level of internal support. Just running Dokeos could be done by any competent IT person, but getting around the quirks may require a trip into the database.
4. Supervisors will have a smaller pool of potential experienced workers. Placing an advertisement for a Blackboard support specialist will probably bring a number of responses. Placing one for a Sakai specialist won't, at least at this stage.
5. Documentation may be poor to nonexistent.
6. Users may have no one to blame if something goes wrong.

Implementation of Claroline at R-MWC

We began consideration of alternatives to Blackboard and WebCT after the rather underwhelming interest by the faculty left us pondering the wisdom of investing in an expensive product. I stumbled across Claroline, Moodle and .LRN while looking for other information and was interested enough to begin evaluation. (Sakai was not available at the time of our evaluation). All of these applications are in use at many large colleges and universities; a basic technical comparison between the three along with Dokeos and Sakai is shown below.

Name	Home institution	Language	Server	Database	License
Claroline	Universite Catholique de Louvain	PHP	Apache	MySQL	Gnu Public License (GPL)
Dokeos	Commercial	PHP	Apache	MySQL	GPL
.LRN	MIT Sloan	Tcl	AOL Server	Oracle or PostgreSQL	GPL
Moodle	Curtin University of Technology	PHP	Apache	MySQL or PostgreSQL	GPL
Sakai	Multiple	Java	Tomcat	HSQLdb, MySQL or Oracle	Educational Community License

In our evaluation, we focused both on possible usage as well as ease of use and support. R-MWC has a single person in charge of instructional technology who has multiple responsibilities and if we would be using a product with limited support simplicity was a major concern. Since R-MWC has no distance education courses and very small classes, a sophisticated conferencing system, advanced chat features or powerful quiz modules were not priorities. We felt that usage would primarily be document sharing, discussion forums, class announcements as well as mass email, web link management and class scheduling. Multiple language support was a major concern as R-MWC has a large international population and offers courses in 9 languages. .LRN was eliminated early on due to its additional complexity over Claroline or Moodle. Moodle and Claroline were roughly comparable at the time of evaluation: both supported the features above as well as having full translations for all the languages of interest. Claroline was eventually chosen more or less by default: it was the first test system installed and I was somewhat more familiar with it. I suspect Moodle would have been equally as effective.

Claroline presents a very simple user interface for both faculty and students. (Please note screenshots are of our current Dokeos 1.5.4 installation, not the older Claroline). On login users see a list of all the classes in which they are enrolled. Selecting a course shows a list of the available tools for that class. Faculty may activate or hide any tools they wish. Tools available in the version R-MWC is running currently (Dokeos 1.5.4) include

- Agenda: calendar items
- Announcements: class email and posting
- Chat: web based
- Conference: marries chat, audio/video streaming and document display
- Course description: online syllabus builder
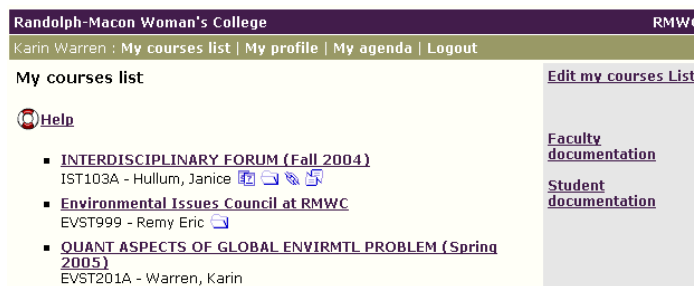
- Documents
- Discussion forums
- Dropbox: faculty and student document transfer
- Groups
- Learning Path: SCORM module import, view and build
- Links
- Tests
- User list
- User tracking

Claroline will work on any system that can run the Apache web server, MySQL database, and PHP scripting language. While some sites run it under Windows, we chose to follow the majority and run it under Unix, in our case RedHat 9.0. The server is a Penguin Computing dual Xeon machine with 1GB of RAM and 300GB disk space. This is overkill for Claroline at R-MWC; a similar size machine serves much larger schools. (Claroline scales fairly well: UCL supports more than 20,000 users on their system.) Claroline will work on virtually any browser as it makes virtually no use of Java, JavaScript, plugins or other technologies.

Two major obstacles had to be overcome before rolling out Claroline to the community as a whole

1. Claroline works on a "build it and they will come" model where faculty are responsible for creating their classes and students are responsible for enrolling in those classes. Given the relatively low interest level among the faculty, this model was not going to work at R-MWC; we needed to create all users and classes ahead of time and keep enrollment updated.
2. LDAP support was poor in Claroline 1.4, meaning that users would need to have a separate password for the system.

The open nature of Claroline made both obstacles relatively easy to overcome. For auto-enrollment, our DB admin wrote a series of views into the PowerCampus database listing current faculty, students, courses, and course enrollments and presented them as simple web pages. For user and course creation, I wrote a series of PHP script wrappers around existing Claroline code which loaded these web pages and then used the existing code to insert the items. Enrollment was handled by a custom PHP script that simply wrote the correct values for the user-course pairs directly into the Claroline database. This took less than a week of our time, even while working on other projects.

A fix for the password issue was also fairly simple. We rolled out a new campus portal (Academus uPortal from Unicon) over the same summer we launched Claroline. A primary goal of the portal was a single sign on for all major systems at R-MWC such as webmail and IQWeb, so obviously course management needed to be included as well. Our portal administrator created a channel for Claroline and had the portal pass the username and a token to Claroline when a user who had successfully authenticated against the portal requested the Claroline channel. The token is a hash based on the username as well as some secret information. I then modified the login code for Claroline to check for a valid token and bypass the login screen if the token passed.

The end result is a system that is virtually transparent to the students and faculty. When they go to the portal, clicking on the myCourses tab will immediately present them with a list of the courses in which they are currently enrolled. The system originally ran the enrollment script every morning at 3:00AM so the list is constantly updated for add/drops, although the system is fast enough that we have since gone to hourly updates- matching 750 users and 450 courses into roughly 4500 enrollments takes less than a minute. The enrollment script originally did not permit students to self-enroll into a class, but this has since been changed due to user feedback.

We made some additional changes as well, such as including pictures of all students in the user list. One notable example shows the Open Source development philosophy of user contributed code: Claroline lacked a single master list of all class agenda items for a given user, so students were stuck going to each class to see events in the agenda tool. I wrote a simple calendar function which displayed all of these items on a single master calendar with links directly to the item. I posted a comment in the Claroline forum asking if anyone else wanted the code. A number of schools as well as one of the primary developers did. I sent to code to anyone who asked, and a modified version was built into the next formal release.

Claroline was introduced to the faculty in a series of voluntary workshops before the start of the Fall 2003 semester. As the documentation from the Claroline site was for an older version of the software without some of our enhancements, I wrote a 20 page manual for the program with step-by-step instructions and screenshots and distributed paper copies to all faculty members. A shorter student manual was made available online. It took roughly 90 minutes to introduce faculty to the features of the software leaving 30 minutes or so for them to practice. Roughly half of the faculty attended one of the workshops. Faculty usage was encouraged by the college requiring faculty to post their syllabi for all of their classes online.

Overall, the introduction went fairly smoothly, but some issues cropped up early. Notable ones included:
- Claroline was limited by default to 2MB document uploads due to a setting in the PHP scripting language, far too small for faculty who quickly decided they wanted to send 100MB PowerPoint slide shows to their students.

- Something about Claroline would occasionally cause Apache to hang after a long period of use. I never located the source of the problem, but restarting Apache every morning at 2AM cured the problem. (This bug has not reoccurred since the Dokeos upgrade, coupled with an OS upgrade from RedHat 9 to Fedora Core 2).
- A bug in the way Claroline set a login cookie would have users appear to log in, but get kicked into guest mode after the login page. While isolating the bug took a morning of frustration, the actual fix turned out to be trivial (Four lines of code) and has since been included in Dokeos.
- MacOS9 users had some issues with uploading documents that did not have a file extension.

From a system administrator's perspective, Claroline was a mixed bag. The admin interface was almost nonexistent. An admin could add or edit a user and some course data, but everything else required editing the database directly. Claroline shipped with PHPMyAdmin, which is an easy to use web front end for the MySQL database, and this was the real administrator interface. Luckily the tables are quite simple to understand even if the column names are in French, but the Help Desk had to refer virtually all Claroline support calls to me since they did not feel comfortable working inside the database directly. Even so, after the initial install, configuration, and rollout the workload dropped off and it took me less than 10 hours a week to administer, fix bugs, and answer user questions.

Usage of Claroline was mixed. Eliminating courses that were automatically created but were obviously not going to have any usage (such as internships and courses with a single enrollee), 83% of courses had at least some professor-added content, even if it was just the required syllabus. 48% sent at least one announcement to the class using that tool. 39% had some content beyond the syllabus, almost always additional documents. The next most used tool, Links, was used in 11% of all courses. Those professors using Claroline beyond the syllabus-only level placed an average of 11 documents and 14 links on their pages and sent 8 announcements.

Students and faculty were surveyed at the end of the year about their opinions of Claroline. The response rate was very low for both surveys (~20%): this was the first year the survey was presented using the portal and many people did not visit the portal in time or did not understand that a survey was available, so these results may be distorted. Some results

- 89% of responding faculty rated Claroline either excellent or good.
- Tools used by more than 50% of the responding faculty were announcements, documents, links, and the user list. No faculty members used the online quiz or chat modules.
- Negative faculty feedback included a poor links tool that did not allow grouping by category and the lack of a way to easily see what the students would see if they visited the site.
- 68% of responding students rated Claroline either excellent or good; another 28% rated it so-so.
- Only 6% of responding students said their professors always used Claroline, but 23% wished they did.
- Most negative student feedback centered around two related topics:
    - "Make the professors use it"

    o   "Claroline needs to notify you when the professor posts something"

The results were encouraging enough for us to plan to use the product in the following year.

The Dreaded Fork

One disturbing note during our first year of using Claroline was the lack of updates to the software. While the 1.4.2 version we were running functioned well for the most part, I fully agreed with a number of the student and faculty complaints about limitations of the software and it was overly difficult to administer. There were few comments by the programmers on the forums and progress along the roadmap for the next version seemed to have halted. For an Open Source product that is supposed to thrive on frequent releases and upgrades, this was a serious concern.

A cryptic February email from Thomas De Praetere, the lead author of Claroline, left us even more worried. Forum postings and emails eventually cleared up the confusion: Thomas had grown unhappy with the pace of development of Claroline at UCL and had quit to form a commercial company, Dokeos, which would sell a modified version of Claroline as well as support for Dokeos. UCL would continue to develop and use Claroline. While the code bases for Claroline and Dokeos were very similar, Thomas fully expected them to drift apart in the future, making the two incompatible.

A fork of this type is not uncommon in Open Source projects. Since the code is open, major disagreements between developers tend to lead to one developer leaving the project, taking a copy of the code with them, and then modifying it the way that they prefer. One example is the BSD Unixes: the original BSD project has forked into a number of projects such as FreeBSD, NetBSD, and OpenBSD, as well as the commercial Macintosh OSX Darwin. For users this can be a difficult time since frequently one of the projects will attract the majority of developer interest, leaving the other to wither on the vine.

R-MWC eventually decided to move to Dokeos based mostly on the development speed of the project. It was clear that progress toward updated versions was occurring quickly within Dokeos, and over the past year Dokeos has evolved much more rapidly than Claroline.

The Second Year: Dokeos

Despite the name change, Dokeos was still extremely similar to Claroline internally and thus presented few problems when modifying the code to our specifications. Most of the changes from the previous year still worked, and the user interface was similar enough that few faculty felt the need for retraining: 10% of the faculty came to a pre-release demo at the end of the Spring 2003 semester and less than 20% to retraining during workshops before the start of the Fall 2004 semester.

The major Dokeos 1.5 upgrades over the previous Claroline 1.4 code included
- Better notification for students about new or updated materials in classes.
- A much improved document dropbox
- A much improved link tool that allows sorting and categories

- A "Student view" tool for faculty members
- A SCORM lesson import tool and SCORM lesson packager
- LDAP support
- Much better Cascading Style Sheet support
- A much improved admin interface

The improved CSS support has been a mixed blessing. With better CSS, we have been able to make Dokeos appear so much a native part of the portal that few students even realize they are separate products managed by different people, causing some confusion in bug and trouble reports.

In addition, we have added several additional tools directly to Dokeos this past year, including one-click access to the library's electronic reserve system for each class, a drag&drop tool for faculty to upload Smartboard and Starboard save files directly to their class pages and a gradebook module for the first year seminar course which had an exceptionally complex grading structure.

One tool that Dokeos did **not** come with was a course import tool, so that professors who taught the same course year after year would not have to recreate a course web site. The course archive feature of Claroline did not work in the automated course creation environment we use at R-MWC, so I was forced to write a small tool for faculty to import old material. This has become an issue with a number of schools and a "course import, copy and reuse" tool is slated for the 1.6 version.

From an administrative side, this year has been easier. Dokeos is completely stable, with no downtime other than for system upgrades. (Although student reports of Dokeos being unavailable continue. Strangely, these always seem to occur the day before an assignment is due, and don't seem to affect other users accessing the site at the times it was reported as down.) An improved admin interface means many fewer trips into the database, and Dokeos has even stopped including PHPMyAdmin with the package, although any serious administrative use will eventually end up in the database.

Student and faculty survey results for 2004-2005 are not available at the submission date for this paper but will be presented at the conference.

Conclusion

Overall, the introduction of Claroline/Dokeos at R-MWC has been a qualified success. The technical integration of the package into the campus went quite well, and students and faculty have been generally positive about Claroline/Dokeos. The biggest challenge is getting faculty to see the advantages of using the system in ways beyond a simple document storage area. For example, despite R-MWC having a strong focus on global studies, I have only been able to get one faculty member to use the online forum to connect to a school outside the U.S.

The original idea was to test Claroline for three years and see if we wanted to continue with the package or switch to another. Having completed two years, my opinion would be that we will

not switch to a commercial package although moving to Sakai would be a possibility, especially since the next version of our electronic portfolio (OSPI) will require Sakai to run.

Appendix 1: Open Source License Types

The terms Open Source and Free Software are highly loaded among advocates of these philosophies, often spawning some of the most boring flame wars to ever grace the Internet. However, the various software licenses that have evolved out of this debate have important ramifications as far as how people are allowed to use the software.

The Free Software movement was begun by Richard Stallman at MIT in the 1970s. "Free" here does not refer to price, but to the freedom to run, inspect, modify, and redistribute the software-- Free software does not have to be cost-free. In order to ensure these rights, he developed the Gnu Public License (GPL), which assures these rights to anyone wanting to use the software while preventing people from using the code in closed source products. The Open Source movement began in the late 1990s as an offshoot of Free Software: Open Source licenses can contain terms that are not permitted under Free Software licenses.

Free and Open Source licenses break down into two major categories, although there are almost innumerable shadings for all of these.

1. GPL-likes. These licenses allow the user to download, run, inspect, modify and redistribute the code with the caveats that the copyright information in the original must remain with the modified version and any software derived from the GPL-licensed original must be released with full source code to the modified version.
2. BSD-likes. The user can download, run, inspect, modify and redistribute the code as with the GPL provided they keep the original copyright information, but they may also modify and incorporate BSD-licensed software into a closed source product without having to make the modified source code available.

A good example of the differences between the two: the early versions of WindowsNT used network code from BSD Unix in a closed source product. This is wholly compatible with the BSD license, but not with the GPL. A college could take a GPL course management system, make substantial changes, and try to sell it, but the terms of the GPL would require the college to make the source code to the modified version available.

Moodle, .LRN and Claroline/Dokeos are licensed under the GPL. Sakai is under the Educational Community License, which allows unrestricted development and is thus more similar to a BSD license.

For more information on both approaches and license issues, see *The Open Source Initiative* and *Philosophy of the GNU Project- Free Software Foundation.*

References

Dokeos. Retrieved 31 Mar 2005 from http://www.dokeos.com/

Claroline. Retrieved 31 Mar 2005 from http://www.claroline.net/

Sakai. Retrieved 31 Mar 2005 from http://www.sakaiproject.org/cms/

Moodle. Retrieved 31 Mar 2005 from http://moodle.org/

.LRN. Retrieved 1 Apr 2005 from http://dotlrn.org/

Raymond, Eric.   The Cathedral and the Bazaar.   Retrieved 31 Mar 2005 from
        http://www.catb.org/~esr/writings/cathedral-bazaar/cathedral-bazaar/

The Open Source Initiative. Retrieved 31 Mar 2005 from http://www.opensource.org/

Philosophy of the GNU Project- Free Software Foundation.   Retrieved 31 Mar 2005 from
        http://www.gnu.org/philosophy/philosophy.html

Hands On Networking Add-Ons

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Abstract

We are always on the lookout for software that will provide students with more hands on knowledge. To that end, I propose to inform attendees of several Hands On products available for introductory Networking classes. I will show everyone how the effective use of several of these network simulator products will enable students to get a more thorough understanding of computer networking. Samples of these products will also be distributed.

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

Some Simple Free Network Scanners for Checking the Security of a Network

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Abstract

The home/work/school network connected to the Internet has become ubiquitous. At the same time, security concerns have increased dramatically in recent years. This paper (and talk) will discuss (and present) some ways in which several freely available security scanners can be used to find weaknesses in a network, as well as to better understand how networks and security work hand-in-hand. Much of the material to be presented was recently used in an information security course.

Background

The ubiquitous computer is a machine that performs computations and, for convenience, stores data (i.e., that can be interpreted as information). In order to share resources, computers are connected together as parts of networks. Information is an important resource on a network, but only one of many possible resources that can be shared. But sharing usually needs to be limited, which is the purpose of security.

The ultimate in sharing is the Internet, a global communication network that is based on the TCP/IP suite of communication protocols. TCP (Transmission Control Protocol) runs on top of IP (Internet Protocol). Packets of data are sent between computers.

The typical tiered information systems model of a web-based system consists of the following layers.

- The presentation layer consists of the web browser using HTML that is formatted and displayed to the user.
- The business logic layer consists of a web server with some form of server-side processing, such as ASP (Active Server Pages), PHP (Personal Home Page) (or the recursive definition of PHP Hypertext Preprocessor), JSP (Java Server Pages), etc.
- The data access layer consists of a database management system such as SQL Server, Oracle, etc., sometimes with a connection to a mainframe database.

Every computer on the Internet needs a unique IP address. A computer can have more than one IP address (e.g., network IP, wireless IP, modem IP, etc.), but no IP address on the Internet should be used by more than one computer at any one time.

Each computer has 65,536 possible TCP/IP ports. Some of the most common are the following.

- TELNET on port 23 (remote login)
- HTTP on port 80 (web pages)
- SMTP on port 25 (outgoing email)
- FTP on port 21 (file transfer)
- HTTPS on port 443 (secure web pages)

Server software on a computer constantly monitors these ports (usually via an interrupt mechanism) to see if there is a client computer who wants to use the services of the server computer.

The Internet has become so popular that local networks, even if not connected to the Internet, are configured as small Internets, called Intranets. Thus, an intranet is an Internet-like TCP/IP network set up within a business or home that is often protected from the outside by security features like firewalls and routers.

Since the number of IP addresses is limited, various schemes have been developed to reuse IP addresses. DHCP (Dynamic Host Control Protocol) is often used to reuse IP addresses. NAT (Network Address Translation) is often used in conjunction with Intranets (i.e., a local Internet) and DHCP, to both isolate Intranets from Internets and reuse IP addresses.

The standard IP intranet addresses are as follows.

- `10.x.x.x` (class A)
- `172.16.x.x` (class B)
- `192.168.1.x` (class C)

Firewalls

For home users connected to the Internet via high-speed Cable Modem or DSL (Digital Subscriber Line) phone access, security can be a problem as computers left on are always connected to the Internet, even when no one is using them who might otherwise notice if something unusually is happening, such as a hacker attack.

The common solution is that, between the presentation layer and the business logic layer, a firewall is placed that only allows certain TCP/IP messages to pass through the firewall. The Internet is outside the firewall while the local intranet (or just the one computer) is inside the firewall. Of course, there are more sophisticated configurations where more than one firewall is used, but that is beyond the scope of this discussion.

Typically, a hardware firewall protects well against outside threats such as network scanners outside the firewall while a software firewall protects against (new) programs running on the computer from getting out, or accepting outside requests, without permission.

A free, for individual noncommercial use, firewall software program that the author uses is ZoneAlarm available at http://www.zonelabs.com. You might have to look around for the free

version as most sites do not make it easy to find the free version; they hope you will go for the upgrade. Windows XP, SP2 (Service Pack 2), includes a built-in firewall. Such software will not only help protect your computer, it will make you more aware of what a firewall program does and how it does it. From Internet research, it appears that you should definitely not use both firewalls at the same time, and as of Spring 2005, the ZoneAlarm firewall was the better choice. Be aware that the XP firewall is turned on by default, so you will want to turn it off if you install another firewall.

Installation of a Cable/DSL router, such as one from LinkSys, at http://www.linksys.com, Net-Gear, at http://www.netgear.com, etc., typically provides NAT to isolate the internal home intranet from direct unsolicited access from the Internet. Most newer routers feature a hardware firewall, as well as other security features. However, if you connect the Internet from the intranet, the connected site can communicate back to the site that initiated the communication. Most companies and academic institutions use NAT to isolate the intranet from the Internet. In most cases, direct access to SQL Server is only allowed from within the firewall (i.e., on the intranet). Thus, users outside the firewall cannot directly access SQL Server. Instead, the firewall allows traffic on the `http:` port (port `80`) and the `https:` port (port `443`) to pass through the firewall in both directions. Often, some other ports (e.g., email) may also allow messages to pass.

Most hardware firewall routers provide an option to email security logs on a regular basis. Typically, logs are sent on each event, once a day, etc., as specified by the administrator. Here is a (typical) log from a NetGear firewall router. Notice that every few minutes there is a probe from some other computer.

```
Begin of Log ----------
Sat, 09/27/2003 07:37:30 - TCP connection dropped -
   Source:81.52.249.113, 443, WAN -
   Destination:199.222.138.2, 3057,
   LAN - 'Suspicious TCP Data'
Sat, 09/27/2003 07:42:01 - TCP connection dropped -
   Source:161.114.19.93, 80, WAN -
   Destination:199.222.138.2, 3062,
   LAN - 'Suspicious TCP Data'
Sat, 09/27/2003 07:47:36 - TCP connection dropped -
   Source:207.68.178.238, 80, WAN -
   Destination:199.222.138.2, 17336,
   LAN - 'Possible Port Scan'
Sat, 09/27/2003 07:50:22 - TCP connection dropped -
   Source:199.77.203.33, 80, WAN -
   Destination:199.222.138.2, 17280,
   LAN - 'Possible Port Scan'
Sat, 09/27/2003 08:11:44 - UDP packet dropped -
   Source:165.166.15.70, 53, WAN -
   Destination:199.222.138.2, 60485,
   LAN - 'Suspicious UDP Data'
End of Log ----------
```

Here are some of the IP source locations (some redundant ones were removed from the listing). The location of the computer/firewall was Rock Hill, SC.

- 81.52.249.113: Amsterdam, Netherlands
- 161.114.19.93: Palo Alto, CA (Hewlett-Packard)

- 207.68.178.238: Redmond, WA (Microsoft)
- 199.77.203.33: Broomfield, CO (Level 3 Communications)
- 165.166.15.70: Fort Mill, SC (Info Avenue Internet Services)

Some of these requests might be reasonable, from companies tracking computers, but other requests are probably from users running scanning software to look for certain things. A convenient place to find the (probable) location of an IP address can often be found from a web site such as http://www.networksolutions.com [as of Fri, Apr 29, 2005].

Network access

"Security is a process, not a product." [3, p. 84]. Security involves the human factor and is only as strong as the weakest link. A common example is the use of password protected resources. The strongest cryptography will not help if a user compromises their password.

So, who has access to your network? And, how would you know? From the above discussion, there are several ways an attacker can gain access to a network.

- An attacker can attack from outside the network (i.e., outside the firewall).
- An attacker can attack from inside the network (i.e., inside the firewall).

An attacker can use any publicly available Internet WHOIS utility to find out information about a given IP address. But what can the attacker see at that IP address? A firewall lets one monitor what comes into and out of the network.

An IDS (Intrusion Detection Service) can help determine when a computer has been accessed. The following are possible errors in the context of an intrusion detection system.

- A type I error is that an alarm is sounded, but there is no intrusion.
- A type II error is that no alarm is sounded, but there is an intrusion.

To determine what can be seen from a given point on the network, to help determine how well an IDS is working, and to learn more about your network in general, a port scanner can be used.

Port scanners

A port scanner scans a range of IP addresses in an attempt to gather information about the IP addresses in that range. Keep in mind that hackers use port scanners from outside the network. Most firewalls and IDS's can either minimize or prohibit this problem. This is often done with NAT filtering, closing ports, etc.

However, many security problems come from within the network. This means that uncooperating users on the network might be scanning the network. Or, it means that cooperating users on the network might have inadvertently downloaded and/or installed malicious software (e.g., from the Internet) that might scan the network and report back the results to a site outside of the network. Remember that it is usually easier to move information from within the firewall to outside of the

firewall (and network) than it is to get information (e.g., code) from outside of the firewall to in-side the firewall. Unless, of course, uncooperating or cooperating users assist in the process.

A port scanner will attempt to contact computers at various IP addresses. These IP addresses can be specified or selected at random. For each IP address selected, the ports to check can be specified or selected at random.

A common process called footprinting or fingerprinting is used to determine which server software might be running on a computer at a given IP address. Most server software uses standard ports. For example, SQL Server, by default, uses port 1433. Each server uses a pre-determined protocol at each port. For publicly available server software, this protocol is known. Port scanners will check such known ports in an attempt to what server software is running at which ports.

Once server software is identified running at a given port, the version and type of that software is determined. Once the version and type of that software is determined, an attempt can be made to exploit the known bugs for that server software.

On occasion, a trap will be set for hackers. The trap is called a honey pot. A honey pot will attempt to look like server software that is operating on a given port on a given machine at a given IP address, but in reality sets off a silent alarm when a hacker (or port scanner) attempts to access it. The legal implications can be compared to setting a trap for an intruder in that the intruder may claim liability for injury if the trap injures the intruder. Such legal implications are beyond the scope of the current discussion.

Some free port scanners are now discussed. As a minimum, the discussion should show how easy it is to acquire and use port scanners, for friends and foes alike. Remember that such port scanning functionality can be built into hacker software that is downloaded and run, with or without the users' knowledge.

WinPcap, at http://winpcap.polito.it/ [as of Thu, Oct 14, 2004], is a free packet capture architecture for Windows. It is required for many of the free scanners to run properly. It appears to have been intentionally broke by Microsoft in the SP2 upgrade to Windows XP, but a work-around has since been done.

Raw Logic Software

Raw Logic Software has several products in the network security area. One of these products is NetBrute, which is free. The NetBrute scanner includes NetBrute, PortScan, and WebBrute. The download and installation is straightforward. Once installed and started, the easiest way to start using NetBrute is to use the "**NetBrute**" tab.

NetBrute allows you to scan a single computer or multiple IP addresses for available Windows File & Print Sharing resources. This is probably one of the most dangerous and easily exploitable security holes. It is common for your novice users to have their printers or their entire hard drive shared without being aware of it. This utility will help you to

find these resources, so you can secure them with a firewall or by informing your users how to properly configure their shares with tighter security.
   http://www.rawlogic.com/products.html [as of Sun, Sep 05, 2004]

Here is how to start using this part of NetBrute.

- Select "**Get IP**" to get the IP of the computer NetBrute is being run from.
- Select the up arrow to set the "**Range**" parameters to this computer.
- Select "**Scan**" to scan this computer.

By default, the NetBrute port scan will be done on port 139 which is the netbios-ssn port, which is used for Windows file and print sharing. The results might appear as follows (check the box for "**Report View**" to get the text for the report).

```
192.168.0.201
  E$:Default share
  D$:Default share
  D:
  XPM:
  F$:Default share
  E:
  ADMIN$:Remote Admin
  C$:Default share
```

Note the intranet IP address. Note also the use of naming shares with the suffix of the dollar sign "**$**". This makes it harder to see those shares from the network (i.e., you, or the software, would have to guess the name of the share which may not be easy). Of course, they can be easily seen when running NetBrute from the computer on which they reside.

To extend the search, modify the upper and lower IP "**Range**" settings and select "**Scan**". For example, the above instructions would set the upper and lower settings to 201. To expand the settings set the lower setting to 1 and the upper setting to 254 (note that 0, all zeros, and 255, all ones, are reserved and can be included or excluded from the scan).

The larger the search area, the longer the search will take. Unless the scan is randomized both in time and space, the scan should be easily detected by most IDS's. More sophisticated scanners (i.e., those used by hackers) would be more versatile in their scanning.

To scan ports in general (i.e., more than just port 139), select the "**PortScan**" tab.

   PortScan allows you to scan a single computer or multiple IP addresses for available Internet services. This will allow you to identify which TCP ports need to be blocked by your firewall, if you wish to secure them. Or it will allow you to identify unused services that are running, so they can be stopped http://www.rawlogic.com/products.html [as of Sun, Sep 05, 2004]

The same methods can be used, but additional ports can be scanned. An interesting exercise is to run PortScan on your own computer and then identify every port being used and what is being done on that port. For example, the following ports were identified when scanning self-scanning.

```
192.168.0.201
192.168.0.201    #7
192.168.0.201    #9
192.168.0.201    #80
192.168.0.201    #1032
192.168.0.201    #2107
192.168.0.201    #2869
```

Port 80 is the web port. Port 7 is the echo port. Port 9 is the discard port. A web search did not reveal the true purpose some of the other ports. An Internet search for "**tcp ports**" revealed the following at http://www.iana.org/assignments/port-numbers [as of Fri, Mar 18, 2005].

```
Abbreviation Port Information
------------ ---- -----------------
echo            7 Echo
discard         9 Discard
http           80 Word Wide Web HTTP
iad3         1032 BBN
bintec-admin 2107 BinTec Admin
icslap       2869 ICSLAP
```

If you are running a web server on a computer where users can create and maintain web sites, the WebBrute part of NetBrute will attempt to guess user passwords. This option can put a load on the web server, but can be useful in certain circumstances (i.e., those listed above).

Nmap and NWinMap

Nmap, for "**Network Mapper**", from http://www.insecure.org/nmap/ [as of Wed, Sep 08, 2004], is a free open source utility for network exploration and/or security auditing. There is a wealth of useful information at this web site.

> *Nmap ("Network Mapper") is a free open source utility for network exploration or security auditing. It was designed to rapidly scan large networks, although it works fine against single hosts. Nmap uses raw IP packets in novel ways to determine what hosts are available on the network, what services (application name and version) those hosts are offering, what operating systems (and OS versions) they are running, what type of packet filters/firewalls are in use, and dozens of other characteristics. Nmap runs on most types of computers and both console and graphical versions are available. Nmap is free software, available with full source code under the terms of the GNU GPL.* http://www.insecure.org/nmap/ [as of Wed, Sep 08, 2004]

Nmap runs primarily only under UNIX systems such as Linux. A port of Nmap for Windows is called NMap (command line) and NMapWin (GUI).

NMap runs from the command line, which is useful for automation purposes. NMapWin runs using a GUI (Graphical User Interface), which is convenient for interactive use. Note that during Spring 2005, NMapWin was considered out-of-date from the updated NMap. After starting NMapWin, select "**Help**" to get more information on using NMapWin.

NMapWin allows the selection of options to NMap in a graphical way. When a "**Scan**" is done, the command line is displayed at the bottom left under "**CMD:**". The output of the command is shown in the "**Output**" window.

If the `nmap` command is taking too long to complete, and you wish to stop before it is done, select "**Stop**". Here are some examples. They are just examples, and will not necessarily work on your network. For example, you will have to adjust the IP range for your network.

I selected a scan of "**Host:**" IP `192.168.0.201`. Under the "**Scan**" tab, I selected a "**Mode**" of "**List Scan**". I selected "**Scan**". Here is the command line under "**CMD:**".

```
CMD: nmap -sL -PT -PI -O -T 3 192.168.0.201
```

Here is the output from the "**Output**" window.

```
Starting nmap V. 3.00 ( www.insecure.org/nmap )
Host ACER2000 (192.168.0.201) not scanned
Nmap run completed -- 1 IP address (0 hosts up) scanned in 0 seconds
```

The output tells me that there is a computer at IP address `192.168.0.201` called `ACER2000`.

To copy the output to the clipboard as text, right-click on the "**Output**" area and select "**Select All**", then right-click on the "**Output**" area and select "**Copy**".

Selecting a "**Host:**" IP of `192.168.0.*` resulted in the same information, but took `90` seconds. In the above output, I knew that the only other computer on the network was at `192.168.0.201`, which took `2` seconds.

On the "**Win32**" tab, select "**List Interfaces**". Here is the command line.

```
CMD: nmap --win_list_interfaces
```

Here is the output.

```
Available interfaces:
Name        Raw send   Raw recieve  IP
loopback0   none       none         127.0.0.1
eth0        none       none         0.0.0.0
eth1        winpcap    winpcap      0.0.0.0
eth2        winpcap    winpcap      192.168.0.200
```

On the "**Scan**" tab, I selected "**SYN Stealth**", "**Scan**". Here is the command.

```
CMD: nmap -sS -PT -PI -O -T 3 192.168.0.201
```

Here is the output.

```
Starting nmap V. 3.00 ( www.insecure.org/nmap )
Interesting ports on ACER2000 (192.168.0.201):
(The 1584 ports scanned but not shown below are in state: closed)
Port        State       Service
```

```
21/tcp      open        ftp
25/tcp      open        smtp
80/tcp      open        http
119/tcp     open        nntp
135/tcp     open        loc-srv
139/tcp     open        netbios-ssn
443/tcp     open        https
445/tcp     open        microsoft-ds
563/tcp     open        snews
1025/tcp    open        NFS-or-IIS
1026/tcp    open        LSA-or-nterm
1030/tcp    open        iad1
1033/tcp    open        netinfo
1433/tcp    open        ms-sql-s
3372/tcp    open        msdtc
6667/tcp    open        irc
6668/tcp    open        irc
 Remote  operating  system  guess: Windows Millennium Edition (Me), Win 2000, or
WinXP
   Nmap run completed -- 1 IP address (1 host up) scanned in 2 seconds
```

Here is the "**Scan**" for "**FIN Stealth**". Here is the command.

```
    CMD: nmap -sF -PT -PI -O -T 3 192.168.0.201
```

Here is the output.

```
   Starting nmap V. 3.00 ( www.insecure.org/nmap )
    Warning:   OS detection will be MUCH less reliable because  we did  not  find at
least 1 open and 1 closed TCP port
   All 1601 scanned ports on ACER2000 (192.168.0.201) are: closed
   Too many fingerprints match this host for me to give an accurate OS guess
   Nmap run completed -- 1 IP address (1 host up) scanned in 5 seconds
```

Here is the "**Scan**" for "**IP Scan**". Here is the command.

```
    CMD: nmap -sO -PT -PI -O -T 3 192.168.0.201
```

Here is the output.

```
   Starting nmap V. 3.00 ( www.insecure.org/nmap )
    Warning:   OS detection will be MUCH less reliable because  we did  not  find at
least 1 open and 1 closed TCP port
   Interesting protocols on ACER2000 (192.168.0.201):
   (The 250 protocols scanned but not shown below are in state: closed)
   Protocol   State       Name
   1          open        icmp
   2          open        igmp
   6          open        tcp
   17         open        udp
   47         open        gre
   Too many fingerprints match this host for me to give an accurate OS guess
   Nmap run completed -- 1 IP address (1 host up) scanned in 10 seconds
```

Languard

The Languard Network Scanner, at http://www.gfi.com/languard/ [as of Tue, Sep 14, 2004], is another free scanner that can be used for network enumeration purposes.

Summary

This paper has discussed various security aspects of port scanners, and some freely available port scanners.

References

[1] Klevinsky, T., Saliberte, S., & Gupta, A. (2002). Hack I.T.: security through penetration testing. Boston: Addison-Wesley.

[2] Scambray, J., McClure, S., & Kurtz, G. (2001). Hacking exposed: network security secrets and solutions, 2nd ed. Berkeley, CA: Osborne/McGraw-Hill.

[3] Schneier, B. (2000). Secrets & lies: digital security in a networked world. New York: John Wiley & Sons, Inc.

[4] Snyder, R. (1994). Proactive approaches to information systems and computer security. Proceedings of the 27th Annual Conference of the Association of Small Computer Users in Education. Myrtle Beach, SC.

[5] Snyder, R. (2001). Computer and information security considerations for installing and running Microsoft Internet Information Server and Microsoft SQL Server. Proceedings of the 34th Annual Conference of the Association of Small Computer Users in Education. Myrtle Beach, SC.

[6] Whitman, M., & Shackleford, D. (2003) Hands-On Information Security Lab Manual. Thompson Publishing.

A Study of Power of Electronic Mail (email) in Students' Assessment

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Abstract

This paper presents the results of a comparative study of students' performances in two larger sections, approximately fifty students, of a computer course at Claflin University. Electronic mail (email) was the teaching mode of one section that is called email section. The other section dealt with the regular conventional method of teaching, called face-to-face section. In email section of the class, students received the class assignments, lecture notes, and other teaching materials through email from the faculty. In addition students were required to turn-in all the required assignments through email within a specific time. Significant differences in students' performances and class participations were noticed in the email-version section.

Note: The author had not submitted his paper at the time the proceedings went to press. He will bring copies to the presentation or make them available via the web or email.

Offshore Outsourcing Drives Curriculum

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Introduction

Introduction to Application Development was completely reworked. Less emphasis was placed on programming and more emphasis on developing and communicating user requirements. Many items used in training industry were incorporated into the CPT 180 course. The paper will detail the change in focus in this course and overall how our curriculum is being transformed.

In this paper I would like to take a look at offshore outsourcing and the effect it has on curriculum in higher education. I will review offshore outsourcing's history and trends that will play a role in shaping our curriculum in years to come. Specifically, I will look at our CPT 180 Introduction to System Development course and review the changes we've made in the last year. I'll discuss how they reflect the skill set that will be needed in the IT world in the years ahead. I will also take a look at our curriculum as a whole and how it may change in the future.

Offshore Outsourcing Overview

Offshore outsourcing has been extremely visible in the last several years with an economy that has slowed after the boom of the 1990s and the well publicized loss of high paid white-collar jobs. Last year's presidential election only added to the publicity as candidates made the topic a subject for debate throughout 2004. What is meant by offshore outsourcing? According to Centipedia.com, offshore outsourcing can be defined as:

> "The practice of hiring an external organization to perform some or all business functions in a country other than where the product will be sold or consumed. It can be contrasted with offshoring, in which the functions are performed by a foreign subsidiary of the parent company"

Even though there has been a raised awareness about offshore outsourcing in the last several years it is not new to the United States. Outsourcing has a long history in the United States dating back hundreds of years when the making of covered wagon covers was outsourced to Scotland. In the 1970s accounting, payroll and word processing were outsourced, generally only as far as another state. It wasn't until late 1980s and early 1990s that offshoring started taking off (Kelly).

According to Centipedia.com jobs that are offshore-able include some of the following traits:

- Don't require customer interaction
- Can be teleworked
- Has high information content
- High wage difference between original and offshore country
- Work is repeatable

Looking at the list, it is apparent many jobs in IT are "offshore-able" candidates. The big impetus for US companies to offshore outsource is the cost savings. In the aftermath of 9/11 and the recession, companies have been looking at ways to help their bottom line. With computer networks stretching to the farthest reaches of the world, it truly is a global economy. IT is an area where costs can be cut. In 2003 the average salary of an Information Technology worker was $8,593 in India compared to $80,286 in the United States (Niederman 2004). India is producing over three million college graduates a year which continues growing.

Trends

Sources such as Gartner and Forrester Research take somewhat different views from the United States Labor Department on the number of jobs lost and anticipated losses in the years to come. A 2004 Labor Department study states that very few job losses in the United States can be blamed on outsourcing. They found less than 2% of the jobs lost in the first quarter of 2004 could be attributed to outsourcing with the hardest hit areas being the Midwest and South. There is some evidence to support that the data was flawed according to experts interviewed in the Washington Post and Wall Street Journal. They site a small sample size and the inclusion of larger companies that laid off 50 or more workers as contributing to the inaccuracy (Webb 2004). Data from Forrester Research estimates 400,000 jobs had moved abroad by 2003 and forecast that number would hit over three million in the next ten years. The debate continues as to the magnitude of offshore outsourcing, who wins and loses, and the long term effect to the American economy. We know that it is not likely to go away in the near future.

In presenting my paper "A Follow up: Developing Growing Need for Soft-Skills in IT Professionals" at the 2004 ASCUE Conference I posed the question about declining enrollments in computer programs. Only one person in attendance said their program was increasing their enrollments. Numbers in our Computer Technology Program (CPT) at the Columbus campus have declined 25-30% over the last several years. Although, these are not scientific studies, a recent study published indicated the number of declared majors was down 23% in the 2002-2003 school year (Schoenberger 2004). This has not escaped industry leaders such as Bill Gates at Microsoft. In February 2004, Gates toured some of the more prestigious universities in the area of computers and technology in an effort to generate interest in computer programs. In a telling interview during the tour Gates mentioned several reasons he felt enrollment was declining, including the fact that he believes the industry doesn't do a good job pointing out that IT jobs are very social, involving collaboration, project management and are not always the hard-core coding stereotype (Ricciuti 2004). In a recent Computer World survey of IT professionals only 19% felt colleges and universities were preparing students for the IT jobs of today and 15% believe colleges and universities are preparing students for the IT jobs in the near future. In that survey the most needed skills included communication/people skills, business skills, hands-on experience and project management (Hoffman 2003). In my paper I presented last year I detailed a pro-

gram that Purdue University developed for Cummins Inc. a Fortune 500 company. The program was in response to a desire to retool some of Cummins' existing IT staff that was being displaced by outsourcing. Instead of programmers, Cummins wanted to retrain employees and place them in positions as Business Analysts. Many of the skills lacking in the aforementioned survey were the skills that Cummins requested we include in the training program.

In order for programs to survive they cannot ignore offshore outsourcing. It is apparent this trend will not go away at least in the near future. If we look at industry as one of our customers we need to provide a product that they will want to buy. Based on some of the items I've just presented, it appears in some cases we are not always doing that. As Bill Gates noted, we need to look at selling the social aspect of it when selling programs to potential students and develop those skills for industry. I would like to discuss what we have done in one of the introductory classes in our program which I believe is on the right track.

Curriculum Changes

First a little background. Our program is in Purdue University's College of Technology. The Computer Technology (CPT) program's goal is to prepare students for careers in the application of information systems. Students can focus in several areas, including networking, database, systems analysis and programming. Our program is not Computer Science or part of a Business program. Part of our department's mission is to engage and develop partnerships with business, industry, and government. These groups are important for our survival and we try to work with them to supply their needs.

Our CPT program assumes that students come in with basic computer skills that consist of using the operating system, word processor, etc. In the first semester our students take a CPT 180 Introduction to Systems Development. This class was offered for the first time in the Fall 2004 semester. It was revamped from the previous class CPT 172 Introduction to Application Development. Over my ten years with Purdue University this course has gone through numerous changes but has typically focused on programming whether it be in Microsoft Access or using straight SQL. The course description for the old course was:

> *CPT 172 Introduction to Application Development* - This course introduces the development of information systems through the use of a database. Topics include business information systems, system and application development, database management systems, problem solving, logic, data types, and programming using database technology. Given a database design and application requirements, students design, construct, and test a personal computer information system.

The CPT 172 class was definitely focused on the programming side. Looking at the topics of the nine labs assigned in the Spring 2004 offering you see the emphasis of the lab portion of the class:
- Lab 1 Create a database
- Lab 2 Query a database
- Lab 3 Maintain a database
- Lab 4 Create Forms and Reports

- Lab 5 Create a subforms
- Lab 6 Create switchboards
- Lab 7 Web features and integrating with other products
- Lab 8 Introduction to SQL
- Lab 9 Additional SQL

In the lecture portion of the class a variety of topics were discussed such as:
- Introduction to information systems
- Technology foundations
- Networks
- Security
- Transaction processing systems
- Decision Support and Expert Systems
- Database management
- System Development Life Cycle
- Context data flow diagrams
- Entity relationship diagrams

A common complaint among students was that there was a disconnect between the lecture and lab section of the course. Many students perceived the course as Microsoft Access class. When reworking the class faculty members tried to make the class more integrated and have less emphasis on the programming.

The new class CPT 180 Introduction to Systems Development has the following course description:

> *CPT 180 Introduction to Systems Development* - This course introduces information systems development. Topics include types of information systems, system development, database management systems, and problem solving. Students will read/create UML, ERD, and data flow diagrams to model information system objects, data, processes, and logic. Labs emphasize modeling and SQL/QBE querying to prepare students for later systems, programming, and database classes. Given user requirements students will design, construct, and test a personal computer information system.

Although the course descriptions are still somewhat similar there definitely was a difference in focus. Looking at the topics of the labs assigned in the Fall 2004 offering you a much wider emphasis in the lab portion of the class:
- Lab 1 Introduction to Information System Concepts
- Lab 2 Context System Modeling
- Lab 3 Deployment Diagrams
- Lab 4 Use Cases and Activity Diagrams
- Lab 5 UML and Class Diagrams
- Lab 6 Data Attribute Discovery and Modeling
- Lab 7 Entity Relationships and ERDs
- Lab 8 Database Design
- Lab 9 Single table SQL query

- Lab 10 Query by Example
- Lab 11 Designing Forms
- Lab 12 Designing Reports

In the lecture portion of the class a variety of topics were discussed but there was a much more concerted effort to align lectures with lab topics. Some of the topics discussed in the lectures included:

- System planning and information system architecture
- System development methodologies and tools
- Determining user requirements
- Object-oriented analysis and design
- Data concepts and conceptual data modeling
- Designing databases
- Process modeling
- From analysis to design
- Output design and prototyping
- Implementation and support

What you see when you look at the content is much more variety in the course. In the CPT 172 course all nine of the labs dealt with some form of programming or working with Microsoft Access. As the students said the lab portion was truly an "Access" class. Comparing that with CPT 180 only four of the twelve labs could be classified that way and even in several of those labs the topics of prototyping and design of reports and forms was incorporated. Although the students come out of the lab portion with emphasis on programming they are getting a much wider use in skills that will be useful in communicating with users and developers. The topics of Use Case, UML, Activity Diagrams, Class Diagrams and the Context Data Flow Diagrams along with Entity Relationship Diagrams exposes the students to a wide variety of tools. We don't expect mastery of all these but the exposure will be beneficial in the upper level classes our majors will encounter later in their academic careers. In the lecture portion of the class you see the same approach with a much more integrated lab and lecture.

The general consensus among faculty and students was that the class was a success. At the end of the semester faculty members for the main campus and four regional campuses met to discuss the class. There were minor problems but the overall feeling was the class was an improvement over the old course and we were heading in the right direction. The major problem was trying to find a suitable textbook with minor issues as to sequencing content and trying to fit the topics into the allotted time. Students seemed to be satisfied with the class although a few wanted write more code. The major complaints was that the textbook was too difficult and the software used Microsoft Visio which couldn't be bought with there student discount so they were forced to do their labs in university labs.

There is another advantage to the content change in our CPT 180 course. This course acts as a service course at the university. Undecided students and students in other majors will regularly take this course. A common complaint in the past was that these students didn't want to do the programming. With the change we are exposing additional students to our change in focus, hopefully exposing students to the fact that the communication skills are important in an IT career and

that it is not just for "geeks". In the past we have had students who would take the introductory class and decide to switch to our major. This new class will hopefully shed a more positive light on our degree and potentially lead to recruiting a few more students in the form of transfers.

Link to Outsourcing Needs

If you compare the CPT 180 content with content of the course we developed for Cummins and detailed in last year's paper you will notice a striking similarity. Following are the main topics covered in that course:

- The Context of Systems Analysis and Design Method
- Information Systems Building Blocks
- Communicating with the Systems Team
- Team Building with the Systems Team
- Information Systems Development
- Project Management
- Systems Analysis
- Fact-Finding Techniques for Requirements Gathering
- Modeling Systems Requirements
- Data Modeling and Requirements
- Process Modeling
- Feasibility Analysis and the System Proposal
- Object-Oriented Analysis and the Modeling using the UML
- Database Design

And, as I mentioned in last years paper, communication and team building was integrated throughout all of the topics discussed so it played a major role in the class. This curriculum was developed by Purdue faculty working with Cummins training coordinator, Cummins IT managers, developers, analysts and Cummins offshore contractors. The goal was to retool the Cummins workers to make offshore outsourcing a success. The course was designed for employees who had careers as Programmers and would be transitioning over to Business Analyst positions. At this time we have delivered five sessions with over 10% of Cummins worldwide IT staff having taken the course with very positive remarks coming back from attendees, offshore outsourcers and management.

Overall Curriculum Trends Based on Outsourcing

From the National Workforce for Emerging Technologies (NWCET) in their Executive Summary of Trends Assessment 2005 they list some interesting trends:

- Seven of the thirty fastest growing occupations are computer related
- Jobs will require IT professionals to focus the applications (healthcare, finance, commerce, etc) rather than the technology
- IT employees will need to be cross-disciplinary
- Outsourcing and a tighter job market will allow companies to look for more work experience, and higher levels of education.

Also, in the NWCET Trends Assessment 2005 they recommend existing IT programs at universities to:

- Offer advanced programs and baccalaureate degrees
- Emphasize applications in IT programs
- Include practical experience and internships
- Integrate soft skills and technical skills into the curriculum
- Integrate collaborative work skills into the curriculum

It appears that IT jobs are not going away but the boom that our programs experienced in the past is gone, at least for the time being. In order to make our students employable we need to get students work experience, incorporate more soft-skills , include more application areas to give students a niche and offer advanced degrees in an attempt to differentiate our students.

CPT Changes

The vision of the Computer Technology Department is to be recognized as a leader of information systems and technology education. In this attempt we find that the curriculum is ever-changing and we are continually looking for ways to improve our product. In this effort there have been several changes or suggested changes to our curriculum at Purdue University. Several of these are in line with NWCET Trends Assessment 2005. Included are:

Until this past year, students chose one of four tracks to focus in: networking, database, systems analysis, or programming and their junior and senior level classes were predominately in that area. This past year database, systems analysis and programming were combined. This gives students a better opportunity to pick and choose classes to fit their interests and scheduling needs.

Another change is that in the past the main campus at West Lafayette and the regional campus in Columbus were the only sites to offer the baccalaureate degree in CPT, with South Bend, Anderson and Kokomo offering the associates degree. The department has made the decision that all sites should seek approval to offer the BS degree effectively eliminating direct competition with the community college system in an effort to differentiate ourselves and students. This past spring the Kokomo campus was granted permission to offer the BS program.

Several recent hires/job postings in CPT indicate a desire to find niche application area experience with healthcare and computer forensics as part of the work experience mentioned in the job descriptions.

Several suggestions that were brought up in recent meetings but have not had any action taken on them as of yet include:

- Having a Master program in Computer Technology, currently students can get a MS in Technology but not specifically in CPT.
- Doing more with internships

Conclusions

With the IT workforce being affected by offshore outsourcing in a negative way it is inevitable that the university programs like our CPT programs will be affected. The university needs to be a source for supplying industry the needs for an ever-changing workforce. We need to provide students with the skills that will allow them to get jobs in their chosen career path. This will inevitability lead to constantly tweaking the curriculum. In this paper I have discussed one small effort on our part to change an individual class. These changes reflect the changing landscape influenced by the recent emphasis on offshore outsourcing. The effort is to introduce students to those skills, mainly skills to communicate with users and programmers as opposed to our previous class that had heavy emphasis on programming, specifically one of the skills being outsourced. It is too early to tell how successful we will be, but early indications are we are moving in the right direction.

References

Centipedia online encyclopedia. www.centipedia.com

Hoffman, T. (2003, August 25). Job Skills: Preparing Generation Z. Computerworld [on-line].

Kelly, T. A Brief History of Outsourcing. http://www.globalenvision.org/library/3/702/

Niederman, F. (2004). IT Employment Prospects in 2004: A Mixed Bag. Computer, 37,1, 69-77.

Perez, J. C. (2003, January 30). Gartner: Offshore outsourcing gains steam Computerworld [on-line].

Ricciuti, M. (2004, March 1). Gates goes to college. CNET News.com. http://earthlink.com.com/2008-7345_3-5167499.html

Royer, M. (2005) Applications of Information Technology: Trends Assessment for 2005. Executive Summary, National Workforce Center for Emerging Technologies (NWCET), Bellevue, WA.

Schoenberger, K. (2004, March 24). U.S. students shun computer sciences. The Mercury News. MercuryNews.com [on-line].

Webb, C. L. (2004, June 11). What Outsourcing Problem? Washington Post. [on-line]

Sinclair Curriculum eXchange (SCX): Sharing Learning Resources to Improve Part-Time Instruction

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Abstract

Sinclair Community College has been awarded a National Science Foundation grant to improve the quality and consistency of instruction across multiple course sections taught by part-time faculty. Sinclair Curriculum eXchange (SCX), an online repository of learning objects (LOs) will be developed and used to deliver a consistent set of pedagogically sound teaching materials to introductory Computer Information Systems (CIS) students.

Note: The author had not submitted her paper at the time the proceedings went to press. She will bring copies to the presentation or make them available via the web or email.

E-Portfolios in Teacher Education Using TaskStream

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Having strong commitment to authentic assessment and use of digital student teaching portfolios for teacher candidates does not by itself result in a successful digital portfolio program. Teacher Education faculty at the University of Indianapolis supported two years of pilot E-portfolio development with limited success due principally to training and support issues. Requirements of software for each pilot were ease of use, true cross-platform (Mac/Windows) compatibility, and reasonable cost.

During academic year 2002-2003 one faculty member and one instructional design staff member conducted a two-semester portfolio pilot using DreamWeaver 4 with a small number of volunteer teacher education candidates. DreamWeaver 4 was installed on computers in a Mac/Windows lab; there was no direct software cost to pilot participants. Though all candidates produced successful browser-based portfolios, surveys of the volunteer student attitudes indicated use of DreamWeaver was unnecessarily difficult and time-consuming.

Teacher education faculty decided to find another medium for digital portfolio building and settled on Lectora published by Travantis Corporation. The software promised to have a slight learning curve and to be truly cross platform, though a Mac version of the software did not exist at the time of the pilot. The second pilot was begun during 2003-2004 using the Lectora software. The department purchased software licenses for the small number of pilot participants. Once again the chosen platform proved unsuccessful. The learning curve was less severe than DreamWeaver 4 had been, but there were certain limitations with Lectora regarding the manner in which files could be dropped into the development screen resulting in user frustration. Once again surveys of participants and support staff indicated that the chosen approach must be modified.

Not lacking perseverance, Teacher Education faculty and staff from the U of I Center for Instructional Technologies examined remaining options, which included HyperStudio and PowerPoint as well as several other proprietary software titles. HyperStudio is not currently supported by the publisher. PowerPoint had limitations and lacked flexibility for the goals set for the project.

TaskStream (http://www.taskstream.com) seemed to fit all of our criteria: cross-platform usability, affordability, ease of use, and flexibility. TaskStream (TS) had the additional ability to store remotely selected student assessments through all four years of the teacher education curriculum, have faculty align assessments to appropriate national and state content area standards, and finally aggregate data for individual certification and institutional accreditation support, including NCATE. Primary benefits for TS were the cost and technical support concerns. Students purchase an affordable license code, either from the campus bookstore or directly from TS online, and data are stored on password-protected TS servers, which are accessed via the Web. Graduating students have the option to purchase a 2-year professional-use license for a nominal fee. Work they have submitted during their four-year college program can be downloaded and kept on the Author's computer using a feature called "Pack-It-Up." There was no need to install software or configure on-campus servers. Therefore we had no need to request the software through budget or support processes.

The TaskStream Web site includes the following tools for our candidates and faculty to use:

Standards Manager
Web Folio Builder
Web Page Builder
Unit Builder
Lesson Builder
Rubric Wizard

Message Center (E-mail)
TS Instant Messenger
Discussion Board
Calendar
Announcements

An additional Cybrary is a searchable collection of user-submitted lesson plans that have been screened by TS staff for completeness and quality. Searches may be by grade, subject, or keyword, or they may be searched by author's name.

It was necessary to create a Directed Response Folio (DRF) for our campus. This defines what could be described as an organizational chart for the institution – citing schools, departments, and instructors that use the TaskStream. The institution can either establish a *manager* to add the instructors and the students or allow everyone to self-enroll. Having tried the *manager* role for the first two semesters, the university will seriously consider a self-enrollment process in the future – primarily due to the time involved in having the campus TaskStream administrator manually enroll everyone. Generally, faculty members are enrolled as reviewers, evaluators, and authors; students are enrolled as authors only.

An Author can request feedback from any Reviewer in his/her group on Web folios, Web pages, and/or other TaskStream work that he/she has created. For each request, the Author may select which Reviewer from whom he/she would like to request feedback. The Author can also use the comment area to engage in a dialogue with his/her Reviewer(s). The Reviewer receives requests for feedback from the Authors in his/her group. The Reviewer can then comment on any of the submitted work.

Candidates and faculty are presently allowed to store 100MB of data on the TS server. Video files as large as 50 MB are currently supported. Additional storage space is available from TaskStream for a nominal fee.

Benefits

We have used TaskStream in multiple sections of two courses during the 2004-2005 academic year: The freshman "Exploration in Education" course is an exploratory course for prospective teacher candidates. In that course each student submits a beginning philosophy of teaching paper. "Technology in Education I" is the entry-level educational technology course. Students in that class submit two assignments, a WebQuest, and a final standards-based Student Choice assignment. Generally students report that the software is easy to use. The interface is generally user-friendly, and except for an occasional jargon term that may be confusing, the site is very easy to navigate. With only one year of use, we have not yet created any reports, but that feature promises to be useful.

The TaskStream term for students is "Authors." Instructors are "Reviewers." There are at least two ways authors can submit class work for review. Reviewers have the option of commenting and then returning work to the Author for revision, or evaluating the submission according to a predetermined rubric (designed using the TS Rubric Wizard). In the case of a student submission

that is determined by the Teacher Education faculty to be part of the candidate's final portfolio, the work is submitted to the Directed Response Folio (or DRF) described above. At our institution we have created a Unit Assessment System Directed Response Folio (or UAS DRF) where the candidates sends specific assignment for each designated course for evaluation by a reviewer and eventual inclusion into the student's portfolio. The UAS is based on the INTASC (Interstate New Teacher Assessment and Support Consortium) principles.

TS offers excellent telephone support via a toll free mentoring telephone number. Print documentation is available online. It is thorough and well-written.

Cost for the Teacher Education department is minimal, as the students purchase the license on a schedule determined by the department. We had no support issues from our computing staff, since there is no local installation or software support required.

Potential Problems

We experienced several difficulties implementing the TaskStream plan. Our first consideration was in the manner of requiring students to purchase the TS license. Our campus bookstore served as reseller for the licenses that are packaged with brief user instructions and a key code for the student. Our plan is to begin with first year students this year, add sophomores, then juniors and seniors in subsequent years. The dilemma was how to have the TS licenses packaged. At the time of this writing the student cost directly from TaskStream for a one semester license is $25; one year is $39; two years is $65; three years is $85; and four years is $99. (TaskStream specifies that one semester is five months duration.) Our concern has been to provide student licenses at the most reasonable rate without wasting money for students who may not complete the program. Our solution was to ask first year entering students to purchase a one-year license. We continue to debate the best plan as we move forward.

The ease of use of the TaskStream student interface is somewhat balanced by difficulties encountered administering the system from an enrollment and grouping standpoint. Our campus TS administrator has needed TS mentoring services several times in order to set properly the enrollments and groupings for our Unit Assessment System and various courses. We have modified somewhat our requirements as we moved through the first year. This will result in our having slightly less data to aggregate when our first reports are created. We view this first year as a time of learning and exploring, making adjustments as we need in order to maximize benefits of using TS within our program. We feel this is good advice to any institution intending to use a standards-based portfolio system of any type. We also learned too late in the game that TaskStream suggests having students self-enroll rather than having the campus TaskStream administrator enroll and group them.

The issue of support for instructors and students deserves comment. For TaskStream to reach maximum potential as an instrument for program improvement requires integrating it into courses during each year of the teacher education program. The department has been working for several years to maximize effective integration of technology into all teacher education methods courses. The process has occasionally worked well, but there is an amount of resistance from some instructors who feel hampered by not having ample, available, and working technology

resources on campus to use with their classes. It appears to us that in order to begin using Task-Stream effectively, a certain initial amount of time for each course should be spent in a computer lab environment with someone who has experience using TaskStream, who can guide both the students and the instructor/s in use of the program.

Conclusion

After two years of unsuccessful pilot programs for e-portfolio development within the Teacher Education Department at the University of Indianapolis, implementation of an INTASC standards-based assessment system including digital portfolio building using TaskStream seems to hold potential as a means of continual program improvement. Despite some difficulties, the affordability and general ease of use have encouraged us to believe we made a wise decision to implement the program.

References:

Baron, Cynthia. Designing a Digital Portfolio: (Voices that Matter). New Riders Press. December, 2003.

Costantino, Patricia M., De Lorenzo, Marie N. Developing a Professional Teaching Portfolio: A Guide for Success. Allyn & Bacon. October, 2001.

Heath, Marilyn. "Are You Ready to Go Digital? The Pros and Cons of Electronic Portfolio Development." Library Media Connection, Apr/May2005, Vol. 23 Issue 7, p66.

Kilbane, Clare R., Milman, Natalie B. The Digital Portfolio Handbook: A How-to Guide for Educators. Allyn & Bacon. October, 2002.

Kilbane, Clare R., Milman, Natalie B. The Digital Teaching Portfolio Workbook: Understanding the Digital Teaching Portfolio Process. Allyn & Bacon. October, 2004.

Mullen, Laurie. Digital Portfolios in Teacher Education. JIST Works. August, 2004.

Woodward, Helen & Nanlohy, Philip. "Digital Portfolios in Pre-Service Teacher Education." Assessment in Education: Principles, Policy & Practice, July 2004, Vol. 11, Issue 2, p167.

More information on the INTASC Principles may be found at:
http://www.ccsso.org/projects/Interstate_New_Teacher_Assessment_and_Support_Consortium/

Using SAM Assessment and Training for Office 2003

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Abstract

This presentation will demonstrate the uses of SAM 2003 from Course Technology as a skills assessment and training software that is used via the Internet. Historically, testing in computer education has taken the form of pencil and paper or standardized testing. The actual computer skills of the student have not been properly assessed. With SAM, the testing strategy is to place a student in front of a computer with the relevant software and see if he can complete the required tasks in a limited time. The student will receive the task to be completed, with the application software running live on the computer. The computer contains all of the files needed to perform each task. The student stores his answers on the computer to be graded, and the exam is then graded based on the instructor's criteria. Since the exams are task-based, this method of testing has a high degree of validity.

Presenter Biography: Gary Whittle is an Associate Professor of Computer Information Systems at St. Catharine College in Springfield, KY. He has a B.S. Degree from Campbellsville University and a M.Ed. Degree from the University of Louisville. In addition, he has postgraduate work in computer science at Eastern Ky. University.

Introduction/Background

St. Catharine College is an independent Catholic college that provides quality undergraduate education and offers degrees in a variety of academic areas and professional programs. Consistent with the Dominican tradition upon which it was founded, St. Catharine College fosters education grounded in the liberal arts values and is committed to the free pursuit of truth. The College embraces Christian principles while respecting individuals of all religious traditions.

Computer literacy classes are a requirement for most degree and certificate programs on most college campuses. This requirement also makes the computer literacy class one of the most demanded classes on campus. With a class size usually limited due to computer lab space, several sections are needed to accommodate the student demand.   With a growing enrollment, the general education requirement of computer literacy has placed a more diverse student population in the classroom and computer labs. To ensure that basic computer skills are demonstrated, Skills Assessment Manager, or SAM, has been used in all sections of CIS 110 at St. Catharine College, our general education required course. As we look to the future of distance learning, or Internet-based course, SAM will be a valuable tool in evaluating students in those courses as well.

For more than five years, SAM Assessment and Training has helped hundreds of thousands of educators and students assess and improve their skills in the Microsoft Office suite and other computer concepts. The 2003 version of SAM is the most powerful and user-friendly solution yet, with dozens of brand new features including...

- Open Simulations: Hands-on, skill-based Microsoft Office, Windows and Internet tasks are so life-like; your students will have trouble distinguishing them from the real thing!
- Custom Scheduled Training: Integrated SAM Training and enhanced scheduling tools allow you to build an exam and automatically create a custom training assignment.
- Tighter Security: Better security options, including a unique exam location function, allow you to lock SAM tests to specific computers.
- Enhanced Reporting: Numerous additional instructor reports enable you to track your students' testing and learning progress more closely than ever before.
- WebCT and Blackboard Integration: You can now export SAM result reports into your grade book using WebCT® and Blackboard®-ready formats. [1]

Traditional Skills Assessment

Skills assessment has been a difficult and time consuming task for computer instructors. Opening files, looking at reveal codes, formulas, or other details for 100 or more students with 15-20 assignments and 3 or more tests often takes up instructor time, or is passed on to teaching assistants. With SAM, the student has the benefit of working real-time in the software, at their own pace, while the instructor is free to spend more time actually teaching and working with the students.

SAM Assessment and Training

As the diversity of the students enrolling in computer literacy classes continues to grow, using SAM as a pre-assessment for incoming students has given the students a chance to see where they really stand as far as computer literacy. Too often, students seem to deem themselves as being "computer literate," when all they really know is how to turn the computer on, surf the Web, and type a paper and print it. An early pre-assessment can also help to identify the student that may truly be ready to take a challenge test and bypass the course. Using SAM as a post-assessment tool can also be a tool for the instructor to document class outcomes, and provide a valuable portfolio piece for students.
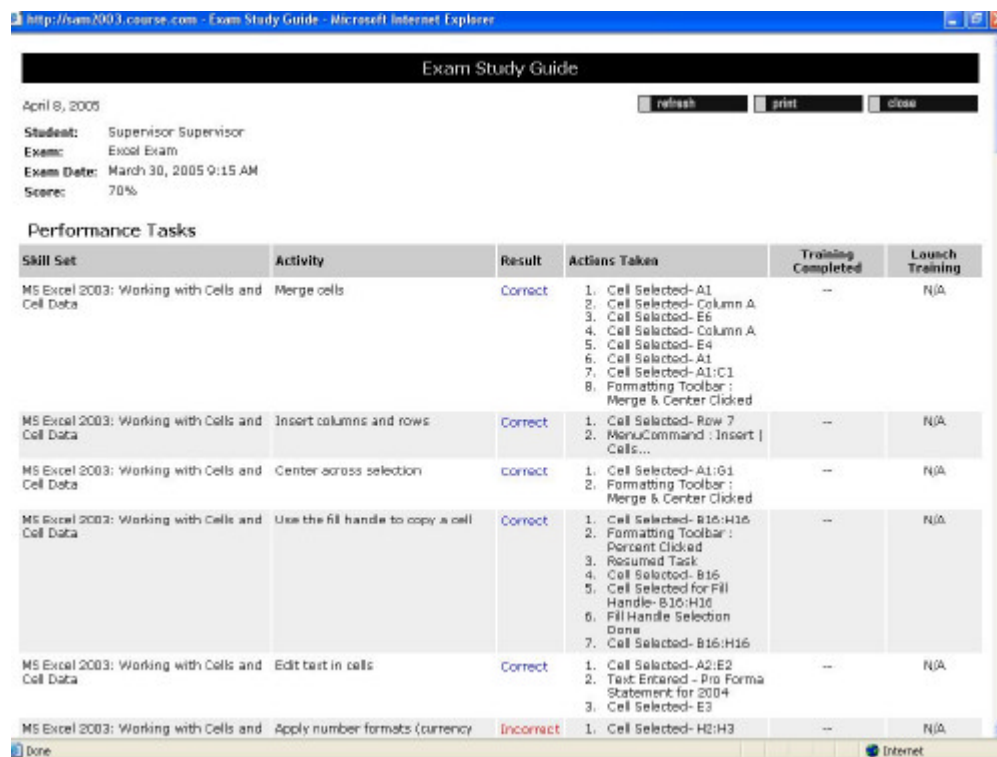
As the instructor moves to using SAM in the classroom, SAM assessment and training allows for instructor flexibility. The instructor has control of all practices, training, exams, times, and locations. One of the most popular "paths" used by instructors is to allow the student to take a pre-test or practice, go through SAM training, then take the exam. The flexibility of SAM can allow the instructor to let the student work on pre-tests and training at home, in the office, or in the classroom or lab. The exams can then be scheduled during supervised lab times if desired. All SAM tests can be customized by the instructor the fit the curriculum. Instructors also set pass rates, time constraints, and can even assign weights to specific tasks/questions. Security can also

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1 From "SAM 2003 Assessment & Training"   http://samcentral.course.com/sam_2003.cfm

be set up by the instructor, who can decide on test passwords, time and location restrictions. For example, an instructor may allow practice and training at various times and locations, but set the exam to be only available at 9:00 a.m. on April 20, 2005 in Lab 232.

SAM Reports

SAM reports can provide the instructor and the student with a wealth of information. Students can print reports based on overall exam results, study guides, and certificates of completion. Instructors can also have access to a wealth of information, from how a particular class section performed on a test, to seeing how all students performed on a particular test, to seeing how an individual student performed. SAM can provide immediate feedback to students and teachers, giving results for each task attempted on a test, along with showing what the student did on the computer, and what page in the textbook the student can turn to for more information.

Using the Internet

Most students come into college computer classes Internet savvy. SAM allows the instructor to use the student interest and knowledge of the Internet to practice and learn Microsoft Office skills in an environment that is more comfortable to the student. Even for the student that may come into the class with limited Internet experience, SAM can be easily set up at the student's home, office, or dorm room. All that is needed is the SAM software setup disk and an Internet connection.

Setup/Technical Requirements

SAM system requirements are:
- Internet Explorer 5.0 or higher
- Macromedia® Flash Player 7
- Live Internet connection (T1 or ISDN recommended, 56K minimum connection)
- Pentium 350 MHz or faster
- 128 MB RAM
- Up to 2.7 GB hard disk space.
- SVGA graphics (800x600.256 color or higher)
- Windows operating system (XP, 2000, or NT4 recommended)

SAM must be installed on every computer that is to be used by the instructor or the students. In the computer labs at St. Catharine College, we initially went through a local installation on each machine. Later, the technology department found that Ghosting the computers with SAM worked just as well. SAM also supports a network installation, but does not recommend this type of setup. In the network setup, speed and reliability of the network may cause some decreased performance in SAM.

Students purchase the SAM student edition, which contains the setup disks and the unique key code, which will allow them to create their SAM user profile and login. The setup is a very straight forward process. The disks auto run, and will take the student through the process step by step, usually in less than a couple of minutes. The student edition also contains a booklet explaining the setup process. The instructor must provide the student with the Institution Key, which is provided to the institution by SAM. It is very important for the SAM Supervisor to save the Institution Key. All students will need it the first time they log into SAM.

SAM also provides an Instructor's Manual and a SAM Lab Administrator's Guide that will provide all the information needed to create sections, create and schedule exams, administer training, and run reports. These documents can be downloaded from the SAM website.

Conclusion

As instructors in the computer information system classrooms are well aware of, we teach in a very dynamic area. Students are coming into our classrooms and computer labs with a much more diverse background. Computer literacy has become a cornerstone for practically every major degree area on college campuses. The challenge facing every computer teacher is to find appropriate means to teach and evaluate this ever-changing group of students. With SAM to help with the skills assessment and to help provide on-line training for the student, the teacher is free to work with the students one on one to address specific learning.

Some have addressed concerns about SAM taking over the teacher's role in the classroom. It is important to me to say that while I use SAM to help teach some of the technical skills, it is still my responsibility and obligation to teach the logic in how to use those skills. Through case studies, I still challenge the student to put those skills to practical use. The course grade is not solely based on the SAM test results. Students must still complete case work that will demonstrate

critical thinking skills and use the technical skills of the software that SAM helps to develop. The bottom line is that learning in the college computer classroom and lab is not just about mastering a skill, but about critical thinking and learning. SAM is just a tool to aid in the process.

Computer Forensics: Is it the Next Hot IT Subject?

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Introduction

Digital Forensics is not just the recovery of data or information from computer systems and their networks. It is not a procedure that can be accomplished by software alone, and most important, it is not something that can be accomplished by other than a trained IT forensic professional. Digital Forensics is an emerging science and was developed by U.S. federal law enforcement agency during the mid to late 1980s. It is also the art of detecting, processing, and examining digital fingerprints.

A Formal Definition of Computer Forensics:

- The gathering and analysis of digital information in an authentic, accurate and complete form for presentation as evidence in a civil proceeding or a court of law.

- The term digital evidence encompasses any and all digital data that can establish that a crime has been committed or can provide a link between a crime and its victim or a crime and its perpetrator

Computer Forensics Overview

Computer Forensics is the application of computer examination and analysis techniques in the interests of determining potential legal evidence. Evidence might be sought in a wide range of computer crimes or misuse, including but not limited to theft of trade secrets, theft of or destruction of intellectual property, and fraud, child pornography, disputes of ownership, prevention of destruction of evidence, etc. Computer Specialists can draw on an array of methods for discovering data that resides in a computer system, or recovering deleted, encrypted, or damaged file information. Any or all of this information may help during discovery, depositions, settlements, or actual litigation.

The field of Forensic Science has experienced many changes in the last five years. Technology that was on the drawing board yesterday is now part of everyday criminal investigation. What will the well-dressed forensic investigator be using solve tomorrow's crimes?

Traditional information security research focuses on defending systems against attacks before they happen. Although recent intrusion detection systems can recognize and take action against attacks, comparatively little research focuses on after-the-fact investigation. This is, in part, because network owners are more willing to absorb losses from computer crime than risk their reputations by letting details of their exploited vulnerabilities become public. In spite of this reluctance, interest in after-the-fact investigation and evidence gathering techniques is growing in communities beyond law enforcement.

The term computer forensics has many synonyms and contexts. It originated in the late 1980s with early law enforcement practitioners who used it to refer to examining standalone computers for digital evidence of crime. (Some prefer to call this aspect of computer forensics media analysis.) As computers became more networked, computer forensics evolved into a term for post-incident analysis of computers victimized by intrusion or malicious code. People often describe the former instance, in which network traffic is captured and analyzed, as network forensics. Some have argued that forensic computing is a more accurate term, especially because digital evidence is increasingly captured from objects not commonly thought of as computers (such as digital cameras). Despite this, we use the generic term computer forensics here to apply to both workstation and network-focused forensic disciplines. Occasionally, we use the phrase computer and network forensics (CNF) when discussing these related disciplines as a whole.

A computer forensic scientist can use the left-behind data to trace email to senders, find the owner's family and friends, find the sources of digital images, determine shopping habits, find the owner's address, look for airplane reservations, and so forth. The scenario is rich in questions relating to data mining, inference processing, operating system functions, software engineering, and hardware design.

Understanding computer forensics' history is important to understanding how to develop educational programs for this discipline. Media analysis started as the child of law enforcement necessity; computers found at crime scenes offered clues, but investigators needed help to make the evidence they contained visible. Early computer forensic practitioners often operated without academic education or formal forensic training, and fewer still had experience working in a structured computer forensics environment

The computer security community traditionally has focused on protecting information systems from attack. The forensic techniques used peripherally in the intrusion detection community. Similarly, computer security education only recently arrived on the scene; the US National Colloquium for Information Systems Security Education (www.ncisse.org) first appeared in 1997 and featured its first topic on forensics in 2001. In spite of this neglect, the computer forensics process gradually formalized, and manufacturers developed commercial tools to streamline it. Soon, various communities wanted the process to be canonized to let practitioners repeat successes and avoid flawed or less productive methods.

Currently, several ongoing programs exist whose goal is to create a comprehensive training and education approach the Center for Secure and Dependable Software Forensics Workshop is the result of one such effort.

Forensic science requires its practitioners not only to have the appropriate training and education needed to perform the examination and prove the rigor of the techniques, but also to be able to communicate the results clearly to a court, which often contains a lay jury. Forensic equipment, tools, and techniques must have scientific validation and produce a demonstrably accurate result. To do this, tools and techniques must be used in the context of a validated protocol. Only when all three pieces— people, equipment, and protocols—work together, can we verify the results of a forensic examination.

Forensics Case Study

Let's look at a real-world scenario and how computer forensics plays into it. Late one night, a system administrator (sesame) troubleshoots a network problem. She captures several minutes worth of network traffic to review with a protocol analyzer. While conducting this review, she notices some odd traffic. A user's desktop has sent a well-formed packet to an obscure port on an unfamiliar IP address outside the company's firewall. Shortly thereafter, one of the company's research and development database servers transmits a packet that does not conform to any of the formats the company uses to the same IP address. This intrigues the system administrator, who does a lookup of the IP address; it comes back as one of the firm's competitors. Now, she's not merely curious, she's concerned. She picks up the phone and calls her boss. The boss could say, "Just block that port," and then go back to bed. However, there's a far better way to handle this situation. The boss instructs the system administrator to take immediate steps to preserve the collected packets. He then contacts the company's chief information security officer (CISO) and informs him of the situation.

The CISO recognizes this as a security incident that could compromise the company's proprietary information and trade secrets; it could also involve the employee whose workstation contacted the competition's IP address. Fortunately, this is exactly the kind of incident the company had in mind when it developed the computer forensic annex to its information security plan.

The CISO assigns an incident manager from his organization to oversee the event. The incident manager then contacts the company's general counsel to discuss the various legal issues involved in the investigation. Next, he calls out a forensics technician to collect and preserve the evidence at the system administrator's computer, the employee's workstation, the database server, and the firewall.

After conducting a routine examination of the collected material, the forensic technician notices a substantial amount of proprietary information on the employee's hard drive that he does not appear to need. Moreover, the forensic technician can't identify the mechanism used to communicate with the competitor's computer. Analysis of the server and firewall logs reveals that lots of information transferred from the database server to the competition.

After obtaining the general counsel's approval, the incident manager engages a researcher at a major university to review the examination results and work product. The researcher identifies code on both the employee workstation and the database server that's written to send information from the database server to the competitor's computer on command from the employee's work-

station. This command is determined to be the first and middle name of the employee's oldest daughter.

The incident manager uses the reports from the forensic technician and the researcher to write an incident report for executive management. Based on this incident report, the employee confesses to cooperating with an associate employed by the competition. The general counsel sues the competitor for damages, obtaining a restraining order against the competition and demonstrating the company's aggressive protection of its trade secrets.

An Envisioned Forensic Workforce

In the just-described scenario, people with different skills fill different roles. To form a reasonable computer forensics education, we must identify the skills and positions such an educational program will fill. Many communities are interested in computer forensics:

- Law enforcement organizations need to train officers and administrators
- Industry needs professionals with computer forensic competence as well as specialized computer forensics technicians
- Academia needs personnel that can teach existing computer forensic techniques and research and validate new ones.

Recognizing the needs of the wider legal community is also important: judges, prosecutors, and defense lawyers might not want to learn about forensic computing in detail, but they'd certainly like to be able to understand and evaluate its results. Law enforcement personnel are classic just-in-time learners who prize immediate practical application, especially if it leads to a more efficient investigative process.

Regardless of how technically educated law enforcement professionals are, they rely on human factors in their investigations— a videotaped confession is far more convincing to a jury than the most elegant technical explanation as to why someone is guilty.

Four forensic positions represent a reasonable approach to developing a forensics curriculum. These positions represent a logical partitioning of the workforce, not the existing body of knowledge relevant to computer forensics.

What are Educational Institutions Doing about the shortage of trained people?

Many higher learning educational Institutions have recognized the need for a cross between Information Technology and Criminal Justice students. Some instructions have developed a degree or certificated program to meet that need. The most common name for the course of study is "Computer Forensics". However, other names have been used. (i.e. Information Technology Forensics, Technology Forensics, Cyber Forensics etc.)

There could be some opportunities to develop a minor for universities that have a major in criminal justice. Forensics is the art of employing science techniques that can be used in a court of law. Overall, this paper will look specifically at how college and universities teach their students

how to obtain evidence from computer logs and network logs, preserving the evidentiary chain, and the legal aspects of the search and seizure of computers and any equipment logs that are related to a search and seizure court order.

Several topics will present varying levels of detail on IT Forensics. It is expected that Criminal Justice students will be less familiar with computers and networks but more familiar with the legal aspects of the field. This is why it is critical that these courses be taught by IS instructors. The following areas should be covered based on IS curriculum standards.

- Introduction to Information Technology
  Computer system components and the Internet
  How TCP/IP and the WWW was formed
  The Internet viruses and the hacker subculture

- Intro to Internet Computer Crime and Related Demographics
  Information Security Fundamentals
  Network user interfaces
  Computer crime statistics

- Computers and Internet Crime
  Crimes involving computers and networks
  Criminals - hackers and crackers

- Investigations
  -IS Life Cycle
  -Security Incident Handling
  -The criminal investigative life cycle
  -Legal methods to obtain the computer
  -Jurisdictions and agencies
  -Internet e-mail, Internet Relay Chat (IRC)
  -Internet chat rooms, Spam, and other interactive application
  -IP addresses and domain names; Investigative methods

- Evidence collection
  Working with ISPs and telephone companies
  Exploring computer networks, Internet Servers, and LAN & WAN   network logs
  Digital Evidence at the Transport, Network, Data-Link, and Physical Layers

- Legal issues
  Constitutional law
  Search and Seizure Guidelines
  Case Law

- Privacy Protection Act (PPA)
  Electronic Communications Privacy Act (ECPA)
  Seizing Electronic Evidence

Investigative and Testimonial Challenges
Future challenges
CALEA
International Computer Crime Laws
Using Digital Evidence as an Alibi

- IT Forensics
    Types of computers (cars, watches, laptops, PDAs)
    Operating System file-storage techniques
    Handling computers and media - maintaining the integrity of evidence collected
    Searching and retrieving files
    Intro to Encryption
    Forensics Application Tools (EnCase, netstat, ping, Sam Spade, trace route, whois, WinHex)

- The Future of IT Forensics
    Education
    National Recovery Teams
    Information Sharing
    Social Engineering

Below are some of the Educational Institutions that have developed course work and degrees in Computer Forensics.

Anne Arundel Community College, Arnold, MD
- **Cyber Crime Studies Institute**

Blue Ridge Community College, NC
- **Cyber Crime Investigations**

Canyon College, Caldwell, Idaho
- **Introduction to Computer Forensics (Online course)**
- **Law Enforcement: Breaking the Technological Barrier Certificate Program**

Capitol College, Laurel, MD
- **Master of Science in Network Security**
- **Security Management Certificate**

Champlain College, Burlington, VT
- **Computer & Digital Forensics Program**

Clayton State College, OH
- **Criminal Justice - Cybercrime Program**

Cleveland State University, OH
- **CyberForensics Course**

College of San Mateo, San Mateo, CA
- **Computer and Network Forensics Associate Degree**

Community College of Denver, CO
- **Public Security Management Degree**

Cranfield University, Wiltshire, UK
- **Masters in Forensic Computing**

Curry College, Milton, MA
- **Certificate in Computer Crime Investigations & Computer Forensics**

Curtin University of Technology, Western Australia
- **Computer Forensics**

Defiance College, Defiance, Ohio
- **Computer Forensics Major (BS)**

Eastern Michigan University, Ypsilanti, MI
- **Information Assurance Training**

Edmonds Community College, Business & Technology Center, Everett, WA
- **Introduction to Computer Forensics**

Fairmont State College, Fairmont, WV
- **Minor or Certificate of Completion in Computer Forensics** [PDF]

Fleming College, Ontario, Canada
- **Computer Forensics Training (on-line)**
- **Computer Security and Investigations (CSI)**

Fond du Lac Tribal and Community College, Cloquet, MN
- **AAS in E-Crime Investigation** [PDF]
- **Computer Forensics Certificate** [PDF]

George Washington University
- **Graduate Certificate in Computer Fraud Investigation**

Glouster County College Police Academy, Sewell, NJ
- **High Technology Investigations**

Goodwin College of Professional Studies, Philadelphia, PA
- **Computer Forensics; Information Warfare courses**

Hong Kong University of Science & Technology
- **Graduate & Professional Diplomas in Computer Forensics**

ICM School of Business & Medical Careers, Pittsburgh, PA
- **ASB Degree in Criminal Justice - Cybercrime**

Iowa Lakes Community College, Emmetsburg, IA
- **Associate in Science of Computer Forensics**

Iowa State University, Ames, IA
- **Computer and Network Forensics**

James Madison University, Harrisonburg, VA
- **Computer-Related Law and Computer Forensics Course**

Overland Park, Kansas
- **Intro to Computer Forensics**

Lake Washington Technical College, Kirkland, WA
- **Computer Forensics and Security AAS & Certificate**

Leigh Carbon Community College, Schnecksville, PA
- **Computer Forensics Courses**

Maricopa County Community College, AZ
- **Cyber Forensics Technician Certificate**

Marshall University Graduate College, WV
- **MS Forensic Science Program**

Medaille College, Buffalo, NY
- **CJ Concentration in Computer Crime Investigation (BS)**

Melbourne University Private, Australia
- **Graduate Certificate in E-Crime Investigation** [PDF]

Miami Dade College, Miami, FL
- **Computer Forensics & Investigation Program**

Mississippi State University, MS
- **Computer Crime and Forensics Course**

Missouri Southern State University, MO
- **Bachelor of Science in CIS and Bachelor of Science in Criminal Justice - Computer Forensics Option**

Cheryl Reindl-Johnson	Sinclair Community College	9
Eric Remy	Randolph-Macon Womens's College	218
Ken Revels	Mercer University	261
James Roberts	Charleston Southern University	46
Gary Rogers	Macon State College	229
Pat Schultz	University of South Carolina-Sumter	63
Michael Shanafelt	Saint Francis University	105
Jeanne Skul	Loras College	174
M. Leigh Smith	Florida Keys Community College	125
Robin Snyder	Savannah State University	230
Lisa Spence	Georgia Southern University	240
Carmen Springer-Davis	Casper College	9
Nesan Sriskanda	Claflin University	241
Dewey Swanson	Purdue University School of Technology	242
Nancy Thibeault	Sinclair Community College	250
Nate Tucker Sr.	Lee University	8
Anne Vaassen	Loras College	174
George Weimer	University of Indianapolis	8, 251
Victor Williams	American Intercontinental University	261
Fred Worthy	Charleston Southern University	46
Carol Yackel	Mercer University	85

Network Technology and Exchange Center, Hong Kong
- **Computer Forensics Analysis Seminar**

North Carolina Wesleyan College, Rocky Mount, NC
- **Course in Computer Forensics**

Northeastern University, Boston, MA
- **Certificate of Professional Achievement - Communications & Networking**
- **Graduate Certificate in Network Security Management**

Northern Virginia Criminal Justice Training Academy, Ashburn, VA
- **Technology Investigation Courses**

Norwich University, Northfield, VT
- **Introduction to Computer Forensics**

Oklahoma State University
- **Bachelor of Technology - Information Assurance & Forensics**

St. Ambrose University, Davenport, IA
- **Minor in Computer and Network Security**

St. Petersburg College, FL
- **Computer Related Crime Investigations Certificate**

Stark State College of Technology, Canton, Ohio
- **Computer Network Administration and Security Technology Security & Forensics Option**

State University of New York (SUNY) Farmingdale
- **B.S. degree program in Security Systems**
- **SUNY Learning Network Online (Distance) Learning - Courses in Computer Forensics**

Presenters' Index