Principles of Visual Communication in Web design

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Introduction

The World Wide Web is a relatively new technology, but it has quickly become a valuable tool for mass communication and delivery of information. However, the new medium has required sometime to become stabilized. Like every other medium, the Web had to borrow from previous media such as graphics, multimedia, journalism, etc. The conventions set by these disciplines quickly found an opportunity to flourish in the web. At the same time, some of the principles of visual communication started to become standards. As web designers and instructors of web design, our success requires knowledge of some basic principles of two dimensional design. In this paper, these principles will be examined in relation to web design and graphics.

The Concept of Line

The concept of line is a basic foundation in 2D design. In the common knowledge, a line is the shortest distance between two points. In dimensional design however, the concept of line is more complex. In this paper, we are mostly interested in the *Implied line*, which means simply a line created by a series of elements. Also, important is the *Visual line*, which refers to a path that eyes follow when viewing a design. When viewers look at your design, their eyes are first caught by one element, usually called the "focal point". After that, the viewers' eyes move to a second element, a third one, etc. This path of perception is called the *visual line.*

Classic works from master artists of the Renaissance, as well as artists that followed, used the concept of visual line to create their designs. Advocates of this theory claim that if one keeps the visual line flowing within the design, the viewer will look at the design longer. If the lines lead the viewer's eyes off of the work, the viewer looks at the work for a shorter period of time. Thus the "triangular" composition was developed. A "triangular" composition postulates that, in order to keep viewers' attention, designers should compose with an imaginary triangle as a guide.

If this is important to painters, it should be crucial for web designers. To keep viewers' attention is a major goal in web development. The special importance of LINE should be kept in mind as we discuss the next six principles of design.

The Concept of Symmetry and Balance

Balance means simply the distribution of visual weight in a design or composition. Elements of design such as images, colors, forms, and text have varying degrees of visual weight. Darker and larger colors and forms have heavier visual weight. Lighter colors and smaller forms hold less visual weight.

A *Symmetrical Balance* has equal visual weight on both sides. If an object is placed on one side, there should be an object of equal size and visual weight placed on the other. Symmetrical balance gives the viewer a sense of uniformity and order.

Examples of a symmetrical balance: International Fine Art Journal

Mirror Balance - is an even stricter form of Symmetrical Balance. It is essentially mirroring exact same thing on both sides of the design. A design such as a straight head shot portrait is an example of mirror symmetry.

An example of mirror balance**:** Moyra's Web Jewels

Asymmetrical Balance is a design that has different elements in the design, yet still remains visually balanced. One large color on one side of the screen (or paper) can balance a smaller image or color on the other side.

The majority of websites placed on the Internet are asymmetrical. The placement of visual elements, and color is crucial for asymmetrical balance.

This site is organized through frames, with links held in the left frame.

The Concept of Space

Spatial organization is an important concept in visual design. It refers to the decision regarding *positive space* versus *negative space*. *Positive Space* includes images, text or other objects in a design. This may be also viewed as the "foreground". The *Negative Space* is the "other" space, which does not include *Positive Space*, and is sometimes called the "background" of a design. Negative space defines positive space, and vise-versa.

Look at the following examples of sites and try to analyze their use of positive and negative space.

Did Hammond Toys consider the positive and negative space?

This web site demonstrates the concept of positive and negative space. The Montessori Web site takes shape, scale, as well as different forms of images into consideration. It limits the amount of information given on the front page.

The Concept of Space includes *shape*, which refers to any form used in design. As children we learn basic shapes (such as circle, square, rectangle, triangle, etc). Skilled designers organize these shapes into a pleasing order. Images of all sorts (including forms, textures, and colors) can be considered as shapes. Also, repeating the colors and shapes and various forms of an image can both accentuate the overall image and amplify the overall design. If a shape points to the edge of a design, it might lead the viewers' eye right off of the design. On the other hand, overlapping shapes could add depth and tie the elements into one cohesive design. It depends on the style of the designer

The Concept of Space includes also *Scale*, which refers to the size and mutual relationships of the shapes (objects, texts or images in a design). Placing all of the elements of a design on the same scale can be boring. Adding an element of dramatic scale can add quickly visual interest.

The Concept of Unity and Variety

The concept of Unity and Variety means simply balancing the similar and different elements. *Unity* refers to the similarity of elements (such as sizes, shapes, lines, textures, colors, text, etc.) as they relate to each other in a design. *Variety*, on the other hand, refers to the elements in a design that are different and unrelated. In a website design, using a combination of *limited color pallets, limited font styles*, and *simple forms* might be a good start in creating unity.

This website "Style Click," uses good graphic design that demonstrates well the concept of unity and variety.

It is important to repeat and accentuate your primary elements using many different colors and fonts, i.e. a *variety dominant design* might make the design confusing and hard to understand.

The designer of this site (on the left) limited the palette to brown and white. Buttons of the same shape are stuck to the left side of the design and their color clashes with the brown "background". This design, though repeating square elements, is unbalanced due to the large white space and lack of overlapping elements.

The Concept of Rhythm and Motion

Visual Rhythm and Motion are created by repeating elements of a design (lines, shapes, colors etc.) in a way that would make the viewer's eye follow and get the impression of movement or rhythm. The concept of *Rhythm and motion* is usually used in conjunction with all the elements of design to create a pleasing experience for the viewer. This brings up images of music and dance (Music is such a broad topic that it must be considered separately in another paper).

An example of an effective graphic design with static motion (limited implied motion) and regular/repetitive rhythm.

This site is an example of the successful use of rhythm and motion. Repeated elements consist of the various figures and shapes which repeat color in the design of the text.

The Concept of Value, Texture, and Color

Value is very important for any type of design. It describes the relative lightness or darkness of a color as well as shades of gray. *Texture*, on the other hand, describes the surface of an object or an element: grainy, rough, smooth, or flat, etc. When the values of a background and text are too close, it can make it quite difficult for viewers to read. Depending on values and colors, certain images look better on some backgrounds than others. It is obvious that black text on a white background is easier to read than white text on a black background. In order to effectively distinguish between the elements of design it is important to have a distinct and pleasing contrast, which means simply the value of lights and darks. Contrast has a vital effect on the overall success of a web page's design.

This is an example of darker values paired with lower color contrasts. Not a generally useful approach, but perhaps relevant to the tone of this page.

This is an example of dark value design with higher color contrasts.

Purple Peoples Page is an example of low value and low color contrast on a textured background

Now consider *Color*, this refers to variance in qualities of light. *Color* is a very important consideration in web design. As previously stated, it is usually best to limit color scheme. This is especially important for beginners who want viewers to concentrate on content. For certain designs, those with the intention to communicate confusion or excitement or chaos, a dramatic colorful palette may be a much more effective choice.

Colors may be contrasted, when juxtaposed they vibrate and add excitement. *Contrasting colors* are: Red and Green -- Blue and Orange -- Yellow and Purple. The members of each pair oppose each other on the color wheel.

The designer may also opt for *Complimentary colors*. These are Red and Orange -- Blue and Purple -- Yellow and Green -- Purple and Red -- Blue and Green -- Orange and Yellow. These colors are next to each other on the color wheel.

PBS's website uses a bold complimentary pallet of colors.

A designer may decide to limit his/her palette to create *unity*. One example would be choosing Blues and Purples (complimentary colors) for the majority of the design. Then place an accent of the color Red or Orange (contrasting color) to add *variety.*

An example of a website using only complementary colors. Note there are no contrasting colors used in this site.

Color considerations may also include the meanings of the colors and the moods that they could evoke. Viewers may have emotional, esthetic, biological responses to the colors of design. There are traditions and symbols of colors that survive today in religious vestments and educational ceremonies.

Text

Text in web design is visually the most important element. If people can't read your text, why bother having a site? Content is the primary concern, but two-dimensional design is the package that carries and promotes the communication of content.

First, the text should be well written and spelled appropriately.

Second, one must consider the organization of information. Many web systems limit the amount of information they carry on a single page. A site requiring lots of text and images may be divided into multiple pages. If so, the first page (the "index") may be thought of as a "Book Cover" and the additional pages as the body of a book. The design of the first page is the most important. It will determine if the viewer will enter the site or move on. Additional pages could be more flexible in their design; usually they are heavier in content than the first page. It is more attractive to keep the same theme of your first page (color, images, background) throughout the entire site.

It is important to use **all** the principles of design discussed here when dealing with text. As with a limited color palette, the font styles and sizes should also be constrained in text. Headings or titles text can be dramatic and wild, but content text must be clear and simple, as easy to read as possible.

Example of a text based design. Their concept of creating forms with text alignment and organization is very innovative. However the background is too “busy” and distracts from the site’s design.

Another important consideration is the making of links. A designer may want to use letters or numbers or may choose to use buttons, images or bullets. If letters or numbers are used, order is important. The use of other markers suggest that order is not important.

If buttons or bullets are used, the shape, size, color and style of the buttons should add to the design; however, it is difficult to design a site around any set of well-liked buttons. One should create a design first, then look for the buttons that will go with it.

When in doubt, don't use buttons. In this example the buttons are difficult to read and do not add anything to the design.

This is an example of a nice use of buttons and bullets, however the large counter numbers are both distracting and unnecessary.

Tables are main tool for organizing text on a page. What appears to be limited can become limitless with the use of tables. Tables can be manipulated to organize and coordinate just about any design you can envision. Analogous techniques for the advanced web designer are frames and maps.

This is an example of a site without tables.

Conclusion:

The serious web designer must consider the seven major concepts (line, balance, space, rhythm and motion, value, texture, and color, and text). Also, web designers must be aware of issues specific to the web technology. There are other more advanced matters. These might be the subject of another paper, but understanding the seven basics is a good beginning.

Blackboard 5 – Web-based Course Experiences

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Introduction

This paper summarizes the experiences of four instructors from the University of Pittsburgh at Titusville who offered *Blackboard 5* web-based courses (all facets except exams) during the Fall 2001 semester. These are entry-level courses and are ideal candidates for web-based instruction. Web-based instruction techniques/tools used included Word or HTML files for syllabi and lecture notes; links to web addresses; PowerPoint files; graphics and video files; and communication via e-mail, digital drop box, discussion boards, and chat rooms. Methods of using these tools will be reviewed, as well as roadblocks, successes, failures, over assumptions, likes/dislikes by students, and learning results.

Web-Based Instruction

Blackboard provides another tool to support distance learning opportunities. It makes it a little easier for instructors to set up and monitor a web-based course. Students participating in these courses may be remotely located, or may be on campus. (Note that the University of Pittsburgh (Pitt) also offers distance learning courses that use interactive television as well as *Blackboard*; these are excluded from this analysis.)

Course Management Systems

What is a "course management system"? It is an integrated software suite to develop, manage, and use web pages for instruction. Pitt identified a need for this type of software package in 1997/1998. They evaluated five products and selected *Blackboard, Inc.;* Pitt refers to their implementation of *Blackboard* as *CourseWeb*. For more information on *Blackboard*, visit www.blackboard.com.

A recent web search located a web site that is a survey of Course and Test Delivery/Management Systems for Distance Learning 1; it listed 151 sites for this type of software. Some widely used software packages, other than *Blackboard*, are *E-College* and *WebCT*.

1 "Instruction and Assessment on the World Wide Web"; http://student.seas.gwu.edu/~tlooms.assess.html, March 13, 2002.

Pitt's Use of Blackboard

Pitt implemented a controlled pilot in the Fall Term – 1998. A small group of instructors began using *Blackboard*. Reaction to the product was favorable by students and instructors. A full implementation of *Blackboard* was begun in 1999. Pitt is now in their 5th year of using the product and recently upgraded to version 5. One thousand faculty members use *Blackboard*, and it serves over ½ of Pitt's 32,000 students. There are 1,400 unique courses using *Blackboard* in some form. Only 5% of these courses serve students studying at a distance. The other 95% of the courses use *Blackboard* as a supplement to the course.

Pitt requires that an instructor complete a basic *Blackboard*/*CourseWeb* course prior to using the product. This is taught by a system analyst and/or a curriculum specialist working for Pitt's Center for Instructional Development and Distance Education (CIDDE), the group that supports and maintains the *Blackboard* software at Pitt. Additional help and support are also available from CIDDE; however, the instructor is primarily responsible for loading any and all *Blackboard* information.

Pitt-Titusville Blackboard History

Faculty at the University of Pittsburgh at Titusville were eager to begin using *Blackboard* and several instructors were trained and began using it in 1999 (including the author). See **Table 1** for course usage statistics. Note that this includes all classes that use *Blackboard*; they are not necessarily web-based. *Blackboard* may be used as another teaching tool or to supplement existing course material.

2001/2002 Statistics	Number of Unique Courses (with different Faculty)	Number of Faculty Involved
Fall	13	9
Spring	20	8

Statistics developed using *Blackboard/CourseWeb*

Table 1

Pitt-Titusville Web-based Blackboard Courses

Pitt-Titusville has offered several courses that are totally web-based for the past two years. **Table 2** below summarizes the courses offered this year and last year.

	2000/2001 Fall/Spring/Summer Terms	2001/2002 Fall/Spring Terms
Number of web-based classes	3	7
Percentage this represents of all *Blackboard* courses on campus	23%	21%
Number of students involved	36	69
Percentage of total student body in web-based classes	6.9%	13.4%

Statistics developed using *Blackboard/CourseWeb*

Table 2

This paper and presentation is based on the experiences of four instructors using *Blackboard* as the foundation for three web-based courses (**Table 3**). All four instructors were interviewed and their comments incorporated into this analysis.

Course	Instructor
Introduction to Medical Terminology	Dr. Nancy Tress, Mr. Chris Coat (team taught)
Personal Health	**Ms. Janet Exley**
Computer Literacy	**Ms. Melanie Anderson**

Table 3

Features of Blackboard

When an instructor is trained and ready to use *Blackboard*, their course is established on the Pitt development server(s) using a standard template. (See **Figure 1.**) The instructor can modify that template as they wish for their class. They do not need to use every feature listed. Once the course is ready, the instructor notifies CIDDE and the course is moved to the Pitt production server(s). Student rosters are pulled in from the student management application, but access is not available to students until the instructor makes the course available.

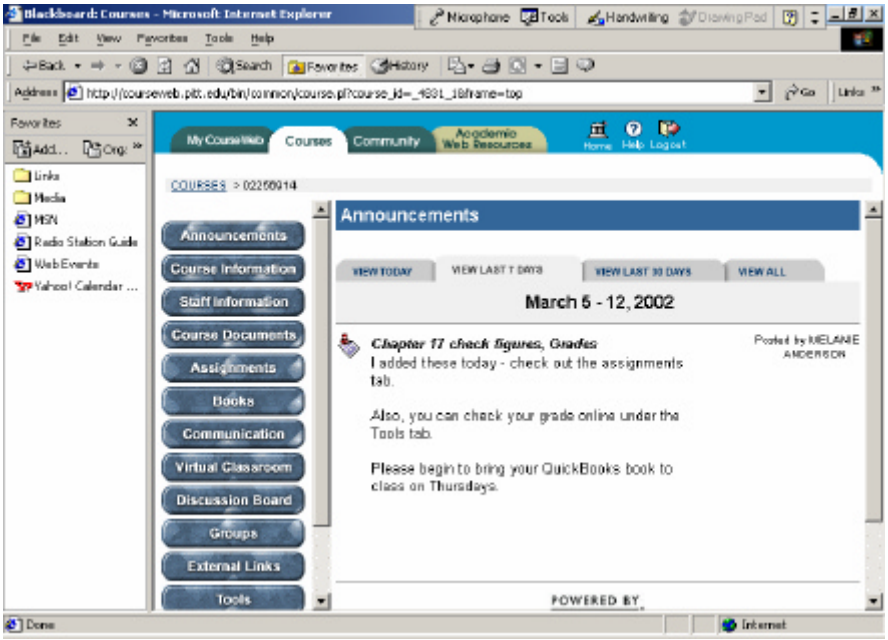

Figure 1

Pitt-Titusville Blackboard Features Used

A review of the courses using *Blackboard* and discussion with the instructors identified the features being used the most (**Table 4**). The following sections will address how each of the three

web-based courses used these features. In many cases, the tool was adapted to accommodate the instructor's style and student's needs.

Tab/Button	Typical Usage	Uses
Announcements	Frequently changed	Assignments due, class changes
Course Information	Static	Syllabus, other course management information
Staff Information	Static	Instructor name, e-mail, web site
Course Documents	Frequently changed	Quizzes, reference material
Assignments	Frequently changed	Lecture notes, assignments, etc.
Books	Static	Book, publisher, bookstore price
Communication	Frequently used	E-mail, other tools
Virtual Classroom	Frequently used	Chat
Discussion Board	Frequently used	
Groups	Infrequently used	
External Links	Static	Links to library, accounts management, reference material
Tools	Frequently used	Check grades, Digital Drop Box, Calendar

Table 4

Chats

All of the courses used the virtual classroom or chat: two of the three web-based courses relied heavily on chats to support the course. This doesn't necessarily translate to chats being the largest percentage of the student's grade. The instructors who utilize chats believe they provide an interactive setting and promote synergy among the students/instructor, i.e. providing additional learning that they could not accomplish on their own.

Two of the instructors use the chat white board feature to display material that is on a web site. One instructor uses textbook materials available on the web. For example, the instructor displays a diagram of the urinary system and asks a particular student (via the chat) to circle the bladder on the diagram. The instructors work the "virtual room" by asking directed questions to each student during the course of the chat. Instructors can track who is logged on to the chat, but the only way to gage participation is to direct questions to the student(s). This is necessary to keep all of the students engaged, and also to assure that students (who are remote) are not just joining the chat and then walking away from their workstation.

The instructor may require that the student multitask during the chat; they may assign students research on the web and require that the student report back on their findings later in the chat. The student then does the research while continuing to monitor the chat session.

The instructors believe that the maximum number of students they can effectively engage at one time is 20 (the instructor is intensely involved then, typing questions and responses at a rapid pace). They also believe that the chat time should be limited to one hour or less.

Potential problems identified include getting students together at the same time for a chat in a web-based class. A specific time must be established at the beginning of the course. Students may schedule another class or activity at that time if they do not know the required chat times well in advance. One instructor allows students who miss a chat to participate by reviewing the archived chat (a new feature of *Blackboard*) and writing up a one-page paper on the chat session.

Another problem is chat disconnects. Pitt-Titusville is in a rural area without high-speed access and with old telephone lines. However, we have had very few problems with connections. One instructor does her part of the chat remotely and reports only one problem over the course of the semester.

Discussion Boards

All of the instructors use discussion boards. One of the instructors relied more heavily on this than chat rooms, to allow the students more flexibility in completing the web-based course. The discussion boards are used to reinforce learning from the week's reading and homework assignments. Questions are put on the discussion board weekly, and student(s) have until the end of the week to post responses. Responses are required to the instructor's postings, as well as to other students' postings. (All responses are time and date stamped.) To give students proper credit for this effort, postings **cannot** be anomoymous.

Other instructors use discussion boards as a forum for "thought provoking questions". It is not used weekly but on an occasional basis and is not a large part of the student's grade. Due to the nature of the course, one instructor allows anonymous postings so that the students can feel free to ask questions about their own personal health issues.

Assignments or Course Documents

These components are used to provide information to students. They are usually made available one to two weeks ahead of time to provide students who are ahead of the pack with needed information. The instructor can control the pace at which the material becomes available, even if it is loaded ahead of time (just make it unavailable until a certain date). This is also a new feature of *Blackboard 5* – the ability to specify a start date and an end date for the material. The materials that are provided, usually on a weekly basis, are lecture notes, PowerPoint slides, assignments, instruction sheets, and homework check figures/points. Students like having the material available and grow accustomed and expect (demand!) it to be available to them. It does take a significant amount of time to maintain this, but the instructor must keep up with the most aggressive students in the class.

Digital Drop Box

The Digital Drop Box (under Tools) is used by all instructors offering web-based classes. Most instructors review this tool (and e-mail) during the first class. One instructor sends the students to the computer lab after she demonstrates the tools. She then makes them send her an e-mail and drop off a file at the digital drop box successfully prior to being excused from class. This is not because the students don't know how to e-mail or use attachments (although some don't) but because they won't use the *Blackboard* tools provided. (They use their own e-mail and send an attachment, instead of using the drop box.) The instructor wants them to use the digital drop box so it doesn't require passage through her own e-mail account, use storage in her e-mail quota or require downloading to her hard drive.

Students may have trouble locating their files to drop off, so they may need practice during the first class. A few pointers may help them. Some file types do not drop off well, such as Microsoft Works (they should be saved as Word file types). The instructor should make it clear at the beginning what file types are acceptable, i.e., what software they are willing to work with (for example, MS Office, but not WordPerfect). Also, the student should identify who they are and what assignment is being delivered on all homework assignments dropped off.

E-mail

The e-mail tool (under Communication) is an easy way for the students to communicate with the instructor; the instructor is only a click away. The instructor can easily communicate with all students as a group. However, all instructors reported problems with students who don't use their Pitt assigned e-mail account and do not use the Pitt account management system to forward their Pitt e-mail to other accounts. One instructor had a student who has four different e-mail accounts that she used for communication. It made it difficult for the instructor to identify incoming e-mail messages, as the student randomly used one of four e-mail identities. Thus, the instructor should specify up front that students are responsible for using their university provided e-mail for course related communication.

Exams/Quizzes

Two of the instructors use the quiz option to provide students with practice quizzes. One instructor uses the quiz option to give exams remotely. She controls this by not allowing students to take an exam until they have completed the required assignments. She then gives them a password to access the exam. The exam is timed, the students only have about 1 ½ minutes per question. This doesn't give them enough time to look up the answers in their book; they must know the material to pass the exam. She doesn't worry if it is the registered student sitting at the remote computer taking the exam, as exams for her course are not a major component of the grade (homework and assignments are).

Checking Grades

Students love the ability to check their grade on-line. They can compare themselves to the class average and calculate their current grade at any time. All the instructors used this feature and felt that it freed up their time in reviewing student's grades individually. However, this *Blackboard* feature is very slow, especially when adding new grade items or posting grades.

Calendar

All of the instructors used this to add events for the course (exams, key assignment due dates). The events will be displayed on all students' calendars/reminders. However, the item shows up on the due date, not prior. Students can also personalize their own calendar, but very few students have taken advantage of this feature.

Pitt-Titusville Instructor Feedback

Overall, instructors like web-based classes and believe that most students have a good learning experience. These instructors plan to continue to offer web-based courses and one of them is expanding to offer other web-based courses (meteorology, ecology).

However, there are a few problem areas, as there is with any new technology. These problem areas fall into three categories.

(1)Students who don't have adequate computer skills.
This is a significant problem, even in today's technology era. The web-based class experience appeals to many nontraditional students who are already juggling family, work and home responsibilities. However, they may not have up-to-date computer skills or chat room/discussion board experience. They may not know how to send an e-mail, or in some cases use a mouse. The instructors interviewed for this paper all meet with their students for the first class to do a "show and tell". However, this may not be enough for computer illiterate students and an over-assumption on our part about their skill set and learning curve. Thus, we are making plans to provide them with more of a support network in the next term (Fall).

(2) Some instructors report dissatisfaction with student's knowledge of the material.
Some of this is a language problem; in medical terminology some students have trouble pronouncing the terms, even though they understand the meaning. This may be partially due to the lack of verbal interaction with the instructor and class. (It should be noted that there is a cassette tape that ships with the book used in this course; students do have the opportunity to hear the words pronounced properly but may not get the reinforcement that they would in a traditional classroom setting.)

(3) **Students who have multiple e-mails and don't consistently use their Pitt assigned e-mail address or even the same outside e-mail address**.

Overall, all instructors believe web-based courses work well for **experienced**, **motivated** and **self-directed** students. A web-based course is not the best first college course for a new student, regardless of whether they are a traditional or non-traditional student.

Student Feedback

Pitt does not have a mechanism to replicate the student survey given in every regular class. The current student survey is administered during 20 minutes at the beginning/end of a traditional class. This survey is not currently available to web-based classes, although some instructors are attempting to do this on their own.

The results from a separate CIDDE survey indicated that 69% of students said CourseWeb helped their learning to a moderate/high degree. Students liked these items on the web site: lecture notes, assignments, checking grades, practice exams and quizzes, and announcements. Only 4% of the students surveyed identified problems, and these were mostly due to problems with access from home with a modem.

Instructor Wish List

Instructors are very interested in technology and are investigating new techniques. Video cameras on remote computers would make contact with students easier. Oral exams would become possible for some instructors who previously did not feel comfortable giving web-based exams. This might also ease the language problem noted earlier with student's pronunciation of key terms.

Instructors also want the ability to easily place graphics and PowerPoint slides onto the whiteboard in the virtual classroom. An easier method to create practice quizzes/ exams is also desired. Help is available with the Wytheville Community College Blackboard Quiz Generator (http://www.wc.cc.va.us/services/blackboard/default.html). In addition, some publishers provide *Blackboard* ready exam material (for example, Course Technology at www.course.com).

Instructors also wanted an evaluation mechanism for web-based courses similar to the student evaluation method used for traditional courses at Pitt.

Conclusion

Web-based courses are a viable alternative and will continue to grow at Pitt-Titusville, although probably at a slower rate than previously observed. Technology and instructors must continue to adapt to meet these new challenges in education.

Stream Your PowerPoint Slide Show—Easily!

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Abstract

Many of the effective pedagogical tools I have implemented have been introduced to me through conference papers of a tutorial nature. If the learning curve of a tool is so demanding that it takes many weeks or months of learning, and many hours to produce a very short learning experience, then I am typically not interested in adding it to my technological tool kit. I often burn out long before any benefits are realized.

Features that I consider essential are that the new tool be:
Easy to obtain/Install
Easy for the developer to use
Easy for the audience to use
Easy on everybody's pocketbook
Effective for developing learning/teaching tools

If you are a neophyte and want to create narrated slide shows for the web which use streaming technology so that download time is cut way down, then this session is for you.

I have been developing multimedia-learning materials for in-class and stand-alone use utilizing presentation software for quite a few years. I then turned my attention to the creation of on-line learning resources. With limited bandwidth preventing the timely download of large multimedia files, I realigned my efforts away from multimedia presentations when developing on-line materials. Unless the audience was on campus to take advantage of local network connections, the benefits of multimedia presentations were almost always heavily outweighed by the cost in time and effort to download and view the presentations. As wider band-width becomes more common, it seems to be time to realign my efforts to multimedia files which can take advantage of "streaming" technology which allows files to begin running before the downloading has been completed. As I explored products that would help me to develop such materials on a limited budget (zero is a definite limitation!), I came across a product distributed by REAL™ which fits the four "Easy" and one "Effective" requirements (described above) I look for when evaluating development tools. While I normally do not push one product over another when possible, this product may well be in a class by itself, especially considering that the Basic version I describe in this paper is distributed free of charge. The tools I present at this session can be learned in less than an hour, and when you return home, you can download and install the tools in less than an hour. You can then immediately begin to create a narrated streaming slide show right in PowerPoint. In this tutorial session, we will locate where to download the necessary software, how to use RealPresenter (the FREE version) to create a streaming narrated PowerPoint slide show. We will then learn how to edit such a presentation. We will then play the final product using RealPlayer (the FREE version.) We will also discuss some tips/tricks to use in PowerPoint before the narration is added such as imaging, drawing tools, and animation options. We will also discuss the RealPresenter techniques to make more effective streaming media presentations.

With less than one hour of training, you should be able to return and implement these tools immediately.

Note: This paper was not ready when the proceedings were compiled. The author will provide copies at the conference either directly or via the web or email.

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Smart Classroom Installations and Pedagogical Implications

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Abstract

This presentation will address practical issues confronted in the installation of computer and multimedia enhanced classrooms. We will share what we have learned concerning selection of projectors, document cameras, accessory multimedia equipment, and connectivity issues. We will share what we have learned concerning control of the equipment using the AMX system, the Proxima Control system, and the Phillips programmable remote. Hopefully this part of the presentation will help participants feel comfortable with designing and installing their own classrooms. We will then discuss the impact these technologies have had on the instruction at Augustana College. The survey results from our campus will focus on which equipment gets used and in what manner. This information combined with discussion from the audience will help provide direction on how best to use our limited resources to provide the biggest impact on instruction**.**

Note: This is a panel presentation without a formal report for the proceedings.

To Copy, or Not to Copy, That is the Quandary: An Introduction to Copying under the Copyright Law

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Abstract

Copyright law has a long and rich tradition in the United States. It has changed greatly, both in scope and duration, over the years. New technologies have repeatedly forced many of these changes. This paper examines the history and purpose of copyright law in this country. It explores the various laws protecting print, video, software, music, websites, and other expressive content vital to teaching and education. It discusses recent legislation, such as the Audio Home Recording Act, the Sonny Bono Copyright Term Extension Act, and the Digital Millennium Copyright Act, as well as the ramifications of those acts on copyright law and fair use. It also addresses some recent court cases involving Napster, the Rio, and *The Wind Done Gone.*

Historical Introduction

In order to fully understand the copyright law in the United States, one must begin with the Constitution, which provides the authority for and origins of this law. Among the enumerated powers granted to Congress in Article I of the Constitution is the power:

> To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.

Like much of the language of the Constitution, this phrase was the result of a compromise. James Madison, the principal drafter of this language, believed that copyright laws should serve both the interests of the public and of the individual. He believed that individual authors would benefit by being able to reap rewards for their creations for a limited period of time. The public would benefit by receiving these creations into the public domain after that time expired. Thomas Jefferson was apprehensive of any type of monopoly, even a limited one granted to the author of a creative work. He finally agreed to the notion of a copyright, as long as it was for a limited period of time. Both Madison and Jefferson readily agreed that the primary purpose of the law would be to promote learning and the progress of public knowledge.

The first Copyright Act of 1790 granted a copyright interest to authors of maps, charts and books for a period of 14 years, renewable for one additional term of 14 years. Over the past 200-plus years, both the scope and duration of this copyright interest has greatly

expanded. Throughout the 1800s, the copyright law was modified several times to include prints and engravings, musical compositions, public performances of dramatic works, photographs, paintings, drawings and statues. In 1909, the law was amended to include "all the writings of an author." Since that time, this language has been interpreted to include, among other things, motion pictures, sound recordings and computer programs.

The length of the first term of copyright was increased from 14 to 28 years in 1831, and the length of the renewable term was similarly increased in 1909. In 1976 the duration of a copyright was changed to the life of the author plus 50 years. The Sonny Bono Copyright Term Extension Act of 1998 increased that to the life of the author plus 70 years. Thus the duration of a copyright today is very different from that envisioned by both Madison and Jefferson during the Constitutional period.

Basics of Copyright Law

A federal copyright interest arises from the moment that an original work of authorship is fixed in a tangible medium of expression. Works of authorship include literary works; musical works, including any accompanying words; dramatic works, including any accompanying music; pantomimes and choreographic works; pictorial, graphic, and sculptural works; motion pictures and other audiovisual works; sound recordings; and architectural works. The owner of the copyright has the exclusive rights to do and to authorize any or all of the following: to reproduce the copyrighted work, to prepare derivative works based upon the copyrighted work, to distribute copies of the copyrighted work to the public by sale, rental, lease or lending, and in the case of some of these categories of copyrighted works, to perform or display the copyrighted work publicly.

The owner of a copyright is free to enjoy these exclusive rights subject to a series of limitations or exceptions. Some of the exceptions are very narrow and specific. For example, the owner of a computer program may make a backup copy of the copyrighted work for archival purposes. The most important and least specific exception is "fair use."

Under Section 107 of the Copyright Act:

> [T]he fair use of a copyrighted work … for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright. In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include--
>
> (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
>
> (2) the nature of the copyrighted work;
>
> (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
>
> (4) the effect of the use upon the potential market for or value of the copyrighted work.

Not surprisingly, many cases involve the determination of whether a particular use of a copyrighted work is a fair use or not. Generally, a court will explore the purpose or nature of the use and apply the four factors listed in the statute to the facts of the case. For example, if a professor discovers a copyrighted article, recently published, relevant to a topic she is teaching that day, she could rest assured that her photocopying and distribution of the article to her class is a fair use of that copyrighted work. It is for a purpose specifically addressed in the statute (i.e., teaching), done in a manner anticipated by the statute (i.e., multiple copies for classroom use), and is consistent with most of the four factors. A court would almost certainly deem this to be a fair use.

Sometimes it may be difficult to determine if the copying of a particular work is appropriate or permissible under the copyright law. A good starting point is to assume that a work is copyrighted. It is no longer required that a copyrighted work contain a copyright notice, although it is still advisable to include one. So you cannot assume that a work is not protected by copyright simply because it does not contain a notice. Similarly, do not assume that you cannot copy a work just because it does contain a notice. Remember that an owner of a copyright may grant whatever rights to copy the work to anyone he wishes. For example, many journals specifically give permission to copy an article contained therein for nonprofit, educational purposes. Furthermore, despite the fact that a work is copyrighted, its copying may be a fair use.

Different Media

A copyright interest can exist in works contained on a great variety of media, including books, audiotapes, videotapes, CDs, DVDs and websites. It is often easier to understand that there is a copyright interest on media with which we are more familiar. For example, most people would probably readily agree that if someone bought a copy of a novel or a textbook, photocopied it and gave or sold the copy to a friend, there would be an infringement of the copyright. Because we are very familiar with books, we know that we are not supposed to make unauthorized copies.

It is interesting to examine how quickly the public learned that computer software is subject to copyright protection. Two decades ago software publishers struggled to protect their product. Many consumers were unwilling to accept the notion that a copyrighted work on a floppy disk was as worthy of protection as a copyrighted work in a book. Publishers tried a variety of methods to protect the software. Many of these methods used technology to simply prohibit the act of copying. For example, a publisher distributed software on a floppy disk which contained code preventing a user from reproducing the disk with a "diskcopy" command. Some enterprising person or company quickly discovered the that the way to circumvent this "lock" was to provide a "key." The publisher then produced version two of the "lock" in order to thwart the "key." But soon thereafter came version two of the "key." And so on.

This cat and mouse game lasted a few years until the software publishing industry decided to educate the public that software is copyright protected. Today, while certainly

there are people who have no qualms about illegally reproducing copyrighted software, most people would have to acknowledge that they know the software is protected by copyright.

Copyrighted works are often subject to different rules based entirely upon the medium from which or to which the work is copied. This certainly contributes to the confusion about what can be copied. Consider the following situations, and try to determine if there is a copyright infringement:

Examples

1. Ilani, Rachel, Ashton and Melissa chip in to buy one copy of the latest John Grisham novel and to make three photocopies of the book. They draw straws to see who gets to keep the book. This scheme works so well that they decide to do the same thing for their Psychology 101 textbook.

2. Zack, Tim and Byron share their resources to buy a CD-ROM game for the PC. They "burn" extra copies so that each of them can install and use the game on their own PC.

3. Melanie's father videotapes the movie "Aladdin" from a channel on public airwaves. He tapes the "Lion King" from the Disney Channel on their cable service. He borrows a friend's "Beauty and the Beast" videotape and makes a copy on his dual cassette video recorder.

4. Charlene buys a high-quality audiocassette and tapes a broadcast of a Lyle Lovett album from the radio.

5. Bruce buys a copy of the "O Brother, Where Art Thou?" soundtrack CD. He makes an audiocassette copy for his car and "burns" a CD copy for his wife's car.

6. Jaime downloads 23 "Elliott Smith" songs on her computer in MP3 format. She "burns" them onto a CD to listen to on her Walkman and in her car.

7. Adam buys a copy of the "Sex and the City: The Third Season" DVD. He makes an extra copy of it and takes it to school with him, leaving the original at home with his parents.

8. For Stacie's eighth grade project on "Multimedia Today," she collects a variety of text, art, photos, audio and video from the Web, and compiles them on a CD. She gets an A+.

Which of these involve copyright infringement? Which of these are fair uses? Are there any other possibilities? For starters, each one of these situations probably involves the copying of a copyrighted work. Unless there is some exception, like fair use or making

an archival backup of a computer program, the act of copying is probably an infringement. Unfortunately, because of some fairly recent legislation, many of these scenarios will have different results based solely upon the medium from which or to which it is copied.

Books (Example 1)

Obviously, the photocopying of the novel by Ilani, Rachel, Ashton and Melissa would be an infringement. This is the easiest example to answer. There is simply very little justification for the copying. With regard to the copying of the textbook, while one might argue that it was done for "scholarship" purposes, it almost certainly would not satisfy the requirements of a fair use. Because they copied the entire textbook, and because that copying would have an effect on the potential market, a finding of fair use would be extremely unlikely.

It is important to note that in the area of educational publishing, there have been a number of cases involving instructor "coursepacks." While the specific language contained in the fair use statute (i.e., "including multiple copies for classroom use") might seem to suggest a great deal of leeway for such copying, the cases have generally decided otherwise. In fact, when Congress passed the Copyright Act of 1976, which included the fair use language, the House of Representatives provided guidelines for classroom copying in nonprofit educational institutions. Basically the guidelines limit the copying with respect to brevity, spontaneity and cumulative effect. For example, one may not be permitted to copy more than four works from the same book, nor anything over 2500 words. While these guidelines have no direct legal effect, a number of courts have referred to them favorably.

Computer Programs (Example 2)

While Zack, Tim and Byron are specifically permitted to make a copy for backup or archival purposes, they cannot legally make extra copies so that each of them can use the program. Generally, one purchases a license to use software. This means that the copyright owner can set contractual limits to what may or may not be done with the software. For example, the license may permit installation on one machine only, or it may permit installation on both a work and a home (or portable) machine, as long as the software is never used on the two machines at the same time. These restrictions are entirely a matter of contractual specification.

Videotapes (Example 3)

Ever since the Supreme Court decided in 1984 (*Sony*) that the videocassette recording of copyrighted works on television could be a legitimate fair use called "time-shifting," videotaping has become a part of daily life. However, there is nothing that authorizes the wholesale taping of copyrighted works. While "time-shifting" has the Supreme Court seal of approval, there is nothing that permits taping for purposes of building a collection of copyrighted works. So while taping the movie off the airwaves, or even the cable

channel, may be a fair use, there is nothing that would justify the taping for the purpose of compiling a library of movies. Similarly, there is no legal justification for using a dual tape recorder to make a copy of "Beauty and the Beast."

Movie producers and content holders, such as Disney, have become masters at marketing videotapes for sale despite the fact the movie can often be taped for free off the airwaves. One of the reasons for the success is probably the quality of the reproduction. Another is the ingenious use of marketing strategies like "never before seen footage," digitally enhanced sound, and special content like movie trailers or outtakes.

Music (Examples 4, 5 & 6)

Copyright protection for music has taken a long and winding road, and that road continues to wind on. For a long time the music industry was concerned about copying, but not terribly so, because of the relatively poor quality of sound produced by the technology of the day. Analog tapes lost a good bit of quality when copying from a record player, a radio transmission, or from another tape. It was not until the advent of digital music, in the form of CDs and DATs (digital audio tapes), that the music industry became terribly concerned. It prevented the DAT industry from taking hold in this country by successfully lobbying Congress.

It wasn't until the passage of the Audio Home Recording Act of 1992 ("AHRA") that the manufacture or importation of DAT players was permitted. The AHRA requires that every digital audio recording device contain a Serial Copy Management System that prohibits or impedes the copying of a copy. The AHRA also establishes a mandatory royalty scheme that authorizes a payment for the sale of each blank DAT, upon the assumption that eventually a copyrighted work will be contained on that tape. In return for this, the consumer gets the right to make analog or digital audio recordings of copyrighted music for his or her private, non-commercial use. Such copying is still considered to be a copyright infringement, but consumers are, in effect, immune from suit for this type of copying.

So Charlene can record Lyle Lovett from the radio, and Bruce can make an analog copy of "O Brother, Where Art Thou?" for his cassette player and a digital copy for his (or his wife's) CD player. What about Jaime's MP3 files? If she had bought a CD containing the songs, converted them to MP3, and then "mixed" her own CD, she would probably fall within the AHRA. But she does not "own" a lawful copy of the work. Can the delivery or downloading of the MP3 files be likened to the transmission of a song over the radio? Obviously, *Napster* (2001) and other cases are still wrestling with this question.

DVDs (Example7)

If Adam successfully made a copy of the "Sex and the City" DVD, he is potentially subject to both civil and criminal liability under the Digital Millennium Copyright Act of 1998 ("DMCA"). DVDs contain encryption software to prevent copying. Under the DMCA, a person can be subject to civil and criminal sanctions for circumventing encryp-

tion software or other antipiracy technologies. We are beginning to see music CDs containing similar software. The software prevents the CD from being played on a computer. There are reports that some of these CDs will crash a computer if the CD is played. It remains to be seen whether the public will accept this.

The Web and Other Multimedia (Example 8)

While it appears that everything that Stacie copied for her school project may have been protected by copyright, there is certainly an argument that some or all of it may have been a fair use for classroom or scholarship purposes. This presents one of the greatest concerns about the DMCA. If Stacie's copying of a short video clip form a DVD or a short audio clip from a CD is a fair use, protected by the copyright law, should technology be permitted to preclude such use? In other words, should the copying of content be regulated by technology, rather than by law? These questions are the subject of several pending lawsuits.

Conclusion

The combination of computers, digital technology, the Web and high-speed Internet connections has provided an opportunity never before seen by man. Information can be readily, easily and accurately copied in a matter of seconds. How can the law effectively, and equitably, provide protection? What kind of works should be protected by copyright, and for how long? Has the scope of copyright law expanded too much? Would Madison and Jefferson even recognize it?

These are all questions that the law is attempting to answer. The law must and does evolve as society changes. Technology often forces those changes. Copyright law is a prime example. As new technologies have arisen over the last 200 years, the laws have been modified to accept (or reject) them. Digital technology has provided many challenging questions. Many of them have not yet been answered.

Recent Cases

Recording Industry Association of America v. Diamond Multimedia Systems, Inc. (1999)

In one of the first cases involving MP3 files, the Court of Appeals for the Ninth Circuit refused to enjoin the manufacture and distribution of the Rio, a portable music player capable of playing MP3 files downloaded by computer. The court held that the Rio was not a "digital audio recording device" under the Audio Home Recording Act and, therefore, not subject to the restrictions therein requiring a Serial Copying Management System. The court favorably likened the "space-shifting" nature of the Rio to the "time-shifting" of VCRs in the *Sony* case (1984).

A&M Records, Inc. v. Napster, Inc. (2001)

The Court of Appeals for the Ninth Circuit basically upheld the injunction issued by the lower court prohibiting Napster from facilitating the distribution of copyrighted songs. The court analyzed the four fair use factors and held that Napster and its system's users were not engaged in a fair use of the plaintiff's copyrighted works. It specifically rejected Napster's defense that users were merely "space-shifting" or "time-shifting."

New York Times v. Tasini (2001)

The Supreme Court held that magazines and newspapers could not include, in electronic databases, articles written by freelance writers without additional permission or assignment from the author. The Court held that under the Copyright Act, the author retains his or her rights to the individual contribution unless, of course, he or she specifically assigns them.

SunTrust Bank v. Houghton Mifflin Company (2001)

The Court of Appeals for the Eleventh Circuit vacated an injunction issued by the lower court which had prohibited the publication of *The Wind Done Gone.* The court's opinion contains an excellent discussion of the history and purpose of the copyright law, as well as a detailed analysis of parody as a fair use.

Universal City Studios, Inc. v. Corley (2001)

In a case challenging the constitutionality of portions of the DMCA, the Second Circuit Court of Appeals affirmed the lower court's permanent injunction prohibiting 2600 Magazine from posting or linking to DeCSS code (code that circumvents some of the encryption software contained on DVDs). The magazine had contended that the anticircumvention provisions of the DCMA unconstitutionally prohibit fair uses of DVD content, and that the DeCSS code is entitled to First Amendment protection. The court rejected both arguments.

Eldred v. Ashcroft (2002)

The Supreme Court agreed to hear a case challenging the constitutionality of the Sonny Bono Copyright Extension Act. The plaintiffs, all of whose livelihoods depend upon a rich public domain, contend that Congress exceeded its authority by extending copyright terms where such extensions do not "promote the progress of science" as required by the Constitution. The plaintiffs contend that Congress is limited by this language, and cannot make copyright laws that are not consistent with this purpose.

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Universal City Studios, Inc. v. Corley, 273 F.3d 429 (2001)

Document Imaging in the Admissions Process

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Abstract:

Dealing with double digit growth in student applications can be an enviable situation, but how does the Admissions office at a small university manage such an influx in documents to review? This report describes the implementation of a document imaging system that seamlessly interfaces with the student information system; this result should be the best solution.

Salve Regina University

Salve Regina University is a Catholic liberal arts university located in Newport, Rhode Island. There are 1,808 full time equivalent students enrolled in the current undergraduate program. The University welcomed its first class in 1947. It originally was an all-women institution and in 1974, Salve Regina became a coeducational institution. The school offers associate and bachelor degrees in such areas as Art, Nursing, Administration of Justice, Information System Science, and Education, among many others; it also has a master's, CAGS and doctoral program in more specialized areas. There are twenty varsity level sports participating as an NCAA Division III school.

A major goal for the University is to properly care for the assets that it possesses and a major strategy related to that goal is to seek opportunities to operate in a more efficient and effective manner. Thus, from an information technologies perspective, collaboration projects with willing functional offices are actively pursued to gain such positive results.

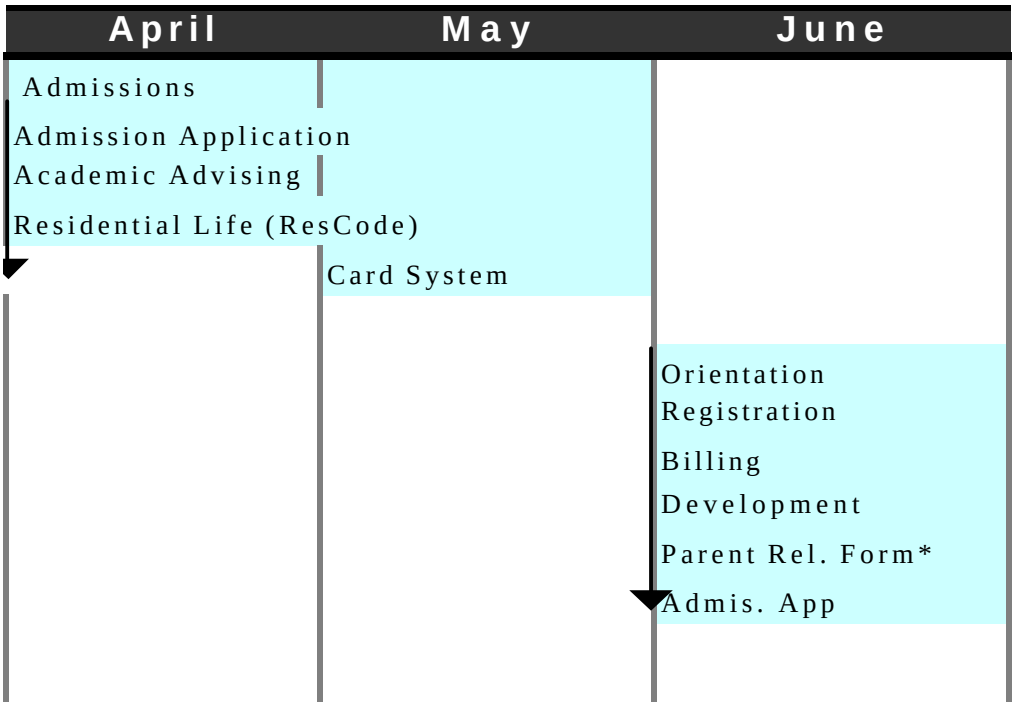
Problem Identification:

Scanware Information Flow Analysis

The initial identification of a processing efficiency problem was made during a campus wide study to review the high-level information flow within the University's student information system, *Scanware*. From the period of April to June in any typical year, there are at least three separate departments that need to have access to a committed student's application document folder; the three main departments are Admissions, Academic Advising and Development. A solution had to be devised to provide concurrent yet secured access to certain documents within a student's folder. Admissions collects the student's documents in the student's folder throughout the application process, Development needs to review the parent or guardian information to set up

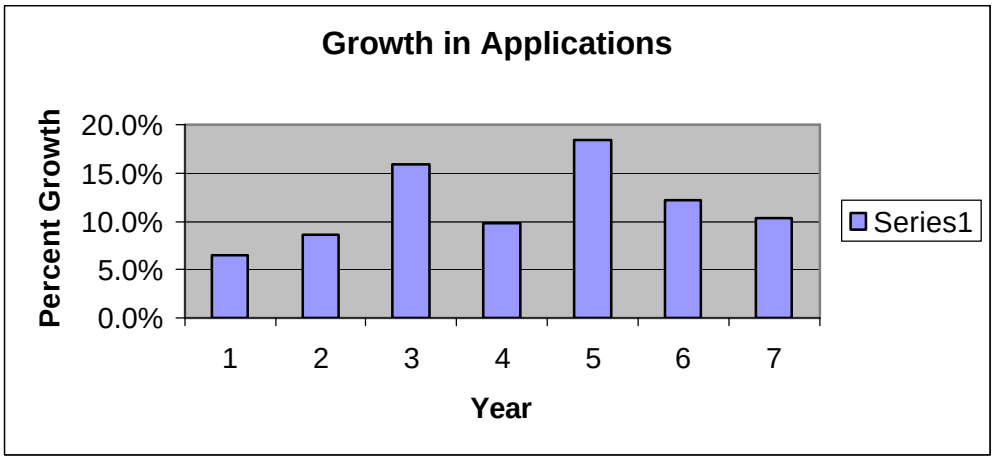
mailing lists of special events, and Academic Advising needs to register the student for the first semester courses before the Orientation session in June.

Chart for *Scanware* Information Flow Analysis Processing



Influx in Number of Admissions Applications

In addition to the bottleneck in the processing of the student's application folder, another situation arose to aggravate the problem even further. During the past several years the number of applications received by the University's Admissions department has experienced double digit growth rate as depicted in the following chart that covers 1995 (Year 1) through 2001 (Year 7).



Since 1995 (Year 1), the Admissions office has added only one support staff and one counselor position. Rather than adding more staff in proportion to the number of applications, a more cost effective solution, possibly with the use of technology, was sought. Two areas were pursued in utilizing technology. One area was to make use of the Internet to provide applications to prospective students; an arrangement with CollegeNet was made to offer online application submission for students to the University. The second area was to investigate the use of a document imaging system to better manage and control the processing of student applications from both within the Admissions department itself and among the interdependent Admissions, Academic Advising and Development departments, respectively.

RFP Guideline for a Document Imaging System

In order to formally prepare for a solution to the initial processing inefficiency, a request for proposal (RFP) document was prepared by the Information Technologies (IT) office. By performing the RFP exercise, even if it was never issued for bid, the identified problem assumed a more tangible nature so that when different vendors were invited for discussions, there was a basic set of commonly accepted facts that were understood by internal parties.

Vendor Presentations and Reviews

Three vendors offered presentations describing their document imaging systems. The vendors had been contacted in different ways. Xerox provides the University with its copier service and there is a long term relationship with the company at the University. IKON frequently would make calls at the University to explore business opportunities. Perceptive Vision, Inc. (PVI) was recommended through a contact in the Nercomp (North East Computer Users) group, which is an association of over 150 colleges and universities in the north east part of the country. The vendors and their respective products are depicted as follows:

Vendor	Partner	Product
Xerox	XeroxConnect	**Docushare**
IKON	FileNET	*FileNET*
IKON	Simplify	*Simplify*
IKON	OTG	*Xtender*
Perceptive Vision Inc.	-	*ImageNow*

Product Selection

After participating in each of the presentations, based on compatibility with the identified requirements of the University, the project team decided to pursue reviewing Perceptive Vision, Inc.'s (PVI) *ImageNow* product. *ImageNow* met users' expectations, IT's technical configuration guidelines, particularly its noninvasive interface with the University's student information system, and the cost was moderate compared to other offerings.

Several contacts were provided by PVI and eventually contacted. The references included:

University of Michigan
University of Wisconsin at Eau-Claire
University of Vermont Law School
New York University
Rutgers University

At Rutgers University, the references not only provided valuable information with a telephone conversation but also invited us to their campus in New Brunswick for a site visit. Seeing the actual document imaging system in practice solidified our understanding and commitment to the *ImageNow* product solution.

Implementation Plans

Because of the impact of the new document imaging technology and the high levels of activity during the spring Admissions season, it was prudently decided to have an implementation plan that consisted of phases rather than one comprehensive effort. The first phase would be a 'pilot' implementation involving the Admissions, Development, and Academic Advising departments. This phase consisted of a number of key steps including the following.

Establishment of Technical Environment.

In anticipation of the implementation of the new document imaging system, a number of purchases were funded by the University including:

Scanner	Canon DR5080-C
Scanning Station/ Document Server	HP Vectra with *Windows 2000* and with 17" Monitor
Linking Station	HP Vectra with *Windows 2000* and with 19" Monitor
Client Stations	HP e-PC C-10 with *Windows 2000* and with 17" Monitor
Network Adapter	100 MHz Network Interface Cards

In addition, a number of future technology investments were planned including the upgrade to the core data switch to support a more robust gigabit data speed requirement, a replacement of the underground fiber optic cable plant to provide single mode fiber capabilities and the installation of a storage area network to accommodate anticipated data storage requirements.

Initial Training and Installation.

A three day installation plan was set to launch the initial use of the document imaging application. The focus of attention during the three days was on the definition of the index hierarchy, the establishment of drawer security by document type, the installation and configuration of the scanning station, the definition of the 'screen scraping' procedures with the *Scanware* application, the initial training for scanning and linking, the installation of the client icon software on each of the users and a brief introduction to **Workflow**.

Establishment of Processing Procedures.

Procedures for scanning, linking, securing and storing documents were established in the Admissions department; routines were also developed to quality assure work. The work procedures for document imaging for the pilot project included tasks that were mostly in addition to rather than in place of current manual steps in the Admissions office. This result was due to the set of committed student applicants that was processed by scanning and linking. The only step that was eliminated was the need to copy the contents of the applicant's folder before sending the folder to the Academic Advising department. Since the Admissions department and Academic Advising department (as well as other departments) had access to the documents through *ImageNow*, there was no need of copying the documents.

Processing of Document Folders.

The initial set of documents in the committed student applicant folders was processed with the new document imaging system in the March timeframe. This set consisted of approximately fifty students' folders. From an operations perspective the time to process seventeen folders of documents, which included document preparation, scanning, quality assurance and linking, was about two hours; this result suggests a processing time of slightly over seven (7) minutes per document folder with a minimum of seven (7) documents per folder. The set of documents entered were now accessible through the document imaging system for members of the Admissions, Academic Advising and Development. Although the initial set of documents was processed smoothly, the greater number of anticipated committed student folders would not be experienced until the April timeframe.

Critical Decisions During Pilot Implementation

Several critical decisions were made in the pilot implementation of the document imaging system. These decisions involved the following:

Assignment of Key Roles of Scanner, Linker, Administrator, Technical Support.

Certain standards were created for the treatment of different documents that were part of the scanning process. During installation, it was felt that by focusing the training on two persons it would be better in the long run for processing efficiency and quality assurance sake. With the *ImageNow* application, an additional component called *Virtual Rescan* (VRS) technology was installed; this software enhances the image clarity of the scanned document. In certain instances for particular documents, this technology has been of benefit. It was also felt that the document imaging system be administered by the user department staff rather than the IT staff. Thus the Admissions department system administrator agreed to play the role of document imaging administrator. This person would address any day to day operational and security concerns and would always have the peace of mind that an IT person was knowledgeable of the application for consultative purposes and as a further escalation support measure, the vendor would be contacted for remote support through an package called *Placewhere*. Because the scanning and linking

functions were so critical, it was decided to train a few persons very well so that established quality levels were maintained.

Location of Scanning Station.

The initial idea was to locate the scanning station in the scanner / linker's cubicle. The size of the scanning station made this somewhat prohibitive, however, as the scanner itself measured 16" x 19" and 10" high; this footprint would leave very little room for physical document placement before and after the scanning process. A second suggestion was to locate the scanning station near the front counter where there was more space; this suggestion was dismissed, however, for confidentiality concerns in an open, publicly accessible area. A third suggestion was to locate the scanning station in the back office, in either the secretary's cubicle or the system administrator's work area. The latter area was preferred not only because it was more spacious but also it was not as disruptive on the office operations. Since the system administrator's area also had an available data drop connection for network access, the installation of the scanning station configuration was finalized.

Index Data Items and Order within Index Hierarchy.

One of the more debated topics during the implementation planning was the set of data items comprising the document index. Six entries are available in *ImageNow* to index a document. Suggestions from other colleges had ranged from using three to five data items. There were many factors to consider. One factor was to ensure the uniqueness of the student's document folder; this item could be satisfied by using the *Scanware* Student ID number that is a permanent entry for every student. A second factor was an easy way to look up the student's materials; this item could be satisfied by using the last name – first name, or possibly the social security number both of which are available in the *Scanware* system. The difficulty with the last name – first name or the social security number choices is that they are not necessarily unique or permanent even though by using these entries, it is fairly easy to identify the student. A third factor was the linkage between the *Scanware* system and the *ImageNow* system; although *Scanware*'s unique key is the Student ID number, this data field is not displayed on the current 'green screen' version of *Scanware*, but rather on a more advanced graphical version of the application. Because of the nature of *ImageNow*'s 'screen scraper' technology, the linkage between the *Scanware* system and the *ImageNow* system has to be through data items that are displayed on certain *Scanware* screens; this item could be satisfied by accelerating the adaptation of the graphical version of *Scanware*.

In addition to the choice of data items to include in the index, another challenge was to decide on the hierarchy of the index; in other words, what hierarchical order would make the index search most efficient from an operational perspective. After much discussion, it was recommended that the Drawer be the top level, the Student ID number as the folder (or second) level, the document type as the tab or (third) level, the last name as the field 3 (or fourth level) and the first name as the field 4 (or fifth) level. No entry was provided for field 5, the sixth level.

Security for Accessing Documents in Multi-departmental Environment

Even though the pilot implementation was planned for a meaningful yet limited use of the new technology, the scope of the phase did involve more than one department. Because of the multi-department perspective, assurances had to be designed to respect and retain department confidentiality in reviewing student document folders. For example, in the application review process, it is common practice for different parties to attach notes or comments to a student's documents so that this information can be remembered and reviewed by one or more parties. This information, however, would not be appropriate for viewing by other departments. In order to respect the sensitivity of department practices with the need for multi-department access to the shared documents, a security access scheme was devised for the document imaging system. A constraint of the *ImageNow* system is that security is assigned to the Drawer level, and nothing else. Thus, careful thought had to be made to assure that certain document types were placed in specific Drawers and only those departments that had to access certain documents were provided with the proper security rights to the particular Drawers.

Key Challenges and Adjustments

During the pilot implementation, several challenges were addressed including the following items.

Changes in Operational Procedures.

The new computers that were ordered prior to the installation of the document imaging software had the standard 17" monitor; the monitor for the persons who performed the scanning and system administration duties was the larger 19" model. Because of the opportunity to have dual system access (*Scanware* and *ImageNow*), the users now had to deal with limited screen 'real estate'. The users chose to either use the minimize / maximize procedure or the multiple windows template for utilizing the student information system with the new document imaging system.

Using 'Screen Scraper' (aka, **LearnMode**) Technology with Java-based GUI version of SIS.

Initially, it appeared as though the Student ID number would have to be visible on every graphical screen pertaining to the student; this presumption would have been a problem because the Student ID number was not displayed on every screen, in fact, it was only displayed on one screen. Through more analysis, however, it was determined that as long as the initial graphical screen contained the Student ID number and the connection to the set of pertinent student documents was established, then the documents would be available regardless of the displayed screen. In addition, the decision on the index fields forced the use of the graphical screen rather than the character ('green') screen because the Student ID number was not displayed on the character screen; only data items actually displayed on the screen can be utilized by the 'screen scraper' technology. If the user chose to use the traditional 'green screen' for *Scanware* rather than the graphical screen, then the *ImageNow* application would have to accessed independent of the *Scanware* application; this result would require a search procedure be exercised in both systems, independent of one another.

Acclimating Admissions Staff and Other Departments to a new way to operate.

The introduction of new technology to procedures that are currently performed manually can be a challenging endeavor. The implementation procedure was designed to start with a small group of users and then gradually grow to a wider circle of users both within the departments and outside of the original departments. In this way, the behavior modification and anticipated positive response of using the system would bear considerable weight in influencing the new participants at a later stage. A main adjustment for the user is to deal with the student information by using a digitally stored image rather than a paper document folder; thus rather than struggling with physical space restrictions, the user was now required to become slightly more adept at screen manipulation.
Implementing Batch Controls on Document Scanning and Storage.

Two of the most critical operations in the document imaging system are the scanning and linking of the received documents. The batch controls of which documents are received, scanned and linked need to be carefully followed. If a scanned document is 'misplaced' in the document imaging system, it can be very challenging to try to locate the folder. Close awareness of which students' documents were processed can provide a trail of possible locations if a document is not found; what makes the problem more complicated is that the missing document may not be realized until some time after the actual linking took place.

Utilization of Workflow

One of the more significant benefits in implementing a document imaging system is the opportunity to redesign the work process. For example, using the **Workflow** component of the *ImageNow* application, the user can manage and control the flow of the received student documents as they are processed by different parties. The reason for this result is that all of the documents are accessible and viewable through the document imaging system rather than in a file cabinet

In planning for the full of implementation of *ImageNow* document imaging system, including the use of **Workflow**, in the Admissions department, the following considerations are made.

1. Document Existing Admissions Procedures
    a. Determine Procedures for Opening Mail / Electronic Documents and Categorization of Source Documents
    b. Determine Data Entry Procedures into *Scanware* / Other System Using Source Documents
    c. Determine Filing and Distribution Procedures of Received Source Documents
    d. Determine Current Practices of Reviewing Applicant Folders In/Out of Office
    e. Determine Correspondence Procedures with Prospective Student
    f. Determine Procedures for Measuring Progress of Admissions Process including key measures of processing efficiency
    g. Determine Nature of Notes / Updates Pertaining to Application Review
    h. Determine Procedures for Application Review
        i. Timing

ii. Critical Set of Received Documents
iii. Method of Work

i. Depict current procedures with system flowchart.

2. Training with **Workflow**
   a. Support from Vendor (PVI) and Documentation Materials
   b. Create Basic **Workflow** Model of Current Procedures
   c. Utilize Javascript Logic Where Appropriate
   d. Utilize Provided *Crystal Reports* from *ImageNow* system
   e. Create Customized *Crystal Reports* from *ImageNow* system

3. Model a Reengineered Admissions Procedure
   a. Analyze and Document Revised Procedures
   b. Create new **Workflow** Model for Revised Procedures
      i. Use Internal and PVI Resources
   c. Use new **Workflow** Model with Test *ImageNow* system
   d. Determine Appropriate Management Tools (Reports) to Monitor Operation including comparable efficiency measures
   e. Review, Revise and Retry as Appropriate

4. Conduct Initial Deployment of new **Workflow** Model
   a. Train Staff involved with new **Workflow** Model on Procedures
   b. Establish appropriate user access rights for various **Workflow** queues
   c. Select set of documents to utilize in new **Workflow** Model test
   d. Utilize new **Workflow** model and monitor progress
   e. Review, Revise and Retry as Appropriate
   f. Finalize **Workflow** Model

5. Production Use of new **Workflow** Model
   a. Establish set of routine procedures for monitoring model
   b. Enhance / modify procedures as new situations arise
   c. Develop and Utilize Javascript routines where appropriate
   d. Establish daily, weekly, monthly reporting routines

6. Additional Items to Address
   a. Seek Opportunities to Transfer Data from *ImageNow* to *Scanware*
   b. Seek Opportunities to Provide Web App of Prospective Student's Progress
   c. Establish Procedures to Access System from Remote Site
      i. Review VPN Client versus *WebNow*

Conclusion

Through the pilot implementation of the document imaging system much insight and experience have been gained. The system is in production mode in the Admissions department and by spring 2002 the participating Academic Advising and Development departments should also be

using the system on a regular basis. The initial exercise in analyzing the current Admissions application processing procedures has provided the framework to commence a serious study in utilizing the **Workflow** component of the document imaging system. This effort should yield the anticipated efficiencies in this aspect of the Admissions operation.

A *Really* Small Computer user in Education

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Abstract

Our Association was originally organized in order to support small computer users in Education. The nomenclature of small computing is making a come back and this time it fits into a shirt pocket!

The hand-held computer is making its way into the schedule of more and more people. Educators are no exception. This presentation will show the benefits of using a pocket-type computer by demonstrating the practical uses for it in education and a case involving classroom and office implementation. The presentation will be given in its entirety using pocket presentation software on the hand-held computer to a projector.

'Memory' Lane

At the Convention of World Future Society in 1977, the President of DEC, Kenneth Olson declared these words. "There is no reason for any individual to have a computer in his home." With the advent of mobile computing this supposed foolish statement is not too far off the mark.

Writing about technology is like writing about vapor over a coffee cup. Here in an instant, and gone just as suddenly. The pocket-pc currently is an evolving breed of computer. Much of this paper may be found in the recycle bin within six months. Many of the web sites may disappear, and another pocket pc will undoubtedly have much more to offer next year. Change is a constant.

The hand-held computing device came in the early 80s with the introduction of Radio Shack's "PC-1." Later the "PoqetPad" (developed by Poquet Computer Corp, which developed one of the first MS-DOS palmtops; MSRP: $2500) came and it ushered in the PCMCIA (Personal Computer Memory Card International Association) device. Apple's "Newton" made its debut in 1993 with a suggest retail price of $699. Many of these represent the early Personal Digital Assistatnt or PDA. Today, notable brands such as the "Palm," or "Hanspring" are in the PDA category, while the more powerful PDAs are called Pocket PCs. Hereinafter, referred to as the PPC.

This new breed of hand held device exceeds the capabilities of its forerunners by including common applications found on most desktop computers. The entrance of the PPC brought with it anywhere, anytime communication. Frankly, it also brought with it a higher price tag. But, the added value outweighs the added cost.

Hand-held vs. Pocket-PC

When classifying a *really small* computer, the main consideration is the display. A PPC has a quarter VGA screen (320x240). A hand-held has a half VGA (640x320) or full VGA (640x480, 800x600) screen. A laptop falls into the column of Hand held computer. Laptops are not designed for the ordinary shirt pocket. However, the PPC does a marvelous job of it.

The CPU

The PPC is equipped with Intel's 206 MHz Strong Arm chip.

Operating System

Most of the PPCs come standard with a pocket version of Windows called Windows CE.(The desktop version of this operating system can be found on the WebTV system, Microsoft's X-box, MSN Web companion and the eBook Reader). Linux exists for the PPC. Some PPCs can be purchased with Linux already installed. The majority of PPCs are using the Windows CE environment.

Recently, third party developers have made a Palm emulation package for the PPC. This is primarily useful for running some of the older (and perhaps out-of-print) titles for the earlier PDAs aforementioned.

Applications

At the 2001 ASCUE Conference, Applied Business Technologies introduced to attendees of their presentation the use of PPCs and rightly predicted that the "demand for this hand-held device will grow as more education-focused applications are created for these devices."(2001 ASCUE Proceedings, "Breaking Away From the Desktop: Applications that synchronize PocketPCs and Campus Database Systems. Page 155).

As of this writing that demand has increased and applications for the Pocket-PC are growing exponentially. It is possible to find nearly all of the favorites available.

All of the Pocket devices (including mobile-phones) have some kind of contact/address list. The PPC (with Windows CE) uses full integration with most e-mail systems and includes a Personal Information Manager (PIM), Pocket Word, Pocket Excel, MS- Reader, Media Player (audio/video), and Pocket Internet Explorer (affectionately known as "PIE").

Popular/Necessary Software Add-ons

Map Applications, Genealogy, Pocket TV, LiesureWare (Games), GPS and ABT's PocketCampus (for institutions using their PowerCampus product.) At the end of this paper please find a nearly exhaustive listing of web sites that promote thousands of software titles.

Programming the Pocket-PC

Basic CE
Windows .NET
VB6 (Visual Basic and Visual Studio)
eVB (embedded Visual Basic)

Accessories (to avoid being out-gadgeted)

Memory

CF—Compact Flash
SM—Smart Media
SD—Secure Digital
MMC—Multi-Media Card

Compaq *iPAQ* Pocket PC Wireless Pack for GSM/GPRS Networks (For use with Compaq *iPAQ* H3600, H3700 and H3800 Series Pocket PC) *219926-B21*

Storage

Iomega "Drive," IBM Drive (From Megabytes to Gigabytes of portable space)

Styli

Single (stylus)
Multi-purpose (red pen, blue pen, pencil, stylus)

Carrying cases (leather, plastic, cloth)

Video Display module (PCMCIA or CF device for displaying PPC on a projector.

Phone (cell phone add-on)

Camera (plugs into socket or slides onto unit for taking moving or still shots)

Using the PPC in the classroom and office

At the beginning of the 2001-2002 academic year, Baptist Bible College and Seminary faculty using the Pocket-PC numbered one. By the end of Winter break that number saw an increase of 400%. In the spring semester the Bible faculty began using the Pocket-PC in class as a ready reference tool. Several versions of the Bible are available including the Greek New Testament (its original form). Beyond this practical use one of the faculty from another department uses his for class attendance as well. Since the Pocket-PC has the ability to recognize hand writing, he has each student write their name onto the notes application. Then later he verifies their attendance.

This staff member introduced the use of "Avant-Go." It is an on-line service, which synchronizes content web pages with the PPC. There are thousands of sites participating in this means of mobile communication.

Since word processing and spreadsheet applications are available, users employ either of these "anywhere" "anytime." The Pocket Power Point programs available implement all of the functionality found in their desktop counterpart. Some faculty members are beginning to use the video display capability with the Pocket Power Point. This allows the presentation to be sent to a projector.

Change is a constant?

Much of this paper may find the recycle bin within six months. Many of the web sites may disappear, and the PPC will undoubtedly have much more to offer next year.

Pocketic Justice

There once was a pocket, which had no friend,
Eventually it got to a place at its wits end,
Until one day the Personal Computer be came small,
And the pocket was befriended once and for all!

Useful PPC Internet sites:

The latest software:

www.pocketgear.com
www.pocketpccity.com
www.pdacity.com

PPC News

www.pdabuzz.com
www.pocketpcpulse.com
www.pocketnow.com
www.pocketpccentral.net
www.pocketpcpda.com

How to access 'Hotmail' with PPC
www.pocketpulse.com/article1006.html

1000s of E-books (.lit)
www.memoware.com

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www.microsoft.com/mobile/pocketpc/hardware/default.asp

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Technology, Students, and Faculty…How to Make It Happen!!

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Conference Abstract

Impact of technology on faculty and students. Limited resources in a small college, and online-courses vs. course enhancement using the internet. Incorporating new ideas and technology for students and faculty…both have difficulty with change. How to make it happen! Ideas to incorporate adjunct faculty into "The Plan". Encourage buy in from those important components of your college.

History

We need a plan! As we look toward the task of continual integration of technology across campus, a question comes to mind: What is the definition of technology? In trying to define technology, we find that as we continue with an aggressive movement towards integration campus-wide, it is possible that there is not an accurate definition of technology. We believe that the definition may change as rapidly as technology itself.

We feel the need to develop a plan and implement continuous improvement with technology integration. Not only do our employees need to possess and utilize high-tech computer skills but also it is crucial that our faculty use and incorporate technology into their classrooms.

Fort Scott Community College is involved in the Academic Quality Improvement Project with the Higher Learning Commission as our process for accreditation. One of our Action Projects is "Systematic Implementation of Technology". A goal in year three is to have 100% participation of faculty and staff in our "Plan". An additional goal is to have all academic areas offering online courses. By setting these goals, we have challenged our institution to have participation by all faculty and staff. We are very excited about the process of AQIP and the systematic improvement that will result.

In 1995, Jack Treuhaft published an article entitled *"Changes in Education"* which discussed the societal events that influence educational institutions to change. It is amazing to note the developments and trends mentioned in Mr. Treuhaft's article are issues that we are still addressing and concerned with in the year 2002. For example, the knowledge required by workers in 1995 is still crucial now. "Employers are seeking employees who are technology….literate. The education of …workers requires emphasis on information access, problem solving, analysis, … and decision making." The trends of community college learners show an increase in the number of older students who require the need to update their skills. We are continuing to address the older learners as we schedule courses and events that coincide with their personal schedules.

As an educational institution, we must constantly be changing and moving forward for continued success. Our financial constraints will not quickly disappear, and doing more of what we are currently doing is not going to solve problems, either. Therefore, we must get the faculty and staff on board and moving in the right direction for technology integration and enhancement.

Impact of Technology on Faculty and Students

What was it the President said, something about our goal being to put a computer in every American home? Does that put the pressure on us to move forward with new technology?

One impact of technology is that employers are now looking for employees that have an understanding of how technology works. They want employees to use and incorporate new technology into their jobs. During a recent visit to Fort Scott Community College, Kent Baker, First Vice President for Merrill Lynch of Kansas City told students " I wouldn't hire someone today without incredible computer experience. My most recent hiree was able to solve my problems during the interview." Employees are not expected to have knowledge of how all the different software programs and new equipment work, but they do expect their employees to have the ability to figure out how it works without a tremendous amount of training. Many employers are now using technology testing as part of the interview process.

Employers are finding themselves spending large amounts of money on training their current employees on how to use new technology. They don't want to spend more on training students that have just graduated from college. According to Lawrence Levine,

> "Given today's increasingly technological world, educational institutions must produce students who are able to function comfortably in this world. Failure to do so is to produce a worker who will not be able to compete in the job market, which is simply not acceptable. One way to foster needed technological expertise is to use technology as part of the teaching and learning experience in the classroom (THE Journal, January 2002)."

Another impact of technology is that four year schools are expecting students to transfer smoothly into their classes, therefore, two year schools must prepare their students to meet these challenges. If students are not kept abreast of the new technology available and it is not being incorporated into the learning experience, then students are being setup to fail as they meet these new challenges. Community colleges must be aware of where their students transfer and what

those students are going to be expected to know. If we look to the publishers where we buy are text, what do they offer today? Publishers today offer to provide PowerPoint presentations, interactive websites, online course materials, etc.

Disparity in Knowledge

Due to the growing and ever expanding world of technology, we now have a wide disparity in knowledge levels. There have been continuous changes in the machines and the software we use. Students doing post-secondary work come to us from all walks of life and we must be prepared to meet the needs of all students. Students are generally classified as traditional or non-traditional, but the needs of students within these groups can be very different.

Traditional students (recent high school graduates) may have very different needs. Students may graduate from a high school that has a very up-to-date technology program, a very poor technology program, or anywhere in between. We must be able to encourage and expand on the knowledge of some students, while providing the necessary encouragement and training for other students in order for them to be able to compete as they move into the job market or transfer to other schools.

Students that have not moved from high school straight into college are considered non-traditional students. The reasons for these students returning to college can be very mixed and they also come to us with varying levels of knowledge. Some of these students may be returning to school from the workplace. Displaced workers may have knowledge in a particular area but lack the skills to be able to find other types of work. Often these students are looking to do something very different or are looking for further training in order to advance.

Some non-traditional students come to us with no computer knowledge and are even afraid of the keyboard itself. Most high school students today have at least some computer experience by the time they reach college, but we must still be prepared to meet the needs of those students that have no basic knowledge of the computer. We cannot expect these students to achieve at the same rate and yet we must prepare them to compete in the workplace. It may mean developing and offering classes that do not count towards a degree, but do provide the student with the skills to go on both in the classroom and workplace.

There is also a disparity in the knowledge levels of our faculty and their willingness to embrace and use new technology. Faculty members may be unwilling to learn and accept new teaching methods. They may find that students are more knowledgeable than they are and feel threatened. Other faculty members may be willing to learn and use new teaching methods, they may have kept up with technology changes, or they may have graduated recently with more computer knowledge.

Willing faculty members may find that they have out-dated facilities that are not technology friendly or there may be financial problems that limit there ability to incorporate new technology into their classes. Some faculty members have become frustrated over the years. They argue that they have asked for years with no result and now they are expected to provide technology based education and online classes. Who are you kidding?

Limited Resources

One of the biggest problems schools are currently facing is the issue of funding. During this time period, when everyone is shouting budget shortfalls, where do we get the money to keep up with the ever-changing world of technology? Schools need to take advantage of all the different avenues available to them.

We are constantly pursuing grants from a variety of sources, including federal, state and private grant opportunities. One of the issues that we face with many grants is the fact that often times, the project must be something "new". Therefore, we must fund ongoing grant activities with institution monies, and many times, that's tough to do.

Forming partnerships is another method of gaining resources. Ft. Scott Community College currently has partnerships with other colleges, such as Pittsburg State University, Unified School Districts, and industry….both large (John Deere, Swift Trucking) and small/local (Great West Insurance, Mercy Hospital, WardKraft Printing). This sharing of resources may range from equipment to personnel. This is also a positive method for the college to interact with these entities, and often provide needed training.

Some colleges are now charging a technology fee…for either on-campus enrollment, and/or online course enrollment. These fees are then funneled toward the upkeep/purchase of high tech equipment. However, when is enough enough? How much can students afford? Are we pricing students out of an opportunity to receive a quality education?

Facilities and Technology Access

Just getting the equipment on your campus does not solve anything. Access must be provided to those who are willing to use it, and there are several other factors that may influence its use. The age of your facilities will have a bearing on what can be accomplished in a given room. Some rooms don't offer the necessary electrical outlets, and may not have available network connections for internet access. One option that many schools are leaning toward is the concept of Smart Classrooms. Again, questions arise. Does the facility make this a possibility? If all classrooms can't be equipped, where does the equality issue fit in? Someone on campus will get the burden of deciding who "gets" those "good" rooms. Caution needs to be used when designing classrooms as a vendor may bid equipment that is beyond the needs of the college if there isn't anyone involved locally (from the institution) helping determine necessities. Another viable option is to make the carts mobile so that they may be moved to any location.

Incorporating Technology Use In Classes Taught In Outdated Facilities

Faculty members may feel that they are being asked to do the impossible. They may be teaching in outdated facilities that are not technology friendly. Some faculty members may teach in the same classroom all day while others may change classroom from one period to the next. Portable

equipment may be out of the question due to the time factor involved in setting up the equipment between classes (5 minutes not long enough).

One way to incorporate technology into the classroom is to assign Internet projects to be completed outside of the classroom. These projects can often be used to encourage further classroom discussion.

Another way to incorporate technology learning in the class is to have students turn in their assignments via e-mail. Students learn to use different programs (databases, spreadsheets, etc.) for doing their work and then send their work as attachments through e-mail.

Online courses vs. Internet Course Enhancement

Our college is moving toward online courses and online degrees. New faculty computers have helped in getting faculty excited about this new direction. However, another method that is being used is course enhancement utilizing the WWW. We use Blackboard as our platform for online courses. Many of the instructors on campus are uploading supplemental information, quizzes, web sites, using the discussion board, etc. and using this as an addition/enhancement to their course. Book publishers are now providing the supplemental resources for instructors on a CD that is compatible with your on-line courseware. As a result, many of these instructors are developing a keen interest in moving to a totally online course.

"It is possible that having control over more of one's own learning should produce better learners." (THE Journal, May 2001) Instead of attending a lecture class, and being "fed" the material, the student must make the effort to log into the course and pursue learning on an independent basis. Obviously, this learning method doesn't work for all students. In a recent survey completed by on-line high school students taking courses facilitated by the Southeast Kansas Education Service Center, the majority of the students indicated that they would like to have a "real" teacher. Some students also indicated that they would like more teacher interaction, would could relate to the "real" person issue. However it's possible that some of these students had an instructor that didn't communicate with the students…either frequently or effectively enough. The challenge is convincing faculty that students receive the same quality of education as in the classroom setting. Faculty focus on how you can be sure that the student is actually doing the work.

Incorporating New Ideas and Technology for Students and Faculty

As we move toward integration and implementation of technology across campus, we must address several issues. How will we get the faculty to "use" their new toys…and in a productive manner? We have several success stories thus far. Faculty and students grasp change easier when it is made easier for them. Small group, hands-on training has been a tool to not only teach new skills, but also a way to sharpen skills, and troubleshoot problems that users may have. This training must be an ongoing component in order to be successful, and keep users moving in the right direction. A key issue is to provide training when the technology is ready. We all know how frustrating it is to trying to learn something that doesn't really work. Some universities have used grant monies to create "camps" for faculty. These camps assist faculty in incorporat-

ing technological resources, exploring different learning styles, various methods available to tailor instruction to address students' learning needs and acquaint faculty with the range of instructional media that can enhance the learning experience. (THE Journal, 10/01)

The same types of training mentioned above may also be used for your adjunct faculty…a very important component who are sometimes left in the wake…or at least feel that they are. This contact will surely encourage buy in from all involved.

Challenges

Out with the old, in with the new! Well, it sounds good as far as technology goes, but we will always face challenges if we are to progress. As mentioned before, our college has three years to achieve the 100% goal of the faculty using technology to teach in their classroom. This is a goal that we are excited about, but I'm sure there will be challenges along the way!

How do we get the faculty to continue using the resources and technology provided? We feel that if we keep "feeding" resources to the users, technology progression and integration will occur. However, whose job is it to search for the pertinent information and funding? There probably isn't an answer….but hopefully several people exist on each campus with this vision that are willing to look for those important resources and grants.

The users also need to see the continued value. Ease and success with use is crucial as we develop equipment carts, Smart Classrooms, or equipment checkout systems. If an instructor wants to show a PowerPoint presentation to several classes on a given day, but has to move the equipment to a different classroom for each class, it's going to be understandably tough to have buy-in from that individual. Continued support from the college is crucial if there is to be forward momentum. However, as the powers that be see and hear the success stories from both faculty and students, they will hopefully see the need for technology.

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An Exploration of Middle and High School Students' Perceptions of Deviant Behavior When Using Computers and the Internet

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Introduction

"Any technology tends to create a new human environment."
-Marshall McLuhan

Deviant behavior on the computer and the Internet is rising as technology use increases Hollinger, 1996b; Power, 2000; Vatis, 2000). Deviant behavior, when using computers and the Internet includes the same types of deviant activities performed before the popularity of computers or the inception of the Internet. These activities include: using the Internet for illegal activities that violate local, state, and/or federal laws, inappropriate use defined as a violation of the intended use of the Internet or computer, and/or purpose and goal, obscene activities defined as entering a pornography website or selling pornography goods on the Internet; using the Internet or computer to violate copyrights laws or other contracts such as institutional or third party copyright, license agreements and other contracts, intentionally disrupting the Internet traffic by spreading a computer virus, spreading rumors about another person on the Internet, intimidating and frightening another person on the Internet.

Deviant behaviors are a real concern since our society is rapidly moving from a typographic culture to a post-typographic culture (Provenzo, Brett & McCloskey, 1999). According to Provenzo, et al. "typographic culture is defined as a culture or society based around the technology of printing and post-typographic culture is defined as an electronic non-text- oriented culture." (p. i) With this movement, our culture and society is being transformed. People are communicating more by electronic mail and computers than by text or letter writing. Culturally, we are becoming more dependent on computers and computer-based technologies (Provenzo, et al.).

Computer technologies can be found in many everyday classroom activities. Students may occupy their extra time by playing computer generated video games. For example, students are no longer learning to type with typewriters, but with a word processor. Those schools that are using typewriters are rapidly moving into the post-typographical era. Graphing calculators are being required in math courses. Digital cameras are being used in art courses. In addition, art teachers are integrating computers with art programs to teach computer drawing or graphics to students.

As a measure of school reform to improve the learning of all students, schools are moving rapidly to integrate computers and the Internet into their curriculum (Glennan & Melmed, 1996). Computers are looked upon as a tool for increasing efficiency and productivity in a curriculum (Hunter, 1984). Researchers have designated the Internet as an equalizer of knowledge, because

it allows the same knowledge to be accessible to all (Kearsley, 2000; Kent & McNergney, 1999; Milken Family Foundation, 1997; Papert, 1993). The cost of purchasing a computer has drastically declined in recent years. This decline in costs is allowing the Internet and computers to be more accessible to all by being available in public libraries and schools. In addition, this decrease in the cost of computers allows more of the United States' population to be able to afford to purchase one.

The past five years have radically changed the way schools interact with the world. The information super highway has become a reality. Students can use the Internet from home or school to travel vicariously all over the world, to gather information and new knowledge. As more travel on this electronic highway increases, maps to find information and rules to keep the journey safe are becoming vital to successfully completing the journey.

> In Understanding Media, Marshall McLuhan (1964) stated the following: Any technology tends to create a new human environment. Script and papyrus created the social environment we think of in connection with the empires of the ancient world. The stirrup and the wheel created unique environments of enormous scope. Technology environments are not merely passive containers of people but are active processes that reshape people and other technologies alike. In our time, the sudden shift from the mechanical technology to the electric circuitry represents one of the major shifts of historical time. (p. iv)

Marshall McLuhan predicted in 1962 a coming "Global Village." This global village is now reality, in the form of the Internet. His words are so prophetic, "Technology environments are not merely passive containers of people but are active processes that reshape people and other technologies alike" (p. 2). Due to the evolution of the Internet and computers, this very quotation is now reality. Computers and the Internet have "reshaped people and other technologies alike" (p. 2).

As our society is being transformed, computers and the Internet are being incorporate into almost every activity including: education, communication, shopping, buying and selling goods, and business. In business, having a website and electronic address in order to show that your company is on the cutting edge of technology is important. Large corporations and small locally owned companies are on-line. Being on the Internet is a new way of attracting potential business. The education system has the same views about technology, having technology in the schools shows a willingness for reform or improvement.

The Study

If the current trend continues, the use of computer technologies and the Internet will increase for teaching and education. It is urgent that researchers study computer and Internet deviance that may occur in the educational environment. Although a limited amount of research has been performed to determine the types of deviant behavior students use on the Internet and on computers, the opportunity to perform deviant acts increases with the integration of technology in education.

Methodology

Population and Sample - The target population for this study was defined as middle and high school students. The accessible population included all students who attended a middle or high school in the East Baton Rouge Parish School System (EBRPSS) with computers that are capable of accessing the Internet. A convenient sample of approximately 1,150 students was surveyed (575 middle and 575 high school students). Principals at these schools were notified of the study and asked to identify teachers with Internet access in their classrooms. The school principals decided which teachers would participate in the study, which determined the students to survey.

Purpose and Objectives of the Study-The primary purpose of this study was to explore middle and high school students' perceptions of deviant behavior when using computers and the Internet. In order to answer the research problem, the following six objectives will be used to guide the researcher:

1. Describe the middle and high school students on the following selected demographic characteristics:
    a. Gender
    b. Age
    c. Ethnicity
    d. Grade in School
    e. Type of School (middle or high school)
    f. Academic Achievement as Perceived by the Students
    g. Religious Affiliation
    h. Students' Interaction with Teachers
    i. Students' Interaction with Other Students

2. Describe the middle and high school Students' Behavior Score.
3. Describe the middle and high school Students' Peers' Behavior Score.
4. Compare the Students' Behavior Score of middle and high school students on selected demographic characteristics and perceptions of computer-related activities.
5. Compare the Students' Behavior Score and the Peers' Behavior Score.
6. Determine if a relationship exists between the Students' Behavior Score and the Peers' Behavior Score on selected demographic characteristics and perceptions of computer-related activities.

Instrumentation and Procedure for Data Collection-The instrument was developed by a Professor San-Yi Li in Taiwan (who gave the researcher permission to use his instrument for this study) and revised by the researcher. Several key demographic questions were added to the survey, which were: "What is your race or ethnicity?," "Is there a working computer in the home where you live?," "If there is a working computer in the home where you live, is it connected to the Internet?," and "What type school do you attend?" The original survey had 62 questions. After the revisions, the number of questions increased to 66. All of the questions were not used for this study. Questions that addressed the objectives of the study were selected as variables to be used in the study. The selected variables were systematically copied into a file. The primary

variables studied were categorized as: 1) students' demographic characteristics, 2) computer- related activities, 3) students' perceptions of deviant behavior when using computers and the Internet, 4) students' perception of their peers' deviant behavior when using computers and the Internet, and 5) students' ability to use computers and the Internet.

Data were collected during the spring semester of 2000. The procedure for collecting the data was as follows:

1. The EBRPSS Director of Academic Accountability was contacted to obtain approval to conduct a research survey in the middle and high schools in the system.
2. The parish Director of Technology (was contacted by telephone and visited in person by the researcher to obtain the list of schools) identified the seven middle and seven high schools with computers that had access to the Internet.
3. Principals of the schools identified were then contacted (by faxed letter and telephone) and a request was made to survey students with computer and Internet usage experience.
4. Those teachers and students selected by the school principals were informed of the general objectives of the research by principal and the researcher. Students were asked to participate in the study voluntarily.

Once the subjects agreed to participate in the research, they were informed that this project required them to complete a survey that consisting of 66 questions. Students were given a pencil and scantron sheet to record responses and an additional sheet with open-ended questions to respond to. Students were allowed a maximum of 45 minutes to complete the survey, but additional time was allowed for those students needing more time. Five hundred seventy five middle school students and 575 high school students responded to the survey.

Summary of Findings

Objective One: Demographics-The first objective of the study was to describe middle and high school students on selected demographic characteristics: (a) Gender, (b) Age, (c) Ethnicity, (d) Grade in School, (e) Type of School (middle or high school), (f) Academic Achievement as perceived by the students, (g) Religious Affiliation, (h) Students' interaction with teachers, and (i) Students' interaction with other students.

Participants of the study ranged in age from 13 to 17 years old. The majority of the responding students were African American, with the next largest group of respondents being White. The grade level of the students ranged from 7th to 12th grade, with the 11^{th} or 12^{th} graders having the largest number of respondents. Students in the study were either in middle or high school, and most of them rated their academic achievement as good. Most of the students indicated they had a strong religious affiliation. A large portion of the students interacted with their classmates and teacher regularly.

Objective Two: Describe Middle and High School Students' Behavior Score - Objective two was to describe the middle and high school Students' Deviant Behavior Score, which indicates how often a student perceives he/she is using deviant behavior when using the computer or Internet.

According to the Students' Deviant Behavior Score, the majority, 869 (79.6%), of the responding students indicated that they displayed no deviance or some deviant behavior while using the Internet. Only a small percentage of students indicated deviance.

Objective Three: Describe Middle and High School Students' Peers' Behavior Score- Objective three was to describe the middle and high school students' Peers' Behavior Score, which indicates how often a student perceives his/her classmate to be displaying deviant behavior when using the computer or Internet.

The majority, (1,016, 81.5%), of the students perceived their classmates to be displaying deviant behavior often or very often when using the Internet and computers. The researcher believes that if the students' peers are engaging in this type of behavior than a larger number of students are engaging as well, but are not disclosing this information. Apparently, students feel more comfortable disclosing what others are doing, rather than what they are doing.

Objective Four: Compare the Behavior Score of Middle and High School Students- Objective four was to compare the Behavior Score of middle and high school students on selected demographic characteristics and perceptions of computer-related activities. The Chi-square procedure was used to determine if a relationship existed with each of the following selected demographic and perceptual characteristics and computer related-activities: (a) Gender, (b) age, (c) ethnicity, (d) academic achievement, (f) religious affiliation, (g) students' interaction with teachers, (h) students' interaction with other students, (I) time spent online, (j) hours per day spent on the Internet and (k) working computer in the home.

When comparing the Students' Behavior Score, the following findings were discovered about gender: males indicated displaying more deviance than females when using the Internet and computers. Results indicated a statistically significant relationship between gender and perceived deviance. It appears that males are more likely to display deviance when using the Internet and computers. The results showed that 27.9% of the males and 12.6% of the females reported deviance. There were twice as many males as females that reported deviance when using the Internet and computers.

The variable age showed that 13 and 17 year olds had the lowest percentage of students that displayed deviance while using computers and the Internet. Students ages 14, 15 and 16 had the largest percentage of deviance reported. Still, all of the age groups indicated that the majority of the students did not display any deviance.

The ethnic group indicating the largest percentage of deviance when using the Internet and computers was the Spanish/Hispanic students. The second largest percentage of students indicating some deviance was Asian students. This is comparable to a study by Hollinger (1996b) of college students. He research crime by computer as it correlates with software piracy and unauthorized account access of college students. He reported that Asian and Hispanic students indicated the highest levels of piracy.

When reporting academic achievement, the majority of students reported their academic achievement as being good, and most of the students perceived themselves as displaying no deviance or some deviance when online. This test resulted in a significant relationship between academic achievement and Student Behavior Score. The highest percentage of deviance was reported by students indicating poor or fair academic achievement. Of the students that reported "poor" achievement, 38.1% indicated deviance, and the students that reported "fair" achievement had 25.7% to indicate deviance compared to those students that indicated "good" (17%) or excellent (17.4) achievement.

For religious affiliation, those students that indicated a strong or very strong religious affiliation also had the largest percentage of students that did not display deviance when using computers and the Internet. Religious affiliation did not result in a statistically significant relationship with Student Behavior Score. When comparing the no religious affiliation with strong religious affiliation (the group that is closest in numbers), there is no significant difference. The researcher believes these students are either just honest because of their religious affiliation, or religious affiliation for some is not as effective as for others in developing ethics. After all, the students with no religious affiliations were they were able to admit what they are doing online.

With regard to students' interaction with teachers, most of the students indicated that they interacted with their teachers. Interacting with teachers did not have a significant relationship with the Student Behavior Score. Although there was not a significant difference between level of interaction with teachers and Students' Behavior Score, students that reported no interaction with teachers reported deviance at 26.3% . This is compared to the students who reported they interacted with their teachers "some" (15.9%), "often" (20.1%) and "very often" (22.5).

Students who interacted with other students reported the least amount of deviance when using computers and the Internet. The majority of the students indicated that they interacted with their classmates. There was a significant relationship between the Student Behavior Score and the level of interaction students have with their classmates. Students that reported no interaction with classmates had the highest overall percentage of deviance (35.2%). This is compared to the other levels of interaction that gets lower as the level of reported interaction get larger ["some" (21.8%), "often" (18%) and "very often" (17.4)]. Therefore, students that alienate themselves from others are engaging in more deviant activity when using computers and the Internet.

The majority of the students indicated that they spend much time online and display very little deviance when using the Internet and computers. This analysis was interesting because some of the students indicated that they do not spend any time online, but they displayed deviant behavior when online (time spent online "none," 28.6% of the students indicated deviance online). Students evidently misunderstood the question. Students time spent online have a significant relationship with Students' Behavior Score. Students that reported spending more time online has the highest overall percentage of deviance -"very much" (22.2%)and "much" (21.2%). This is compared to the other students that reported spending less time online, "little" (15.5%).

As related to hours per day spent on the Internet, when asked specifically how many hours per day they spent on the Internet, students could relate to this question and responded more accurately. Hours spent online is highly related to Student Behavior Score. Students that reported

spending the least amount of time online reported the lowest percentage of deviance (=2 hours =15.3%). This is compared to the other amounts of time spent online, in which the percentage of deviance increases as more time is spent online (3-4 hours, 19.1%, 5-6 hours, 37.2, 7-8 hours, 44,7%; =9, 46.7%). It is highly recommended that students' time online is supervised and coupled with a program that will monitor or control their online activity.

When asked whether there was a working computer in the home, the majority of the students indicated that they had a there is a working computer in the home. However, a smaller number of students indicated that they did not have a computer in the home. A working computer in the home was shown to be significantly related to the Student Behavior Score. The percentages for deviance were higher for those students not having a computer in the home. This relationship could mean that students do not need a computer in the home to engage in deviant acts on computers and the Internet.

Kevin Mitnick (one of the most famous computer hackers) did not own a computer, but he had been engaging in deviant acts with computer since he was a juvenile. Students with a working computer in the home may be more familia with computers. Students may not realize or not have been taught that certain behaviors are deviant, therefore they may not be reporting their behaviors accurately. The significance may be how students with computers view what is actually deviant verses those without a computer in the home. Coldwell (1996) concluded that students from machine-based disciplines (computer environments) are less able to predict the social consequences of computer crime than those from people-based disciplines (no computers).

Due to the fact that students are being introduced to computers and the Internet at an earlier age, technology ethics needs to be introduced at all levels of education starting when computers are first introduced to the student. Having a computer in the home allows for more chances of deviance to occur, despite the fact that student may not realize what is happening. Therefore, supervision and ethics teaching becomes a necessity at home and away from home.

Objective Five - Comparison of Student Behavior and Peers' Behavior Scores- Objective five was to compare the Student Behavior Score and the Peers' Behavior Score. When comparing the means of the Peers' Behavior Score and the Students' Behavior Score, students' perceptions of themselves and their classmates are very different. Students perceive their peers are displaying deviant behavior "often" and "very often" on computers and the Internet. However, students perceive that they are not engaging in "deviance" or "some deviant" behavior.

The researcher believes that if the students' peers are engaging in this type of behavior than a larger number of students are engaging as well, but are not disclosing this information. Students may feel more comfortable disclosing what others are doing. Students may not want to admit displaying deviance, but it is easier to be more open when discussing someone else's behavior. Therefore, the two scores can be used to gauge the amount of actual deviance being displayed.

Objective Six - Relationships Between Student Behavior and Peers' Behavior Scores and Selected Demographic Characteristics and Perceptions of Computer-related Activities- Objective six was to determine if a relationship existed between the Student Behavior Score and

the Peers' Behavior Score on selected demographic and perceptual characteristics and computer-related activities.

Results of the analyses indicate that relationships are statistically significant between gender, hours spent on the computer, access to a computer with Internet, ethnicity and the ability to use the Internet for how students' perceive their peers' deviant behavior when using the computer and Internet. Likewise, results indicate that relationships exist between gender, hours per day spent online, access to a computer with Internet, ethnicity and working computer in the home when examining how students perceive their behavior when using the computer and the Internet.

In both analyses, gender was the best predictor for how students may perceive deviance scores; hours spent on the computer is the next best predictor for both scores. The more time students spend online is likely to influence how deviance is perceived. Spending more time on computers and the Internet may lead students to perceive that their deviant behaviors are not deviant. Especially, if the students are committing deviance and nothing is happening. There may be no one to supervise students' online behavior. Consequently, students feel the behavior is not deviant.

Conclusion

The primary purpose of this study was to explore what middle and high school students perceive as deviant behavior when using the computer and the Internet. Based on the findings, it can be concluded that students do not perceive most of their behaviors on the Internet and computers as deviant. More specifically, the Peers' Behavior Score mean is higher than the Students' Behavior Score. Therefore, students do not perceive their behaviors as being as deviant as their peers'. This attitude can be correlated to a theory known as the third person effect (Perloff, 1989). Cohen, J., Mutz, D., Price, V. and Gunther, A. (1988) defined the third person effect as how people represent themselves in relation to others. The students' image of themselves is more ethical than the students' image of their friends. Consequently, their classmates are the ones that visit the pornography websites, access other people's websites without permission and perform other deviant acts when using the Internet and computers.

Additionally, this study will add to the small, but growing body of knowledge concerning students' perceptions of deviance when using the Internet and computers. We have gained an image of how students use the Internet and computers, how students spend some of their time online and how much time they spend using computers and the Internet. From this information, the following profile is generated of the possible characteristics of a student that may engage in computer or Internet deviance:

- Male, possibly Asian or Hispanic; 14-16,
- Poor to fair academic achievement;
- No religious affiliation
- No interaction with classmates or teachers;
- From 5 to 9 hours a day spend on the Internet and/or computer;
- May or may not have a computer at home.

When analyzing the above profile, keep in mind what Bologna (1981) perceived. He indicated that younger computer abusers find it to be challenging to beat the system, establishment or institution. The motive is not always to harm others or for financial gain.

To summarize, the researcher recommends the following to avoid or decrease the chances of deviance when using computers and the Internet at school and home:

- Decrease the size of computer classes to 18-22. This number can be better managed by one teacher.
- Teachers and parents should encourage students to talk about what they are doing on the computer and the Internet. Find out whom they are talking to in chatrooms and via instant messaging, as well as the types of websites they are visiting;
- Supervise their online activity. Students should not be alone for lengthy periods of time. When supervision is not possible, use software or hardware that will help to limit online activity.
- Schools that offer computer classes and access to the Internet should include information on appropriate computer and Internet behavior and ethics in their curriculum. Awareness is the first step to prevention and reducing the potential of abuse.

With the integration of computers and the Internet into the curriculum, there must also be responsibility. If deviance is to be avoided or decreased, all participants must take responsibility, which includes users and the suppliers. Educators and parents must be vigilant in their effort to discourage computer and Internet deviance.

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Roundtable Discussion: Campus Information Technologies

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Abstract

Technology Center management issues including but not limited to: collaborative ventures, partnerships, IP telephony, wireless technologies, PDAs, document sharing and management, resource scheduling, administrative web applications, enterprise systems, software maintenance costs, financial aid changes, security and privacy, storage systems, disaster planning, personnel management, project management, support services, distance education, and funding IT. We will entertain other topics from the audience as requested. We want to discuss what others are doing and what concerns there are that we may not have noticed yet.

Note: Since this session is a roundtable, there is no paper for the proceedings. The results of this roundtable will be published in the fall newsletter.

Teacher Education Program Data Collection at Franklin College

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Introduction & Background

Franklin College is one of 40 institutions of higher education in the state of Indiana that prepares students to be educators. As such, Franklin College must maintain accreditation from the Indiana Professional Standards Board (IPSB) so that students may receive state licensure. Many of the IPSB standards, procedures and policies are based on those set forth by the National Council for Accreditation of Teacher Education (NCATE). Franklin College maintains a voluntary NCATE accreditation as well. As part of their alignment with NCATE standards, IPSB has mandated that accredited schools develop and maintain a Unit Assessment System for tracking both their Teacher Education programs and the students within those programs.

In April of 2001, the Franklin College Department of Education applied for and received national Title II grant funding through IPSB. The express purpose of this grant was to develop "an electronic-based teacher education informational system to enhance data management, unit assessment and eventually student promotion, each with applications to Franklin College and the inter-related community of professionals who work with elementary student teachers in the field." (Barbara J. Divins, Chair, Franklin College Department of Education. "Title II Improving Student Achievement through More Effective Teachers" (2001)).

The project, nicknamed "T.I.E.S." (Teacher Education and Informational Systems), has three specific objectives:

1. *To identify and manage all data to be generated from the Unit Assessment System*
2. *To utilize the assessments in analyzing a student's and program's strengths and weaknesses*
3. *To increase the availability of performance-based information about an elementary education student teacher to the cooperating teacher and supervisors*

The focus herein will be the development of the Unit Assessment System (UAS) and the various elements it comprises.

Unit Assessment System Elements

1. Grade Point Average

The most basic, and perhaps the most critical data element used in assessing the performance of an Education Program candidate is grade point average. While cumulative GPA is given more weight in considering acceptance and continuance in the program, content GPA is considered as

well. A minimum GPA of 2.0 is required for students entering their sophomore year. This minimum increases to 2.5 in the junior year and 2.75 in the senior year. The UAS is tightly integrated with *PowerFaids*, the academic information system employed at Franklin College. Hence, cumulative GPA, content GPA and credit hours can and will be included in various reports and views throughout the system.

2. Field Experience Evaluations

Beginning with the Fall Semester of the sophomore year and continuing for five of their final six regular terms, Teacher Education Program candidates are required to take a Field Experience course in which they actively participate in a classroom setting one full day each week for 12 weeks. The student is placed with a cooperating teacher in one of several surrounding school districts. During each experience, various aspects, methods and principles of teaching are emphasized relevant to the student's progression through the program. These Field Experience courses culminate in the Spring Semester of the senior year with a 10-week, full-time student teaching assignment. At the conclusion of each field experience, both the cooperating teacher and appropriate Franklin College supervisor evaluate the student's performance. The student is evaluated on 10 principles developed by the Interstate New Teacher Assessment and Support Consortium (INTASC). These principles are:

- **Content:** *The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.*
- **Child Development:** *The teacher understands how children learn and develop, and can provide learning opportunities that support their intellectual, social and personal development.*
- **Learner Needs:** *The teacher understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners.*
- **Instruction:** *The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving and performance skills.*
- **Classroom Management:** *The teacher uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning and self-motivation.*
- **Communication:** *The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.*
- **Planning:** *The teacher plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.*
- **Assessment:** *The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner.*
- **Reflection:** *The teacher is a reflective practitioner who continually evaluates the effects of his/her choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.*
- **Community:** *The teacher fosters relationships with school colleagues, parents, and agencies in the larger community to support students' learning and well-being.*

The UAS calculates and displays a rubric score for a varying number of items within each principle based on the following four-point scale:

1. Unsatisfactory
2. Basic
3. Proficient
4. Exemplary

An average score for each principle as well as an overall evaluation score is calculated. The raw data, along with any comments provided, is stored permanently and becomes a part of the student's overall assessment profile. Since all raw data is stored as opposed to just the rubric and summary scores, a variety of comparisons or reports are possible.

3. Benchmark Assignments

Throughout a student's progression within the Teacher Education Program, four benchmark assignments are given. Each assignment involves the completion of a project related to a task or role required of actual teachers.

The first of these assignments occurs at the end of the freshman year as the student is completing the introduction level course. This assignment is carried out in the form of a 15-minute interview conducted by Education Department faculty, during which each student is evaluated in each of the following five areas:

- Professional Appearance
- Knowledge of Key Concepts
- Quality of Oral Language
- Ability to Articulate
- Understanding the Role of Teacher

Assessment is made using the same four-point scale to assign a raw score for each area and an overall score is calculated. Again, all raw data is stored by the UAS.

The next benchmark is a reflective writing assignment in which the student is expected to demonstrate how he or she has learned from past experiences and how these experiences will improve their effectiveness as a teacher. The assessment rubric for this benchmark was not available at the time of this writing. However, it is anticipated the same four-point scale will be used and the raw data will be stored and scrutinized in a similar fashion to Benchmarks I & III.

A case study is to be completed as the third benchmark assignment. The case study will be assessed based on 13 prescribed requirements using the identical four-point scale. A score will be given for each requirement and an overall average score is then calculated. Additionally, the requirements will be split into four sub-groups with an average score being computed for each. The four sub-groups and their corresponding requirements are:

- **Format**
  - Case Study must be of stated length, correct font, edited and typed

  - Case Study must be as stated, including all pages securely attached, with direction sheet, student name and numbered pages
  - Case Study final form must be submitted by stated date and time to designated location
  - All parties within the case study are included in both the proposed ending or prevention step
- **Application**
  - Case Study responses show evidence of use of past course materials
  - Endings must demonstrate accurate information from previous courses
  - Prevention actions must demonstrate accurate information from previous courses
- **Solutions as Multiple Perspectives**
  - Two different endings required; each shows decision-making skills
  - Endings must focus on a student-identified problem and cause
  - Endings must be relevant and reality-based
- **Causes as Multiple Perspectives**
  - Two different prevention actions required; each would stop or lessen the problem
  - Prevention actions must be relevant and reality-based

The fourth and final benchmark assignment is to be completed five weeks into Spring Semester of the senior year as the student prepares for a student teaching assignment. This assignment requires the student to create a web-based portfolio containing a resume, a sample lesson plan, a teaching philosophy and more. The address for this portfolio will be stored as part of the student's UAS profile and is maintained for six months following graduation. The Department of Education is currently in the process of evaluating solutions from outside providers for creating and maintaining electronic portfolios. The need for an "in-house" solution will be determined within the next 12 – 18 months. Although various resource limitations exist, the inclusion of streamed video clips remains as a wish list item as well.

4. Pre-Professional Skills Tests

The final data element collected by the UAS is a set of scores from the Praxis series of pre-professional skills tests. Each candidate is required to take the three-part Praxis I test during the sophomore year. Praxis I is an academic skills assessment that measures reading, writing and mathematical skills. A passing score for each part of the test is necessary for acceptance into the Teacher Education Program. The Praxis II test is a general competency exam that measures a student's knowledge of the subject they will teach and is taken at the end of Spring Semester of the senior year. Elementary Education students are required to take an additional reading exam as well. A passing score is required in order to receive recommendation for certification. The Praxis test scores are received via electronic mail in encrypted form. Once decrypted, scores are easily loaded into a holding table in the UAS and then distributed to the appropriate student profile.

Elementary Education Four-Year Course and Assessment Plan

The following series of tables outlines a typical four-year academic plan. It also indicates the points at which the various elements of the UAS are collected and analyzed.

Freshman Year

Catnum	Course Description	**Hours**
Fall Semester		
GE 101	Freshman Reading and Composition I	4
GE 103	Mathematical Models and Applications	4
	Foreign Language (if needed)	4
PSY 117	General Psychology	4
CMP 130	Introduction to Computing	3
	Total of 15 – 19 credits	
Winter Term		
WIN ###	Freshman required course	3
	Total of 3 credits	

- No GPA requirement
- Student may not be on academic probation

Spring Semester		
GE102	Freshman Reading and Composition II	4
	Foreign Language (if needed)	4
EDE 124	Introduction to Teaching and American Education	2
EFE 183	Field Experience in Elementary Education	1
ENG 117	World Literature I	4
	Total of 11 – 15 credits	

- Benchmark I Assessment
- Student must have a minimum 2.0 GPA

Sophomore Year

Catnum	**Course Description**	**Hours**
Fall Semester		
HIS 120	US History to 1877	3
GE 201	Public Speaking	3
ENG 223	Children's Literature	2
GE 205	World History I	3
EDE 225	General Methods and Technology for Effective Instruction	3
EFE 284	Field Experience in Elementary Education	1
	Total of 12 – 15 credits	
Winter Term		
INE 285	Early Childhood Internship	4
	Total of 4 credits	

- Benchmark II Assessment
- Student applies for acceptance into program (early Spring Semester)

Spring Semester		
HIS 121	US History from 1877	3
GE 206	World History II	3
GEO 220	Geography	3
EDP 222	Survey of Exceptional Child	2
EDU 222	Child Development and Educational Psychology	4
	Total of 12 – 15 credits	

- Student must pass Praxis I tests
- Student must have a minimum 2.5 GPA by end of summer school
- Student must be accepted into Elementary Education Program

Junior Year

Catnum	**Course Description**	**Hours**

Fall Semester		
GE 304	Environmental Studies	3
MAT 321	Mathematics for Elementary Teaching	4
EDE 344	Teaching and Learning Literacy I	4
EFE 384	Field Experience in Elementary Education	1
SCI 332	Topics in Science and Elementary Teaching I	5
	Total of 17 credits	
Winter Term		
INE 286	Internship / Community Middle Childhood	4
	Total of 4 credits	
Spring Semester		
GE 307	Religion, Values and Self	3
EDE 345	Teaching and Learning Literacy II	4
EDE 363	Mathematics Methods for Elementary Teachers	4
EFE 385	Field Experience in Elementary Education	1
SCI 333	Topics in Science and Elementary Teaching II	5
	Total of 17 credits	

- Benchmark III Assessment
- Student must have a 2.75 GPA by end of summer to continue in program

Senior Year

Catnum	**Course Description**	**Hours**
Fall Semester		
FNA 420	Fine Arts for Elementary Teachers	4
PED 222	Methods of Teaching Health, Phy. Ed. and Safety	3
EDE 444	Methods of Teaching Elementary Social Studies	3
EFE 484	Field Experience in Elementary Education	1
EDE 445	Education Technology	2
EDE 443	Interdisciplinary Unit Planning	1
	Total of 14 credits	
Spring Semester (first five weeks)		
EDE 456	Professional Development and Performance Assessment	1
EDE 457	Advanced Instructional Strategies	3
EDE 499	Senior Competency Practicum	0

- Benchmark IV Assessment

Spring Semester (last ten weeks)		
EST 489	Student Teaching in the Elementary Classroom	10
	Total of 14 credits	

- Student must pass Praxis II test to be recommended for certification

Completion & Implementation

The freshman class that matriculated in the Fall Semester of 2001 will be the first assessed using the UAS. An initial set of Praxis test scores was received, uploaded and distributed successfully in mid-April. Candidate interviews for Benchmark I were conducted and posted in early May. It is anticipated that all data collection tools will be completed by the end of May with just Benchmarks II & III remaining as of this writing. All profile and reporting tools are scheduled for completion by the end of July with a fully functional system ready for use at the beginning of the Fall 2002 term.

Viruses and Hackers - How to protect company resources

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IT Security – How do I get there?

Executive Summary

This document outlines in a very broad sense how to protect Institutional resources. Included in this discussion is how to identify assets and risks, and an outline of auditing and disaster recovery plans. This document contains a discussion of viruses and malicious hacking activity and the solutions to those problems. Also included are software and hardware considerations for erecting a security perimeter and an explanation for each component. Finally, this document includes some real life examples of how to select and administer a vital component to any security plan – the firewall.

Assets and Risks

The first step in determining what is an appropriate level of security for your campus is to determine what is important to the institution. In order to maintain information security, there must be a process to identify what is worth protecting. This process called Risk Assessment is not a project that should be conducted in a vacuum within the confines of the IT department. In order for top administrators to buy into the plan, and for users to accept certain inconveniences posed by IT security measures, there should be a team of cross-campus users and administrators conducting a Risk Assessment exercise.

Franklin College is not unique among other educational organizations where assets are defined not as revenue generating assets, rather, information. The most important asset that Franklin College holds is student records and those pieces of technology established to maintain those student records. Franklin College is in the business of education, as are all other institutions, therefore the product is intangible by definition. The primary purpose of a risk assessment in our institution is to report the controls and associated weaknesses, then quantify the potential loss in the event of a disaster. (Bruce & Dempsey)

In evaluating risk at any institution of higher education, many factors must be considered. A disaster is defined as an event that makes it impossible to carry out the business of the College, either through destruction of physical property or through destruction of data. Physical property and data can be lost through fire or other natural disaster. Data can be lost through cyber-attacks or virus activity.

Franklin College was victim to a series of disasters in the mid 80's when two separate fires demolished a Residence Hall, followed two weeks later with a fire that gutted the Main Administrative building where class rooms and administrative offices are housed. After the fires, disaster

recovery and asset management took on a very real meaning. From that period, six processes or Institutional assets were classified as mission critical. The following list is in order of importance to the institution.

1. Payroll
2. Student Records
3. Financial Records (general ledger)
4. Income Management (Development Activities)
5. Financial Aid
6. Student Access to academic records

Auditing – is auditing important?

In order to maintain a workable security plan, auditing must be mapped out and followed as part of your organization's routine tasks. During your Risk Assessment, you should discover and identify what to audit and when. At Franklin College, auditing is performed on areas of the highest potential loss. The second purpose of audit as it relates to risk assessment is to inform management of the risks and potential loss associated with the computing environment. Third, Auditing as part of Risk assessment can alert developers and system administrators to potential problem areas. (Bruce & Dempsey)

At Franklin College as with other Colleges and Universities, the data collection and usage is the primary concern. To this end, the Student data Administrative software POWERCAMPUS is audited for both unauthorized access and adherence to successful backup policies. Payroll data for both Staff and Students is tested quarterly for data integrity.

Disaster Recovery – Should I have a plan?

To keep your institution in a position of functionality, a disaster recovery plan should be created. Disaster can come in many forms including the destruction of data by physical damage, cyber-attack or virus activity. At minimum your disaster recovery plan must include the following items:

- A definition of what constitutes a disaster
- An Identification of what is mission critical processes
- Identification of alternate operation locations. For instance, if the main computing center is destroyed, where should you set up shop.
- Plan for recovering from a disaster
    - Who is on the recovery team and how to contact

- Where to operate
- Plan for replacing equipment – vendor lists and contact numbers
- Plan for Restoring data
- Definition for what constitutes minimal and full recovery

The disaster recovery plan should be reviewed frequently for changes and additions. The operators of critical systems should be part of the disaster recovery oversight committee. The disaster recovery team should be well versed to the procedures in recovery from the written plan.

These things cannot eliminate the risk to important data at your institution, but the likelihood of recovery in the event of a disaster is better with education of the critical systems and data involved.

Viruses

What is a virus?

A computer virus is a set of program instructions that attaches itself to a file, reproduces itself, and spreads to other files. It can cause corrupt data, destroy data, display irritating messages and overall disrupt computer operations. (Ojo & Parsons) One misconception is that viruses contain program code to spread themselves from one computer to another. They do not. The reason viruses spread is because people distribute infected files by exchanging disks or CDs, sending email attachment and downloading software from the web. (Oja & Parsons)

One of the most common reasons for the loss of productivity at the desktop level is due to viruses. It is estimated that viruses cause $1.6 billion in lost productivity per year. In North America alone, businesses lost 6,822 person-years of productivity while responding to viruses, denial of service attacks or other cyber attacks.

The number of computer viruses has grown exponentially. In 1986 there was one known computer virus. Today the count exceeds 50,000. There are 10 to 15 viruses appearing on any given day. The Michelangelo virus took seven months to reach 75,000 people; Melissa took 10 hours to reach 3.5 million; and the I-Love-You took only 3 hours to reach 72 million. (Oja & Parsons) A virus is a very apt name for this particular problem as it is inflicted on an unsuspecting soul and spreads without treatment.

How do I protect my Institution from Viruses?

The business of protecting against Virus attacks can be handled in a combination of ways. The software companies specializing in security call this type of defense a “Blended Approach”. Virus protection must happen on many different levels. Organizations may choose to use some or all of these approaches.

Viruses enter organizations using many different transport devices. The most common form of transport for viruses is through email attachments. Homemade CD’s as well as floppy disks are transport devices used frequently. Within the last 6 weeks there has been a discovery that viruses can be transported via popular chat programs. Viruses have become a gaping security risk

at Franklin College. In September 2001, 32,000 viruses were intercepted on the FC email server showing the need for Virus Protection on each server, gateway, and client.

In the following sections, reference will be made to the software vendor Symantec. Franklin College chose to use a suite of products sold by Symantec to maintain consistency with support and interoperability. There are other products produced by other vendors that perform the same security based functionality. Vendor selection must be made to integrate into your individual institution. I will share with you the tools, in this case produced by Symantec, used at Franklin College to support the Security Plan. This is in no way an endorsement of products.

Virus Protection for Clients and Servers

The virus protection for Clients used at Franklin College is Symantec Corporate edition 7.6. This version supports Windows 9.x, Windows NT 4.0/2000, Windows Me, NetWare. Some of the key features include:

- Enterprise-wide virus protection and monitoring from a single management console
- Enforceable anti-virus policy management across multiple platforms
- Centralized, scalable management
- Rapid deployment and automatic virus protection via Closed Loop Automation

Norton Anti-Virus Corporate Edition 7.6 for desktops and file servers offers centralized policy management with scalable, cross-platform virus protection on an enterprise-wide basis. Centralized management from a single console allows IT managers to lock down policies that keep systems up to date and properly configured, fully protecting users at all times.

On-demand, enterprise-wide virus sweeps initiated from a single console ensure that infected desktops and file servers are cleaned quickly and efficiently. NAVEX, a single, extensible scanning and repair engine, provides the ability to update virus definitions and engine extensions — without having to reboot servers or re-deploy application software. This feature maximizes system uptime. The new release is compatible with Microsoft Terminal Servers as well as Microsoft Windows XP, allowing organizations to enjoy uninterrupted virus protection as they migrate to the latest technology. (Symantec)

Deployment and maintenance of software updates and virus definitions can be done from a central console based on Microsoft's MMC. Deployment can be achieved through login scripts, from the central console, or via web-page installation programs.

Virus Protection for Email Servers and Gateways

Franklin College uses Norton Anti-Virus for Gateways. Some of the key features include:

- Provides integrated filtering to block email-borne threats by subject line, attachment name and type, or by message size.
- Simple integration into any networked or firewalled environment
- Runs on Windows 2000, Windows NT, and Sun Solaris platforms

Norton Anti-Virus for Gateways provides virus protection against fast-spreading, email-borne viruses. This tool can be administered from anywhere through a browser-based console. Norton Anti-Virus for Gateways scans all incoming and outgoing messages at the SMTP gateway. Using integrated filtering, administrators can block messages by subject line, attachment extension name, or message size.

Norton enables administrators to implement virus fixes without installing new software and without server downtime. (Symantec)

Security against Hacking

In the last year, Information Security has become a battle well fought but not conquered at Franklin College. In response to the increased amount of viruses and hacking activity since September 2001, a perimeter firewall was installed at Franklin. Security "Hacking" or unauthorized access can come from varied sources. Those bent on harming computer systems range from people with too much time on their hands, to disgruntled employees to hardened criminals. We are an academic institution where we prepare bright students for a career in the computer industry. It is not unreasonable to assume those skills possibly could be turned against us.

Buying a Firewall? Software Vs. Appliance Based

One of the ways malicious activity can be minimized is the installation of a perimeter firewall. The purpose of a firewall is to limit or inhibit the intrusion of unwanted traffic to the Institution's Local Area Network. Barring pulling the plug on the Internet connection, a firewall is the best protection. A firewall is software configured to run on its own server, or in some cases an all-in-one appliance with a hardened OS. A properly configured firewall permits an organization's internal users to access the external Internet, while placing severe limits on the ability of outsiders to access internal data. Firewalls are a necessity with one very real shortcoming. They provide no protection from insider pilferage. (Pfaffenberger)

When Franklin College began to investigate firewalls, the question we had to answer was should we install an appliance-based firewall or Firewall software installed on a dedicated server. After our own research and advice from our vendor, we first chose an appliance-based firewall, then later replaced it with a software solution

Appliance Based Firewall

The firewall solution Franklin College initially chose was a Symantec product called the Velociraptor. This firewall was is an all-in-one appliance with some advantages and disadvantages. The first advantage is simple administration. There is very little to no administration because it operates on a hardened OS. Administration is done through a console on a remote system. If your Institution is able to implement this firewall without any configuration changes, it could possibly be a viable solution. One disadvantage is also the lack of administrative control. A second disadvantage and the reason Franklin eventually switched to a software solution is because the appliance-based firewalls are limited to what is shipped. There is no way to upgrade memory, disk capacity, or processor speed. At Franklin, we found that with 1300 users behind our firewall and hosting three web servers, we quickly taxed the Velociraptor to the point of fail-

ure. The cost of the Appliance-based firewalls is surprisingly lower than the software solutions. In our situation, we would have to buy multiple appliances to meet our current Internet access load, therefore the cost would be prohibitive.

Software Based Firewall

After our 6 month episode with a failing Velociraptor, we negotiated with Symantec corporation to replace the appliance with a software based firewall solution. We replaced the Velociraptor with the Symantec Enterprise Firewall with VPN 7.0. This is the solution we were seeking. The Firewall software sits on an Intel-based Windows 2000 server. The server is administered in the same way our other servers are administered. The firewall software must be on a dedicated server as it terminates all functions not necessary to perform as a firewall. The limitations of the firewall are only those of the server itself. We currently are running a 1.4 GHrz processor, with 1 GIG of Ram, and 35 GIG of hard disk capacity. The only disadvantage to this solution is the cost. The software is marginally more than the Appliance, and you must also factor in the cost of the Server. Over all, this solution has been successful at Franklin College.

Other products to protect Institutional Resources

There are products beyond firewalls and virus protection software you may consider based on individual need. The following products have been installed at Franklin College or are currently under evaluation for implementation.

Symantec Intruder Alert (currently being evaluated at Franklin College)

Some of the key components of the Intruder Alert product include:

- Monitors systems and networks in real time to detect and prevent unauthorized activity
- Enables the creation of customizable intrusion detection policies and responses
- Enables policy enforcement with the automatic deployment of new policies and updated detection signatures
- Delivers network-wide responses to security breaches from a central management console

Symantec Intruder Alert is a host-based, real-time intrusion monitoring system that detects unauthorized activity and security breaches and responds automatically. If Intruder Alert detects a threat, it sounds an alarm or takes other countermeasures according to pre-established security policies in order to prevent information loss or theft. From a central console, administrators can create, update, and deploy policies and securely collect and archive audit logs for incident analysis, all while maintaining the availability and integrity of systems. As a complement to firewalls and other access controls, Intruder Alert enables the development of precautionary security policies that prevent expert hackers or authorized users with malicious intent from misusing systems, applications, and data.

Intruder Alert provides complete control over systems with policy-based management that determines which systems and activities to monitor and what actions to take, as well as with real-time intrusion detection reports for both host and network components. Administrative wizards perform many routine tasks and silent installation and remote tune-up capabilities make it easy to deploy and maintain the system. (information collected from http://www.symantec.com/)

Packetshaper from Packeteer

Franklin is not unique in the type of open academic environment we create and foster for our students. Because information of all types flow to and from the Franklin College domain, it became necessary to install a pass-through server to "shape" the type of traffic, amount of resources it uses, and even block certain types of internet traffic. This device called a PacketShaper, allows Network administrators to allocate and prioritize bandwidth to certain internet applications. For security purposes, this limits the liability for Franklin College in regards to copyright infringement if internal users stream audio or video media illegally. All security considerations are in place to protect data from hacking activities from the inside and cyber-attacks from the outside. (http://www.packeteer.com/)

Hardware and Software Considerations

Maintaining a Security Plan is not cheap. Each piece of the security plan typically requires a dedicated piece of software, and in many cases a dedicated server. You will find in the sections above the software and hardware required to erect a security perimeter around your institution. During the evaluation of software and hardware requirements, it is helpful to remember the cost of losing your mission critical data or resources.

Training and Personnel Considerations

In your organization there should be a Security Specialist. This person should perform the duties listed below and possibly could combine these duties with other job functions. A Security Specialist analyzes the computer systems (LAN and Workstations) for vulnerabilities, threats from viruses, worms, unauthorized access, and physical damage. Security Specialist will install and configure firewalls, anti-virus software and any other perimeter security functions as required. Security specialists should work in conjunction with administration and end-users to develop policies and procedures to protect computer equipment and data. A security Specialist should have a wide-ranging knowledge of computers, as well as communication protocols that can be applied for quick resolution of problems and crisis that can occur. (Oja & Parsons)

There is a new Certification tract available for those people in the security field. The Security Certification is called the Security Certified Professional (SCP). SCP is two levels - each vendor-neutral security certification programs that enable individuals to acquire skills and get certified as a level 1 Network professional or a Level 2 Network Architect.

A security Specialist must be aware of latest virus threats and security concerns in the industry. To this end, one must subscribe to security newsletters, be part of security forums and even visit hacker sites for the latest information. It is the responsibility of the security specialist to be in stride or a step ahead of security risks.

Conclusion

The first step in determining what is an appropriate level of security for your campus is to determine what is important to the institution. In order to maintain information security, there must be a process to identify what is worth protecting.

Protecting Institutional resources is a very complex process starting with assessing risk to determining the level of protection needed to implementing necessary IT security components. The level of risk changes daily with the introduction of a new virus, a new hacking tool or other unforeseen risks. The security plan your institution develops must be flexible and have the buy-in of users from the top administrators to students.

The elimination or reduction of avoidable risk starts with all education of all users as to what constitutes an asset and risks to them. The best security plan will be unsuccessful unless all users are educated as to the security issues involved with their computers within the domain. Users should be educated to appropriate passwords and the need to keep them private. Along with the security plan, users should be encouraged to attend an annual workshop dealing with password administration, dealing with suspicious email, and safe Internet browsing practices.

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"Working Smarter not Harder." Increasing Student Interaction in Class With Less Total Time From The Teacher

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Abstract:

Distance learning and Web-enabled classes have directed attention from teacher-centered to student-centered learning. Many teachers have found that instead of decreasing their work they have more to do. Assignments still need to be graded and tests need to be made out but now also e-mails need to be written to students individually and web pages need to be constantly updated. What is a teacher to do? Fortunately, instead of working harder or longer hours, teachers can use the technology available to work smarter. This session will focus on strategies one teacher has used to "lighten the workload." Topics include using speech recognition software for individualized e-mails, speeding up grading using a template, displaying grades anonymously on the Web with Excel, using Excel's 'what-if' analysis tools for answering questions about grades, and incorporating Cold Fusion scripts for interactive databases.

Biography:

I have been teaching at Young Harris since 1984. It was a one-man operation until 1995 when I recommended Hollis Townsend to be hired as network manager. I first came to ASCUE in 1995. As the Director of Information Technology for three years, we received and successfully implemented over $500,000 grant to upgrade bandwidth to gigabit Ethernet using all Cisco equipment. I have taught classes in Introductory Personal Computing, Advanced Access and Excel, C++, Java, HTML, JavaScript, File Processing and File Structures, and special topics in Computer Science.

Introduction

I have a quote on the door of my office that reads, "The value of the technology is not the information it carries, but the interaction it fosters and the communities it creates," by Michael Schrage of MIT's Media Lab and Sloan School of Management. We must use the technology we are teaching our students to increase their interaction with our subject material and us. If we don't incorporate technology's primary value we will miss out on many teachable moments. Also we will be wasting of a lot of valuable time. That's a commodity in short supply for all of us.

Distance learning and Web-enabled classes have directed attention from teacher-centered to student-centered learning. Many teachers have found that instead of decreasing their work they have

more to do. Assignments still need to be graded and tests need to be made out but now also e-mails need to be written to students individually and web pages need to be constantly updated. Perhaps you want to embrace a new technology in your classroom but lack the time. It is very difficult to create large blocks of time to obtain new skills without endangering the welfare of current students. What is a teacher to do?

Fortunately, instead of working harder or longer hours, teachers can use the technology available to work smarter. This session will focus on strategies one teacher has used to "lighten the workload" while increasing student interaction. Topics include speeding up grading using a template, using speech recognition software for individualized e-mails, displaying grades anonymously on the Web with Excel, using Excel's 'what-if' analysis tools for answering questions about grades, and incorporating Cold Fusion scripts for interactive databases.

David G. Brown, provost of Wake Forest University, in an article, titled "The Low-Hanging Fruit," in the magazine Syllabus, wrote "All of us need quick, cheap wins early on, and that's where the low-hanging fruit comes in. … [Most] of the increase in learning that results from extensive use of technology comes from the enhanced quality and quantity of communication between students and faculty and among students." There are several ways to increase student interaction in the classroom. Not all of these use the same amount of technology. I am going to discuss my list in order of increasing use of technology. By picking the lowest hanging fruit first you may be able to increase student interaction in your classroom without spending an inordinate amount of time. In other words, by working smarter not harder, you may be able to increase student interaction in your class with less total time.

Speeding up grading using a template

When I first started using e-mail for having my students turn in their assignments I soon became bogged down grading. It took much longer to grade an electronic version of a letter than it did if I was just looking at a piece of paper. This was because I wrote down the corrections on a separate sheet of paper and then I would compose an e-mail to the student and list the things I had put on the paper. This was double work and not very smart. If you have the Microsoft Office suite or something similar there is a handy feature that eliminates the extra work. Using the "**Insert, Comment**" feature allows you to put comments directly onto the file. It works like putting a yellow sticky note in the file where you want a comment. You then save the file and e-mail it back to the student with their grade. This works in Microsoft Word, Excel, and PowerPoint but not Access. I also use the **Tools, Track Changes** feature in Microsoft Word to write extensive comments on student's term papers so they can make corrections.

Another low-hanging fruit is using a template. I am sure we've all used a piece of paper with punched holes as a grading template. Grading proceeds by putting the paper with the punched holes on top of the answer sheet and counting correct answers or crossing off answers that are not correct. The kind of template I am talking about here is a set of grading policies defined prior to their use by the student. These grading policies correspond to the "punched holes" that the students try to line up with. Explaining the grading policy to students and then sticking to it increases the student's recognition of your grading policies. The better a student understands the

grading policies the less apt they are to argue their final grade. This gives you a firm foundation to interact with the student about grades.

By using a grading template you increase the student's motivation to do well. Much of a student's interest in class is motivated by grades. The use of a template will increase this motivation because the student will know beforehand what to do to achieve the grade they want. I also give the students a chance to give feedback on the grading policies. After the assignment is handed back with a grade I ask the students what parts of the grading policy were vague. I am able this way to continually refine my template. This interaction also gives the students a feel for more control of their own class grade. A secondary benefit is increased student evaluations.

Speech recognition software

A ripe fruit hanging a little higher on the tree is using speech recognition software to speed up typing in e-mails and on tests. Much of the monotony and drudgery of teaching is in the preparation of assignments and in the grading of papers. Now that much of the communication with students is done on line or through e-mail typing skills would seem to be at a premium. However, speech recognition software takes away the drudgery because we can talk seven times faster than we can type.

In the past there were several hindrances to using this type of product. Five years ago this type of product was available but inefficient because of the speed of processors. Minimums for product efficiency were set at 200 MHz. However, realistically minimums were more likely 500-600 MHz. With the advance of GHz processors and low-cost memory speech recognition software now should be available on most desktops.

There are several new products on the market. Dragon Naturally Speaking, IN CUBE Voice Command, Apple Speech Recognition, and IBM ViaVoice, to name just a few. I am familiar with all of the products except IN CUBE and personally use Dragon Naturally Speaking version 6. It allows me to speed up routine tasks on my personal computer. I can dictate instead of type. I can work on the Web by voice. I can also protect myself from developing repetitive strain injuries (RSI).

There are a few setup tasks needed to begin using the product. After installation of the program on the computer you need to create a new user. Then a small amount of time is needed to train the software to your particular voice. The manual says that you can begin using the software in as little as fifteen to thirty minutes. The more you use the software the more it "learns" your voice and how you say things. Complete speaker independent software where no training is needed is still in the future. For me personally the dictation feature is very fast and efficient but I like to keep a handy reference guide for the navigation commands I use most often.

Displaying grades anonymously on the Web with Excel

Reaching higher into the tree but without using a ladder (i.e. significantly more investment in time) is displaying grades anonymously on the Web with Excel. A spreadsheet can model any teacher's grade book. This is usually the first page students look at on my syllabus after they log

on. In order to ensure the privacy of student grades four digit numbers are selected at random. Students may then keep or modify their number.

Because you may want to display the Web page differently than the way the spreadsheet is displayed make all the corrections you need to the spreadsheet and save it. Now make whatever modifications you want to the spreadsheet for the Web page. You may also want to put some notations at the top of the spreadsheet as a header for the Web page. Then drag your mouse from the top left cell to the bottom right cell of the worksheet and select only that area to be saved. Go to the **File** menu and **Save as Web Page**. Be sure to mark the radio button **Selection**. This will make your Web page much smaller and load much faster. Fill in the **File name** and **Save in** information and press **Save.** Now you are ready to hyperlink to this page from another Web page.

Excel's 'what-if' analysis tools

With just a small ladder of time you can reach the fruit of Excel's 'what-if' analysis tools for answering questions about grades. Students usually want to know what their grades are. One of the most frequently asked questions near the end of the semester is, "What do I need to make on the next assignment or the next test in order to make a (fill in the blank grade)?"

Because this section will be updated frequently be sure to put pertinent instructions at the top of the page. For instance, these instructions,

> "Use this feature to determine what you need to have on the next few assignments and tests in order to achieve a certain grade. Copy your scores from the grades worksheet and then put in hypothetical numbers for Cht, Db, and Mrg assignments. Then put in numbers for T3 and T4 and the project. Your 'what-if' grade will be computed to the right. It is based on 90% and doesn't include the final exam."

are placed above my 'what-if' analyzer on my CIS 101 page. Students must find their own grades on the grade sheet and insert them into the 'what-if' analyzer. Then they can put in whatever grades they think they will make on grades yet to be determined to calculate their 'hypothetical' final average.

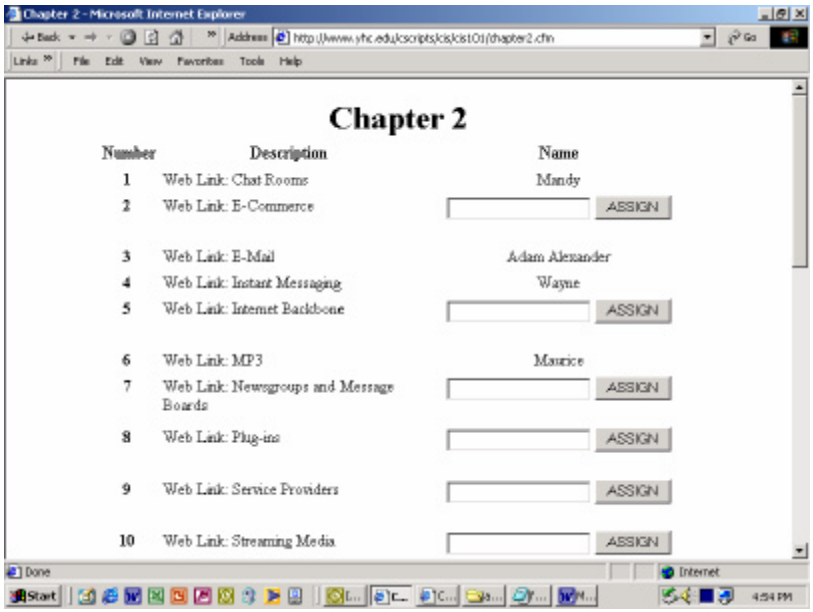
The following are the details for building the 'what-if' analyzer. Create a blank line in your spreadsheet that has the same formula for averaging a grade as any student. Make sure you use the proper headings above each entry and put a 0 into each entry. You should also put any notations at the top of the page, as mentioned above. Select the area to be saved. Go to the **File** menu and **Save as Web Page**. Be sure to mark the radio button **Selection**. Fill in the **File name** and **Save in** information and press **Save.** Now you are ready to hyperlink to this page from another Web page. This page should be updated fairly frequently as you get closer to the end of the term. The formula for calculating a student's average could change as assignments, tests, or extra credit are offered.

Incorporating ColdFusion scripts

Hopefully, some of you are interested in picking some fruit that is higher up on the technology tree. One such fruit is incorporating ColdFusion scripts for interactive databases. What is ColdFusion? ColdFusion is a Web server application that provides a set of tools that you can use to quickly create and deliver dynamic, interactive, data-driven Web-based applications–without learning to program in difficult and time-consuming programming languages. ColdFusion allows you to create dynamic Web sites by using a tag-based, embedded language that is very similar to HTML.

A critical question to ask at this juncture is, "Do you have access to the Web server?" If you don't have access to the Web server this is a moot point. You don't have to know how to do this if someone at your school will do it for you. These ColdFusion scripts were written by Richard Hunt, the Young Harris College systems administrator, using ColdFusion 2.0, over 3 years ago. Now ColdFusion 4.0 is out and it has many new features which should make it even easier to create interactive lists.

The following is an example of using ColdFusion scripts to automate the process of people signing their names on a list on a "first come, first served" basis. I ask my students to pick a link from the end of the chapter to explore on the Internet and write a summary page. Instead of me keeping track of who is doing what link I use ColdFusion scripts to keep track of this for me. This is what the students see from their side of the Web page.

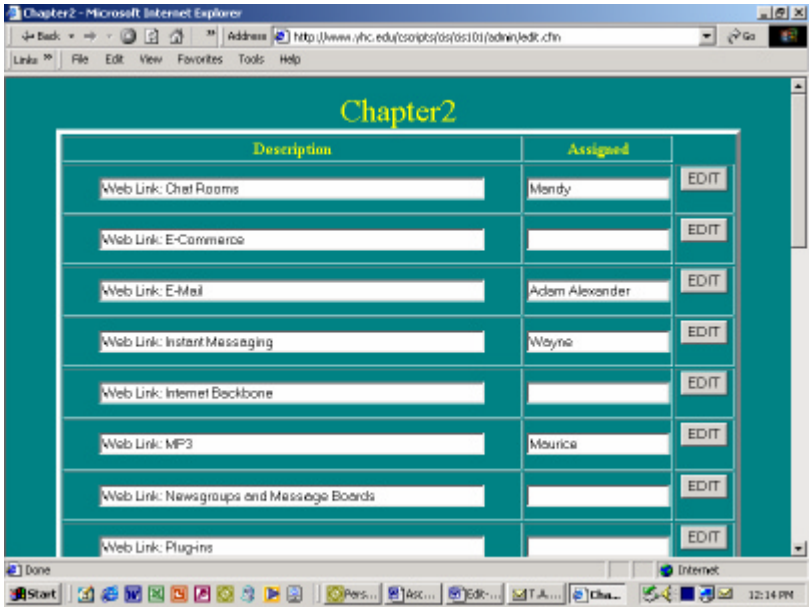


What follows is the corresponding ColdFusion script that created the Web page. The text at the right following the // symbols are comments to help you understand the code that is not obvious.

```
<CFQUERY NAME="chapter2" DATASOURCE="KenFox">          //Call the query chapter2
     SELECT * FROM chapter2                                  //Get everything from chapter
</CFQUERY>
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
```

```
<HTML><HEAD><TITLE>Chapter 2</TITLE></HEAD>
<BODY BGCOLOR="White"><DIV ALIGN="center">
<TABLE BORDER=0 CELLPADDING=2 CELLSPACING=3 WIDTH=600> //Create a table
<TR><TH COLSPAN=3><FONT SIZE="+3">Chapter 2</FONT></TH></TR>//with 3 cols
<TR><TH WIDTH=50>Number</TH>                                    //Column 1
<TH WIDTH=250>Description</TH>                                  //Column 2
<TH>Name</TH></TR>                                              //Column 3
<CFOUTPUT QUERY="chapter2">                                  //Output the results of query
<CFIF name NEQ "">                                           //If name is not equal to null
     <TR><TH WIDTH=50 VALIGN="TOP">#recnum#</TH>                //then display it
     <TD WIDTH=250 VALIGN="TOP">#words#</TD>
     <TD><DIV ALIGN="center">#name#</DIV></TD></TR>
<CFELSE>                                                        //If no name is assigned
     <TR><TH WIDTH=50 VALIGN="TOP">#recnum#</TH>                //just display number
     <TD WIDTH=250 VALIGN="TOP">#words#</TD>                    //and description
     <TD><DIV ALIGN="center">
     <FORM ACTION="chpt2add.cfm" METHOD="POST">              //When Assign button is hit
          <INPUT TYPE=HIDDEN NAME="recnum" VALUE="#recnum#">
          <INPUT TYPE=TEXT NAME="name" SIZE=20>              //add this info to current info
          <INPUT TYPE="SUBMIT" VALUE="ASSIGN">
     </FORM></DIV></TD></TR>
</CFIF></CFOUTPUT></TABLE>
</DIV></BODY></HTML
```

This is the administrative side of the same page. You should be able to readily see the similarities.



What follows is the ColdFusion script that creates the Web page. The teacher/administrator keeps up this page by entering items in the description column and erasing student names to use the list again next semester.

```
<CFQUERY NAME="get_list" DATASOURCE="KenFox" DBTYPE="ODBC">     //Query is
get list
     SELECT * FROM #FORM.table#                          //Get everything from table in form
</CFQUERY>
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML><HEAD>
<CFOUTPUT>
     <TITLE>#FORM.table#</TITLE>                         //The title comes from the table too
</CFOUTPUT></HEAD>
<BODY BGCOLOR="#008080" TEXT="#FFFF00">
<DIV ALIGN="center">
<FONT SIZE="+3"><CFOUTPUT>#FORM.table#</CFOUTPUT></FONT> //Print table name
<TABLE BORDER=5 CELLPADDING=2 CELLSPACING=2 WIDTH=680>
<TR><TH WIDTH=70%>Description</TH>                       //Print Description
<TH WIDTH=20%>Assigned</TH>                              //and Assigned
<TH></TH></TR>                                          //and nothing above Edit button

<CFOUTPUT QUERY="get_list">                             //Output results of query in new table
     <TR><TH><FORM ACTION="update.cfm" METHOD=POST>  //Sends results to update
                                                                    // page
     <INPUT TYPE=TEXT NAME="words" VALUE="#words#" SIZE=60></TH>
     <TH><INPUT TYPE=TEXT NAME="name" VALUE="#name#" SIZE=20></TH>
     <TH><INPUT TYPE=HIDDEN NAME="recnum" VALUE="#recnum#">
     <INPUT TYPE=HIDDEN NAME="table" VALUE="#FORM.table#">
     <INPUT TYPE="SUBMIT" VALUE="EDIT"></FORM></TH></TR>
</CFOUTPUT>                          //In ColdFusion you always have to pass a primary key
</TABLE>                                  //otherwise it will do the update to all the records
</DIV></BODY></HTML>
```

The same administrative tasks can be accomplished using a Microsoft Access database. Microsoft Access is rated as the best database to use along with ColdFusion.[7] The fields in the database need to be changed by the administrator instead of using a ColdFusion script to automate the process. However, the ColdFusion script that displays the Web page the students see is still the same.

These are just two of the seven ColdFusion scripts used to show these lists to the students and administer them. There are two scripts to show the list to the students and five scripts to edit and update the lists by the administrator. After the presentation I will give out all of these generic scripts on a floppy disk along with complete instructions on a readme.txt to help anyone interested use this code to meet their needs.

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Rubric Assisted Assessment of Outcomes-Based Computer Programming Courses

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Abstract

Institutions interested in becoming outcomes-based are developing ways to provide better assessment of course enrollees, the course provider, and the delivery methodologies utilized. The University of Charleston is striving to become a nationally recognized leader in the areas of outcomes-based education and assessment. To aid in the generation of valuable feedback and to improve the standardization of university-wide assessment, rubrics have been developed in several different academic areas.

The rubric to be discussed in this session has been used in Visual Basic Programming courses, but with modification it may be used in courses dealing with other computer programming languages or other subject matter. This presentation will detail the evolutionary process of the rubric creation and describe how it improves student assessment, course evaluation, and the information available to administrators and accrediting bodies. Attendees will be given a copy of the Rubric and the accompanying Explanation Sheet.

Background

University of Charleston

The University of Charleston was founded by the Southern Methodist denomination in 1888 as Barboursville Seminary in Barboursville, WV and became a college in 1889. In honor of a prominent donor the name was changed to Morris Harvey College in 1901. The institution was moved to the center of Charleston in 1935 and became independent in 1942 as a result of the merger of the Northern Methodist and Southern Methodist denominations. In 1947 the school was physically moved by barge to its current location, which is directly across the river from the state capitol building. On December 13, 1978, after an intensive drive to strengthen ties with the Charleston community, the name was changed to the University of Charleston.

The university is a 4-year Liberal Arts Institution accredited by the North Central Association of Colleges and Secondary Schools. It currently has over forty undergraduate programs and Master Degree programs in Business Administration and Human Resources Management. Annually there are approximately 800 full-time students with less than 300 living in residence halls. After

adding in a substantial number of part-time commuting students the annual FTE increases to approximately 1100.

For the past two years, the university has been listed as one of "The Best 201 Colleges for the Real World". Dr. Ed Welch, President of the University of Charleston, says, "This honor reflects that UC's emphasis on 'Learning Your Way' addresses the needs of students and society."

Computer Information Systems

The Computer Information Systems major began in 1971 as an Associate Degree program in Computer Science. After the name of the institution was changed to the University of Charleston in December of 1978, the program was upgraded to the Baccalaureate level in 1980 and its name and focus were changed the following year to become Computer Information Systems. It has grown to become the program with the third largest number of majors at the University of Charleston.

The profile and background of the entering CIS majors at our institution is probably much different from entering CIS majors at other similar institutions. The most prominent difference is the lack of experience in programming and other fundamentals of computing. Out of approximately 40 freshmen in their first programming course last fall, only 3 had ever programmed a single instruction in any language. Therefore, we spend a lot of time during the freshman year, not only assisting the students in learning the environment and syntax of Visual Basic, but assisting them in the development of their logical thinking skills.

Outcomes-Based Education at UC

In the fall of 1996, the faculty and administration at the university began what is known on campus as the "academic transformation" of what was previously known as "General Education". Students are now required to possess and demonstrate skills in six (6) Liberal Learning Outcomes areas to qualify for graduation. Those are critical thinking, communication, ethical practice, science, citizenship, and creativity. Students possessing certain required skills can receive credits by demonstrating those skills or by submitting portfolios. UC students are not constrained by the traditional academic calendar nor a maximum course load limit per semester. This emphasis on demonstrable learning caused the University of Charleston to adopt as its slogan the phrase "Learning Your Way."

Freshmen entering in the fall 1998 were the first students to participate in the new curriculum. These students went through three "communities", which were team taught courses where students, not only could accumulate credit for the subject matter (Humanities, Science, and Social Science), but could also, through demonstrations and the creation of portfolios, acquire credit for English-101, English-102, Speech, and Microprocessing.

In the fall of 1999 Liberal Learning Outcomes were developed for the sophomore level students and in the fall of 2000 they were developed for the upper division students. For fall 2001, all entry-level courses had to be outcomes-based and by August of 2002 that requirement will apply to all mid-level courses. By the fall of 2003 all courses must be outcomes-based.

Outcomes

Definitions

"Rubric" – an established mode of conduct or procedure (especially if written in red).
"Assessment" – the evaluation of instructional methodologies as well as student progress.
"Outcomes-based" – basing credit upon students meeting a set of prescribed competencies.

CIS Outcomes

Outcomes are what a student must achieve in order to be considered competent enough to graduate from the University of Charleston. Outcomes for Computer Programming are a required part of the Outcomes required for graduation with a degree in Computer Information Systems.

Outcomes for CIS-211

1. Demonstrate the understanding of the Visual Programming Environment by creating a software package, which uses a minimal amount of the tools found within the language.

2. Demonstrate the understanding of Forms, Controls, and their associated Properties by creating a software package utilizing Access Keys, Text Boxes, Frames, Check Boxes, Option Buttons, Images, and the additional properties that accompany these controls.

3. Demonstrate the ability to handle Arithmetic Operations by creating a software package, which employs Variables, Constants, Calculations, and the Value Function.

4. Demonstrate the ability to utilize the power of Decision-Making capabilities by creating a software package, which uses Nested If Statements, Relational Operators, and Compound Conditionals.

5. Demonstrate the ability to develop Windows-Like Applications by creating a software package, which contains a Menu System, Common Dialog Box, Sub Procedures and Functions.

Outcomes for CIS-212

1. Demonstrate the ability to develop more sophisticated projects by creating a software package, which utilizes Multiple Forms, Splash Screens, and the Standard Code Module.

2. Demonstrate the understanding of the Iterative Process by creating a software package, which employs Looping techniques and includes List Boxes and Combo Boxes.

3. Demonstrate the ability to handle Matrix Operations by creating a software package, which employs Multiple Dimensional Arrays, User Defined Data Structures, and the Select Case Statement.

4. Demonstrate the ability to Store and Retrieve information by creating a software package, which utilizes Sequential Files as well as Random Access Files.

5. Demonstrate the ability to provide the project user with modern Data Accessing capabilities by creating a software package, which uses a Database and allows the user to Access, Add, Modify, and Delete information contained therein.

Rubric Development

The requirement for all courses to eventually become outcomes-based mandated that the CIS department should investigate the methods and devices that would be employed to accomplish that mission. Several other departments, lead by the English department, had developed what are known as rubrics. These evaluation tools provided more consistent evaluation and assessment, particularly in areas where many different faculty were attempting to arrive at an equitable evaluation of similar student work.

For many years, while instructing students using programming languages such as Basic, QuickBasic, and Q-Basic, I, as many others, required students to turn in a diskette which contained the assigned software along with an actual hard copy of the program. This enabled the instructor to execute the program while simultaneously writing informative comments on the hard copy version of the project.

Fall 1999
With the increasing popularity of the Internet and the advent of on-line courses and distance learning, it became apparent that we could and should now forego the long-standing practice of requiring students to produce hard copy versions of their work. It was about this time that I first attempted to evaluate projects by assigning each student a unique number and then electronically posting on the Internet, not only their scores, but also the actual reasons for the deductions. The deductions were grouped into categories and the amount of the deduction corresponded to the severity of the offense. By comparing their deficiencies with the deficiencies of other students in their class, the students could easily assess whether they were having difficulties with the same concepts as others or were the only ones having trouble grasping a particular skill.

In addition to electronically posting the grading of the project, I also posted the scores for all projects, the student's averages at the current point in the semester, and the Letter Grade that would have been assigned if given at that point in the course. This enabled students to determine where they stood in the class compared to the other students at any given point in the semester.

Fall 2000
During the next academic year, I did essentially what I had done in the previous year with the exception of modifying the assessment tool itself through reformatting and making improvements in the contents of the categories. I still electronically posted both the assignment assessments as well as the cumulative scores for the semester.

Fall 2001
In the fall of 2001 I turned my grading tool into a full-blown rubric similar to the rubrics that had been developed in some other areas. The categories were much better defined and the concepts much more clearly spelled out. There was a 0 to 5 grade given for the three categories of Standards and Conventions, Documentation, and User Interface, and each category accounted for 20% of the grade. The fourth category, Project Performance, accounted for 40% of the grade. There was an overall grade of 0 to 5 assigned for the entire project. For projects worth differing

amounts of credit (5, 10, 15, 20, and 25 points as I used for the projects to satisfy the 5 outcomes in the CIS-211 course), the total became simply the rubric grade of 0 to 5 multiplied by a factor (1, 2, 3, 4 or 5).

I actually returned a hard copy of the rubric to each student after each assignment so the student could get more personalized feedback. And after 18 years of teaching, I still made the fatal mistake of asking the students to keep all five rubric sheets and to return them to me with the final exam. Needless to say that a few, very few, returned all 5. A somewhat larger number returned differing subsets of the 5. And the largest group returned none at all. I did continue to post the cumulative scores, but no longer posted the assessment of each assignment since each student received hard copy feedback. I later realized that the students did not now have the ability to make an easy comparison of their work with that of their peers.

Spring 2002

This past spring I decided to make a copy of the rubric for each student and keep the original. I continued to post the cumulative scores and to also electronically post the actual rubric with cumulative errors so students could once again discover whether they were the only ones having difficulty in understanding a new concept.

By keeping the original rubric sheet for each student, I could compare each student's assignment with previous work to see if they were improving or were continuing to have problems with the same concepts. I told the students that I was doing this and that continued problems in the same area would bring about more and more severe deductions. This also enabled me to tell where each student was having particular problems, and therefore, needed more assistance.

Next Steps

Next Fall I plan to expand the 40% Project Performance category of the rubric making a category which will contain the actual outcomes for the assignment. Therefore, there will be a total of 5 categories with each accounting for 20% of the assessment.

By the fall of 2002 the university plans to have an on-line database system in place so that students will be able to post and preserve work pertaining to different areas of accomplishment. I plan to have all students submit their projects to the database for grading. This will eliminate the collection of multiple diskettes, better accommodate the distance learner or absent student, and enable an even better comparison of student work from assignment to assignment. This collection of work will then be available on-line for faculty, administrators, and accreditation bodies to evaluate.

Benefits

Benefits to Students

The students benefit from this process by having a written record of their deficiencies. They also are much more inclined to improve their performance if they know that the assessor has a record of their deficiencies from past assignments. Students are able to compare their performance on a given assignment against standards as well as others in their peer group. They are also able to compare their progress with the progress of others in their class.

Benefits to Faculty

Faculty members are aware of each student's actual deficiencies from previous assignments, not just a score. The faculty can also easily determine if a student is continuing to make the same mistakes over and over. Therefore, they can better assist the student with a particular weakness. It also provides a mechanism for faculty to determine whether a particular deficiency is common to many students indicating that perhaps the particular area was not covered sufficiently. And finally, instructors have a written record to assist them in improving the course for future delivery.

Benefits to the Administration and Accrediting Bodies

The administrators of the institution and members of visiting accrediting bodies can readily ascertain that standards are being used to evaluate the outcomes of the course. They can also see that records are being kept pertaining to the assessment methods being used and the way the course is being delivered. If revisions in future course offerings show improvement in student ability, then evidence is present which supports the fact that the feedback loop is indeed being used to improve the course. And finally, the progress of individual students can be examined both in the hard copy rubrics and in the electronic portfolios. All of this provides public accountability.

XML in the Classroom

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Introduction

Extensible Markup Language (XML), a subset of Standard Generalizable Markup Language (SGML), is increasing in popularity. As use of HTML and web page development has become widespread in many academic disciplines and real-world settings, XML is poised to follow. It is important that students be made aware of this new technology and understand how it may be used.

The purpose of this paper is to discuss possible learning objectives and identify useful tools that instructors and students might use in obtaining the objectives. This is preceded by an overview of conceptual material that the learner needs to understand before working with XML.

XML: Overview

XML's future is bright for several reasons. Like HTML, the XML data is encoded in a universally accepted scheme. The XML standard calls for use of UNICODE; thus data can be easily transmitted across the web and/or processed on various platforms. It follows that XML is a foundation of web services, a solution to long-standing interoperability problems for distributed processing.

Unlike HTML, XML separates information content from presentation specifications. Combining content and presentation in HTML, as with the <H1> tag, creates difficulty. For example, text serving as headings needs to be identified in the document to enable searching. But marking text as a heading in HTML also means that text will be formatted in a particular way. In the XML world, content markings and format markings are completely separated, but can be associated. Thus, multiple presentation formats for multiple devices, e.g., desktop browser, WebTV, or a WAP-enabled device, can be used to present the same content in different ways. A single content source used with these various formats affords easier content management.

Whereas HTML elements are already defined, XML elements can be created to structure document content. This offers great flexibility. A set of XML elements can be established and accepted for structuring a particular type of data, such that information, once structured according to the standard, can easily be accessed and searched by others. Where like data content is bound by variant XML data structures, XML provides means to reconfigure data into a desired structure. All this aids information sharing.

It should be noted that XML does have disadvantages and it should not be used for all applications. In most cases, when data will not be distributed but is retrieved and manipulated by a single application, XML is less efficient and less powerful than a relational database accessed with direct calls, e.g., ADO and ODBC.

Pieces of the XML Pie

The XML umbrella includes a variety of specifications all under the purview of the World Wide Web Consortium (W3C) [1]. The need to include any of these components in a course will vary with course objectives and the student's technical proficiency. Whatever the objectives and abilities may be, use of XML can be demonstrated and applied. The following list describes the major components that might be included in curriculum objectives:

XML: Extensible Markup Language
: A specification used by developers for data (content) which is tagged in a manner similar to HTML.

DTD: Document Type Definition
: Used by developers to create a structure for acceptable XML content, i.e., what data may or must be included and the order thereof.

Schema
: An alternative to the DTD that serves the same purpose, but is more powerful and is itself structured as XML.

XSL(T): Extensible Stylesheet Language (for Transformations)
: Specifications for formatting the XML content for display or converting to another format, e.g., HTML or another XML structure.

DOM: Document Object Model
: A picture of the XML document used as an interface by processes to retrieve and even change data within the document.

SAX: Simple API for XML
: Similar in purpose to DOM, but it functions in a different, more complex way and is better suited for retrieving small parts of documents with less complicated queries.

Fill-in-the-blankXML
: A number of XMLs, e.g., MathML, are already formalized and adopted in various information domains.

Serving Pieces of the XML Pie

As stated before, curriculum objectives that incorporate XML must be tailored to demands of the course and abilities of the students. The following objectives are suggested possibilities. A de-

scription of tools and their use in support of the objective is provided. Most of the tools mentioned here are freely available via the web.

Objective: Viewing XML Documents

Foundational to use of XML is the basic structure of an XML document and the use of elements and attributes. This can be demonstrated by examining an XML file. A basic understanding of HTML will help students comprehend the structure of XML, although the basic structure is not complicated. Elements, attributes, case sensitivity, prolog contents and use of paired tags are easily shown. Since XML documents are stored as "text" files, an XML file, such as the simple computer lab inventory XML in figure 1, can be viewed with any text editor.

```
<?xml version="1.0"?>
<!DOCTYPE INVENTORY SYSTEM "LABINV.DTD">
<INVENTORY>
     <OPTIONS/>
     <COMPUTERS>
          <COMPUTER>
               <MODEL>Stealth Z1200</MODEL>
               <SERIAL-NUM>32B931</SERIAL-NUM>
               <PROCESSOR>
                    <PROC-TYPE>P4</PROC-TYPE>
                    <PROC-SPEED>1.2Ghz</PROC-SPEED>
               </PROCESSOR>
               <RAM>256MB</RAM>
               <DRIVES>FD, 40GB HD</DRIVES>
          </COMPUTER>
     </COMPUTERS>
</INVENTORY>
```

Fig. 1. An XML Listing

Microsoft's Internet Explorer (IE) will format the document in a more pleasing manner, color coding elements and allowing elements to be collapsed. Clicking the plus and minus signs will expand and contract the listing. Figure 2 shows IE's rendering of the XML from figure 1. Note the PROCESSOR element is contracted in figure 2. This capability can be used to demonstrate nesting of XML elements.

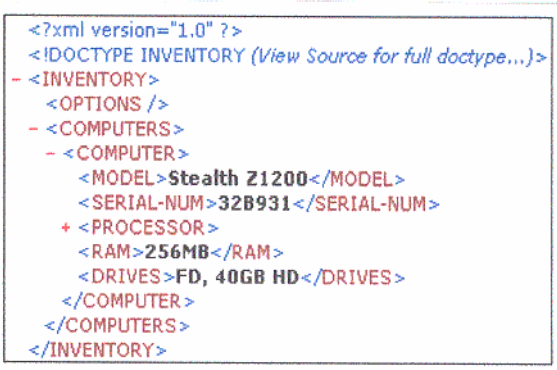

Fig. 2. An XML Listing in Internet Explorer

Objective: Exposing XML Data

Given the hype surrounding XML, viewing an XML document may leave students unimpressed and questioning its significance. Demonstrating use of an existing XML standard will aid students in understanding the power of XML. This can be addressed by exposing data stored in XML's easily communicated format to an application that can manipulate it. Amaya, a freely downloadable web browser and development tool provided by the W3C [2], does support specific XMLs as documents can be both created and viewed. The XML source can also be viewed. In a simple use of Scalable Vector Graphics (SVG) [3] as shown in figures 3 and 4, use of attributes and name-spaces can also be introduced.

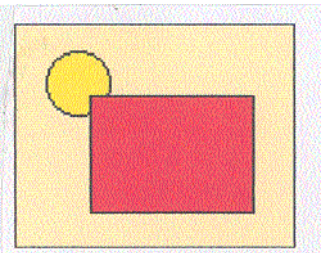

Fig. 3. SVG in Amaya Browser

```
<?xml version="1.0" encoding="iso-8859-1"?>
<svg xmlns="http://www.w3.org/2000/svg">
  <circle stroke="black" fill="yellow" cy="77px" cx="170px" r="15px"/>
  <rect stroke="black" fill="red" y="82px" x="175px" width="75px" height="54px"/>
</svg>
```

Fig. 4. SVG Code

It is very easy to create graphical elements and view the corresponding XML. Amaya also supports MathML [4] as in figures 5 and 6. In each case, a few lines of descriptive XML are used to generate a graphic or text which will require a more involved rendering with other tools. The browser or application must support the specific XML implementation for the content to be properly rendered. IE 5.5 supports neither SVG nor MathML so content is rendered in the same manner as figure 2.

```
<?xml version="1.0" encoding="iso-8859-1"?>
<math
xmlns="http://www.w3.org/1998/Math/MathML"><mi>f</mi>
  <mrow>
    <mo>(</mo>
    <mi>x</mi>
    <mo>)</mo>
  </mrow>
  <mo>=</mo>
  <mfrac>
    <mn>1</mn>
    <mi>x</mi>
  </mfrac>
  <mtext></mtext>
</math>
```

Fig. 5. MathML Code

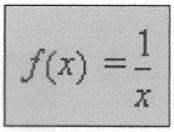

Fig. 6. MathML in Amaya Browser

A Word About XML Parsers

XML parsers do the work of extracting and manipulating data in XML documents. For example, even Internet Explorer incorporates a parser. Whether used directly or by an application as an

interface to a document, parsers are necessary to do virtually anything beyond viewing code. This is not necessarily obvious to students as the parser functions in the background.

Parsers are freely available. Microsoft offers MSXML, formerly called Microsoft XML Parser, which can be obtained from the Microsoft web site. Note that different versions of MSXML can be installed and run side-by-side. Applications using different versions of MSXML may produce different results. Another popular parser is James Clark's XT which is available over the web in Java or as a Windows executable file.

Objective: Creating XML

Hopefully some exposure to the capabilities of XML will motivate students to design and create their own XML language and documents. A text editor can adequately support this task. Students must remember to save the document with an XML extension. As shown above, Internet Explorer provides more visual cues about the XML content; however, IE does not support modifying the document.

For more challenging projects, sophisticated XML development environments can be a significant aid. XML Spy, available from Altova, is a powerful visual tool for developing one's own XML or creating documents that conform to an existing standard. Not only does it support XSL

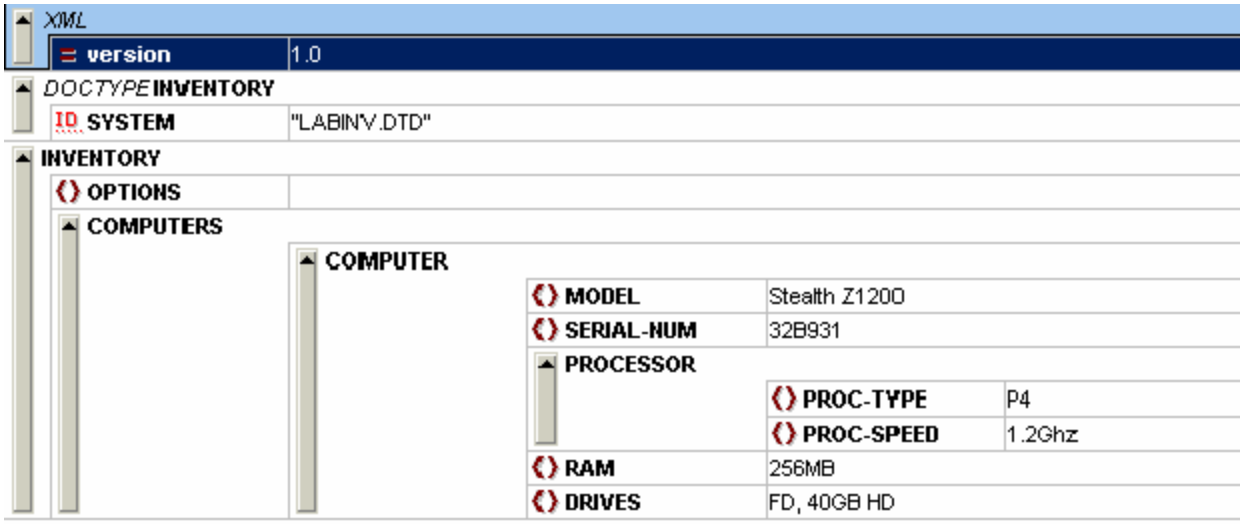

Fig. 7. XML Spy's Enhanced Grid View of the XML Document

and Schemas, to be discussed below, but XML Spy also supports interfaces for SQL Server 2000, Oracle 9i databases and Java. This tool is not free, but a 30-day trial version might service projects allowing students to experience a comprehensive development tool. Figure 7 shows XML Spy's Enhanced Grid View of the XML document from figure 1. It is very easy to add child elements and attributes as the document may be accessed in several different views.

While lacking support for databases, XMLEditPro [8] by Dave Levinson also provides a visual interface with multiple views including a tree and source code. The tree view will reinforce the XML's nested document structure while making the source file easy to update. It is a free download.

Objective: Creating a DTD or Schema

More complex and useful processing involving XML requires that the data structure be established and shared. The DTD and Schema are two approaches to specifying a standard for the existence, order and relationships of data elements within an XML document. A text editor can be used to create a DTD or Schema. A DTD in text form, consistent with the figure 1 computer lab inventory XML document, is shown in figure 8.

```
<!ELEMENT INVENTORY (OPTIONS, COMPUTERS)>
      <!ELEMENT OPTIONS (OPTION1*, OPTION2*) >
            <!ELEMENT OPTION1 (#PCDATA)>
            <!ELEMENT OPTION2 (#PCDATA)>
      <!ELEMENT COMPUTERS (COMPUTER*)>
            <!ELEMENT COMPUTER (MODEL, SERIAL-NUM, PROCESSOR, RAM, DRIVES)>
                  <!ELEMENT MODEL (#PCDATA)>
                  <!ELEMENT SERIAL-NUM (#PCDATA)>
                  <!ELEMENT PROCESSOR (PROC-TYPE, PROC-SPEED)>
                        <!ELEMENT PROC-TYPE (#PCDATA)>
                        <!ELEMENT PROC-SPEED (#PCDATA)>
                  <!ELEMENT RAM  (#PCDATA)>
                  <!ELEMENT DRIVES (#PCDATA)>
```

Fig. 8. DTD for the XML Document in Figure 1

Of course a comprehensive tool such as XML Spy [7] supports creating and editing DTDs and Schemas. As with XML, an Enhanced Grid View, shown in figure 9, makes editing easy. XML Spy also converts between DTD and Schema formats.

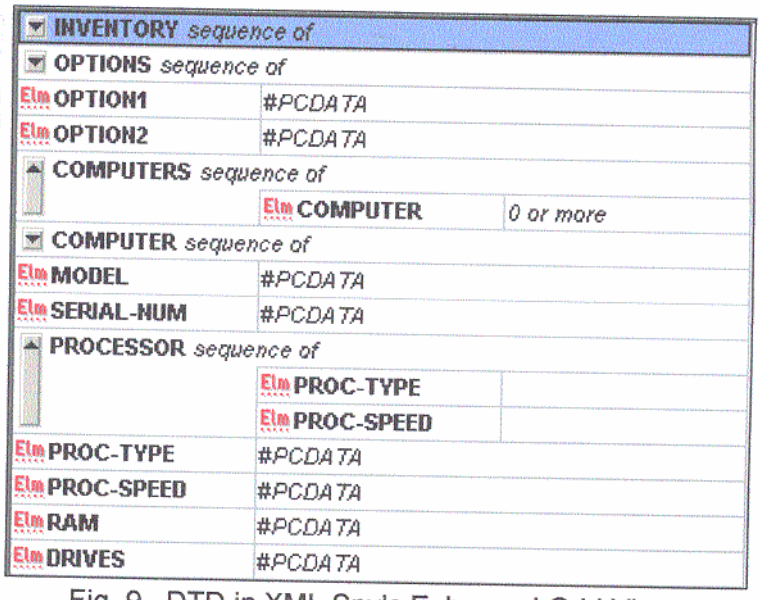

Fig. 9. DTD in XML Spy's Enhanced Grid View

Other tools, while limited in scope and sophistication, are still useful and are freely available. Generally, they are also easier to learn. Duncan Chen's ezDTD [9] is one such tool. It edits DTDs through a visual interface to a text editor and with a bit of practice students can master its use. Users must be familiar with proper DTD syntax as its drop-down menus for code completion are adequate, but not as strong as XML Spy [7]. This shortcoming can be an advantage, if the learning objective is to memorize correct DTD syntax.

HiT Software [10] offers several XML and database access tools. Included in their web site is an online converter. It will create a Schema from a DTD. It will also generate a DTD or Schema based upon an XML document. These tools, while useful to a developer, can also be incorpo-

rated into a learning exercise. Students required to create a schema or DTD can use this tool to check their work and explain any differences from that created by the online converter.

Objective: Checking for Well-Formedness and Validating XML

Ensuring that an XML document adheres to proper XML etiquette, that is, "well-formedness," and that the XML document follows the structure specified in the DTD or Schema, that is, "valid," is a simple task that students should complete. Internet Explorer will check the XML file for well-formedness on load and it provides error messages. Whether the DTD is internal or external to the XML document, IE will check the structure of the DTD itself when the XML document loads. When a DTD is associated with the XML document students must pay close attention to the error messages to differentiate between problems in the XML and DTD.

Note that Internet Explorer does not validate the XML on load; however, an embedded tool is available from Microsoft under the title "Internet Explorer Tools for Validating XML and Viewing XSLT Output" [5]. Once this is installed a "Validate XML" option appears on the popup menu in IE.

Objective: Transforming XML to Another Format

XSL provides much power and flexibility in transforming an XML document into another XML structure or a non-XML format. This removes barriers between applications. If an application can generate and/or read XML, that XML can be transformed for use by other applications. For students the most obvious use of XSL is for presenting data as HTML. The XML structure presented in figure 2 is actually created by a default XSL in Internet Explorer.

XSL is XML so the same tools can be used to create an XSL file; however, the XML file must be modified to reference the associated XSL file. Text editors and XML Spy can be used to modify XSL. The latter will apply the transformation and show the results in one interface.

Clark's XT [6] can also be used in MS-DOS mode to transform XML using XSL. The result can be viewed or stored in a file that can be processed separately. Although useful, students may desire more feedback in debugging their XSL as displayed error statements are limited in scope.

Internet Explorer will apply a referenced XSL, if supplied, to an XML document and immediately render the result. Immediate rendering can make debugging difficult for students as the source of the error is not apparent; however, the aforementioned download from Microsoft includes an embedded "View XSL Output" for IE [5]. This is a handy tool as the output from the transformation process before rendering can easily be seen. The same functionality can be obtained with XT, but the IE tool is easier to use.

XSLDebugger is a debugging tool by Chris Stefano and offered through TopXML, an XML developer support web site. The tool displays XML, XSL and the output and allows one to observe the transformation in progress. While a help to developers, XSLDebugger is also useful in helping students to understand the function of XSL statements.

Objective: Expose Stored Data as XML

Students who master XML, DTD/Schema and XSL may still question the usefulness of the technology. Moving XML structured data into or out of a database or an application file format sheds more light on how XML can increase access to data and reuse of data. Assuming the computer lab inventory data is stored in a system developed in-house, transferring data to desktop applications may be an alternative to writing more programs, especially where users themselves are capable of manipulating the data within those applications. Once the data is exposed as XML it is accessible to users who can manipulate it using several tools.

In Office XP Microsoft has expanded XML support in its Office suite products; thus, Excel can be used to demonstrate importing and exporting data. For instance, if the in-house system can expose data as XML in LABINV (see figure 1), Excel's data import option can obtain the path and data shown, in part, in figure 10.

	A	B	C
1	/INVENTORY		
2	/COMPUTERS/COMPUTER/DRIVES	/COMPUTERS/COMPUTER/MODEL	/COMPUT
3	FD, 40GB HD	Stealth Z1200	1.2Ghz

Fig. 10. Inventory Data Imported into Microsoft Excel 2002

Microsoft has introduced XML Spreadsheet (XMLSS) which specifies how cell content and formatting specifications can be stored in XML; thus, while the imported data does not look attractive, the inventory XML file can be transformed into an XMLSS file that specifies content and format of the spreadsheet. Writing such a transformation is a good student project. Likewise, Excel spreadsheet data can be exported into XMLSS where it can be transformed into another XML format or a web page. Frank Rice [12] provides deeper information on Excel 2002 and XML.

XML support in Access 2002 has also been expanded as described in "Using XML and Access 2002" [13]. Access tables can be created from elements in the XML document, although attribute data is not imported. Access tables can also be exported to XML. In this case each field becomes an element nested within an element for the record. Access reports can also be generated as XML. Of course the XML data may not be in the desired structure giving students opportunities to write XSL transformations.

Beyond Office XP, Microsoft's SQL Server 2000 provides much more power and flexibility in using XML, but it is also much more complex. SQL Server data may be accessed and updated over HTTP. This requires a virtual directory be configured in Internet Information Server to support SQL Server XML. An SQL statement can then be appended to the URL sent to the server. Instead an XML template containing a call to a stored procedure may be placed on the server. The template is invoked with a URL request. In addition, the database can be updated using "updategrams," an approach somewhat similar to templates. SQL Server data can also be manipulated via ADO and OLE DB. Data may be retrieved via a recordset and stored as an

XML file which can then be transformed externally. Alternatively, the data can be accessed as a data stream that can be queried and the query results returned. In all cases the SQL Server data can be mapped to an XML document in different ways, e.g., as elements, as attributes or some combination thereof. More information about SQL Server and XML is available on Microsoft's web page titled "XML and Internet Support Overview" [14].

Use of SQL Server is obviously more complex than other applications mentioned here. Students must possess a larger knowledge base before implementing XML on this platform. If the learning objectives focus specifically upon XML, alternatives to SQL Server should be used.

Objective: Use of the DOM and SAX

Both the Document Object Model (DOM) and the Simple API for XML (SAX) are used in creating application interfaces to access XML data [15]. In either case, a student will have to create an application that requires access to XML in order to appreciate the need for an interface. Functionality can still be demonstrated without developing an application. Students can implement DOM using a few lines of VBScript or JavaScript added to an HTML file; thus, an HTML editor and a browser are all that is needed.

While DOM carries a larger performance hit, SAX requires more advanced programming skills and is conceptually different from most of the XML framework. SAX requires a parser that supports SAX, such as James Clark's XP [6], and a program development environment for a language such as Java or C++.

Conclusion

XML is a technology that is being embraced by IT. Students of information systems need to understand XML's use within IT development. Other students will benefit from understanding XML. Whatever the learning objective may be, software tools can be used to support learning.

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Increasing Curriculum Continuity with a Strategic Integration of Adjuncts using an Online Approach

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Abstract

Adjunct Instructors often have difficulty tapping into university resources, building continuity within a program by aligning material and delivery of content, and getting constructive feedback from department faculty. Many adjuncts have positions in business or at other institutions and taking the extra initiative to become familiar with these factors is a burden or impossible. The use of online platforms, set up by full time staff or faculty for adjuncts, can be used to communicate and facilitate key information that will increase the impact adjuncts have on academic programs and student learning. Data, outlines, or links from courses taught by full time faculty can be shared on a common web platform or just uploaded to the adjunct faculty's course web site. Announcements to students, FAQ's, and technical orientation information can be uploaded as well. Key in our effort has been the collaboration on business projects using the web-based platform. We connect full time faculty, program objectives, and adjunct instructors together. Our facilitation activities and experiences using Blackboard 5.0 (entirely online and web-mediated hybrid format) have made significant contributions in maximizing the efficiency, effectiveness and continuity contribution of adjunct instructors. We will review objectives, strategy, technology interventions, and methodologies in our presentation.

Note: This paper was not ready when the proceedings were compiled. The authors will provide copies at the conference either directly or via the web or email.

Moving a Course to the Web: Lessons Learned

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The Course

Here at the Miami University Middletown campus we offer an introductory algebra based physics, a calculus based physics, and several foundation courses for non-majors. I teach all of these at one time or another. I had taught one of these foundation courses, Energy and the Environment, on several previous occasions. I chose this course to be my first foray into complete online teaching and learning. Energy and the Environment is a wonderful course that teaches the students about energy production, energy alternatives, and the effects of energy usage on the environment. In the process students learn about force, mechanical energy, thermodynamics, electricity, and nuclear physics. The physics is very basic. Students can use this three-credit course to help fulfill Miami's physical science requirement. Non-science majors usually find this course appealing. I do also get some science majors who find the topic interesting. The math level in the course is meant to be fairly basic (basic algebra). Most of the students who take the course are not fond of nor excel in math.

Why Online?

Does technology drive us or do we drive the technology? Well, unfortunately business and industry drives the technology. But why can't we as educators use it to benefit our students? I know that many universities have gone online. There are even universities that are only online. But I needed a good reason to go there. I hear more and more from my students that they must miss class because of family obligations, work obligations, or because their car broke down. I also have had students who find it difficult to attend due to illness or disability. I decided that it would be easier for some of my students to attend class if they were not bound by place and time. As long as they could get the same material and help, as they needed it, why not offer the class at their convenience. The Energy and the Environment course seemed to be a good fit for this. First, there is no lab associated with the course. Secondly there is less math work with this class. Finally there is a plethora of material available on the Internet for energy topics. The material on the Internet is very up to date as well (unlike myself at times).

There was only one way I was going to go "online" and that was if I felt the students received a similar quality of education as they did in my face to face offering. This would be difficult since my bad jokes would not have the same punch online. In all seriousness I am very cognizant of my students learning styles or at least I try to be. I try to mix demonstration with lecture and videos etc. My online version would have to have the same mix including jokes and all, if this was going to be a success in my mind.

How?

My first duty was to learn a little more about online delivered courses. I did some research and gathered information. I verified my belief that I could not just simply take my old content and put it up on the web. I discovered that the module approach was best. I didn't think that would be too hard. The book I used for the course, *Energy: Principles, Problem, and Alternatives* by Joseph Priest, was in chapters that would work for a modular approach. I also came to the realization that this was going to be a lot of work.

Since this was going to take some extra time and effort, I looked into the possibility of some sort of grant. I applied for an Ohio Learning Network grant that wanted some new courses for Internet delivery that also incorporated discovery learning. I thought my course was a good fit. Unfortunately the grant was turned down. But my campus was sufficiently impressed. So I received a grant from an ongoing Miami Middletown National Science Foundation project, *Furthering Advances toward Learner-Centered Education* (NSF-DUE #9850015) for some summer release time. This was just what I needed to keep me on task. I began to plan the course during the summer of 2001.

I cannot emphasize enough that the key to this whole online concept is **ORGANIZE.** I must admit that as an instructor I tend to be……spontaneous…..yeh that's it. I like to change things up depending on the students and what suits me at the time. Let me assure you, that does not work online. Everything must be carefully planned and checked. Errors and or omissions are exaggerated on the web because there is a delay in answering clarification questions and giving better explanations. Each module is already "taught" before they even begin. I spent the first month at least putting each module on paper.

The Modules

I carefully wrote objectives for each module and made notes as to what I wanted to include in each module. In each module I tried to include the following sections: setting the stage, materials, activities, links.

Each module was designed around a chapter in the text. Most of the modules were designed to be completed in one week although several were designed for two weeks. I made notes of what I wanted to include in each module. I did not worry about how I was going to accomplish each task. I simply stated what I wanted to see in each module. I did not want to be dependant on the technology for the design.

The setting the stage section was designed as the hook. I wanted them to want to go on into the module after the setting the stage section. I wanted pictures, quotes, and movies, whatever I could get to lure them on. Dr. Priest included a motivation section in each of his chapters, but I did not want the setting the stage to be words necessarily.

The materials were the extra PowerPoint or videos or animations that I wanted to include. I expected them to read the book so I did not want to necessarily repeat that information verbatim. I wanted to have some lecture content in the form of perhaps PowerPoints but I wanted to include

my voice, not just slides. I also wanted them to see me some….you remember….the jokes. I also wanted to use this part to clarify things I thought to be confusing in the text. I wanted to take advantage of the web and turn some of Dr. Priest's diagrams into animations to bring some of the physics to life. This portion was going to get more difficult when the implementation phase arrived.

The activities section was fun to plan. I wanted to come up with some fun things that I perhaps never did in the face-to-face class but had always wanted to do. I also wanted to keep some activities that I thought worked well in the face-to-face class. I wanted to utilize the vast resources of the web as well. I do not feel that I have come up with as many good activities as I had hoped. I plan to add more. I also came up with some assignments for them to turn in. I found that I could integrate some good writing assignments into the modules. I also planned on having an online quiz at the end of each module.

The links section I had a head start on since Dr. Priest put some helpful links in the new edition of his text. I used them as well as surfing myself. There are many more than I have put in each module but I suppose that will be a never-ending process. I also found myself checking back frequently to be sure the links were still good.

This planning process took some time and it kept me from my favorite part…the computer. But I tend to like to "play" on the computer so I knew that if the organizational stage was skipped or slighted, it would be reflected later in the course. I made myself get something down for each end every module. There were 12 modules for the 15-week course.

Implementation

Now, to make the course come alive was another challenge altogether. I started with what I knew and what would be the backbone of the course. Miami uses Blackboard as their course organization software. I had used it some but had experienced it to be slow at times and sometime down for extended periods. I was not excited about the thought of my course being crippled for a day or more. The literature made it clear that if students became frustrated with the technology, their experience in the course would be greatly diminished. But I needed the chat, discussion, grading, and testing functions that Blackboard had to offer. I made the decision to put the course on two different servers. Blackboard would basically be a tool and my own web site would be the backbone. If one or the other went down for an extended period, I could transfer the needed material to the other site. We would never be out of business for long (unless I was so unfortunate that both sites crashed). I also wanted to put the generic material that would rarely change on a site that would be there continually and not be archived at the end of the semester.

My site was first. I used Macromedia's Dreamweaver to create this site. I created a design that I thought was simple and easy to follow. I created a couple of graphics for it and chose color schemes etc. I wanted something that would not make everyone nuts in 15 weeks. I wanted them to find the site appealing and friendly. I included instructions for navigating the site and what exactly could be found there. I also considered the fact that outsiders would find their way there as well. I created the navigation and instruction pages and a basic template that each module would follow.

Blackboard was not too difficult. I used the same graphic as I did on my other page to tie the two together. I made sure that they were linked to each other. I chose my color scheme and buttons etc. I also made a tentative schedule and placed it on the calendar.

Animations

I was excited now. Now I got to play. It was time to put my ideas into action. I started looking at the first few modules to see what I had wanted in the way of animations or motion. The application choice was easy. I had been a user of Macromedia's Flash in the past. I would just create the animations in that. But I wanted them to relate to the book, so I asked Dr. Priest if I could use the diagrams in the book as a basis for my animations. He agreed enthusiastically and sent me his electronic copies of many of his diagrams and pictures. Although this process was "fun" for me and I think worthwhile for the students later, the animations took lots of time. I probably spent 4 hours or so for each of the first several animations. Four hours for a 20 second animation. Was it worth it? I still believe it was. There is just something about trying to illustrate a moving process with a still picture that gets lost in the translation. I simply tried to put some of the motion back. To do most of the animations from the book, I had to first trace the original graphic and then animate individual parts. This was why it was so time consuming.

Video

In order to include video I had to choose a format and delivery system. I had decided early on that I did not want the students to have to wait at home for massive downloads of materials. I knew they would get frustrated and probably not view the material. This was confirmed for me when I took an online course myself and had to struggle through streaming material that I could only view at certain times of the day (or night). I decided that I would burn each student a CD for the semester and they could view the large materials at their leisure on virtually any machine. Since the cap on my course was 15 and blank CDs are cheap, I felt the expense and time was well worth it.

Now I had to choose my format. I could have used PowerPoint with sound but if you have ever struggled with PowerPoint and sound timing and coordination, I was not into that. I played with the free version of Real Presenter but it had its limitations as well. I could have used Flash for entire presentations but I am not experienced enough with that. I also had to consider the final file size. I did not want these so large that I could not put them all on a CD. I was running out of time when a colleague of mine came back from a Math conference. She knew I had been struggling with these questions and basically paralyzed because I was afraid of choosing the "wrong" application. She told me she had found my solution, Sonic Foundry's Vegas Video. This is basically a video-editing package. Still pictures, video, and sound in virtually any format can be added to your final video. I was intrigued. After "playing" for half-an-hour or so, I was convinced that I had found my solution. The software was easy to use because it used a drag and drop format. I could save my PowerPoint slides as jpg and use them as needed. I could place video over stills and visa versa. The best thing was that I could save the video in virtually any format. This was great because if I did need to stream some day, I could without recreating all my work. I chose to make my first few videos in Real Audio because it made for small files with

reasonable quality. I wanted to use MPEG but this was not available until later. Now I save them as MPEG.

I was now in the video business. I started with some PowerPoint lectures that I had already created. I added sound which was easy to add with a computer microphone at my desk. I then began to add movie introductions with my Quick cam that sits on my desk. (A perfect place for bad jokes!) I overlaid these on top of the PowerPoint slides. I also had some video clips made by former students that were perfect for these movies. Animations could also be added as needed.

I soon became more ambitious. I acquired one of the campus digital video cameras, which I wanted to use for demonstration videos. But don't reinvent the wheel. There are places on the Internet that have demonstration videos in physics and other disciplines. One such site is OhioLINK Digital Media Center. I downloaded several video clips that fit the topics I needed. I contacted OhioLINK and asked if they would mind if I put several clips on the course CD and give them recognition for their creation. They agreed. For the demonstrations I could not find online, I started to record them myself. I did not do anything fancy, I just recorded simple demos and edited them on the computer. I added the voiceovers later so that I did not have to worry about what to say while I performed the demonstrations.

The final step was to create the CDs. Unfortunately my plan to give them just one CD was abandoned when I could not finish all the videos by the start of the class. So I gave them Part 1 CD. I burned them individually but I recommend if you have a large class that you get access to a multiple burner. In future offerings of the course I will consolidate CD 1 and CD 2.

Preparing Myself

I decided that I should not teach an online course without first experiencing what it was like myself. I took the course, "Teaching Online " form LERN (Learning Resources Network). I wanted to experience the questions and frustrations that my students might encounter. I learned some important lessons from the experience.

- Make sure all the students can access the technology – I could not get their streamed media during the day and it became frustrating.
- Send an introductory letter explaining the class and what to expect – I found this to be very helpful and comforting. I could prepare myself and I new what to expect.
- Larger classes are less impersonal – I did not feel comfortable with such a large class. That does not mean they are bad. It was just bad for me. It is something to consider.
- As a student it is important to organize your time – Their advice to set aside time each day dedicated to the course was valuable.

Preparing the Students

There were 15 students who initially enrolled in the course. I composed a letter that explained that the course was a web-based course and how the course would work. I listed the software that they would need and where they could download it if they did not have it. All the software was available on the computers in our computer center as well. I sent the letters over the Christmas break. I also stated in the letter that all the students were required to come the first night of class

or be dropped from the course. The first night was going to be used to explain the course and be sure all the students were on the same page technically. Of course I got two students who "absolutely could not come to the first class but *really* wanted to be in the course". I allowed them to come to my office and get the information from me but I really don't recommend this practice.

The First Night of Class

Since Miami University Middletown is new at this web based education, I was not comfortable just turning them loose without meeting them and making sure they could handle this. I showed them the web sites they would be using. I took the time to navigate each site and where to find different things they may need. I took their pictures which I later e-mailed to them for their own Blackboard web sites. I had an employee of our computer center come and make sure they all new how to log on, read and forward their e-mail, and field any other technical questions. This worked really well and I would do it again. I also had paper versions of the schedule and syllabus available in case they had not been able to print them from the web site, but most of the students had printed versions with them.

Evaluation

I know there is still a debate as to how to evaluate the students of an online course honestly and fairly. I have not yet come to a final determination on that subject yet. For this course I chose to use a variety of methods. Each module was different with regard to turn in assignments. Some of the modules had half to full-page papers to turn in a particular topic. Other modules had a problem that was significant to the topic to work out and turn in. I wanted to give a variety of graded activities to fairly evaluate the students and their strengths. I also believe the writing assignments to be a valuable endeavor in any class. These could easily be handed in via e-mail as either an attachment or the e-mail itself.

Some of the modules had self-tests or quizzes within them. These were simply drill and practice for the students to see how much they had learned. At the completion of each module the students were directed to take a quiz on Blackboard. I experimented with the format of these quizzes. Some gave feedback while others did not. Some of the quizzes were timed and some they could only do once. Other quizzes allowed them to take it multiple times but changed each time they pulled it up. I wanted to see their reaction as well as get a feel for what was doing them the most good. I had intended not to even count the quiz scores but the students got very upset over this. They really wanted them to count for something. In fact the students preferred the quizzes that gave them feedback and let them take it multiple times. I said that they would have to choose one or the other. They chose multiple chances. I have not really settle on what I like the best. They were very forthright though and admitted they would keep trying until their score was perfect. And I gathered they worked together some too. But I also got the impression that learning was taking place as well.

After every five modules I had them meet in class for a test. The test were multiple choice, open answer, matching and true/false. These were all of the same types of questions found on their quizzes and activities. They were approximately an hour in length. I also gave them a questionnaire to get an idea of what was working and not working for them so far. I will address these

results later. The students averaged an 81 on the first test which is on par with my face to face offerings of this class. (78.8, 76.8) These scores were on different test during different years and is not offering up any kind of statistical analysis. The second test was similar with an average of 82.7. (82.5,80.9)

Student Attrition

As I mentioned before I began the course with 15 students which was the maximum I allowed. After the first two modules, 3 students dropped the course. They had kept up to that point but came to me and felt it best to drop. Two students stated that it was due to the math involved and the lack of personal attention in that phase of the learning. They wanted to see the problems worked out and be able to get personal assistance. I offered to have them come to my office hours to get help but they felt that it would not work. One of those students and the third student stated that they were dropping due to their own lack of discipline. They could not keep up with the material and stick to a schedule. I feel that I can work on the first problem but the second is out of my hands.

Another student drifted away citing conflicts with another class that met at the same time. (He was warned not to double book.) Normally for a web course this would not be a problem but with this course in its infancy, I could not recommend that students do this. The final student exited after missing the second test. She had an extended illness and had difficulty keeping up all along. She has stated she will be taking the course again.

Discussions

The asynchronous discussions have been lively. I have posted questions from time to time and gotten good responses from all the students. They have been reading each other's postings as well. Unfortunately I cannot get them to post discussion questions on their own. I am not sure why that is. I think this is a key part of the online course. It allows for students to be heard and makes many of them feel safer than the face-to-face course. They can plan out what they want to say which is very beneficial to certain learning styles. I have made questions for the tests from some of the discussion topics as well.

The synchronous chats were very valuable as well. I had planned to have four chats with the caveat that if they attended all four they would receive extra credit. Unfortunately I only managed two live chats. But I think they were outstanding. The first chat was with the author of the textbook, Dr. Joe Priest. They inundated Dr. Priest with questions. It was very lively and lasted about an hour. He seemed to enjoy it very much as well. The second chat was to be with experts from our local power company but due to their security reasons, we could not have it. I rescheduled with a gentleman that works at the Miller Brewery power plant. This chat went better because I moderated it more. The student had to type an exclamation mark if they wanted to ask a question. I kept a list of the names and called on them, as we were ready for another question. This chat also went well except we kept diverting to beer questions. That was ok too though. Since when do classroom discussions always stay on task? This chat lasted about an hour as well. Again I invited them to set up synchronous chats any time they wanted to but they never did.

Blackboard Stats

Looking at the Blackboard stats up to this point is interesting. There are no surprises when it comes to which areas they have hit the hardest. The main content area is the most used, which makes sense to me.

Figure 1

Again not surprising, the usage has gone down since the beginning of the course. Figure 2 shows the usage by day of week. The modules were due on Wednesday of nearly every week.

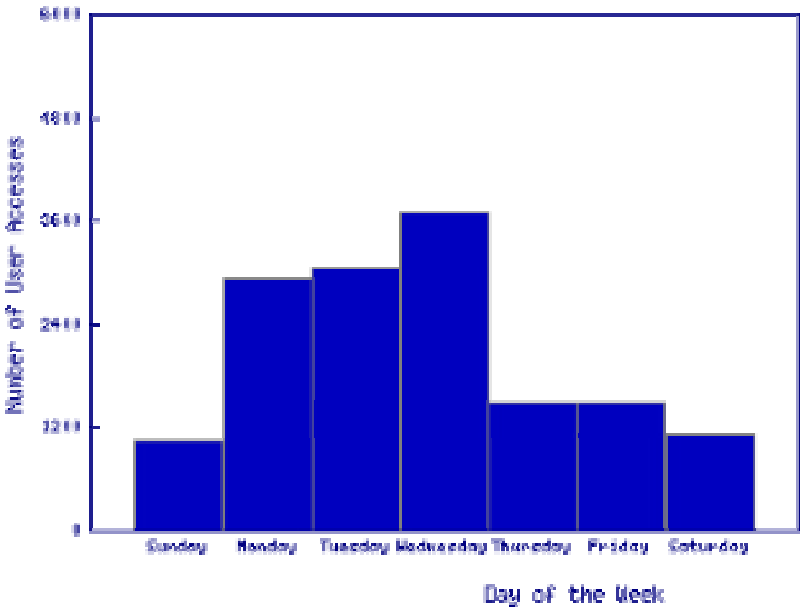

Figure 2

I also found the usage by time of day interesting (Figure 3). It seems they liked to work on thing in the middle of the day. I must admit that the course is not normally offered during these times so it was helpful for them to have this format. There was some late night usage as well.

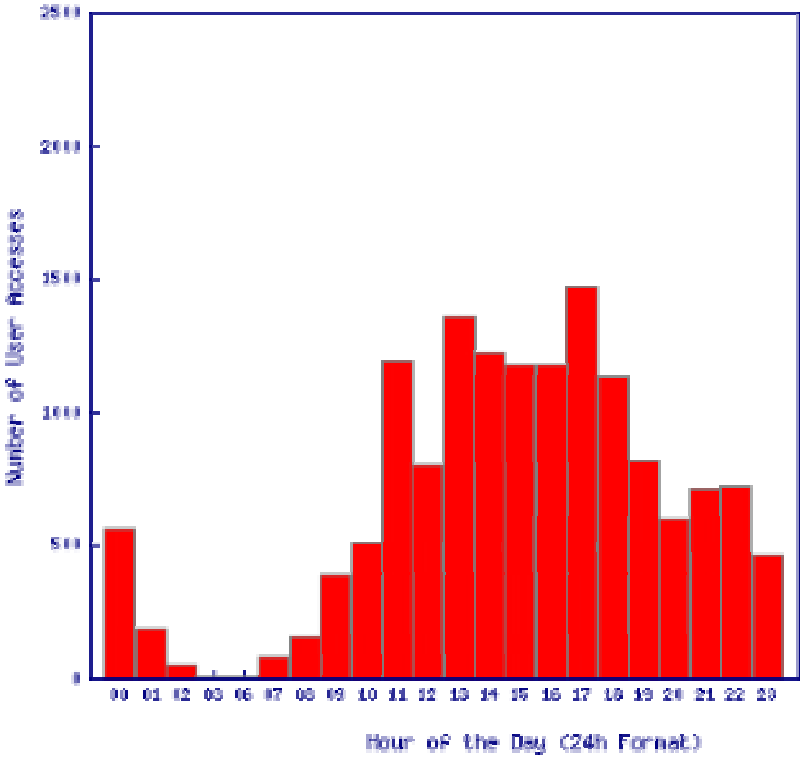

Figure 3

Conclusions

My overall conclusion is that this was a successful class. The students learned what they were supposed to learn. I also feel that they had positive experiences overall. The flexibility was what they needed and it did not detract from the class or content.

Here are my lessons learned:

- **Not all students can learn with this style of course.**
- **Plan ahead…..way ahead.** I found myself scrambling at times to keep up with the modules. I am hoping that the second offering will be even more organized.
- **Warn the students what will be expected of them prior to the start of class.** I truly believe that the introductory letter helped prepare the students and helps them to self-select for this type of course.
- **Test the students or have them self-test to determine if they are good candidates for asynchronous learning.** I was going to do this and then just put it out there as an option. There are tests on the web the students can take themselves. I think it would have helped several of the students that dropped the course.
- **Give the students the tools (skills) needed for the course.** Since we were doing a lot of communication via e-mail, I did a short lesson in the first module about writing e-mails and proper etiquette. One cannot assume that these skills are known.
- **Have a "techy" at the first class.** This was invaluable. I can wing the tech stuff but why risk it. Have someone there who can field these types of questions.
- **Utilize all your resources.** Don't reinvent the wheel. Use textbook sites, video repositories, and anything else you can find that is already out there. I do not think that I have mastered this yet.
- **If you are utilizing video, use the CD approach.** Streaming video is almost there but I still think it is a burden on the students to rely on this.
- **Make a good first impression.** Do everything in your power to have things go smoothly through the first module. That can make or break a student's momentum for the rest of the course.
- **Make it simple.** My students liked the fact that things were laid out for them very simply. They new what they had to do and when it was due. Each module was essentially a page with link off of it. Nothing too fancy.
- **Consider accessibility issues.** Accessibility is increased for some but still restricted for others. I did not consider this in the original design. I will be working to comply with Section 508 in the future but it would have been easier to do in the original design.

Using Campus Technology Issues as a Resource for Student Learning

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Introduction

Studies have shown a major factor in organizational success is the involvement of managers and decision makers in all aspects of information systems (Stair & Reynolds, 1999). For students who wish to pursue careers in IS, a broad set of skills is required. Needed are: technical knowledge and skills, business knowledge, problem-solving skills, communication and interpersonal skills, and teamwork and project management skills (Gupta, 2000). According to Dennis and Wixom (2000), the skills students learn in their advanced courses, such as systems analysis and design, should mirror the type of work they will do in organizations in the future. However, as Gupta (2000) notes the variety of terms and concepts in introductory IS courses can be overwhelming to students. Gupta (2000) goes on to suggest that professors can help draw students into the material by looking at the societal and personal impacts of technology thus showing students the relevance to their lives. Similarly, Davis (1993) talks about working with students to help them acquire new information, practice new skills, and expand on what they already know. Studies have shown that "hands on" learning experiences, such as service learning projects can also enhance student learning (Kretchmar, 2001).

Campus technology issues at Luther College are similar to those found on other campuses and in other organizations. Luther College is a small liberal arts college in northeast Iowa. The surrounding area is primarily rural and the community itself has a limited industrial base. Because of the geographic location of the college and the limited access to organizations of size, we have come to use the college as our case study for many activities in our curriculum. We have been able to use current technology issues on campus as the foundation for class activities and projects that help meet the learning objectives of both our introductory MIS course and our senior-level analysis and design courses. The goal of this paper is to provide examples of how common campus technology issues were used to create activities that could enhance learning for both introductory and advanced IS students.

Three courses in particular have taken advantage of campus technology issues as learning resources: Concepts and Issues in Computing, Systems Analysis and Design, and Analysis and Design Project.

Our introductory MIS course, MIS 30, is titled Concepts and Issues in Computing. General topics discussed in this course include information systems and their uses, hardware, software, databases, networks, the Internet, and the systems development life cycle. The course is a require-

ment for all students majoring in accounting, economics, management, and management information systems. The course also serves other students on campus who want a general introduction to computer technology in a business setting. The majority of students enrolling in the course are in their first or second year. Because of the diversity of students' interests and experiences with technology, one goal of the course is to introduce basic concepts about major areas of technology and give students a common vocabulary to talk about technology. A second goal of the course is to help students see how technology can be useful in their fields. In keeping with this goal, a significant amount of time is spent helping students see applications of concepts that are discussed and helping them think through the issues that arise with the use of various technologies, so they can be more informed users and good decision-makers when it comes to technology.

At the other end of our curriculum, senior MIS majors are required to take a two-semester sequence of courses dedicated to systems analysis and design. The objectives of MIS 62, offered in the fall, are to help students understand the systems development life cycle, the role of a systems analyst, client interaction, and basic project management. The class is structured around a series of small projects that help reinforce concepts. In the spring, students take MIS 63 in which they work with an actual client on a semester-long project that is intended to meet a need the client has for the use of technology in their work.

In MIS 62, campus issues are used as the foundation for the types of projects used for learning. In MIS 63, many of the clients students work with are campus community members who have a technology need.

Examples of Activities

Creating a Plan for Updating and Maintenance of Campus PCs

Because of the continual advances in hardware and software, the college is constantly updating equipment on campus in faculty and staff offices, computer labs, science labs, classrooms, and other areas. One significant issue has been developing a plan for the cycling of equipment updates and maintenance that will be feasible with given staffing and budget constraints, yet will meet the diverse needs of the users.

This problem is used as an example in MIS 30 to help students recognize the value in understanding user needs and common concepts for basic technology like PCs. Students learn about hardware including processors, memory, and storage. Students also learn how different hardware fits different user needs. Based on that knowledge, students are asked to develop a proposal for the update and maintenance cycle for PCs supported by the college.

In developing this proposal, students consider such things as: who typical campus users are and what type of PC hardware they require, the number of users that will have to be supported and how much hardware that requires, how much needed hardware costs, and how often hardware has to be replaced in order to continue to meet user needs.

The first goal of the activity is that students have to apply their understanding of hardware in selecting the type of hardware needed for campus, recognizing how users differ and how hardware

can or should differ to fit users. A second goal of the activity is to get students thinking like decision-makers, understanding how their choices about common technology affect the budget and resources of an organization.

Creating a Policy for Internet and Email Usage

The college has recently moved from two T1 lines for Internet access to a partial DS3. The college has also had to address potential limits on usage of the Internet and the effect on speed of access for academic work because of the number of students downloading and sharing music and video files.

In MIS 30, students are introduced to how the Internet works along with ideas of security, privacy, forms of access (e.g. T1, cable modems) and applications that are enabled because of the Internet (e.g. email, chat rooms, distance learning). Once these concepts are introduced, students are asked to create a framework for a college policy on Internet and email use.

In developing the proposal, students have to consider such issues as: the amount of usage the policy will allow, the cost of providing adequate access based on the amount of usage, how costs fit in the college budget and priorities, the value of open Internet and email usage, the liabilities of open usage, the benefits of limiting usage, and the problems with trying to limit usage.

One of the goals of the exercise is to get students to look at the Internet and email as tools and to assess their business value. A second goal is to reinforce concepts students learned about how the Internet works by forcing them to think through how the college gets access as they try to evaluate the costs of usage. A final goal is to help students ask questions about appropriate uses of a given technology and how the definition of appropriate usage may depend on the environment.

Creating a Business Plan for Group Decision Making Systems

In 1993, Luther received a grant from the Olin Foundation to build a new facility for mathematics, computer science, and business. The building opened in 1995 with its centerpiece being a group decision-making system housed in a room called "The Round Table Room." Since that time, the number of staff members trained to serve as facilitators in helping groups utilize such a system has dwindled. Due to limited staffing and other factors, the room has not been utilized as effectively as it could be. And, because of the low utilization, the college has limited the amount of maintenance and updating of the technology in the room. In the fall of 2000, Luther's president requested a business plan for the room from the campus technology support organization, Library and Information Services (LIS).

MIS 62 students had studied the concepts of identification of stakeholders, identifying the business value of technology, analysis of user needs, feasibility, design of solutions to meet user needs, cost/benefit analysis, and implementation issues. Students were also introduced to principles of teamwork, meeting management, and project management.

Working with the director of LIS, the MIS 62 class was charged with developing initial plans for four different business models for the room. The goal of the project was to give students a "real world" problem to apply their skills to. The class was broken into four groups of eight students

each, with each group creating one plan. Plans ranged from dismantling the room and reallocating the space to making the room a profit center. Students were required to include in their plans the technology changes and requirements, staffing issues, costs of the plan, and benefits of the plan to the college. Students were also required to present their plans to the director of LIS and ultimately the president of the college. This gave students exposure to working with decision makers to gather information and analyze potential solutions. Students also got the satisfaction of knowing their work was a valuable contribution to the college. Since this project was completed, staff at the college have continued to refine the plans started by the students in order to create a formal plan for the room.

Providing Development Services for Campus Offices

The Library and Information Services Department on campus supports the technology needs of campus. Because staffing in the organization is a finite resource, projects have to be prioritized. A number of small projects from a variety of offices on campus often end up as lower priorities. These projects may include such things as developing websites, creating small database systems for individual office use, or training staff on the use of common software and technology.

Students in MIS 63 have done a variety of campus projects, using the technical skills and knowledge they have gained throughout their academic career as well as the specific systems development knowledge they gained in MIS 62. Examples of projects they have done over the past three years include: websites for the offices of the Registrar, Financial Services, Human Resources, Student Life, and Student Academic Support, websites for a variety of departments/majors, a database for tracking services provided in the counseling office, a searchable resume-like database for the campus career center, an electronic submission form for information on prospective teachers, and investigation and proposal of software to provide students with electronic portfolios in the campus career center.

These projects have a number of goals. First, they allow students to use and grow their technical skills. Students are often given projects for which they do not have all of the necessary skills to complete the project. They are expected to learn on their own whatever additional skills their project requires. Second, gain actual experience dealing with clients. Third, projects are done in groups, so students get the experience of managing group dynamics. Fourth, groups get different projects so students are responsible for managing their own deadlines and progress as appropriate for their projects. Fifth, a significant portion of each project is training the client to be able to maintain the system, so students learn about documentation and training. Finally, students get an opportunity to use their knowledge and expertise to serve their community.

Conclusions and Reflections

Using campus technology issues as a basis for designing class activities has been an effective teaching tool. It is worth noting that my ability to use campus technology issues effectively has been enhanced by a deeper understanding of the college issues. Much of this understanding of campus technology issues has come from service on two particular committees at Luther College. I served as the faculty representative on a task force charged with going through the analysis and selection process for a new campus-wide integrated information system. I also served as a campus representative on a task force made up of campus constituents and off-campus technol-

ogy professionals that developed a strategic plan for technology at the college. These experiences enhanced my understanding of different technologies and of specific campus issues. They also allowed me to form connections with potential MIS 63 project clients from many offices on campus and connections with off-campus professionals who can serve as resources. And, these experiences provided real examples of planning and analysis processes to share with students.

Using my service experiences as learning opportunities, I was able to enhance my teaching. Feedback in written student evaluations suggests the types of activities described in this paper have aided student learning. In our introductory course students have regularly commented that the use of real-world examples helps them to better understand concepts that seem abstract. Too, the use of campus-based examples allows for examples that will be commonly understood by most students. Similarly, students in the systems analysis and design courses have regularly commented on the enhanced learning when attempting to apply concepts rather than just study them. They appreciate the opportunity to work with the campus community because they can often immediately see the value of their work to the client and they can enjoy the pride of giving back to their community.

There are a number of other campus technology issues that can be addressed. And, activities based on a given issue can range from class discussions, proposals, recommendations, and technology briefs, to implementation of systems to be used by campus clients.

The activities outlined above are simply examples of the types of activities that we have found useful in helping to meet learning objectives in our MIS courses. Using campus technology issues as a foundation has provided material students can relate to, has introduced students to technology problems that are commonly found in organizations, and has provided hands on learning experiences for students at a small liberal arts school.

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Prestonsburg CC has a new web tool for posting information

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Abstract

This session will highlight a newly developed web interface that allows employees at Prestonsburg Community College to get and post information to the college's web server both securely and economically. Like many college's, a small number of faculty web enhance their course by using either: Blackboard, WebCT, or Prometheus. But other faculty wanted to provide basic course information without having to use one of the web portals. Now, all faculty can post basic information to the web server. Also, employees who are responsible for maintaining information about their area are able to update their portion of the website without having the web team process it. All employees can also use the new interface to obtain sensitive data and documents thus relieving their e-mail boxes and saving them time by not. The nice thing about this new web interface is that it was developed internally and can be tailored for the future. A demonstration of the system and details as to how it was developed will be presented.

Introduction/Background

Prestonsburg Community College (Prestonsburg CC) is one of 28 schools part of Kentucky's Community and Technical College System. As a member of this system schools are provided with many information technology services such as high-speed connections to the Internet, centralized applications and databases, and web services. Schools have the choice to either use the central web server to host their school's web content or have a local server on their campus. Both have their advantages and disadvantages. Schools that choose to use the central server do not have to worry about installing and maintaining the server and related software. But they are limited in how interactive their site can be because server based scripts/programs are restricted and as a result site content cannot be generated from a database. Schools that choose to have a web server on their campus are responsible for installing and maintaining the web server in addition to the site's content. The advantage of having a web server on campus is the web master and developers are as limited in what the server can/cannot do which results in the campus being able to have interactive web site by taking advantage of server based scripts, programs, and databases.

Prestonsburg CC employed myself in July of 2000 as both an instructor of computer courses and also the college's webmaster. The college's web site had been inactive for many months prior to my employment so my first task was to bring the site up to date before the fall semester started. During the first year, the college's site was housed on the system's central web server. This was an adequate and convenient arrangement while I became more familiar with the college and planned how to redesign the site. At the end of the 2001 spring semester the decision was made to setup a web server that would reside on campus and move the content from the central web

server to it. The server software chosen to run the server is Linux 7.2 for the operating system and Apache 1.3.20 for the web server. This software was chosen based on my prior experience as a webmaster and the cost savings gained by not having to purchase the software.

One issue related to having a web server on campus is the need to keep the server secure from attack by hackers and viruses. Even though this is true for all computers, this is especially important because of network structure that Prestonsburg CC is part of. Because of this, access to the server is limited to only myself and one other person for the purpose of management and maintenance. In addition to who can access the server, the methods used to connect are limited as well. In the past most server administrators would setup FTP accounts for folks to post web content. In recent years, this is not the norm because FTP is not a secure and most administrators are turning this type of access off. This is the case of the Prestonsburg CC server, FTP has been turned off and another method of connecting to the server for file transferred, called SSH, is being used. SSH requies the user to have a SSH compatible program on their computer in order to connect to the server on which SSH is installed and running. Not only does this require the user to have "special" software on the computer they are currently using, the software is not as easy to use for those who are new to computers. This posed a problem for allowing others to develop and post content about themselves, the courses they teach and/or the area in which they work. Thus, the need for a method to allow individuals to post information to the server securely and easily was needed spawned the project that now has to potential to change the flow and storage of information at Prestonsburg CC.

The Project

Work began December 2002 on providing access to faculty who had requested the ability to post their course information on the web site. One aspect of the project is that the method/process had to be kept simple and required very little from the user and their computer. I decided to use the web as the medium for this process based on the fact that all employees have access to a computer with a web browser. But this lead to a few issues:

* normal web transactions are not encrypted
* a way to identify the user without having their information sent unencrtyped was needed
* a way to keep track of users as they move through the site was needed

SSL

Ensuring server security was a must so I chose to add SSL (Secure Socket Layer) to the server. SSL would allow users to send information to/from the server without their information being viewed by most network eves-droppers. An add-on module for Apache was available and straight forward to configure. One problem I ran into once SSL was configured and working is that web browsers only recognize SSL certificates created by specific entities. These entities charge a fee to create SSL certificates, which can be quite substantial. Also, the certificates created by these entities are only good for 1 - 2 years; thus increasing the cost to maintain a secure medium for data transaction. I discovered that one can create a certificate to be used with their web site but users will get a warning screen as shown below. Image 1 illustrates what people who use Microsoft Internet Explorer will see. Netscape on the other hand shows 5-6 different

screens detailing the issue as images 2-5 show. To prevent users from being discouraged by seeing these messages, during the work shops held showing them how to access the site, I told them the messages being displayed are normal and to just click past them.

User Identification and Tracking

With SSL configured the next issue was how to identify the user. The method that is currently being used asks the user to complete a web form (Image 7) once they have gotten to the SSL secured site. This form passes the data entered by the user to a script written in PERL, which refers to an ASCII file for user names and passwords. Once the user has been successfully identified, the site keeps track of the user by passing their first name, last name, and password from one page to the next. The information is encrypted so anyone viewing the page's source code would see a line of random letters, numbers, and symbols while the next PERL script decrypts and verifies the user information before proceeding with that step. By passing the persons information between web pages and scripts, a user is not limited to the capabilities of the browser they or features that maybe turned off.

Herding Cats

With security and identification issues taken care of, the next item was developing a way to get files from the user yet ensure the files are put in the correct place on the server with a valid name for web visitors to access. To handle faculty uploading files related to their course(s) I wrote several PERL scripts to handle this. The faculty member only has to indicate which file on their computer to upload, which course the file is for, and which of four files to save the file as; those being Syllabus, Outline, Homework and Messages. When a faculty member clicks on the link to upload files for their course(s), one script will scan a data file that contains a listing of courses and who teaches them. This script then creates a web page with the courses for the currently logged in user (Image 8) with the ability for the user to select one of four different files that could be uploaded for each course. The user clicks on the browse button to select what file on their computer they wish to upload and then finally clicks on the upload button to actually upload the file. A script will receive the file, course, and file type then based on the course information put the file in the proper location with the correct name. Each file was named based on the course and file type, an example would be CIS-149-01-syllabus.html for a file uploaded to be the syllabus.

Future Capabilities

At the time this document was written only faculty could upload files to the web server using this tool. Our Wellness Center and library have requested to use this tool to upload files for their respective areas. Also, I plan to give Human Resources, Public Relations, and Club Sponsors access so they can provide up to date information about their area. In addition to

Image 1

Image 2

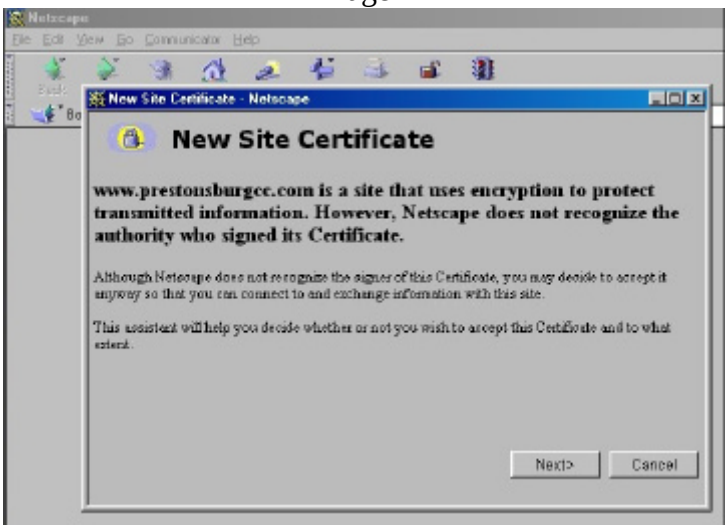

Image 3

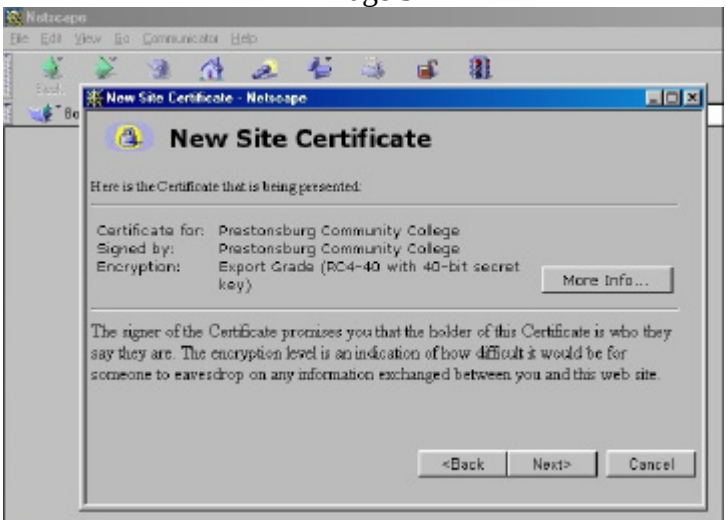

Image 4

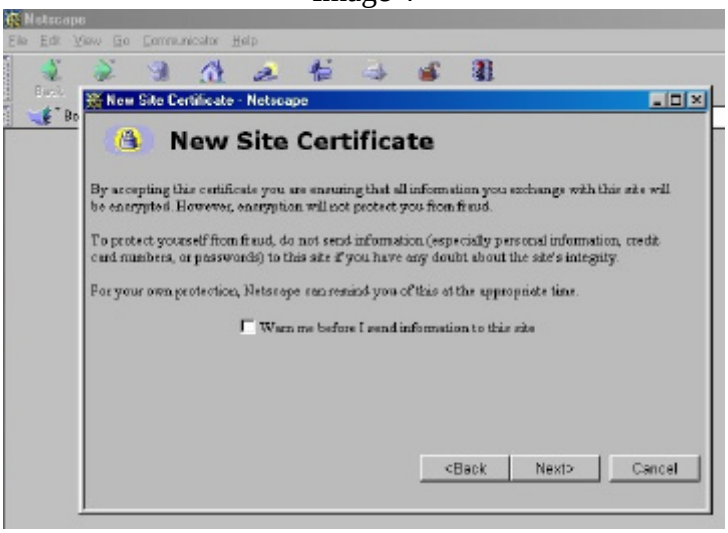

Image 5

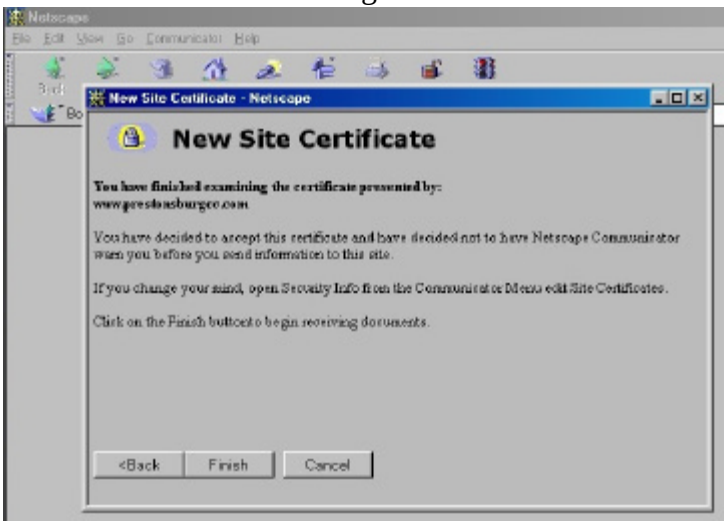

Image 6

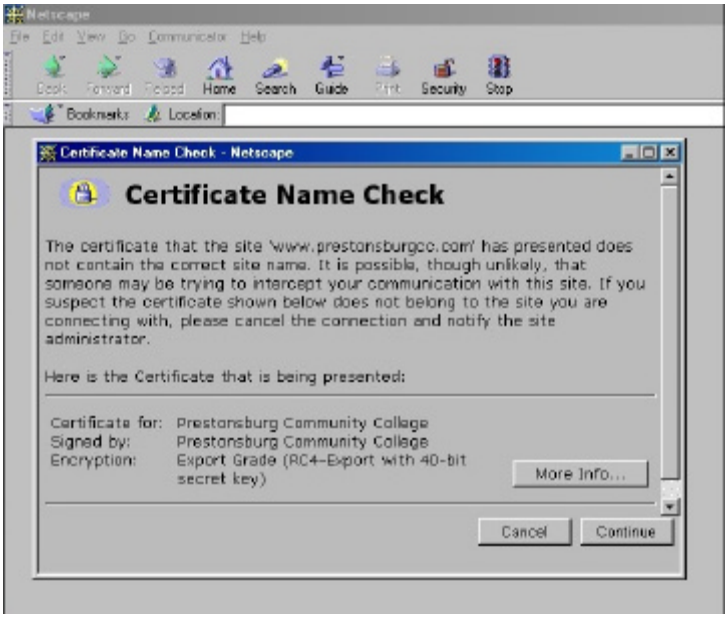

Image 7

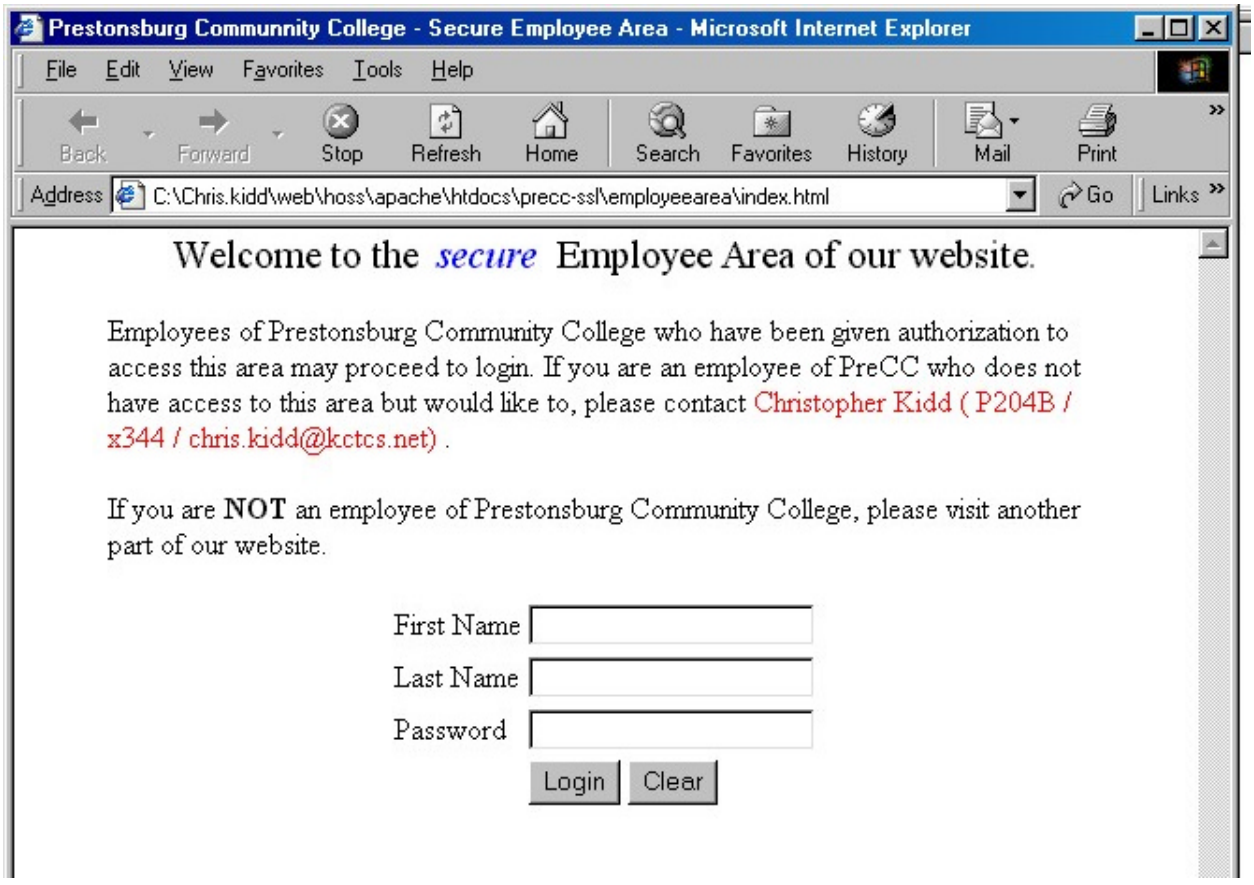

Image 8

Achieving Faculty Buy-in: A Grass Roots Approach

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Abstract

Presenters will discuss the integration of Blackboard's Course and Portal Solutions at a medium-sized, private institution. The presenters, acting as change agents, developed and implemented a plan including faculty training, promotion and tenure, support, and administrative buy-in to achieve wide-scale adoption on their campus.

Presenters will discuss the following topics in their university's implementation of Blackboard's Course and Portal Solutions:

Initial selection of Blackboard
Center for Instructional Technologies' support
Achieving faculty buy-in
Grass-roots faculty adoption
Faculty mentorship
Workshops and brown bag lunches
Incentives for the faculty risk-takers
Developing and hosting Instructional Technology Conferences relating to the integration of Blackboard on multiple, private college campuses
Enabling faculty to network with colleagues from other campuses
Purchase of a test & development license
Establishment and support of a Distance Learning Committee
Three levels of course integration: Web-enhanced, Web-based and Distance Learning
Promotion and Tenure issues related to technology integration

Note: This paper was not ready when the proceedings were compiled. The author will provide copies at the conference either directly or via the web or email

Faculty Confessions: Why Faculty Are Reluctant to Engage in Technology/A Process For Meaningful Discussions and Approaches About Pedagogy and Technology

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Ask any academic computing staff member involved in developing technology programs and training opportunities how they get faculty to come to these events, and I bet you will get the same answer: food. However, even food is not always an attraction, as the same staff will tell you that there are often more computing staff at such events than faculty. The faculty that do come are usually interested, but their ability to pull together a project after the event is over is another story. Look at what's published about faculty attitudes in using technology in teaching and you will repeatedly encounter faculty profiles: early adopters, late adopters and Luddites. However, the audience that should be of interest to all of us is the late adopters or the group I call the "In-betweeners;" they are faculty who express an interest in using technology, but never quite follow through.

Early adopters are a group we don't need to talk about. They are the folks who typically buy the first generation anything: DVD players, digital cameras, computers and all the peripherals that go with them. They either read the manuals or figure it out on the own. We see this group when they want us to buy them something, and they are also the faculty who, by nature of their discipline, need to be technology aware in order to teach and do research in their field. Computer science and math professors are the obvious examples.

Luddites, (those philosophically opposed to using technology) are at the other end of the spectrum; this group will rarely engage with academic computing staff in using technology. Curiously, they often come to technology presentations, but only with the intent to participate by giving long diatribes about the negative aspects of using technology in teaching.

The In-between Group represents the majority of faculty on most campuses. Typically they are faculty who are curious about using technology, as noted by their presence at technology workshops, email, or calls about an idea or project. However, it is only a small percentage of this group that will actually follow-through with learning and using technology in their classroom. The most common excuse for their lack of follow-through is lack of time. While time is an important factor, what I have learned is that there are other issues that prevent this in-between group from taking the time to learn technology skills, issues that are often spoken to me only behind closed doors and only after I have known these individuals for a period of time. So what do they confess? Here are some quotes from faculty:

"Don't tell anybody, but I don't know anything about technology."
"I feel really stupid" (about technology)
"I'm really bad at this stuff."
"I don't want my students to know that I don't know anything about technology, so I don't use it."
"I feel really dumb about computers."
"I'm still illiterate" (about technology)
"I'll never be able to do this."

These examples are not meant to be irreverent or to prove that faculty suffers from unrelenting feelings of inadequacy. Instead, faculty attitudes about feeling technologically inadequate points to problems in the culture of academia where structured and ongoing training (about anything) for faculty is usually nonexistent. It is an environment that expects excellence before, during and after the tenure process: excellence in teaching, excellence in scholarship and excellence in everything having to do with one's academic profession. To expect faculty to come forward and admit they know nothing (even if it is *just* technology), especially if they view their students and others as experts, is antithetical to faculty who are trained to survive in an environment where the expected and conditioned behavior to portray is that of an expert.

Faculty is also unique from other professionals when it comes to on-the-job training. For faculty, learning in the work environment in the form of "continuing education" or being mandated to learn to skills to increase job efficiency or to enhance production, is not the norm. Additionally, faculty is rarely in a position to be taught by non-academics such as technology staff. Research is typically done alone or perhaps with one other colleague. The rejection letter or comments for edits of a submitted article is done privately. To fumble in a computer lab among your peers or among staff who are experts, or worse yet, in front of your students, can't be anything but humiliating.

While academic computing staff is well intentioned in their attempt to train faculty how to use technology, the approach is often misguided. Discussions are not about delivering a good lesson or class, but about delivering or learning a technology product. Only recently have folks in academic computing discussed the need to have a dialogue with faculty about pedagogical objectives, thereby providing a context for faculty to think about how to use technology tools in teaching. Unfortunately, workshops and training are typically about manipulating computers and teaching involves using various bits of computer-based training lingo, often couched with the nudge that "this is easy to do."

While there are no hard and fast solutions to dealing with all the variables that impact the difficulty of capturing faculty's attention in the using technology in teaching, there are a number of elements that can help the process:

First, talk to faculty about what they teach. Listen and learn about the subject that they have a passion for and find out how they go about teaching this knowledge. Ask them what aspect of their teaching works and what frustrates them. Ask them what their goals and objectives are for the course. Only then can you guide faculty in matching technology tools with pedagogical ob-

jectives. Then, develop or use a pedagogy/technology assessment tool based on learning theory to make the connection between teaching and using technology. For example:

- If their objective is to teach knowledge that recalls information by accessing that information from memory suggest using an online quiz.
- If a problem is that too much time is wasted giving quizzes and tests in class, again, consider giving these quizzes or tests online.
- If conceptual knowledge is important and it is difficult to determine whether the group understands the concepts being taught from class discussions, suggest using an electronic bulletin board or a dialectical notebook to see students' responses and as a way to monitor the direction of the conceptual understanding.
- If too much time is taken up with oral presentations, suggest students put them online.

Second, educate faculty about the pedagogical benefits of using technology before discussing any software applications or hands-on training. This requires that someone in academic computing have knowledge and training about the pedagogical benefits of computer-mediated communication. For example:

- Discuss how multimedia tools benefit different learning styles, e.g. having a "buffet" of learning activities benefits all learners and maintains interest among students.
- Discuss how research has indicated that people are more comfortable communicating in an online environment, even in small seminars; for example, the shy, reflective learner who rarely contributes to class discussions has a voice online, and students who don't feel comfortable raising their hand and asking a question in class might be feel more comfortable posting online.
- Discuss how student online presentations can enhance collaborative learning and take the place of or compliment oral presentations.
- Discuss how lectures posted online allow students to review difficult concepts, or can improve their notes, which might be limiting or perhaps even inaccurate.

Third, at the beginning on any hands-on training, educate faculty about the limitations and difficulties of using computers. This requires that the trainer understands human-computer interaction issues:

- Impress upon faculty that the learning curve for individuals is different; that only when they are comfortable in manipulating the computer and the various buttons and pull-down menus will they be able to focus on how it will benefit their teaching.
- Give a simple example to let them know that even using an electronic bulletin board will initially be clumsy until they are familiar with the screens, icons, and navigation.
- Give them the facts! Humans can only remember 7(+/-2) chunks of information for 30 seconds without rehearsal, so learning to remember the information on the computer screen to make the application work will initially be very difficult particularly if you don't have a good working memory.
- Repetition and practice is how you get better at using computers; it's no different than learning how to ride a bike. Faculty shouldn't expect to take a one-hour workshop and remember everything without practice.
- Know that you read 1/3 slower on a computer screen than in hardcopy, so you might not work as fast as online until you are very familiar with the material;

- Suggest they print out the help, or better yet, re-write simple help and guides for faculty when there are gaps in the help instructions.
- Tell them that the meanings of icons are often obscure, and unless you use an application frequently, you will forget what some icons mean, which can paralyze you in moving on to a next step.
- Learning software applications fluently takes time, and asking help from someone who knows the program well is sometimes the only way to get unstuck. Like their students, faculty should ask for help.

The above strategies are key to developing the partnership between academic computing and faculty. The partnership by nature is a collaborative one where it is required that technology staff and faculty is on the same page in order to understand and educate each other.

This approach will help the process along; however, there are many issues beyond individual attitudes and/or lack of training that impact faculty's interest and ability to consider and use technology in teaching. Many direct and indirect issues related to institutional budgets, initiatives and policies impact faculty's ability or interest in using technology. While academic computing staff may control some of these issues, there are elements that academic computing staff cannot control yet they are critical in successfully engaging faculty in the technology gig:

Note the asterisks for more detailed explanations below.

- Have an up-to-date infrastructure in place.*
- Put a computer on every faculty member's desk.
- Get to know faculty beyond the computing center.
- Develop a partnership with the Deans' office to support your technology initiatives.*
- Get the administration to support a committee to promote teaching/technology initiatives with representatives campus-wide: students, faculty, technology staff, and administration.
- Create a faculty computer lab so faculty can have their own technology space.
- Adopt or develop a Pedagogy/Technology Assessment Tool to help faculty match pedagogical objectives with technology tools.
- Provide consultation on a one-to-one basis, which can be manageable and might be expected in the small college environment.
- Provide ultimate customer service.
- Use a course management system to get going.
- Use experienced faculty to teach others about using technology and teaching.
- Train work-study students to work with faculty on technology projects.
- Pick one or two programs in which to integrate technology; do it well and use it as a model.
- Use technology fellows to work in discipline specific areas with specific projects.*
- Get grant funding for special programs and projects.
- Develop a generic tool that is extremely user friendly that can be used across disciplines.
- Hire staff that can provide help, support, and training for faculty, from the entire spectrum of technological know-how to pedagogical know-how.
- Schedule workshops at the end of the semester when faculty have time to focus.

- Don't reinvent the wheel; research available tools at other colleges and institutions.
- Bring in outside experts (faculty) who are using technology to demo/discuss how they are using it in their class; their knowledge and expertise may be valued more than in-house faculty or staff.

*At the top of the list is the obvious: "have an up-to-date infrastructure in place." While the focus of this paper is not on infrastructure, it is imperative to have good IT leadership to advocate for getting and maintaining up-to-date campus computing. Faculty attitudes about using technology changed dramatically under new IT leadership when Bard's third world technology campus transformed to a 21st century campus with a 24/7 lab and state of the art facilities in less than three years under the leadership of a new IT Director.

Academic Computing at Bard in 1998
:
There were staff at Henderson Computer Resources Center: an IT Director, a tech support staff, a network administrator and an administrative assistant. The two computer labs on campus were always locked, except when they were being used for a class. Students did not have access to any public computing labs. Email was the extent of computing at Bard and many dorms were not wired. No classrooms were wired and faculty did not have computers on their desks.

Academic Computing at Bard in 2002:

There are 22 staff at Henderson Computer Resources Center that encompasses services that provide a range of services from help desk to training and curriculum support. The vision of a new IT Director has accomplished in three years:

- all wired dorms (with the exception of one dorm which needs to be re-habilitated)
- 4 public labs (one is 24/7)
- Computers on all faculty desks
- Computers are available in the campus center for email access
- Adoption of WebCT, Fall 1999, now with an average of 40+courses per semester
- Ongoing training and support is available for questions and support for numerous software applications.
- A database-driven interactive teaching tool for writing/responsive was developed in the Fall 2000 and will be launched through three programs: Faculty Technology Workshop, Institute for Writing and Thinking Workshop (with faculty from higher education and secondary education schools), and Freshman Orientation
- A three-day intensive technology workshop is offered annually at the end of the spring semester.

*Developing a partnership with the Dean's office is key to promoting and expanding technology initiatives. At Bard, the relationship and contacts developed by the IT Director with the Dean have resulted in a campus-wide committee where student, faculty, technology and administrative representatives are involved in campus wide technology decisions that impact everyone. CPAL, the Center for Pedagogy and Learning is a recent initiative whose mission is to facilitate teaching and learning on campus, including the appropriate use of technology. The strategies (previously described) will fit into this structure, and it is expected that CPAL will become a natural venue

for the types of dialogues to occur about teaching with technology. While technology is not the focus, it is naturally subsumed in this center because of its mission to promote best practices for teaching and learning, with technology being a part of that process.

*Technology fellows (funded by an Andrew W. Mellon Grant) have been used at Bard to help promote the use of technology and teaching with some success and with some obvious failings. Quite simply, such fellows can be used well when a specific program and specific faculty are identified where the Fellow will assist the process of supporting and helping faculty along with using technology (both pedagogically and in training). What hasn't worked is expecting Fellows to "infiltrate" the academic community and get faculty interested in using technology tools that same way that academic staff has tried to do. This open-ended approach has resulted in few changes and resulted in frustration on the part of Fellows who were on campus for a time-limited one-year tenure.

Two specific projects where success was evident occurred in Bard's Language and Thinking Program (L&T) and in the development of an interactive teaching tool: Cybergraphia: Teaching Poetics in Today's World:

A Technology Fellow in Writing worked with 30 faculty who taught in L&T, the freshman orientation held annually in August for three weeks. Her grass roots approach in meeting with faculty to suggest, educate and promote the use of technology in teaching (using the interactive tools in WebCT) resulted in participation and a favorable response of some 17 faculty. Her efforts resulted in continuation of this initiative for the following year. Also, it has been noted that those students who used technology in L&T were more comfortable in using technology tools in their classes in the regular semesters than students where technology was not used in L&T.

A Technology Fellow in Poetry provided the content for Cybergraphia: Teaching Poetics in Today's World, an interactive teaching/writing/response tool. The Fellow worked with the Coordinator of Curriculum Support & IT and a database programmer during the Fall 2001 semester, and developed a tool that will be used not only to facilitate the teaching of poetry, but also for any discipline where the teaching of close reading of text and students' responses to particular text are part of the teaching objective. The Fellow additionally has responsibility for beta testing the tool with a group of faculty and will be the initial trainer to general Bard faculty. The expectation is that the tool, and the web site with documentation on how to use the tool will be maintained with relative ease by other faculty who become familiar with the pedagogical and technical aspects of the tool's uses. The Fellow's role in supporting faculty in guiding them in understanding the pedagogical aspects of the tools should prove to be a wise investment that will benefit many faculty and students at Bard and elsewhere.

Summary:

The recipe is simple. Partnerships with faculty work better when academic computing staff learn about what faculty teach and take the time to ask how they teach. It is the most efficient way to get faculty's sustained attention and interest in learning how they can use technology in teaching. Partnerships also have to include involvement with the Dean's office or other appropriate admin-

istrators who are decision makers where allocations are made regarding infrastructure and faculty support for computing.

Using the industry model of providing good customer service will help the process of getting faculty beyond their fears and embarrassment of being in a position of knowing nothing and feeling inadequate about their lack of technology skills. If the "In-between" faculty sees that technology can make their teaching more interesting and are reminded that in this situation they are not expected to be the expert, but that they are instead the student, then perhaps a more relaxed commitment to learning new skills for new teaching opportunities for using technology in their class will follow.

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Using Group Polices and Logon Scripts to Control Laboratory Desktops

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Abstract:

This paper discusses some of the issues involved and solutions implemented for controlling student computer laboratory desktops in a Windows Server2000 Networking Domain.
The author will describe the basic philosophy underlying the security needs and the group policies and logon scripts that were developed to implement that philosophy within the Mathematics Department at Monmouth University. The environment consists of a student computer laboratory, a computer enhanced classroom with 15 student workstations, 2 classrooms with instructor stations and projection systems, a mathematics tutoring center with 8 student workstations, and individual faculty workstations. These resources are administered through a single domain structure within the University environment.
A demonstration will be provided to illustrate how some of the basic group policies are set and the effect of incorporating logon scripts.

Instructional Setting:

Monmouth University is a private, comprehensive, teaching university enrolling approximately 4500 students of which 3200 are full-time undergraduate students. The University is located in the central shore area of New Jersey – about 55 miles south of New York City.
The Mathematics Department has twelve full-time faculty members. The Mathematics Majors program at the University enrolls over 60 full-time equivalent students; a significant number of those students are dual-majors – mathematics and education. As with most institutions of today, a substantial part of the teaching responsibility of the Mathematics Department is directed toward instruction for non-majors with many in the non-science disciplines. The largest single group serviced by the Department consists of those students majoring in programs within the School of Business Administration.

Like most higher educations institutions of today, the University boasts of a wired campus. At Monmouth, this includes connections to all campus buildings and to each room in the residence halls. At the present time, the University is completing a plan to wire all classrooms with video and data and to install computer-supported video display units that are connected to the campus network. There are currently 27 computer laboratory/classrooms and 25 classrooms with permanently-installed video display units.

Mathematics Department Resources:

The Mathematics Department has a computer laboratory with 30 computers; a laboratory classroom with 15 computers and a video projection system; a mathematics skills center with 8 workstations; twelve full-time faculty offices with workstations; a part-time faculty office with 3 workstations; and two general purpose classrooms with instructor workstations and video projection systems. Most computers in the Mathematics Department are Pentium 400 class or higher units running either Windows2000 or Windows XP operating systems. These resources total approximately 70 workstations and 6 network printers.

The Department is supported by two servers: a general purpose file and print server and an applications server running under the Microsoft Terminal Server suite of tools. The general purpose server also functions as the Domain Controller for the Mathematics Domain. Both of the servers are Dell-Power Edge midrange server computers.
The servers are physically located in the University Computer Center. The University Network Group has the responsibility for maintaining the operating systems by keeping them up to date with patches and fixes and by backing up the data files on a daily basis. Administering the user accounts, user policies, application software installations, and disk space allocation remains the responsibility of the Mathematics Department. These resources are organized under the Active Directory Structure using a single domain model.

The main software products used by the department are: *MS Office Productivity Suite, Maple 7, MiniTab, MatLab, Geometer's SketchPad, InteractiveDE, Advanced Grapher, and Euphoria*.

Goals - Laboratory Environment:

As noted in [1], the goals for the Mathematics Laboratory environment are simple and in some respects, obvious. They are:

1. Provide an environment with the capability of controlling user access to resources -- program execution, data files, directories, and disk read/write operations.
2. Provide an environment that facilitates individual faculty control over their files, directories, and read/write permissions.
3. Provide an environment that is robust to the extent of dramatically reducing (if not totally eliminating) the wasteful scenario -- system hang-up, reboot, wait, start-over.
4. Provide an environment that is consistent -- always the same when the student sits down at the workstation -- appropriate icons are on the desktop, network drives are available, and executables are available and functional.
5. Provide an environment that will minimize the amount of administrative support in terms of time and dollars.

One of the first issues that must be decided when establishing a student laboratory environment is to what extent the laboratory must support student access to desktop and environment settings, program installations, disk storage, and general program feature availability. Obviously, different answers to those questions will require different environment settings.

In the case of the Mathematics Computer Laboratory, the over arching goal is to have a consistent and robust environment -- one that must support a wide range of student expertise. Consequently the Department has adopted a conservative approach -- one the permits very little student control over the environment settings.

Server and Network Configuration:

The Mathematics Department server is running the Win2K operating system in a single domain environment with Active Directory installed. At this point, very little of the Active Directory functionality is implemented. In fact, the only significant pieces are group polices and controlling shared network printer resources. In addition to the OS, the other "system type" software products installed on the server are *Print Manager* and *PCAnywhere*. Print Manager is being used to control the size of print jobs in the Laboratory. It is currently set to a maximum of ten pages per print job. Side comment -- prior to the installation of Print Manager, the Laboratory was viewed as a general purpose University print station. This product has substantially reduced that useage.

PCAnywhere is one of the tools used to remotely manage the server. More details on this tool are found in the the section on Tools.

Domain Configuration:

In a basic Win2K domain structure, there are two distinctive categories that need to to administered -- the *security groups* and the *organizational units.* The fundamental differences between these two concepts are that security groups are used to control user access to shared domain resources and organization units are used to assign policies and profiles to users.

One of the acknowledged shortcomings of the initial implementation of the Active Directory is the need to have both Organization Units and Security Groups. As a general rule, Organization Units are containers that can contain Security Groups and other Organization Units. Security Groups can contain other security groups. The Mathematics domain structure is relatively straightforward and has been organized around five organization units and five security groups. For the most part, these objects contain the same user accounts.
The *Organizational Units* units are:

1. MathAdministrators (administrator organizational unit)
2. Faculty (full, part-time faculty, and other nonstudent users)
3. Students (laboratory logon accounts)
4. MathStudents (mathematics majors)
5. TSUser (logon name for Terminal Server Applications)

User accounts for each of these organizational units are placed within the organizational unit container. For example, the MathStudents OU contains the logon names for all the mathematics majors.

The *Security Groups* are:

1. Administrators (the built-in administrator group)
2. FacultyGroup
3. MathLab (security group for mathematics lab user logons -- should have been called StudentsGroup)
4. MathStudentGroup (security group for math majors)
5. TSUserGroup

In order to maintain the semblance of an organized structure, each of these security groups has been placed within the corresponding organization unit, and all the user logons for the organizational unit have be placed as members of the security group.

Administering a domain structure requires setting policies and permissions. The arrangement described above facilitates setting policies and permissions that impact the same set of users.

Naming Scheme and Login Accounts:

In a Win2K Domain structure, both users and computers are members of the domain and have security identifiers. In order to minimize the amount of user account maintenance, we have adopted the policy of creating user accounts for faculty, staff and student mathematics majors. Users of the public access computers (mathematics laboratory, computer classroom, and math skills center) do not log in. Those computers are set to auto-login for specific userID for a given computer. Mathematics majors are able to execute a drive map to their own private directory from any of the computers in the mathematics domain. These computers are named ma##cmpt with ## ranging from 01 to 60 and physically identified by their computer name. There are user login accounts with the names ma## that have the password set identical to the name. These computers, mathematics laboratory, computer classroom, and skills center, are set to automatically log to the corresponding user login name. Consequently, it is a simple task to identify which student working at which computer is doing what.

It should be noted that the feature of being able to map a drive letter to a subdirectory of a share has made the student private directory feature relatively easy to manage. This ability is not possible in a Win4.0 Domain structure. The drive mapping script, found in the Appendix A, creates the map to their private directory which is a subdirectory of the server share "students."

Group Policies:

Figure 3 in Appendix B is an example of a Group Policy editing screen. For the purposes of the discussions on Group Policies, the basic container headings in Groups Policy Editor will be abbreviated as follows: UC = User Configuration, WS = Windows Settings, AT = Administrative Templets. In addition to the general lockdown policies, some of which are described below, the laboratory environment is protected by *common desktop folder*, a *background screen*, and *screen saver*. These basis settings prevent students from adding and deleting individual shortcuts and items to the workstation desktop.

The common desktop folder is set in UC\WS\FolderRedirection\Desktop. The setting points to a folder in the NetLogon share.That folder contains three subfolders containing the shortcuts to the

applications that are used on the computers. Those subfolders become a part of every desktop. The background screen is set in UC\AT\DeskTop\ActiveDirectory\Desktop. This setting points to a bitmap file in a subfolder of the NetLogon share.

Since the computers in the Mathematics computer laboratories are set to autologon to a specific account, it is unnecessary and disruptive to have students logout when they leave the workstation. The LogOff option can be invoked through two different procedures. One is through the Start Menu and the other is through the security screen that is invoked by the Ctrl-Alt-Del sequence. For WinXP workstations, it takes two settings to remove the LogOff ability. The Start Menu Option is disabled through a setting in UC\AT\Start Menu & TaskBar. The settings for the Security Screen and set in UC\AT\Systems\Logon/Logoff. In addition to setting the Logoff feature in that location, it is appropriate to also enable: TaskManager, LockComputer, and Change Password.

Another important setting that is set disables the context menu on Internet Explorer. Even though the background screen (wall paper) has been set and cannot be modified, the context menu option within Internet Explorer permits saving any graphic as background. Because of the controlled background screen, the graphic doesn't appear on the user desktop. However, it does pop up during logout/shutdown and during startup. It doesn't take too much imagination to think of the kind of graphics students attempted to place on the desktop. It took a little while to figure out where those graphics were located and how they were placed there.

The policies have disabled a lot of features within UC\AT\WindowsComponent and Internet Explorer containers. The Mathematics laboratory computers do not have Netscape installed.
A complete list of the policies that have been enabled is too long to present here. However, Appendix B contains several screen shots that are involved in the setting the policies.

Scripts:

Three general logon scripts have been developed to control and facilitate the use of resources within the mathematics domain. Appendix A contains a listing of each of the logon scripts. All logon scripts are physically located in the *NetLogon* share. The physical location for that share is not easy to find. If the defaults haven't been changed, the location is:

c:\winnt\sysvol\sysvol(share name: sysvol)\yourdomainname\scripts(sharename: netlogon).

Since the general domain resources are contained within a domain share called *users*, a drive mapping script has been developed to that share. The mapping script ensures that all domain users have access to the share and that the resource is referenced by a consistent name. For obvious reasons, the mapped drive letter is "M." Since this mapping is intended for all domain users, it is implemented through a policy that is applied to all domain users. Since it is to be applied to all domain users, the policy is set in the top-level container for the domain. In our case, the container is called *mathematics.* A policy for that container has been created under the name "DefaultDomain." The specific location within the policy setting is: UC\WS\Scripts\Logon.

Faculty have been given two separate directories on the server. One directory is located in the *users* share where they can maintain public and private access subdirectories and files. This is the share that is mapped to the "M:" drive for all domain logons. The other directory that is provided is within the "web structure" under the "wwwroot" share. The difference between these two faculty directories is that their user share directory can be accessed only through the local intranet (specifically for computers connected to the mathematics domain). Sample worksheets and laboratory exercises are placed in that directory. The web directory is where faculty place the materials that are intended to be distributed through the web. Course syllabi, course notes, sample tests, and general course information is placed in that directory using basic html technologies. A logon script for faculty maps a drive to those resources. The share name is "webnotes" and the mapped drive letter is "W:" This logon script is placed in a policy under the Faculty Organizational Unit. The general policy name is *DefaultFaculty*. The location of the script is: US\WS\Scripts\Logon.
The third logon script is a general "cleanup script" for the computers used by students. It cleans up the directories where temporary files are created during a user session. Generally the computers in the mathematics laboratory are rebooted Monday morning. During that process, the cleanup script is executed.

Two scripts have been developed to permit mathematics majors to execute a drive map to their private directory. One is a drive map and the other is a drive disconnect. Both of these scripts are a single form written in VB 6. The code behind the form is shown in Appendix A. This feature has was implemented at the beginning of the Spring term. The interesting feature here is that the scripts were placed in the Scripts folder described above, a new folder called *Drive Mapping* was created with shortcuts to the two scripts. The *Drive Mapping* folder was placed in the *Common Desktop* folder described above. At the next login, the *Drive Mapping* folder appeared on the desktop with the appropriate functionality. Once the scripts were developed and debugged, making them available on the desktop took less than 1 minute.

Tools:

As mentioned above, both of the servers are located in the University Computer Center. The Center is located in the same building as the Mathematics Department offices, computer laboratories and instructional classrooms. However, they are not on the same floor and are located in a secure facility. Consequently, it is unrealistic to have direct console access to the servers for administrative tasks.

There are four administrative tools that are being used to administer the domain resources on the domain servers. These tools run on computers in the Mathematics Department administrator's office (the author's office). The author has found that no one tool solves all problems efficiently; consequently a combination of four different tools are used to administer the mathematics domain.

The basic tool is *PCAnywhere*. This product permits connection to the servers in a fashion that emulates console logon. Fundamentally, all functions that can be performed at the computer console can be performed from a *PCAnywhere* session. This tool requires that the remote host version must be running on the server. The product requires a complete login to the server. Generally, all functions that can be performed at the console can be performed through a PCAnywhere

connection. The downside is the network login process when only a small single task is to be performed. The connection is sometimes flaky. That is, there have been times when PCAnywhere service on the server hangs up and must be restarted as a service on the server. This cannot be done remotely and requires direct console intervention. Twice this process required the complete reboot of the server with the associated disruption. The plus side of this tool is that a variety of tasks can all be performed within the same *PCAnywhere* session.

Basic user account and password maintenance is done through a product called *Hyena*. *Hyena* functions in the security context of the workstation logon user. It doesn't require and additional login operations. The attraction is that it is quick and easy to remotely create a user account and change user passwords. A second feature that the authors likes is that it can quickly list all the shares on a server. Sometimes when a share is located down the directory structure and the location and name are forgotten, it is a difficult tasks to search through the entire directory tree looking for the shares. *Hyena* provides information on system shares. The product purports to be a full-bodied active directory administration tool. The author has found that working directly within the Active Directory MMC snap-in is much more convenient; especially within the context of the active directory structure described above.

The third tool is Microsoft Administration Tools Pack, called adminpak.exe. The tool comes in two flavors -- one for installation on Win2K workstations and one for installation on WinXP workstations. When the tools are installed on a remote computer they provide a user interface that mirrors the MMC snap-ins that are run directly on the server from either the console or from PCAnywhere. Basically, the pack contains the functions that are contained in the "control panel -- administrative tools folder and are installed on the workstation in the corresponding folder. This tool also operates in the security context of the workstation user account and doesn't require any additional logon procedures.

The fourth tool is a simple drive mapping to the administrative hidden share c$; which is the complete c: drive directory structure. The administrative drive mapping permits easy and quick control of security settings on any directory or file and can perform fundamental file and directory operations such as move, copy, and delete.

In summary, the author has found the following scheme most effective:

1. Use a PCAnywhere session when a variety of tasks are to be performed.
2. Use the Administrative Tools pack snap-in to administer Active Directory tasks (policies and security groups).
3. Use Hyena to maintain individual logon account parameters.
4. Use the Administrative drive mapping to administer directory security issues and maintenance.

Lessons Learned:

The fifty student-access computers in the computer laboratory, computer classroom, and skills center were initially set up at the beginning of the Fall 2001 term. As of the writing of this paper, mid April, not one of those fifty computers had to be reimaged. That is, they are all operational and are functioning with the September setup. There have been a couple of policy additions since

September. Most notably the context menu for Internet Explorer and the implementation of the Logon Clean Up Script. Very little effort has been required for ongoing upkeep and enhancements to the settings. The obvious conclusion is that with appropriate Group Policies and Logon Scripts, a robust student laboratory environment can be implemented.

Reference:

1. Richard Kuntz, *Setting Up and Administering Mathematics Department, Windows NT Network and Laboratory*, 32nd Annual Conference Association of Small Computer Users in Education (ASCUE), 1999.

2. _____,*Using Microsoft Terminal Server to Support Mathematics Courses*, 34nd Annual Conference Association of Small Computer Users in Education (ASCUE), 2001.

3. _____,*Using NetSupport School in a Mathematics Computer Classroom*, 14th International Conference on Technology in Collegiate Mathematics (ICTCM), 2001.

Appendix A.

MSetupDriveMap.vbs

This is a Visual Basic Script that runs in the context of Windows Script Host environment. All users in the domain execute this script at logon. It provides the consistent reference to the basic server public file resources.

```
rem Sets a drive mapping to the user directory where general lab materials are found
On Error Resume Next
dim Net
Set Net=CreateObject("Wscript.Network")
Net.MapNetworkDrive "m:", "\\mathserv2000.mathematics\users", False
```

WSetupDriveMap.vbs

This is also a Visual Basic Script that runs in the context of Windows Script Host environment. User members of the *faculty OU* execute this script at logon. It provides the consistent reference to their personal web-based directory. Each individual faculty member has full control over the directory within the share.

```
rem Sets a drive mapping to the faculty webnotes directory
On Error Resume Next
dim Net
Set Net=CreateObject("Wscript.Network")
Net.MapNetworkDrive "s:", "\\mathserv2000.mathematics\webnotes", False
```

MathLabLogonScript.vbs

A Visual Basic Script that runs in the context of Windows Script Host environment. Users in the *students OU* script at logon. These are the generic logons that correspond to the workstations in the laboratories. The purpose is to clean up the temporary directories and files that are created during a session. The script is only executed at reboot time, since system policies for these stations do not permit logon-logoff. These are the autologon stations.

```
rem Cleans temporary directorys on laboratory computers
On Error Resume Next
Dim oNet, oFSO, t
set oNet=createobject("WScript.Network")
set oFSO=CreateObject("Scripting.FileSystemObject")
t=oNet.UserName
oFSO.DeleteFile "c:\Documents and settings\" & t & "\Favorites\*.*"
oFSO.DeleteFile "c:\Documents and settings\" & t & "\Favorites\Links\*.*"
oFSO.DeleteFile "c:\Documents and settings\" & t & "\Favorites\Media\*.*"
oFSO.DeleteFile "c:\Documents and settings\" & t & "\Local Settings\Temporary Internet Files\*.*"
oFSO.DeleteFile "c:\Documents and settings\" & t & "\Local Settings\Temp\*.*"
oFSO.DeleteFile "c:\Documents and settings\" & t & "\My Documents\*.*"
oFSO.DeleteFile "c:\Documents and settings\" & t & "\My Documents\My Pictures\*.*"
oFSO.DeleteFile "c:\Documents and settings\" & t & "\Desktop\*.*"
oFSO.DeleteFile "c:\Documents and settings\" & t & "\Start Menu\*.*"
oFSO.DeleteFolder "c:\Documents and settings\" & t & "\My Documents\*.*", True
oFSO.DeleteFile "c:\Documents and settings\" & t & "\Cookies\*.*", True
oFSO.DeleteFile "c:\Temp\*.*"
oFSO.DeleteForler "c:\Temp\*.*, True
rem WScript.echo err.Description
```

Math Majors Drive Mapping

This is a VB6.0 script. It is the code that corresponds to the code corresponding to an input form containing three fields: LoginID (student user name), PasswdID (student password), and DirectoryID (name of the student's personal directory). The script contains a certain amount of field checking and error messages. To date, it has been sufficiently robust as not to require any additional error traps.

```
Private Sub LoginBtn_Click()
Dim Net, Drive, DomainID, ServerID
Set Net = CreateObject("Wscript.Network")
On Error Resume Next
'Setup the variable constants for domain and server names
Drive = "s:"
DomainID = "mathematics\"
ServerID = "\\rak1cmpt.mathematics\students\"
```

```
'First try to establish the drive mapping -- process any error
'    codes that occur
Net.MapNetworkDrive Drive, ServerID & DirectoryID, False, DomainID & LoginID, PasswdID
Select Case Err.Number
  Case 0 ' Success in mapping drive
  Case -2147024811  ' Drive letter already mapped
    MsgBox "Drive mapping already exists -- will reset."
    Net.RemoveNetworkDrive Drive, True
    Err.Clear
    Net.MapNetworkDrive Drive, ServerID & DirectoryID, False, DomainID & LoginID,
PasswdID
    Select Case Err.Number
      Case 0
      Case -2147024843   ' Directory not found
        MsgBox "Directory not found", , "Directory Message"
      Case -2147023570  ' User logon failure
       MsgBox "User Logon Failure -- Incorrect User ID and/or Password", , "User Login Mes-
sage"
      Case Else ' Trap other errors in mapping
      MsgBox Err.Number & "   " & Err.Description
     End Select
  Case -2147024843   ' Directory not found
    MsgBox "Directory not found", , "Directory Message"
  Case -2147023570  ' User logon failure
      MsgBox "User Logon Failure -- Incorrect User ID and/or Password", , "User Login Mes-
sage"
  Case Else ' Trap other errors in mapping
     MsgBox Err.Number & "   " & Err.Description
  End Select
Set Net = Nothing
End
End Sub
Private Sub Reset_Click()
LoginID = ""
PasswdID = ""
DirectoryID = ""
End Sub
```

Math Student S Drive Disconnect

This to is a VB6.0 script that relies on a VB form and is the companion script to the drive map script given above. Students are required to execute this script at the conclusion of their session; otherwise the "s:" drive remains mapped to their directory. Plans are to develop a timeout script to the drive map script so the directory map will be disconnected after a certain time period of inactivity.

```
Private Sub disconnect_Click()
Dim Net, Drive
Set Net = CreateObject("Wscript.Network")
Drive = "s:"
On Error Resume Next
' Now disconnect the drive mapping
Net.RemoveNetworkDrive Drive, True
  If Err.Number = -2147022646 Then
    MsgBox "A mapping to the s: drive doesn't exist.", , "Disconnect"
    Err.Clear
    End If
  If Err.Number <> 0 Then
    MsgBox Err.Number & "   " & Err.Description
    End If
 Err.Clear
Set Net = Nothing
End
End Sub
```

Appendix B.

Figure 1. -- MMC Active Directory Users and Computers

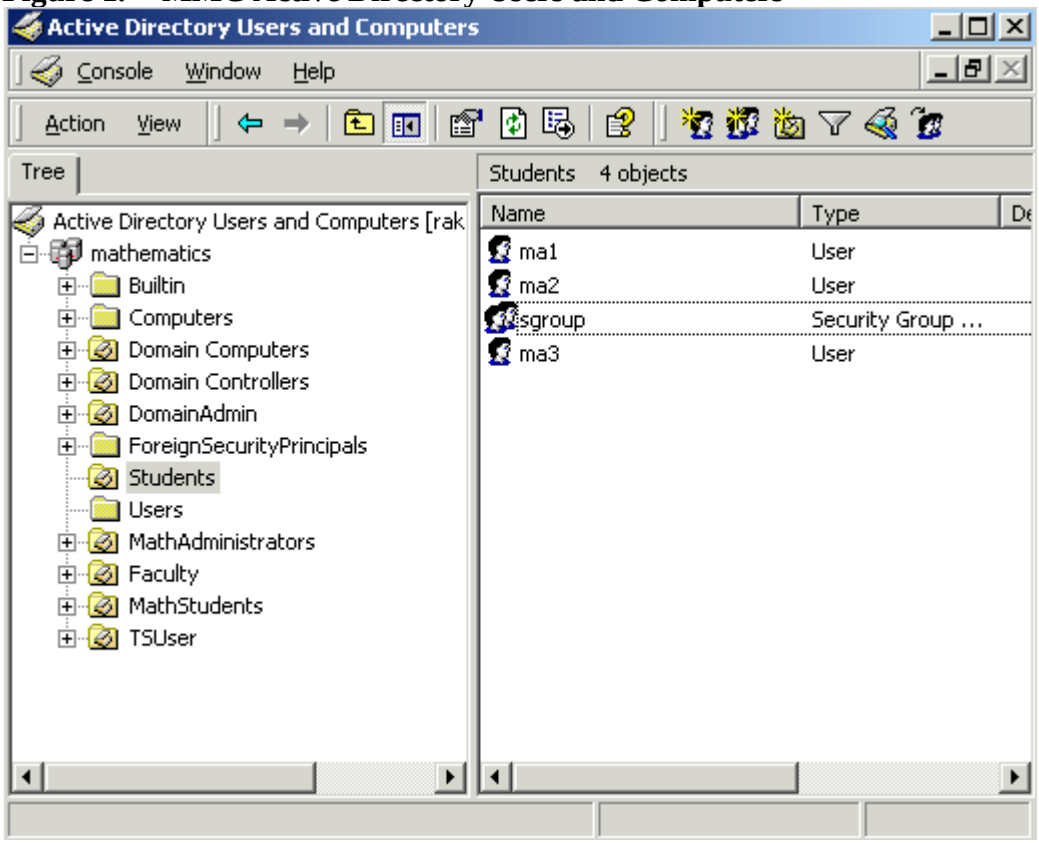


Figure 2. -- Group Policies Organization Unit Selection Screen

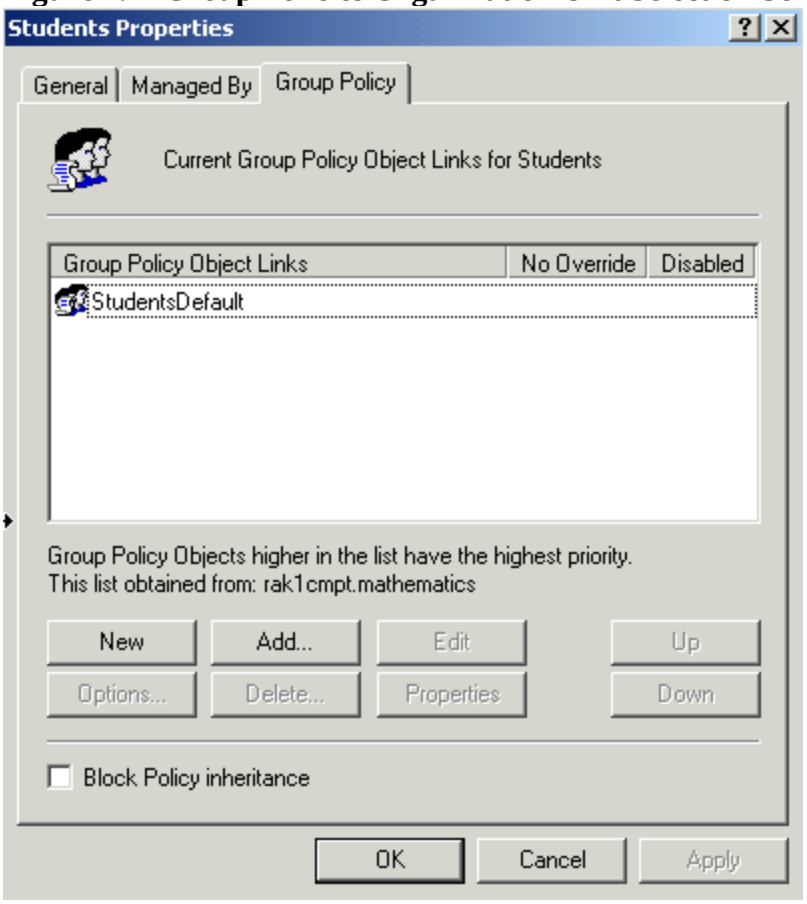
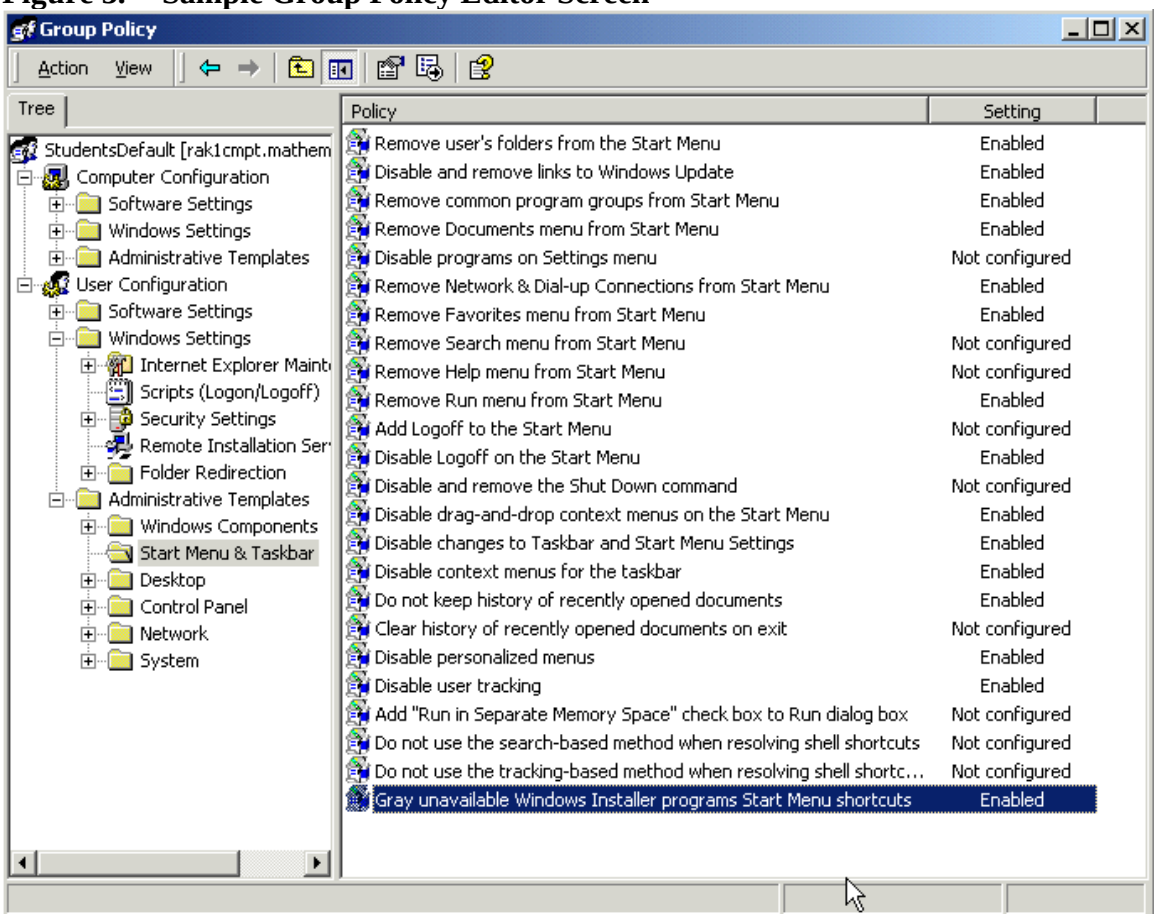


Figure 3. -- Sample Group Policy Editor Screen



Planning and Implementing a Web-based Campus Administration System

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Introduction

Grove City College had undergone a major change in their computer administration system beginning the summer of 1999. The college purchased TEAMS Elite, now called JenzabarEX, from the company formerly known as CMDS. (CMDS and other campus software companies merged with Jenzabar in fall, 2000) This software replaced an early version of the POISE system that GCC's computer center staff had rewritten and maintained.

Following an aggressive implementation plan by our in-house project manager, John Inman, (now Registrar of the college) Jenzabar EX became fully operational by summer, 2000. Modules currently in use are: Student Life, Registration, Financial Aid, Admissions, Alumni/Development/Giving, and the following business office/accounting modules: Human Resources, Accounts Receivable, General Ledger, and Accounts Payable. Included in the initial purchase of the software was a web-based module, "Campus Web." Decision makers recommended that Campus Web not be implemented during the first year and that staff time and resources be devoted to the start-up modules.

During spring 2001, I accepted the position of Assistant Registrar for Academic Technology. This position reports directly to the Registrar. One of the primary responsibilities of this position is implementing and managing Campus Web. Additional technology duties carried over from my previous position as Software Services Manager included administering the "Blackboard" system, coordinating training programs, plus continuing to serve as a liaison for academic software support.

Campus Web

Installation of the server and software by the computer center took place during late summer, 2001. The current version of Campus Web is primarily an interface into the Registrar's database.

Here are the highlights of Campus Web:
Faculty

- On-line grade entry
- Course rosters (previous, current, future terms)
- Course search capabilities

- Advising Features
    - View advisees
    - Grad Audit Report
    - Grade History
    - Advisee schedules
    - Meeting Notes

Students

- Financial accounts
- Unofficial transcript
- On-line registration
- Schedules
- Course search capabilities
- Advisee features
    - Grad Audit Report
    - Grade History

Fall 2001 Implementation Plan Phase I

Campus Web's ability to retrieve academic records, enable faculty to enter grades, and permit students to schedule on-line is both exciting and a challenge to implement.

Key questions that needed addressed:

- Make sure that Campus Web operates according to specifications and guidelines.
- Who should gain access and when. How to administer and maintain security.
- What functions are going to be immediately available. How effective are these functions.
- Evaluate the impact on the traditional registration and advising system.
- Reduce and/or eliminate the current paper-based reporting system.

Primary decision makers included John Inman, myself, the VP/Provost and the two Deans of the college. (Dean of Arts and Letters and Dean of Science and Engineering.)

The basis of a plan approved by the Deans and VP/Provost in early September 2001, recommended that Campus Web be "faculty first" in that all faculty would be given access to a base set of functions with pilot groups setup to test other functions. The base set of functions included course rosters, course schedules, faculty schedules, advisee lists, grad audit reports, and other advising functions. Pilot groups would further study online grade entry and advising. Once faculty began using the system, then student access would shortly follow. One of the goals of Campus Web is to create a "common and pervasive use of technology" among students and faculty.

Faculty Implementation

After receiving the approval from the Deans and VP/Provost, the plan was then presented to the Curriculum and Instruction committee. (C&I committee) This committee is comprised of all faculty department chairmen, The Deans, and presided by the VP/Provost. Following tacit approval

from the C&I committee, John Inman and myself presented at a monthly faculty meeting on September 25th.

The very next day, all faculty received instructions and a business card containing their user id number and PIN number. I coordinated all support issues.

Most faculty immediately embraced Campus Web. One function that they particularly liked was viewing course rosters on-line. Prior to Campus Web, faculty received roster printouts, causing lots of work for the registrar's office to update and maintain. Now professors had a live snapshot of drop/adds into their classes.

In general, the registrar's office is striving to increase technology usage. We adopted a "Campus Web first" platform, decreased paper reporting, increased electronic reporting, and developed our first website. Reluctant technology users are politely asked to use Campus Web, go to the registrar's website, and/or accept electronic reporting methods when possible. (Electronic reporting includes Excel worksheets and Adobe Acrobat reports sent directly through e-mail.)

Faculty Pilot Groups

Shortly after faculty received access to a base set of functions, the two pilot groups, On-line Grade Entry and Advising, got underway. The Deans in cooperation with Department Chairs asked for volunteers from all the academic departments.

On-line Grade Entry Pilot Group

For On-line Grade Entry, 45 faculty volunteered to enter midterm grades, due on October 15, 2001. (GCC has 132 full-time and 48 part-time faculty.) Again, I coordinated all training and support. Success as well as problems occurred with entering midterm grades.

The problem areas were twofold:

1. Grade selection: We setup a table of grades that include, for example, *B, *B- as well as B and B-. The "*" grades indicate a repeat grade for a course. Since "*" grades in sorting order come before regular grades, we had about 25% of the professors choosing a repeat grade rather than the regular grade.
2. The Grade Entry acceptance screens are confusing: Once grades are entered there is an "Update Grades" button to select. Clicking on "Update Grades" presents you with a validation screen of the student grades. The strategy is to review, then either click on the "Back" button if there is a mistake or click on "Submit" to accept. About 10% of the test group faculty thought that "Update Grades" was sufficient, and lost all their grade entries.

These particular problems were resolvable by continued training and familiarity. We have also re-defined our repeat grade values so that they do not first show on the grade selection list.

Overall, on-line grade entry proved very successful. A Blackboard survey administered to the pilot group indicated a positive response to entering grades on-line. Previously, faculty entered grades on paper and then submitted them to the registrar's office. Direct entry on-line seemed

quicker and easier according to the survey. The pilot group forgave the problem areas, and recommended that all professors enter grades on-line. Based on the survey results and the pilot group's recommendations, academic administration granted permission to have all full-time professors begin entering grades on-line. (Part-time professors have the option of using Campus Web or submitting their grades on paper.)

Final grade entry for fall 2001 experienced success, even though several professors continued to enter repeat grades and several professors lost grade entries due to confusion on "Update Grades."

One footnote to on-line grade entry: Even though professors have the ability to enter and access midterm grades, students and advisors cannot view midterm grades. Subsequently, the registrar and student life offices need to maintain the current paper-based reporting system. We have asked Jenzabar to consider rendering access to midterm grades for both students and advisors.

For final grades, the registrar's office decided to temporarily block student access prior to post office mailing. Reasons being: to protect professors who had inadvertently entered the wrong grade on-line, and also to prevent questions from students about their grade award during finals week. In addition, a rough polling of students indicated that they preferred to have grades mailed home rather than view solely on-line (The mailing preference surprised us in the registrar's office. Our thinking is the newness of Campus Web had not led to complete acceptance at that time.)

Plans are to block student view for spring 2002 final grades. Beginning fall 2002, final grades will only be administered on-line.

Advising Pilot Group

Advising functions with Campus Web include an advisee roster, graduation audit report, meeting notes, student schedule, course needs based on major, and other related functions. All faculty have access to Advising functions with the qualifier that they are "understudy."

The effectiveness and usage of these functions needed to be determined by faculty users, and not dictated by the registrar's office. We formed committees near the end of November, 2001 and did not convene until after January 2002. Please see Spring 2002 Implementation Plan Phase II for more information.

Student Implementation

During fall 2001, all students gained access to Campus Web in stages based on their class status. (Seniors first, then juniors, sophomores, and freshman) Since Campus Web has the ability to register on-line, we decided to pilot on-line registration and couple the pilot test with Campus Web access. The registrar's office planned this approach for several reasons: First, we wanted to test on-line registration in a controlled fashion. Second, once schedule entry occurred, either on-line or traditionally through the registrar's office, we wanted to give students access to view-

ing their current course status instead of sending them a printed schedule. (Previously the registrar's office would send any new or updated schedules to students through campus mail.)

We have an undergraduate population of about 2230. 80 students from each class, excluding seniors, received an invitation to register on-line. (Seniors had already registered the previous spring for the entire year.) The first registration pilot test began on October 25th. Invitations were extended based on a randomization of their 8 digit PIN #, excluding any student that had classes from 8:00 am-10:00 am. (We didn't want them cutting class!)

Two weeks prior to the actual pilot test, a "pre-pilot" test of 25 students from our computer center help desk previewed the on-line registration function. The student help desk provided valuable input and suggestions. In addition, the Student Government Association (SGA) reviewed the specifics of the on-line pilot study and student implementation plan.

We conducted the pilot test by using 35 computers at our Technology Learning Center from 8:00 am until 11:00 am for one day. (The first day of registration eligibility for that particular class.) After 11:00 am, on-line permissions became disabled. Students needed to bring a signed registration form from their advisor before they could register. (Our current paper system requires a form and a signature. We wanted to maintain consistency and conformity.) Approval of the form then led to students receiving access codes and registration documentation. Login to Campus Web and schedule entry followed. After the on-line pilot session ended for that class, we then sent similar documentation and access codes through campus mail to the remainder of the students from that particular class. (Seniors received their access codes first even though they did not participate in the pilot study.)

Outcomes were generally positive according to a Blackboard survey, with a few quirks that seeped to the surface. Students liked knowing the status of open and closed classes, thought that the add/drop process worked well enough, and enjoyed several of the other functions of Campus Web. The negatives or quirks of the pilot study included not able to register for an audited course, and the "red ball" which indicated that a course was closed which may or may not have been true. (If the registrar's office deliberately waitlisted a student, then Campus Web assumed a closed course even though seats remained available.)

We also encountered a performance problem with the next two groups. It seemed that when we had over 30 login connections, the system ground to a halt. Users timed-out or could not gain access. Testing and troubleshooting is continuing. (See Spring 2002 Implementation Plan Phase II for more information.)

On the whole, students are very appreciative of Campus Web, with some growing pains and transitioning occurring. For example, a common student complaint was not receiving course schedule printouts even though course searches can be conducted through Campus Web. (Campus Web course search does have an annoying security feature, which prevents you from going back to the previous screen.) More training on Campus Web and "weaning" of the traditional paper reporting is needed.

In addition, we have not granted students access to an Advisee tab, which has similar features as Advisors. Determination of Advisee functions is linked with the on-going Advising study.

Summary of Fall 2001 Phase I

At the conclusion of fall 2001, all faculty and students obtained access to Campus Web. Our strategy was to either introduce Campus Web as a front-end interface to our registrar data, (course schedules, grades) or to parallel the implementation with on-going traditional systems. (Advising, on-line registration.)

To move forward, particularly in the area of on-line registration, a plan needed to be developed that would maintain the integrity of our advising system; yet give students the opportunity to schedule classes on-line. In this context, Spring 2002 Implementation Plan Phase II was born.

Spring 2002 Implementation Plan Phase II

FYI: The deadline date for this proceeding is April 12, 2002. Therefore, the following is a plan in-progress and outcomes will be explained during my presentation.

The registrar's office had undertaken a commitment to make data access more available, increase technology usage in general, and to target 100% on-line student registration as a primary goal. Several issues confronted us as we began spring 2002.

Issues that needed to be resolved:

1. Insure that Campus Web will operate satisfactorily during heavy usage.
2. How to maintain and protect the advisor/advisee meeting process if students are given freedom to register on-line.
3. The advising functions of Campus Web looked awkward. The graduation audit report did not look trustworthy.

Campus Web Reliability

As mentioned above, we "hit the wall" when 30 or more logins occurred. Investigations indicated that the proxy server is creating a bottleneck. At this point (April 5th, 2002) we have sent students instructions on how to bypass the proxy server. There have been VB script error messages during heavy usage, which may or may not be unrelated. Our systems administrator is working closely with Jenzabar to diagnose and fix the problem.

Maintain and Protect the Advising Process when all Students register On-line.

The freedom to schedule on-line yet insure that students are following the advisor's recommendations is a common issue with many schools. A typical solution is to disable the student's access to on-line registration prior to registration. The student then meets with their advisor who reissues the access code. (PIN # for us.)

We found this system to have several flaws for us. First, reissuing pin#'s would cause more confusion with students since they are issued a pin# that cannot be changed and is one that they would not necessarily remember. (The current version of Campus Web does not allow users to change pin #'s) We constantly receive a steady stream of requests to reissue the original PIN. Second, trusting 140 faculty to keep track of student pin #'s and handle accordingly is problematic. We do not have an abundance of secretarial-support staff and initial discussions with faculty indicated a lack of support. Third, we felt that this method to be somewhat punitive in that removing access, even temporary, seemed contrary to promoting Campus Web usage. Finally, we felt that advisor approval before the student entered their schedule did not maintain enough controls with the advising-scheduling process.

The Post-Validation Plan

In early February 2002, I spoke with Don Thomanson, Registrar of Cincinnati Bible College and Seminary. Cincinnati Bible has students schedule on-line, then meet with their advisor for approval. This concept looked promising, and I passed the idea along to several administrators. (John Inman, Registrar, VP/Provost, Assistant to the Provost.) They agreed that a pilot study was worth forming.

Here is a summary of the plan:

Goals

- Institute an on-line scheduling system for students; protect and improve the advisor/advisee process, and encourage scheduling closure within a discrete time period.
    - Evaluate a student on-line registration process using "post validation."
    - Evaluate the "human-side" and "e-advising" methods and processes as related to course scheduling and degree progress.

Registration Plan

22 advisors and nearly 500 students are participating in the pilot study. On-line registration will open by class status, and remain open for eight days. For example, rising seniors in the pilot study are eligible to pre-register on Thursday, April 11 beginning at 7:30 am. On-line scheduling permission will end on Friday, April 19, at 12:00 noon. Within this eight-day window, students are expected to enter their schedules on-line then meet with their advisor for approval. (If needed, students are encouraged to consult with their advisor prior to schedule entry.) After the eight-day window, on-line scheduling permission is disabled, and the traditional add/drop system resumes. (A registration form with an advisor's signature is required.)

When the student meets with their advisor and gains approval, the advisor will then enter a "DONE" meeting code in the Meetings module. (A function in the Advising module) Our systems administrator has written a script that will find all "DONE" codes then search and disable the student's ability to schedule on-line. Two "door locks" are now in place: the eight-day window within the class eligibility period and using the "DONE" meeting code to disable on-line scheduling. (We are also asking advisors to sign and collect registration forms. Reasons are consistency with the current paper-based system, as well as another auditing check.)

Students received notification of the pilot study plan by "e-mail-merge" letters. Instead of typical e-mail which is general and not personal, I've been using e-mail-merge letters which can be more personal and with individualized information. (Same as mail merge letters. Instead of printing, you can funnel through e-mail.) There is a registration/advising web page with all the necessary information and documentation. (http://www.gcc.edu/registrar/pilot_study.htm) Training sessions by class are also scheduled. Subsets of students are also asked to evaluate the graduation audit report and Excel major status sheets. (See Graduation Audit Report below.)

Advising Pilot Groups

With advising functions now available through Campus Web, the registrar's office requested faculty input to determine their effectiveness and usability. In particular, the graduation audit report needs reviewed for accuracy and usability. In addition, since advising was "on the table," it seemed like a good opportunity to review the advising system that is currently in place.

This led to the establishment of four committees:

1. "The Human-Side" of Advising is tasked with looking at the advisor/advisee relationships, procedures and quality attributes.
2. The "E-Advising" committee's mission is to study the effectiveness of Campus Web Advising Functions.
3. The "Administrative roles" committee is reviewing current support and reporting.
4. The "Registration Day" committee will submit a report on the twice a year registration day that occurs the first day of the fall and spring semesters.

These committees are using the on-line post validation pilot study as the focal point for their specific tasks. Each committee has a chairperson and I am serving as central coordinator and liaison.

Graduation Audit Report

Of particular concern is the accuracy and usability of the graduation audit report. Initial findings have discovered inconsistencies; partly do to the nature and complexity of our system, and partly due to the limitations of the software itself.

We are asking 160 students to assist with the evaluation of this report. (The advising module for students is activated for this group, which includes the grad audit report.) Key areas are hours attempted, hours earned, major qpa and overall qpa. One of the e-mail-merge reports sent to students was similar data from the core JenzabarEX system. I am asking them to compare the numbers, see if there are differences, and submit the report to their advisor.

Paralleling this effort is a pilot study on Excel Major Status sheets that calculate the same values. About 50 students are being asked to enter their grades and other course information then see if the resulting mqpa, cqpa, and hours earned are the same as what was e-mailed to them. Again, I want the students to perform an analysis, and submit their findings to their advisor.

Feedback/Analysis

Blackboard surveys will be instituted for each class. Questions on the on-line process, grad audit report, Excel Major Status Sheets, and several questions about Campus Web will be asked.

Faculty in the advising groups will also be asked to answer a Blackboard survey on registration, advising, and various campus web functions.

The advising committees will reconvene and recommendations and plans will follow.

(As mentioned earlier, I cannot give you the final results of the Spring 2002 Implementation Phase II plan until we meet at the conference)

Summary

This year has been an exciting time of change in the registrar's office. A very traditional reporting system is being re-invented in many ways. There are growing pains, organizational and system constraints. System constraints will become an issue for us very quickly. However our goal of having Campus Web and other web-based systems serve as the central repository for reporting and inquiry will continue.

IP Videoconferencing: How, and Why?

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Videoconferencing Background at Franklin College

In the summer of 2000, Franklin College first implemented videoconferencing equipment on its campus. The equipment was donated through a mini-grant from IHETS, which is an Indiana governmental agency charged with providing technical resources to higher education, K-12, and governmental institutions in the state of Indiana. This equipment is a VTEL ESA series cart-based unit, which allows us to roll the unit from room to room within one building. This unit uses ATM protocols to connect to a service provider (in this case, IHETS) and then connect to other videoconferencing units. The connection is made over a dedicated T-1 that comes from IHETS, who also provides our data connection to the Internet.

There are several benefits to this arrangement. The unit provides a very good quality connection. We are able to connect to other video units all over the world, in such places as Hawaii, Russia, and Norway. Occasionally, we would run into connection problems in the middle of a conference, but these problems were due to the long connections overseas. (We did not have these problems when connecting to Hawaii.) The unit had one TV screen and one camera, but was still able to cover a decent sized room. Since this unit uses the ATM protocol, once we get a connection, we know that we are guaranteed to continue receiving the same quality, as long as the connection stays intact.

This setup also has some disadvantages. Since the unit uses the ATM protocol, we were restricted in several areas. One of the more important areas where we are restricted is in the use of the T-1 for videoconferencing. It is nice to have a dedicated T-1 for just videoconferencing, but as a small college, it is not always practical. We have only one T-1 for all of our data and e-mail traffic, but are paying for two T-1s. At this time, we are only using the equipment for specific conferences, not for classes. So far, we have only used the videoconferencing equipment roughly 5 hours a semester, which means we are only using the T-1 for roughly 5 hours a semester. IHETS was not able to come up with a good way of running both ATM and regular IP traffic through that T-1 at the same time, or find a way of scheduling a priority for the ATM traffic during a videoconference, so we were stuck with leaving that T-1 for only videoconferencing traffic.

A problem with the unit itself is that it is a PC-based video unit, which uses Windows 95 as the operating system. Any time you would want to use the unit, you would have to restart the computer before the videoconference, which was an annoyance. It also took some time for the computer to boot and load all of the extra software for videoconferencing.

Another disadvantage of this setup relates to the data connection. Since we do not run any ATM enabled equipment on our local network, we were forced to restrict usage of the videoconferencing unit to the building where the ATM connection came into campus. We were also restricted to the first, second, and basement floors of this building, since we had to tie directly into the ATM video switch. (The first and second floor data connections were serviced in the same network closet as the video switch, which is why we were able to use those floors as well.)

A physical disadvantage to this setup came about because of the network restrictions. Since we were only able to use 3 floors of the building, we were limited in our choice of classrooms. Compounding this problem was the fact that the majority of these 3 floors consist of offices, with some classrooms sprinkled throughout the floor. The major drawback to these classrooms is that they are not very large rooms. Our first round of videoconferences had 16 students (with the addition of a professor and myself), which quickly became very crowded. The rooms got warm at a very fast rate, even with the air-conditioning turned on full. The second round of videoconferences were even worse…20 students and two professors, plus myself. Luckily, the students were quick to adapt and learned to deal with the crowded conditions.

Reasons to change from ATM to IP videoconferencing

During the fall of 2001, Franklin College completed construction of a new building to house the Fine Arts department for the college, as well as the English and Leadership programs. This was the first new academic building on campus since 1927, and we were able to include many new technological advances into this building during construction. Some of these include a wireless network, as well as many traditional network drops for students to be able to connect laptops in and around the building with ease. This new building also included technology enhanced classrooms, with two main lecture classrooms with video projectors, VHS/DVD/CD/Audiotape capabilities, as well as projecting from computers, document cameras, and other video/audio sources. The regular classrooms all contain a ceiling mounted projector, as well as VHS, DVD, and computer projection capabilities in each classroom. Also, a part of this new building would be that it would have videoconferencing capabilities.

The building was physically finished in October, but there were still some fine tuning of the equipment in the building. One specific issue was what type of videoconferencing equipment would we get? This was not decided before the building was finished, but rather, after everything was in place. We had already decided that the video equipment would tie into the new equipment already in place, with the possibilities of additional rooms with videoconferencing. We met with the vendor, and during this time, decided that we would forgo the ATM installation and switch to an IP setup. There were several reasons for this, and of course, some drawbacks.

One of the main reasons for switching to IP from ATM is that IP videoconferencing seems to be the way of the future. Although ATM is technically superior in several ways, it has some drawbacks, such as the difficulty in setup, as well as price. This has helped to push ATM to the side, and move towards cheaper and easier setups. The equipment itself is cheaper than its ATM counterparts, as well as connection charges. By switching to an IP framework, we were leverag-

ing our experience and infrastructure, instead of trying to struggle with ATM for this specific task.

One of the biggest benefits to switching to IP video is the convergence factor. Instead of maintaining a separate network for ATM video, we can use the current network resources for videoconferencing. Since Franklin College is currently using one T-1 for data and one for ATM videoconferencing, by switching to IP videoconferencing, we can use both of the T-1s for all services, and not let a T-1 "sit" and not be used, except for a few hours at a time.

There are some drawbacks to switching to an IP videoconferencing setup, as well as some major problems that must be overcome. One of the biggest problems relates to how IP uses packets of information, and ATM essentially uses a "stream" of data. With an ATM system, it is relatively easy to guarantee a level of service. Once you are connected on the network, you are more or less guaranteed to stay in that call as long as you want, and have the quality that you need to continue with the video call. With IP, however, the information is broken into packets, which then finds the quickest way to the destination, and then the packets are re-assembled. In non-time sensitive applications, this is not a problem. If it takes a few extra seconds, or even minutes to receive an email or to view a web page, it does not cause problems for the end user. However, a delay of a few milliseconds is noticeable for video. For video to look smooth, it needs close to 30 frames per second, which makes the task of guaranteeing service a difficult one.

There are several ways of getting around this problem. This can be overcome by overbuilding a network, where you would have so much capacity that the data can get to the endpoint very quickly. This is not cheap, or the best method. A better way to ensure good video quality is to implement some sort of Quality of Service, or QOS. What QOS essentially does is mark the video packets as a higher importance, which means those packets are given the first priority. By doing this, the video traffic passes through before any other traffic, which means the time-sensitive traffic arrives first.

QOS must be implemented in all connections in order for this to work. At Franklin, there are several links that have to have QOS, and from there out as well. Since our connection is directly to IHETS, much of the problem of implementing QOS does not have to be solved by ourselves. Since we connect directly to IHETS, we can be guaranteed good quality to anyone else in the state on IHETS network. Our ATM setup connected to IHETS as well, so we are able to use the same long-distance resources with the IP equipment as we could with ATM. We connected through long-distance lines at a expensive rate ($6-$9 per minute) across the world, but at least we were able to get a good quality connection. One advantage in this respect is that by using the IP equipment, we are not restricted to only using the long distance carriers to connect to other countries. We can connect through the traditional Internet, which most of the time will not give a good quality signal. However, we will be able to also connect through Internet2, since we are connected to IHETS and IHETS is connected to the Internet2 hub at IUPUI in Indianapolis. By using IP videoconferencing, we have an additional layer of flexibility to help defray costs for long-distance videoconferences.

One of the problems on the local network, as well as our connection to IHETS is implementing QOS. Currently, IHETS is in the final stages of preparing for IP videoconferencing. There are

still a few steps that need to be taken in order to have everything ready for IP video. One piece that is still currently missing is QOS on the link between Franklin and IHETS. A way of getting around that currently on our campus is to change some settings and parameters in the packet shaper that we use on the Internet connection. In the fall of 2001, our campus Internet connection was VERY heavily used by music and video sharing Peer to Peer programs. In order to control this and make sure that legitimate resources could use the Internet connection, we purchased and installed a Packeteer packet shaper. This allows us to slow down certain types of traffic, and allocate resources better. By giving IP videoconferencing a high priority in the Packet Shaper, we are able to get the level of service we need for the videoconferencing. This is one of the biggest pieces of the IP puzzle. Because of the packet shaper, we are able to share both of the T-1s coming into the campus for regular video traffic, but still guarantee that videoconferencing is going to have the necessary bandwidth to work correctly.

One of the final steps in QOS pertains to the Local Area Network. For IP videoconferencing to work correctly, it is recommended that you have at least a 100mb connection, running full duplex on the local network. The cabling must be at LEAST a CAT5 cable or better. On a local area network, QOS can be a little bit easier, since the connection speeds are better than what you have on a T-1. In our situation, we will usually be only running 1 videoconference at a time, with maybe 2 occasionally at the same time. Our T-1s are the bottleneck, because they do not have the capacity that the LAN has. Our video calls usually happen at 384kbps. This is a good in-between rate for a video call. If you go below that, the video is jerky and does not look good, and those problems start to impose on the learning experience. Go above 384, and the quality improves, but your costs also start to rise. (On a local call, this is not a huge issue, but for a long distance call, $2+ for every 128k per minute adds up very quickly.) When doing a video call at 384k, the resources needed on the network are typically a little bigger than that, due to overhead and packet management. Usually, a 384k call is in the 400k range, which means you will need at least an 800kbps connection (need the same connection speed on the upstream AND the downstream). On a LAN with a gigabit backbone and 100mbps connection, a 800k data stream is only a fraction of capacity. On a T-1 with a 1.544mpbs connection, an 800k stream is a major portion of that connection. This illustrates why QOS isn't as crucial on a LAN. However, if you have a lot of traffic across a particular segment of your network, and that is where the video unit resides, getting those speeds on a network can be a problem. At Franklin, the IP video equipment is housed in the newest building on campus, which also has the newest networking equipment. Some of the QOS capabilities are already built in to this equipment, which helps to guarantee the availability of a quality videoconference.

Using the Videoconferencing Equipment

Obviously, there needs to be some reason to want or need to use videoconferencing on your campus. IP videoconferencing is a tool, not a means to an end, just like any technology. At Franklin, we have had several videoconferences with people in other countries, so that people in the class participating in the conference can get insight for a particular topic from the person in a different country. Specifically, the equipment has been used in two different leadership classes, to talk to leaders in other countries to see how they lead in different environments and cultures. In the fall of 2002, we are looking at the possibility of offering a class that would meet several times a week, and use the video equipment to connect to another class at a different physical lo-

cation. The students taking those classes don't care how the system works, just that it will work. One nice thing about our setup is that the equipment in the main room is permanent. With the ATM equipment, there was no permanent location, so the equipment had to be rolled around to the classroom where the videoconference was going to be, and then consequently set up in that room. With the permanent setup, all an end user will have to do is go into the classroom, dial the number, and then be able to start the conference. We also have a smaller, "set-top" unit that will sit on top of a television, which can then also be used for videoconferences. It is very portable, and it fairly easy to set up. This allows for some flexibility when it comes to using different rooms. This smaller unit will probably be housed in the same Fine Arts building, in a smaller conference room, where it can be used for smaller groups. One of the great things about these two units is that they are made by the same company (Polycom) and the controls for both are the same. This will make it easier for the end user, as the controls will not differ across units.

Final Comments

There are many reasons to use an IP videoconferencing solution. At Franklin College, we decided to go with IP video because it provides a great combination of better usage of resources, lower cost, easier use for the end user, and easier support due to convergence. We are a little behind our schedule in getting IP video in production. Due to a merger of our vendor with another company, our purchase and installation of the IP video equipment got delayed from November to April. However, we are still moving ahead, and plan to have it ready for class use before the fall semester. The process of getting IP videoconferencing to work has been an interesting and thought provoking experience. It is a challenge that we have had fun solving.

The Good, The Bad, and The Web: How Technology Has Influenced What I Do (and How I Do It)

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Abstract

This talk will address how changes in technology have impacted how and what I do in the classroom, as well as in my professional work as an academic psychologist. Issues to be touched upon will include: (a) the Digital Divide – how do we meet the needs of the technological haves and have nots; (b) the use of the Web as a pedagogical tool/aide -- is it all its really cracked up to be? (c) database management -- how changes in computer technology have revolutionalized the collection, storage, and analysis of social science data; and (d) broader implications for pedagogy, theory, and practice.

Note: This paper was not ready when the proceedings were compiled. The author will provide copies at the conference either directly or via the web or email

Videoconferencing and Course Management Software Working Hand-in-hand to Expand Course Availability at a Multiple Site Institution

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Introduction:

Would you like to bring that special guest speaker to your classroom? What if you were called out of town unexpectedly? Wouldn't it be wonderful if you could still give your lecture? Wouldn't it be great to allow students no matter their location to attend your lectures and interact with you as well as their fellow classmates? How about taking this a step forward and having your students meet and join forces with your colleague's class at another institution?

Videoconferencing and Blackboard may be the answer you've been looking for. Videoconferencing is using technology to connect two or more locations so that they can see and hear each other.

Videoconferencing allows colleges/universities to connect with their satellite campuses as well as other institutions and market their courses to a larger audience. Videoconferencing allows an instructor to bring resources in their classroom that otherwise would be impossible for their students to experience in a typical classroom setting. For example, via videoconferencing, the class could interactively participate in a dig being excavated by a paleontologist. What better way to allow your students to explore the world of Dinosaurs? When it is impossible for your class to be on location the instructor can use videoconferencing to bring the location to their class.

Students benefit from a wider array of instruction along with the additional time they gain from not having to travel to attend classes. Videoconferencing gives students another option to access the courses they wish to take, whether they are required for a degree or taken just for the pursuit of knowledge. It is not about reducing instructor influence but instead about giving them another strategy to meet the increasing demand for innovative materials and information that has until this time been unanswered.

Videoconferencing is not limited to two sites. Students with disabilities who are unable to attend classes could use the smaller via video units attached to their home computer to be there. The university would need to purchase the units and loan them to students.

What has made this possible is high network bandwidth, at Edison Community College, we have a dedicated T1 line for our classes, and the new H.323 videoconferencing technology based on Internet computing.

A new videoconference class was introduced in the Spring 2002 semester for the Networking and Communications course. This class evolved into a videoconference class when the course enrollment at the satellite site and the course enrollment on the main campus were not high enough to support a class being offered on each campus. Videoconferencing kept students connected during class time. Students need to connect with the instructor, but also with other students in each of the two locations.

Currently on our campus, this method is being used to support videoconference classes at our satellite campus in Greenville, Ohio. Future offerings may not necessarily be limited to just the satellite campus. This model could be expanded to cover additional college campuses and physically challenged individuals who cannot travel to either campus.

Objectives:

Our objective in this project was to make more courses available to students on both campuses and to alleviate the commute for students located at our satellite campus 25 miles away. Videoconferencing gives the students the opportunity to hear and see the course lectures, but we needed to find a means for distribution of course materials, student testing, and to facilitate group projects. Blackboard course management software seemed to meet the instructor's needs.

Videoconferencing – Edison:

Edison Community College purchased their videoconferencing equipment in March of 2001, to be used in our Distance Education Program. Edison Community College currently has five classes that are being offered to students at both campuses. The courses being offered are as diverse as the technology itself.

Courses:
Telecommunications & Networking
Early Childhood Development
Business Law
Introduction to Humanities
Life Span Psychology

Usages:
Class sizes in our videoconferencing mirror the sizes in our normal classes, with about 15-25 students on average. At this time, we only have two locations connected through videoconferenc-

ing. In the Fall Semester, we are looking at combining with several other institutions to offer courses via videoconferencing.

Classroom Design

The design of your classroom is one of the most important elements for a successful learning experience. The classroom should be a very flexible environment, with the means to present information in a variety of ways, with access to varied information sources, and with maximum flexibility for interaction between and among teacher, student and information.

Students and faculty need to have a full view of each other and of presentation materials, just as they do in a traditional classroom. Each room should be equipped with three monitors/screens, two cameras, and one microphone for every two students in the classroom. The instructor should be able to face the class and view the students at the satellite campus on a monitor in the back of the room. One of the two cameras should be positioned beside this monitor to allow the students at the satellite campus to view the instructor face on. One of the monitors in the front will be used to allow the students at either site to view each other. The second monitor will be used by the instructor to transmit documents from any peripheral equipment. This equipment should include at the minimum a VCR, document camera, and desktop/laptop.

Other concerns that should be addressed are the lighting in the room, the configuration of the desks and computers, and extraneous distractions.

Classroom Equipment

The main equipment necessary to set up your classroom include:

1. **Video camera**

   - preferably, a pan, tilt and zoom (PTZ) camera

   - some applications may require multiple cameras or a document camera, like an Elmo.

2. **Video display**

   - which for personal computer systems is just your monitor, or

   - large monitors, or for a room-based system, a computer projector

3. **Audio components**

   - microphones and speakers, or a headset for personal use

   - you need simultaneous two-way (full-duplex) audio, preferably with echo cancellation

4. **Codec (compressor/decompressor)**

- a hardware codec is essentially a board that you install on your personal computer, or

one that comes built-in on some products

5. **User interface**

- the user interface is typically very intuitive

- allows you to interoperate with other H.323 terminals

- provides a menu system that allows you to control the system and attached peripherals (i.e. additional cameras, VCRs, microphones, notebook computers, and etc.)

Additionally, it may be necessary to equip your classroom with a range of specially integrated equipment, allowing sophisticated control, but with a simple interface for the user.

Types of equipment:

There are several types of videoconferencing systems to choose from: software-only desktop clients, integrated USB desktop units and stand-alone units. The type of unit needed will vary depending on the number of students at each specific location and the size of the classrooms being used to conduct the class. A typical class may require some of each type.

The software-only desktop clients are inexpensive solutions like Microsoft NetMeeting or CuSeeMe Networks' CuSeeMe Pro. NetMeeting is a free solution whereas CuSeeMe cost approximately $60.00. You will also need to purchase a small video camera, speakers, and a microphone.

The integrated USB desktop units are a simple to use solution and consist of a self-contained video camera, a microphone and a codec. The units connect to the USB port of a desktop PC or laptop computer. The units support 30 frames per second at 384 Kbps, their video quality is good, and work best for small groups. They would be ideal for a student to use from home or their office.

Stand-alone units make the ideal solution for your classrooms. The units are small, easy to operate, and require only a network connection and a TV monitor. Stand-alone systems include high-quality Pan Zoom and Tilt cameras, hardware codecs, microphones, and have a variety of additional input and output ports to connect secondary cameras, document cameras, VCRs, computer video, projectors and audio sources.

Currently, Edison Community College uses a combination of the stand-alone units and the integrated USB devices to conduct our classes. Within, the next year we plan to incorporate more of the USB units to be used by students that cannot attend classes on campus.

Concerns:

Students involved in distance education via videoconferencing, expressed concern about how this type of environment would affect their learning. Their initial apprehension centered on issues such as:

- How will I get to know my instructor?
- How will my instructor know me?
- Will the technology work every time or will I miss lectures due to technical difficulties?
- Will there be time for interaction and will I be able to ask questions at any time?
- Will I have access to the materials I need to complete assignments?
- How will I adapt to this new type of learning environment and will learning be relevant?

The use of video conferencing in the classroom requires special attention to the comfort level, teaching style, and instructional techniques of the instructor. There will need to be some adapting and learning on the part of instructors to use video conferencing successfully for instruction.

Overcoming the obstacles:

The instructor should be organized, accessible, encourage participation from all students, and find ways to relate with each of their students.
This could be accomplished by having the students introduce themselves using the microphones the first evening in class. This will allow them to interact with each other as well as with the technology. It will give the instructor a chance to learn something about each of his/her students and possibly come to know the student by their voice so they can address that student by name when they speak or ask questions. This will allow for the beginning of the constructive relationships.

Time should be spent the first evening to ensure that the students are comfortable with using the video controls as it may be necessary for the students at the off-campus site to adjust a camera or microphone.

The instructor if possible should make at least one visit to the off-campus site to teach early in the semester. An on-site visit will be extremely valuable in establishing a relationship that can then be continued via videoconferencing. This may help to increase participation and interaction from this site.

The course expectations and materials should be addressed the first evening. This will assist the students in understanding what is expected of them and may enable them to feel more confident about the learning experience. Students should continue to have opportunities to work in groups, not just with the students at their site but also with the students at the other location.

The videoconferencing equipment needs to be reliable and adequate to meet the demands of the material to be presented. Instructors should be competent using videoconference technology before classes start. They should have skill in using effective teaching strategies appropriate to the

videoconference technology and to the classes being taught so learning experiences will be positive. They should be confident that when they walk into their room they would not encounter any problems with the equipment. Practice time outside of actual class time must be available and utilized to effectively integrate the technology with their own instructional style and methods, thereby ensuring a natural flow of classroom activities by the time the technology is experienced by the students.

Advantages:

Videoconferencing saves time and money. It enables the instructor as well as the student to spend less time traveling to the home campus. They will also save money because of the reduced mileage costs.

Videoconferencing allows students to interact with experts that otherwise would be inaccessible. It also allows them to interact with other students and adults that may be different from them.

Videoconferencing addresses different learning styles. Instructors will need to use other mediums than lecture. It can include video clips, animations, audio and graphics.

Students should have a better retention of the material, as they will be learning from a primary source instead of a textbook. Videoconferencing should help to increase the student skill level in presentation and speaking, communication and management, and questioning. Students may be more motivated in preparing for their presentations, as they know others will be watching along with this they will be using a new technology and we all enjoy using new gadgets.

Blackboard:

Edison Community College purchased a Blackboard license in July of 2001, to be used for online course offerings. Twelve out of 24 online courses began using Blackboard during the fall semester. A campaign was started on campus targeted to faculty to expand the usage of Blackboard. The message delivered to faculty was that Blackboard was not just for online courses. The advantages of using Blackboard for announcements, course syllabi, lecture notes and online testing were touted to the instructors as a way to make their lives easier. Ten Blackboard course sites were set up for web-enhanced courses. The use of Blackboard on campus began to spread.

For the spring semester, we have 16 of the now 28 online courses using Blackboard. Several new instructors began to use Blackboard for web enhancements during the fall semester. These new early adopters on our campus expanded their web-enhanced courses and brought the count up to 46 web-enhanced courses using Blackboard.

It was a natural progression for the instructors in the videoconferencing classes to use Blackboard for web enhancement to their courses. The course sites were set up initially for instructors to post their syllabus, course handouts and to post announcements.

Advantages:

Blackboard enabled students to print out course materials from the course web site in preparation for class. In the event that a student was not able to make it to class, they could view the instructor's Power Point lecture that had been uploaded to the Blackboard course site.

Enhancements such as e-mail, discussion boards, online testing enables the teacher to keep in closer contact with the students in the class. Group project work can be completed within Blackboard so students from different locations can collaborate on projects.

Putting it all together:

Course Syllabus/Handouts:
Due to budgetary constraints it is not possible to have a proctor at the satellite web site to distribute course materials. It was unfair to expect employees and administrators to shuffle papers back and forth for the instructor on the main campus. The instructor uploaded all course documents/handouts into Blackboard and the students then had immediate access from a computer connected to the Internet to print out copies that were needed.

Discussion Board:
Topics being discussed in the videoconferencing class could be posted to the Discussion Board in Blackboard. That gave students an opportunity to pose additional questions for the instructor and to debate issues with other students in the class regardless if they were sitting in the same room during class.

Testing:
Proctoring, grading and shuffling of paper tests between campuses was not cost effective, and the opportunities for tests to become lost or compromised was a distinct possibility. One of the reasons for offering the capability of taking a course at the satellite campus was to save time and fuel for the weekly commute to campus. Requiring students to come to the main campus for testing, or to visit the Learning Center was alleviated by using the testing feature in Blackboard.

Group projects:
The Networking and Communications class had a need for more than just the basics of Blackboard. A large percentage of the student's grade is based on the completion of a group project. As students move through the course curriculum, they begin to put together information that will be used in a project to submit a complete proposal for a computer-networking project. Much of the work has traditionally been done on campus during class times and face-to-face meetings on campus outside of the regular class. This presented a problem because of the geographical distance between students.

Groups created inside of the Blackboard course site gave students the opportunity to work together online in either a synchronous or asynchronous format on group projects. The groups each have their own section inside of the Networking and Telecommunications Blackboard site. In their group area, they are able to have asynchronous discussions using the bulletin board tool. Students can post information, web sites, and Microsoft Word files to the discussion board. Synchronous meetings can be achieved using the virtual classroom tool in Blackboard. Students can brainstorm using the chat and the white board area. Part of the presentation involves finding

prices on the web for components for the project. Web sites for networking supplies can be brought up and displayed in the virtual classroom tool of Blackboard in the white board area. By displaying the page in the White Board area, all students can view the same URL at the same time.

Challenges:

This videoconference course was put together at the last minute, and there were technical difficulties in relation to the location that class was held in, and the newness of the technology for the instructor. Initial course meetings were done with an ITS specialist available to help the instructor learn to use the videoconferencing equipment. The instructor needed to make adjustments to accommodate students who were not in the face-to-face section of the class. Fortunately, this instructor was willing to adapt to the new technology of teaching a videoconference class.

Outcomes:

Classes are now available to small numbers of students by connecting our two campuses. This has increased the availability of courses that may have been cancelled in the past. In the future, this can be expanded to include other institutions, guest speakers, and students at a distance.

As new users to Blackboard, none of the Blackboard course sites had taken advantage of the group tool in Blackboard. With the pioneering efforts of the Communications and Networking instructor, the tool is now being used in her traditional web-enhanced courses, and is being suggested to other instructors using Blackboard as a "best practices" way to use another feature in Blackboard.

Edison Community College is opening our campus to more opportunities for students at a distance. A fully online course may not meet the learning needs of some students. With this new format, students are still able to communicate on a weekly basis with an instructor, (similar to face-to-face) while completing their assignments and group projects online.

There has been a shift in pedagogy for the Blackboard/Videoconferencing classes. Solutions had to be found to make the students comfortable in this new learning environment. Activities are more learner-centered. Students retrieve their own information from the Blackboard site. Students are responsible for participating in discussions in the class that are continued in Blackboard using the discussion area. Group projects are now managed differently using Blackboard's group tool.

This is a relatively new undertaking for Edison Community College. Many things that were learned this semester from the Networking and Telecommunications class could be used in other videoconferencing classes, web enhanced courses, and online courses. Combining the use of videoconferencing and Blackboard is a good partnership that will continue to grow on our campus as more courses move into this new format.

Just remember: "*Whatever you can do or dream you can, begin it. Boldness has genius, power and magic in it*." Goethe

Advantages of an Integrated Academic- and Administrative-Information System Design

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Abstract

This year, the Campus Computing Survey lists academic/e-learning applications, user support, and administrative information systems as the IS profession's top three priorities. Most administrative software vendors have chosen to partner with a course-management provider to offer their clients a total solution. While this two-system solution represents a quick answer to the needs of faculty members, it also places additional user-support responsibility on an already overburdened IS staff. The alternative is an integrated, academic-and-administrative systems design that takes advantage of the performance, reliability and scalability of mature database systems such as Microsoft's SQL Server for the content-management functionality essential to any course-management application. In this presentation, ABT will share its experience using Microsoft's Active Server Pages, Interdev and XML development tools to architect the industry's first fully integrated academic and administrative application.

Note: This paper was not ready when the proceedings were compiled. The author will provide copies at the conference either directly or via the web or email

WIDE AREA NETWORK

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The presentation will cover innovative communications solutions used by Allegany College of Maryland, which operates five instructional sites in three counties and two states. AC's fully integrated communications network, combining voice, video, data and Internet, uses new-generation wireless microwave technology to hurdle mountainous terrain and leapfrog a cumbersome patchwork of conventional communications providers. In creating its own communications network custom-designed for its needs, the college thus improved connections for its about 500 employees and thereby strengthened education for its nearly 2,900 credit and thousands more continuing education students.

AC's Associate Dean of Computer Services, John Moore, will explain how the college devised and implemented a communications system that is not only better and more reliable but less costly. The Cumberland-based college's journey down this communications highway began when it branched out, in 1989, to offer courses in Somerset, Pa., and a year later in Everett, Pa. Both towns are in neighboring Somerset and Bedford counties to the north. For several years, communications needs were relatively simple, as courses were held in the evening at Somerset and Everett high schools and local campus administrative space was borrowed where the college found it.

Communication needs grew when each campus acquired its own quarters in 1994 (Somerset) and 1995 (Bedford) and expanded its schedule to include daytime classes, added more academic programs and saw enrollment rise. The college assembled a communications system using conventional telephone service providers, but doing so meant it had to work with five phone companies – an unwieldy arrangement at best. While voice transmission was satisfactory, transmission of computer data, over the same modems used by residential Internet customers, was not adequate for the organization. Soon, the college sought to expand courses at its two Pennsylvania campuses by introducing distance-learning technology through a compressed video signal carried through phone lines. But the system proved less than satisfactory for this purpose, showing itself to be only as strong as its weakest link. There were occasional breaks in service, and it was costing too much for a long-distance call.

The college realized it needed a permanent, continuous link among its three college campuses, so it went to a higher capacity system using a T-1 line more suitable for business applications. A full T-1 line linked the Cumberland system to the outside world, which in turn was linked to its two Pennsylvania campuses with a half T-1 line to each. Communications improved and costs were stabilized, but there were still shortcomings. When a circuit went down, we had to deal

with five phone companies, it was a real challenge trying to get it all back up and running again. Then, there was the expense. When the project was first started the monthly cost was around $4800. Every few months, the bill would go up. By the time the college had paid its last such bill, in December 2000, the tab had risen by more than 30 percent.

Aware of emerging wireless technology, we tried to interest representatives of large companies that we met at information technology conferences. But given the college's comparative small size and its long distance from the metropolitan markets, none could be drawn. We later turned to TWR Communications after we realized the Cumberland-based firm had added wireless capability to its services. The company developed a proposal that included radio transmitters and receivers and rooftop dishes to connect with its microwave towers atop the mountains. The TWR agreement provided the college needed wireless equipment, from Western Multiplex Corp., and maintenance for five years, after which AC will own the equipment. Monthly lease payments with TWR, plus rent of a non-TWR tower on Tussey Mountain in Bedford County, are significantly less than previous communications bills the college was paying. Moreover, the amount will remain stable over the five-year period. Implemented in January 2001, the wireless communications system was instantly successful. Reliability has improved with not one break in communications faulted to the new network. Quality of signal, including video picture, has been upgraded. And data transmission has been increased, because the wireless network's bandwidth is greater than that of its phone-line based predecessor; a full T-1 line, carrying 1.5 megabits of information, now runs to each Pennsylvania campus. In April 2001, the college arranged its Internet service, which to that point had some reliability shortcomings of its own, through TWR. Where its service formerly came through a three-quarter T-1 over phone lines, the college now receives the Internet via a full T-1 line delivered by the wireless technology system. And the monthly bill is now two-thirds of the previous expense. The new system provides more bandwidth for less money. It supports voice, video, data, and Internet, all at T-1 speed.

The college's new Gateway Center, home to the School of Hospitality Tourism and Culinary Arts, is the latest of AC's five instructional sites to benefit from this wireless communications technology. Faculty and students at that Baltimore Street location are fully integrated into the college communications network using a wireless connection that includes voice over IP technology.

Computer Services Computer Services Computer Services

ALLEGANY COLLEGE

WIDE AREA
WIRELESS COMMUNICATIONS
FOR PA CAMPUSES

Computer Services Computer Services Computer Services

Computer Services Computer Services Computer Services

WIRED SYSTEM

- One half T1 to each Campus
- 256 KB for Data
- 384 KB for Video
- 2 Phone Circuits

Computer Services Computer Services Computer Services

Computer Services Computer Services Computer Services

WHY GO WIRELESS

- Cost
- More Bandwidth
- Local Provider (TWR)
- Reliability

Computer Services Computer Services Computer Services

Computer Services Computer Services Computer Services

WIRELESS SYSTEM

- Full T1 to each Campus
- 896 KB for Data
- 384 KB for Video
- 256 KB for Voice Circuits

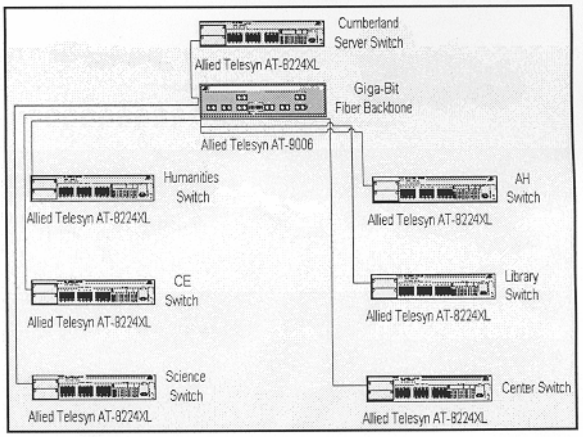
Computer Services Computer Services Computer Services

Computer Services Computer Services Computer Services

CAMPUS BACKBONE

- Server Switch 10/100 with Gigabit Uplink
- Backbone Switch Gigabit Fiber
- Building Switches 10/100 Gigabit Uplink
- 10 Megabit connection to Wireless

Computer Services Computer Services Computer Services



Computer Services Computer Services Computer Services

WIRELESS BACKBONE

- 2 Multiplexes in Cumberland
- 1 Internet Router
- 1 Internet PIX Firewall
- 9 Tower points in System
- 16 Radios in System
- 1 Multiplier at each site

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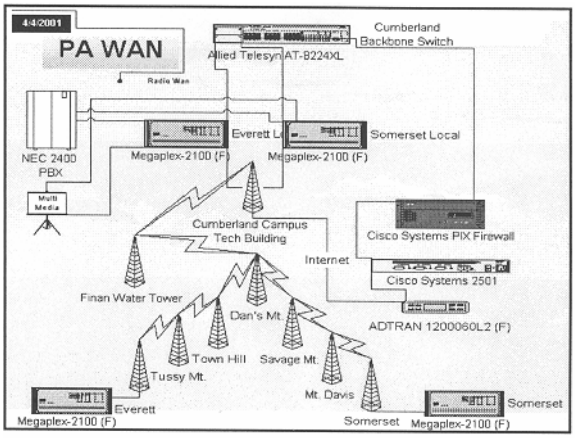
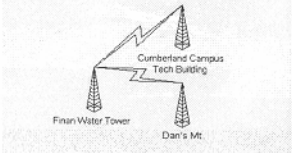


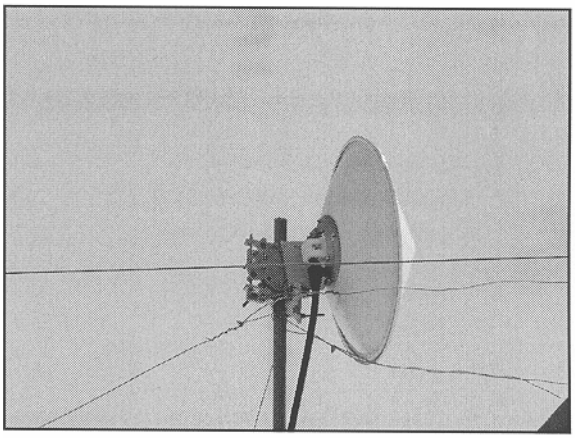
Computer Services Computer Services Computer Services

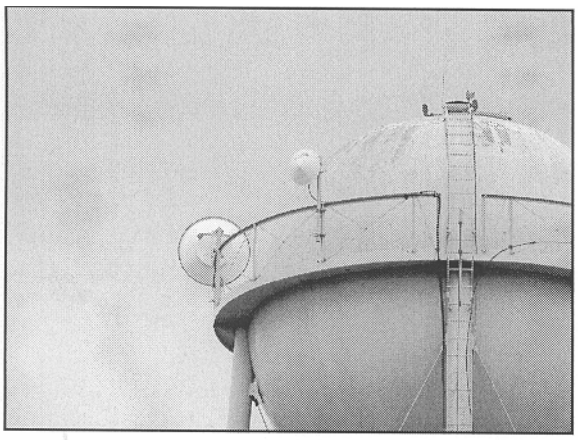
COLLEGE TO DAN'S MT.

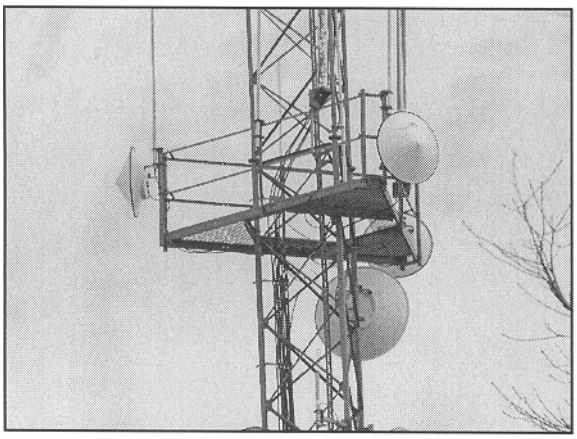
- Provides 4 T1 Circuits
- T1 Link to Somerset
- T1 Link to Bedford
- T1 Link to Internet
- T1 Link for growth



Computer Services Computer Services Computer Services



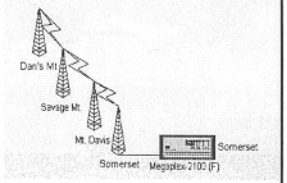




Computer Services Computer Services Computer Services

DAN'S MT. TO SOMERSET

- 1 T1 to Somerset
- Tower on Savage Mt.
- Tower on Mt. Davis
- Link to Campus
- Provides 4 T1 Circuits

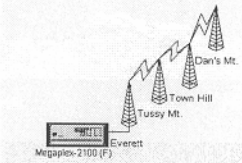


Computer Services Computer Services Computer Services

Computer Services Computer Services Computer Services

DAN'S MT. TO EVERETT

- 1 T1 to Everett
- Tower on Town Hill
- Tower on Tussy Mt.
- Link to Campus
- Provides 2 T1 Circuits



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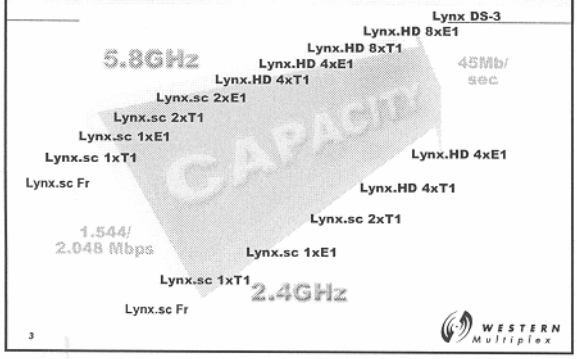
Computer Services Computer Services Computer Services

RADIO EQUIPMENT

- Western Multiplex
- Lynx sc6
- Spread Spectrum 5.8GHz
- 8 Radios with 4 T1's
- 4 Radios with 2 T1's
- 4 Radios with 1 T1

Computer Services Computer Services Computer Services

Broadest Product Line



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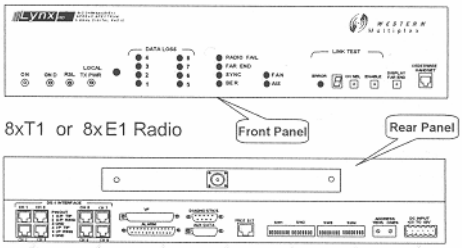
Lynx Front and Rear Panel



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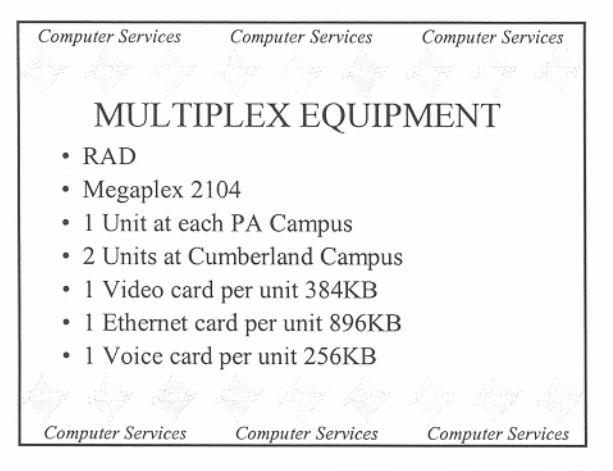
Computer Services
Computer Services
Computer Services
MULTIPLEX EQUIPMENT
• RAD
• Megaplex 2104
• 1 Unit at each PA Campus
• 2 Units at Cumberland Campus
• 1 Video card per unit 384KB
• 1 Ethernet card per unit 896KB
• 1 Voice card per unit 256KB
Computer Services
Computer Services
Computer Services

Progress Report - Microsoft Office XP-2002 Lynchburg College Tutorials

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Abstract

For the past several years Lynchburg College has developed Microsoft tutorials for use with academic classes and faculty, student and staff training. These tutorials are "webbed" and available at no cost to anyone. Their popularity is now international and CD's containing the tutorials are mailed all over the world. At the 1999 ASCUE Conference, Lynchburg College introduced the Microsoft Office 97/98 tutorials. At the 2000 and 2001 Conferences, the Office 2000 tutorials were presented. At this year's conference the Office XP/2002 tutorials will be previewed. This presentation will review the process for creating the Office XP/2002 tutorials, and furnish an overview of the features of each tutorial and its associated Microsoft product. Each participant at this session will receive a copy of the tutorials.

Microsoft has indicated that they will supply significant "gift" software for the this conference since the Microsoft-Lynchburg College FrontPage, Publisher, PowerPoint, Excel, Access and Outlook XP/2002 tutorials will be announced officially at this conference for the first time.

Introduction

In the early 1990's software tutorials were expensive and not specifically designed for academic use. At Lynchburg College the decision was made to develop specific, general use tutorials that covered the "most used" aspects of each Microsoft Office application - except Microsoft Word. The initial Microsoft Office 95 tutorials were created in 1995.

Since then, Office 97, 98 and 2000 have been introduced. This year the Office XP/2002 will be unveiled.

A Quick Word About Windows XP and Office XP/2002

For many years users of Microsoft Office/Windows have been "promised" that the software will make available easy to retrieve "backups" when there is a system failure. To date, the only "automatic" backups were in Microsoft Word, and the save prompts in Microsoft Publisher. Window 95, 98 and 2000 had the temporary file feature available for system failures. However, it was often difficult to determine which "temporary" files were available since all of the files utilized the .tmp extension. In Office XP/2002 this dilemma appears to have been solved. When

a system fails, Office XP/2002 modules, when next accessed automatically display a recovered file area on the left side of the screen. Many simulated "crashes" were created. When the modules were again accessed, "crashed files" were recovered 100 % of the time.

General Overview of Office XP/2002 – Task Panes

The first thing a user notices when browsing through the various modules in Office XP/ 2002 are the new graphical screen layouts in each module. When a user selects certain features such as Searches, Text Formatting, Graphics, Templates, etc., a special "Task Pane" appears on the right side of the screen. These Task Panes, logically, vary from module to module. It takes awhile to get used to them but, once mastered, they are a very efficient method to enhance the features of the module in which you are working. We'll cover certain Task Panes for individual modules later in this paper.

Graphics

In Office 2000, the graphics were enhanced for the more graphic modules: PowerPoint, Publisher and FrontPage. Each of these modules took advantage of a new Clip Art Gallery that had significantly expanded features, images and sounds. Office 97/98 clip art contained only static graphic images. Clip Art Gallery XP/2002 retains the static clip art, but also includes high quality photographic images, a sound gallery and animated images that were a part of Office 2000 Gallery. The new gallery takes up an entire CD – or close to a gigabyte of information. The standard installation only loads about 10 % of the information because of the number of images – the same as in Office 2000. You have to activate the custom installation to load all of the information. If you don't have room for the information on your hard disk, you may insert the installation CD when the software indicates to do so.

The Clip Art XP/2002 Gallery also has the helpful Clip Art search feature. You may enter a topic and the gallery will search for images, sounds or animations that fit the search criteria.

The Clips Online feature is also available when you access Clip Art. When you click-on this feature, you will be "taken" to Redmond, Washington and the Design Gallery. When you access the Design Gallery you will have not only the entire Clip Art CD available, but many other image libraries as well. Static and animated Clip Art and sounds are all available at this site as well as many "seasonal" features.

When you import clips from the Design Gallery you will notice another new feature. In any module where you download Clips Online, the Clip Organizer will appear. You will observe a button at the bottom of the Clip Art Task Pane that allows you utilize your Clip Organizer whenever you access a clip art image.

A Word about WORD XP

While there have not been any Word tutorials to date, a comment about Smart Tags is appropriate in this paper. Word XP has this new feature. When Word XP "sees" a proper name, it assumes that the author of the document desires to have a Smart Tag attached to the name. A dot-

ted, purple underline will appear under the proper name and a small box with an "i" will appear above the name. When you click-on this box, a drop down menu will appear that allows you to use Microsoft Outlook Mail features like Send Mail, Schedule a Meeting, Open a Contact, etc.

POWERPOINT XP

Many of the features of PowerPoint XP are very similar to those in the 2000 version. However, this is probably the module in which you will immediately notice the most significant Changes.

The first thing you'll notice is the screen layout. On the left you will see the "old" small slide view that was common in the "old" Normal View. There are now only three "view buttons" at the bottom left corner of the screen in PowerPoint XP – Normal View, Slide Sorter View and Slide Show. The new Normal View has the small slide images on the left, Speaker Notes at the bottom, and a Task Pane on the right (when a Task Pane is active).

As soon as you begin creating your slide show you will notice that a Slide Design Task Pane appears on the right side of the screen. As you insert clip art and utilize Custom Animation, the Task Pane will change to these features. As you "accumulate" Task Panes, you will be able to move back and forth between Task Panes. You will also notice that when you are in Normal View, and using Custom Animation on your text and images, that each line of text or image which you animate, has a numerical marker by it. If you click-on a marker, the associated Task Pane will appear to assist you. No longer will you see the "old" PowerPoint menu screens that you did in the past. Everything is replaced by Task Panes.

Another significant enhancement is the fact that if you choose, you may apply a different Design Template to each slide. In "old" PowerPoint this was a "tricky" undertaking. As with PowerPoint 2000, you can still access additional Design Templates through the Microsoft PowerPoint web site.

In PowerPoint XP you may now have an object, text, or just about anything, move around your slide. In the Microsoft –Lynchburg College tutorial this feature is explained in detail. You simply use your cursor to "trace" a path for your object. You will also notice that text transitions have been significantly enhanced as well. There are now many new "nifty" text transitions.

The PowerPoint XP tutorial has expanded by fifteen pages to explain all of these new enhancements.

PUBLISHER 2002

As indicated earlier, you will notice that Publisher 2002 is more graphically oriented than the previous version. As soon as you select a publication style from the New Publication Task Pane, you will see that the Publication Wizard has been replaced by a graphical Publication Task Pane that appears on the left side of the screen. Instead of selecting individual Wizard "steps," you will select graphic objects which furnish a "thumbnail" preview of each selection.

The Publisher Task Pane will change each time you select a new task – just as with the other modules.

Those who send their Publisher publications to commercial printing companies, will notice that the commercial publication features are also enhanced. When the Publisher 2000 tutorial was first created, there was a help feature which assisted in finding a commercial printing establishment in your area. That has now been replaced by a Microsoft Certified Commercial Printer system. Many commercial printers have now been certified by this system and accept Publisher files as they are presented to them.

All in all, except for the Task Pane, Publisher 2002 is pretty much the same

FRONTPAGE 2002

Again, FrontPage 2002 is very similar to the 2000 version. There are several new features that enhance the new version.

FrontPage 2002 now has "tabs" at the top of the web site pages that make moving from page to page in the site much easier. You no longer have to use the Window-select the web page, Folder List, nor the Navigation feature to move between pages. Simply click the tab and the page appears.

In addition, the Frames, Tables, Navigation and Shared Borders features are also enhanced. Several of these enhancements are included in the tutorial.

The Task Pane feature is also an integral part of FrontPage 2002.

EXCEL XP

As indicated, there are not a significant number of enhancements to the non-graphic modules. Pivot Tables are becoming more popular and are enhanced in Excel XP.

The Excel XP tutorial is also expanded with additional images and text to make the tutorial more easily understood. Many have requested additional images and instructions in a number of areas. These are included in this edition.

ACCESS XP

There is one huge change in Access XP- file saving features. In Access XP, for the first time in an Access database design, you are able to open and save database files to and from earlier versions of Access. This is huge. Using the Import/Export feature in Access XP we were able to import and export individual databases, tables, queries and reports from Access XP to the 95/97 and 2000 versions, as well as to import these same functions. There were no problems encountered on "either end."

The major enhancements added to the Access 2000 tutorial are an integral part of this tutorial. In addition, the new Saving, Import and Export features are also covered.

File Structure

All of the Office modules (Word, Excel, PowerPoint, Publisher, FrontPage, and now Access) use the same file structure as their predecessors. So, you may "go back and forth" from XP to 95/97/98/2000 with no problems.

OUTLOOK XP

Once again the features of Outlook XP are not significantly different than those in Outlook 2000.

Conclusions

As indicated above, the graphic oriented modules (PowerPoint, Publisher, FrontPage) evidenced the major changes from previous versions. The enhanced graphics are much better. Also, the commonality and availability of the Task Panes assist the user significantly.

Excel, Access, and Outlook have only minor enhancements. However, the tutorials for these early tutorials are greatly expanded to include additional instruction in areas that users have requested.

A copy of the current "edition" of the Lynchburg College-Microsoft tutorials will be available to each participant at this presentation. If a participant desires a CD (which contains all of the tutorials, in the 97/98/2000 and XP/2002 formats) it too will be available.

All of the Lynchburg College-Microsoft tutorials (Office 97/98/2000) can be downloaded from:

http://www.lynchburg.edu/userguide/

The XP/2002 Office tutorials will be available at the above web site this summer.

The tutorials have become popular internationally. We have created a CD, which includes all of the tutorials in Microsoft Word (English) - available at no cost to those who desire a copy. Simply contact me at one of the addresses on the first page of this paper if you desire a copy.

Educational Opportunities in Enterprise Resource Planning (ERP)

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Abstract

For quite some time, the goal of technology leaders has been to integrate the information systems applications in their organizations. Quite recently, concern about readiness for Y2K and the viability of legacy systems served as an impetus for organizations to assess their information systems and to examine their organizational processes with the underlying objective of improving cross-functional integration.

Many organizations have looked to enterprise resource planning (ERP, frequently with costs exceeding hundreds of millions of dollars, as a means to achieve inter-departmental integration and cross-functional integration of processes. A typical ERP system includes a complete set of applications including order processing, human resource management, manufacturing, finance, accounting, and customer relationship management.

Several ERP vendors have made their products available to educational institutions with very attractive pricing options. This paper will discuss the educational offerings of three major vendors, namely Oracle, PeopleSoft, and SAP R/3

Introduction

Enterprise Resource Planning (ERP) is a cross-functional enterprise wide system that serves as a framework to integrate and automate many of the business processes that must be accomplished within the manufacturing, order processing, logistics, distribution, accounting, finance, human resource, and customer relationship management functions of a business (O'Brien, 2002, McNurlin, 2002). The major objective of an ERP system is to integrate all departments and functions of a company on a single computerized system (Turban, 2002). ERP is a family of software modules that supports the business activities cited above and is the equivalent of an operating system for electronic business (Kalakota 1999). Although ERP was originally packaged with business process reengineering initiatives, when successful, ERP systems have created major business value by:

- Creating a framework that results in major improvements in areas such as customer service, production and distribution efficiency.
- Providing timely cross-functional information that assists managers in the decision-making process (McCarthy, 2000 and Steadman, 1999).

The installation and adaptation to an ERP system is a complex task largely because of the many business process changes required by the ERP software. ERP software makes certain assumptions about how a business operates. The assumptions and processes imbedded in the software may be significantly different than the processes currently in place. Of course, adapting to new processes involves change, and frequently the change required meets with considerable resistance. Customization of ERP software is possible, but it is a very costly and time-consuming undertaking. The company implementing the ERP must decide that its current processes warrant the expenditure of substantial dollars to accommodate customization of the modules or manage change in order to adapt to the processes as they are designed in the ERP system.

Because of the complexity of the systems and the fact that processes must be changed to suit the software, success with ERP installations is not guaranteed. Just as there are many success stories with ERP, there are also many notable failures. Organizations must be willing to change not only their processes but also their culture in order to optimize benefits from ERP systems (McNurlin). Buckhout (1999) studied ERP implementations in organizations that had more than $500 million in revenues and reported some alarming findings. The study revealed the following:

- Average cost overrun was 179 percent.
- Average schedule overrun was 230 percent.
- Desired functionality averaged 59 percent below expectations.
- Implementation projects that finished on time and on budget amounted to 10 percent.
- About 35 percent of the projects were cancelled.
- The most notable cancellation was Dell Computer, which canceled an ERP project after two years and over $200 million dollars invested.

Application Service Providers (ASPs)

Application service providers provide online channels for packaged software. ASPs generally focus on high-end software applications such as databases, enterprise resource planning and customer relationship management (O'Brien). The end-user business generally pays a monthly fee for the application software, hardware, service and support, maintenance and upgrades. Fees can be fixed or based on utilization. (Turban). ASPs differ from outsourcers in that they manage servers at a centrally controlled location, and the applications are accessed via the Internet or a value-added network (VAN) using a standard Web browser interface. ASPs are particularly prominent in enterprise computing and electronic commerce, areas that are too cumbersome and too expensive for many organizations to do on their own. Major providers of ERP software such as SAP and Oracle are offering ASP options for their clients (Turban). Advantages of using ASPs include cost savings in development, hardware, software maintenance and upgrading, and user training. Disadvantages include security, confidentiality of information, consistency in level of service, and degree of control, especially when problems occur.

Use of an ASP should involve a detailed and well-defined service level agreement (SLA). Service level agreements usually address all major system resources, namely hardware, software, people, data, networks, and procedures. Expectations and level of performance in all areas should be clearly stipulated in the SLA in order to define expectations and eliminate future disagreements.

The difficulties and expenses involved in implementing ERP systems in a business setting suggests that it will also be quite difficult in an educational setting. Typically, the resources available in higher education are considerably less than those available in a business environment. Therefore, the use of an ASP for technical assistance may be quite beneficial to an educational institution.

Customer Relationship Management (CRM)

An increasing number of organizations are looking to customer relationship management (CRM) as a business strategy. The notion that the customer is the core of the business and is of utmost importance has never been more pronounced. CRM is just one of the many modules available in an ERP family of applications, but it is one that all of us can relate to and understand. CRM software enables an organization to provide fast, convenient, dependable and consistent service to its customers. The software enables organizations to track customer contacts for cross-selling and up-selling, qualify leads, manage responses, schedule sales contacts, provide information to prospects, and manage service requests (O'Brien). Mowen and Minor (1998) define relationship marketing as "the overt attempt of exchange partners to build a long-term association, characterized by purposeful cooperation and mutual dependence on the development of social as well as structural bonds. It includes the elements of loyalty and trust."

Kalakota reports the following as an endorsement for maintaining solid customer relationships:

- It costs six times more to sell to a new customer than to an existing customer.
- Typical dissatisfied customers tell eight to ten people about a negative experience.
- By boosting annual customer retention by five percent, a company can boost its profits by up to 85 percent.
- The odds of selling a product to an existing customer are 50 percent as compared to 15 percent to a new customer.
- When complaining customers are promptly satisfied, 70 percent of them will do business with the company again.

Although similar justifications can be provided for the importance of many of the modules included in an ERP suite of products, the above is included in this paper to illustrate the sophistication and emphasize the significance of one of the most popular modules being adopted from ERP product lines. The key point, and one of the primary reasons for considering an ERP system is the single system cross-functional integration of subsystems that the ERP system provides.

ERP for Education Programs

A key strategy of software vendors for a number of years has been to provide very deep discounts for educational institutions that wish to purchase the software. In earlier years, Lotus Development Corporation, and more recently, Microsoft has provided software suites for educational institutions at a fraction of the retail cost of the software. Three of the major ERP vendors have launched cooperative educational programs to make their ERP software modules available to institutions of higher education. The ERP software is targeted at business, engineering pro-

grams and applied technology programs. The software made available to the educational institutions typically has a commercial value estimated at one to two million dollars. At this time, even with the educational pricing, ERP offerings can become quite expensive, and therefore educational institutions must proceed with caution.

The most developed of the ERP educational offerings is the SAP Education Alliance Program. SAP was founded in 1972, employs 20,000 people, and is based in Waldorf, Germany. The Education Alliance Program has been in place since 1995. SAP is very proud of its commitment to education and currently claims several hundred academic institutions and an emerging group of high schools as members of its Alliance program. SAP R/3 or mySAP.com e-business software has been integrated into a number of fields including business (general to graduate), technology, computer science, engineering, and engineering management. Each education alliance member receives enterprise software, faculty training, curriculum development support, and professional development opportunities (SAP, 2001).

In order to become an Alliance member, the school must commit to an SAP academic coordinator, an IT staff person, and faculty commitment to training, curriculum planning and development. It also requires the necessary hardware, operating systems, connectivity and workstations. A new addition to the program allows for running the entire suite of products on a local server or optional access to a host referred to as a University Competency Center (UCC). Annual membership cost is $8,000 including the ASP host if desired. Additional details are provided in the Pricing Table at the end of this paper (SAP).

Oracle's program is also quite good and is called the Oracle Academic Initiative (OAI). Like SAP, the program offers a wide range of software products. Also similar to SAP, Oracle offers an eBusiness Initiative program in addition to its more long-established products. The Oracle product line receives very high praise among the ERP applications and is noted for its reliability and compatibility. Although the front-end investment is not as great with Oracle, training is rather expensive, though discounted at 50%. Costs are detailed in the Pricing Table at the end of this paper. Requirements for academic participation in the OAI program are comparable to SAP. The institution must be a degree-granting accredited institution, must meet hardware and operating system requirements, have personnel to support the system, and have a plan for integration within the curriculum. The Redwood, California based Oracle Corporation provides 24/7 product support, access to a self-service web site for downloading class lab files, and classroom technical support. To the best of the author's knowledge, ASP service is not an option with the OAI program (oai.oracle.com).

The latest entrant into the educational ERP market is Pleasanton, California based PeopleSoft. PeopleSoft has instituted a comprehensive industry – academic partnership called the On Campus program to assist colleges and universities to integrate PeopleSoft enterprise software into curricula. The academic offerings available are considerably less than SAP or Oracle, with Human Resources Management, Financials, Supply Chain Management and Customer Relationship Management applications currently available. As detailed in the Product Offering and Pricing Tables at the end of this paper, PeopleSoft offers the least applications but is the most expensive of the three ERP options. At this time, the number of participating universities in the program is rather small. Qualification requirements to be part of the program are similar to SAP and Oracle.

Requirements include a proposal for integration, a primary contact person for planning and implementation, sufficient annual budget, detailed plans for technical support, a commitment of faculty with a curriculum implementation plan, and an estimate of the number of students involved. PeopleSoft has attempted to provide ASP service, but thus far the effort has not been successful (peoplesoft.com).

Conclusion

A curricular ERP implementation is both difficult and costly. The three major vendors detailed in this paper have initiated programs that enable an educational institution to have access to millions of dollars worth of ERP software for a relatively low cost. Both organizational and educational ERP implementation projects are difficult because of the complexity and detail of the software applications. Faculty training is very time consuming and expensive for Oracle and PeopleSoft. It is included as part of the SAP academic initiative. Deciding what and how much to include in coursework is difficult, because there is a risk that too much coursework will be dedicated to ERP and not enough to developing the course's core content. Implementation is also difficult because of the knowledge requirements of the personnel who will support the software. Competent personnel are both expensive and very much in demand. Hardware requirements are also quite expensive. For most educational institutions, use of a host ASP may prove to be the best solution.

Based on the information, especially product availability and pricing, presented in the tables in this paper, it appears that SAP offers the most comprehensive and affordable ERP options for education. SAP has devoted considerable resources to development of its educational offerings, and is quite proud of its educational initiatives. It is relatively easy to secure information from SAP, and they are the only ERP educational offering that includes ASP service at no additional cost through their University Competency Center program. As an added bonus, SAP is currently the most widely used ERP software suite in the business world.

Product Offering Table

The Product Offering Table below is the author's best effort to summarize educational product availability from SAP, Oracle, and PeopleSoft. Offerings are subject to change.

MODULE	SAP	ORACLE	PEOPLESOFT
CRM	X	X	X
SCM	X	X	X
HR	X	X	X
Financial/Accounting	X	X	X
Manufacturing	X	X	
OLAP		X	
Data Warehousing	X	X	
Data Mining		X	
Decision Support	X	X	
Enterprise Information Portals	X	X	
Production Planning	X		
Sales & Distribution	X		
Personnel Planning & Development	X		
E-Procurement	X	X	
Product Life Cycle Management	X		
Mobile Business	X		

Pricing Table

The Pricing Table below is the author's best effort to summarize educational product pricing from SAP, Oracle and PeopleSoft. Contacts are also provided. Pricing is subject to change.

SAP	ORACLE	PEOPLESOFT
$8,000 Membership, Maintenance, ASP fee; Training and R/3 Software are included; 110 days of training for faculty and IT Staff in use of R/3 also included All upgrades are free and upgrade training is free	$500 Annual Fee; $150 Instructor kit per course/department/year; $150 Student kit per course/department/year; Training fee @ 50%; $3,000 Initial E-Bus Membership Fee	$10,000 on campus standard fee; Implementation fee: $2,500-$12,500 Additional Fee of $7,500 for CRM - 25% discount on install; Additional Fee of $10,000 for SCM- 25% discount on install
Contact: Email: www.sap.com/usa/education/alliance Ed Wilson, Ph.D. Manager, U.S. University Alliance Program Telephone: 610. 661.5573 Fax: 610.661.5574 Email: edward.wilson@sap.com	Contact: Email: www.oai@oracle.com Telephone: 800.633.0584 x 48730	Contact: Email: www.peoplesoft.com Susan Webb Edelman Public Relations for PeopleSoft Higher Education Telephone: 202.326.1707 swebb@edelman.com Dan Conway PeopleSoft, Inc. 510.468.2697 dan_conway@peoplesoft.com

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Cyber Terrorism: Aspects & Course Integration

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Introduction

In this era of heightened security awareness, the issue of cyber terrorism is certainly relevant. This presentation will discuss this issue AND how we have incorporated this crucial concept in out itec4223 Messaging Applications class. Students are increasingly aware of this issue and want information about it since they are aware that prospective employers are ALSO acutely interested.

We attack this issue by initial student research. For example, students conduct intensive Internet and non-Internet research into what cyber terrorism is and what true security is: "Absolute Security: Unplugged from the network, power supply, locked in a safe, and thrown at the bottom of the ocean." Since this is impractical, we must investigate deeper issues of how to provide the best security we can, within whatever constraints are present such as network productivity, cost issues, organizational policies, and the political environment.

We address these issues: why does cyber terrorism exist? (political agendas, personality profiles, organizational fallacies, etc), why industry doesn't protect itself more effectively: (Lack of knowledge, It won't happen to me,It hasn't yet happened to me;, and the ever-popular I'm not a politically-oriented firm or organization. For example, did you know that there is a half-life to intrusion attempts of perhaps 45 days in most organizations. After that time, focus is diverted elsewhere until the next intrusion/compromise.

We also cover exactly how these terrorists perpetrate their acts such as Denial of Service, "Smurfing", Unauthorized Access, Executing Commands illicitly, Confidentiality Breaches, Destructive Behavior, Data Diddling and Data Destruction, Password "cracking", Exploiting known security weaknesses (such as the recently-discovered IIS vulnerability in NT servers), Network spoofing, and Social engineering".

We also have the students develop a perspective on how damaging this is to industry and governments by conducting research on the estimated losses incurred by industry and governments, data losses, national security lapses, etc, both pre and post September 11. After this primarily Net-based research, their eyes are opened into just how severe this issue affects industry, governments and even society as whole.

We also address who perpetrates these illicit and/or illegal activities. Examples are anti-social individuals, unhappy consumers, bored individuals, disgruntled/laid off/fired employees, and, finally (the most sensationalist) malicious agents for organizations and/or governments.

Students also download ten firewall products from the Net, and we proceed to test them. Students rate each products' performance, its effects on the host system and any other performance characteristics. Then, students spend an extensive amount of time attempting to "compromise" these products.

Conclusion

This topic is not only a current "hot" topic, but, more importantly, a topic that employers are increasingly asking in job interviews. A recent survey conducted by our division here indicated that 82% of prospective employers asked network security questions of our IT graduates. Why not provide these students with additional industry-relevant knowledge to enhance their job prospects, especially in this era of corporate downsizing?

We propose to cover how we have integrated these cyber terrorism aspects in our course. In fact, we are in the process of creating a special course in Network Security due to both student and prospective employer interest. We would also like to provide an overview of how penetrating and successful undergraduate research was employed by the students. Finally, if time permits, we would like to lead the audience through an online demonstration of exactly how a cyber terrorist might "compromise" a system. We will employ a firewall on a laptop and then attempt to "compromise" it and gain illicit access to the laptop.

We also cover the many legal aspects of this iusse such as what the penalties are at the Federal, state and local level, notable cases & how to prosecute cases in this arena. Recent events in this area are also addressed.

We are excited in this new endeavor since we are seeing more accomplished networking students, as well as students with more marketable skills and would like to share this adventure!

Project Debriefings: The Best Thing Next to a Vulcan Mind-Meld for Improving the Success of Introductory Programming Students

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Abstract.

Software researchers and practitioners have recognized project debriefings as fundamental to successful software development. I have utilized debriefings in an introductory programming class for the same purpose. For these novice programmers, the primary purpose of the debriefing is to show how I completed the project. This gives the students insight into how I applied the steps of the software development process, and also gives them an opportunity to compare their development experience with mine and recognize where they could improve.

Introduction.

In the Star Trek movie, "Wrath of Khan," a heroic (or, in Vulcan, logical) Spock performs a mind-meld with Dr. McCoy just before entering the engine chamber to repair the warp drive. In an instant, Spock embeds his very essence (katra for you trekkies) into McCoy's brain. This leads to some very confusing moments for McCoy in "The Search for Spock" when he mysteriously begins speaking and acting like his dead friend.

I have often wished I could perform such a mind-meld on my introductory programming students. Not to confuse them of course, but to enlighten: I want them to know what I know with utter clarity. Why? It's painfully simple to understand. For a dedicated Computer Science professor, there is nothing so heart-breaking as the forlorn expression of the student who fails to complete a programming project. Conversely, there is no greater delight than to see the exultation of one who succeeds. Computer Science educators have long made efforts to decrease the former and increase the latter. Advances in technology, such as integrated development environments and on-line access to course materials, have helped. Advances in pedagogy, such as the use of closed laboratories, have helped. But they haven't been enough. After employing the wisdom of the Computer Science sages for many years, I still found an alarming number of students unable to succeed. This desperate professor concluded that he must go where no programming instructor has gone before. To ensure success of introductory programming students I decided to employ the Vulcan mind-meld. This would enable a quick and painless transfer of everything needed to successfully complete all programming projects. Unfortunately, I had difficulty in mastering this technique, and reluctantly had to abandon it. In my search for a replacement I wandered outside of the ivory tower and found an industrial-strength alternative : Project debriefings.

Software researchers and practitioners have recognized project debriefings (reviews, postmortems) as fundamental to successful software development. The purpose of a project debriefing is to review and document the good, the bad, and the ugly so that all may benefit from the lessons learned to improve both process and product for the next project. This practice is not common among Computer Science educators. More likely, after a project is graded both instructor and student treat it as ancient history—uninteresting and irrelevant—and so suffer the truth of the adage, *"Those that do not know history are doomed to repeat it."*

Occasionally, the instructor may offer a "best-of-breed" solution or one created by the teaching assistant. In rare instances the instructor himself may provide a solution. This may qualify as a minimal debriefing; at least students get to *see* what a successful project looks like. The impact on improving subsequent project performance is questionable. First, the student must analyze the supplied code and compare it to his own. This is no small task for novice programmers: Program comprehension skills are as sophisticated as construction skills. Understanding the supplied code is not enough; it must be "diff"ed with the student's own to uncover areas where critical mistakes in design or implementation occurred. Again, this is an extremely difficult task. While the student can compare his *project* to the exemplar, he can't compare his *process* to that which created the exemplar. It is an axiom of software engineering that a quality product cannot be produced by a flawed process.

For introductory programming students, the primary purpose of the debriefing is to show how I completed the project. This gives students insight into how I applied the steps of the software development process, what knowledge was necessary to complete each step, how much time each step took, and how I knew each step was successfully completed. It also gives them an opportunity to compare their development experience with mine and recognize where they could improve. In the remainder of this paper I explain the project debriefing process and its impact on student performance.

The Project Debriefing Process.

Webster's defines debriefing as questioning in order to obtain any information gathered during a mission. Common synonyms include "postmortem" and "review". A postmortem can mean the analysis or evaluation of something after it has ended, but it also denotes the examination of a dead body to determine the cause of death. Alas, this is too often the appropriate sense for student projects! In applying the concept of reviewing to the larger context of learning, Roger Greenaway distinguishes two perspectives. From the learner's perspective, reviewing is the process of learning from the experience itself. This can be done maintaining a journal or in discussion with peers. From the instructor's perspective, reviewing is the process of facilitating learning from experience for the students. This can be accomplished by asking questions, giving feedback, or exploring alternatives.

The debriefing process I use largely embodies Greenaway's second perspective. My purpose is to give them feedback on what went right and what went wrong, and to present my solution. The process itself is adapted from "A Defined Process for Project Postmortem Review." I have abbreviated the authors' five-step process to four, but remained faithful to the debriefing goals of

gaining insight into events that hinder software development and improving the methods and practices that comprise software development.

Step 1: Complete Project Survey. Immediately after the due date, each student is required to complete a project survey. The survey is available on the web. The survey gives the student an opportunity to reflect on what happened during the project, especially on those events that prevented or promoted successful completion. In the case of failure, the idea is not to point a guilty finger, but to identify risks so that the student can develop strategies to cope with those risks. The survey asks the student to distinguish between technical (I couldn't figure out how to disable the Start Race button) and non-technical (I had to work mandatory overtime all last week) issues that affected progress. The student is also asked if he changed anything about his process as a result of the previous debriefing. A sample survey is given in the Appendix.

Step 2. Collect Project Data. This step involves gathering quantitative project data. Time spent on each development phase is the primary data of interest. Both the distribution of time across phases (design, code, test, etc.) and across days is collected.
The project survey described in Step 1 is utilized as the collection tool. Data collection across projects allows for comparisons across multiple projects. This can be especially helpful in providing information for planning future projects. For example, if documentation takes an average of two hours for the first three projects, it is likely that two hours will be needed for the next project. Such data can also be used to reason about the relationship between process and product. For example, suppose a certain project failed a number of test cases executed by the instructor. Further suppose that the student only spent ½-hour testing and all testing was done on the day the project was due. It is reasonable to conclude that both more time on testing spread throughout the development cycle would be advantageous.

Step 3. Communicate Results. This step takes place during a regularly scheduled lecture period and comprises two activities: (1) Summary of project evaluation and survey results; (2) Presentation of the instructor's solution. The instructor's solution and accompanying slides are published on the web. I try to leave at least ten minutes for questions or comments from students.

The project evaluation summary includes score range and distribution and the most common flaws in design, coding, and documentation. Survey results include the distributions of average times over phases and days and a sample of the most articulate responses to the process-oriented questions. I also attempt to draw correlations between evaluation and survey data. A frequent result is the negative correlation between hours spent on the last day and project score.

I present the instructor's solution as a case study. Through a series of slides I walk them through my software development process, explicitly reviewing what the steps are, when I applied them, and how I applied them. I make particular effort to show them how a disciplined approach--thinking first and coding second--works a lot better than the other way around. Laying bare my process has two purposes. First, I hope to convince them that I really believe in what I am teaching them about the development process. It is not a case of "Do as I say, not as I do". Many of them believe that the process is burdensome and can be ignored without consequence. Though I must admit that the more capable students can successfully complete these projects, I have found that the most common technical reason for failure is that students short-circuit the development

process. This leads to what I call "swamp programming", attempting to evolve their programs out of the keyboard. Random mutations aside, these students invariably underestimate project complexity or overestimate their skills and end up with an unviable program.

Secondly, I want them to see, hear, smell and taste a successful process one sweet morsel at a time. Many times I have witnessed the "Homer Phenomenon" during a debriefing. This occurs when a student reacts to a sudden insight into where he went wrong. The most common gesture is smacking the palm against the forehead and mouthing, "Duh!" There is a flip side to this phenomenon. It's when a student realizes that his process is a pretty good reflection of mine. This is great affirmation for the student as well as incentive to continue imitating the master. (I often tell the class that my principal goal is to mold them into my image.) A sure sign of this is a big smile accompanied by subtle head-bobbing.

While emphasis is on the process, presentation would not be complete without walking through the code. This serves several purposes. First, I can show them how the code was derived from the design. Secondly, I can review any new language features that were needed. Thirdly, I can discuss alternative implementations highlighting trade-offs in readability versus complexity.

Step 4. Construct a Response. The ultimate goal of project debriefing is to improve performance in future programming projects. The foundation for such improvement is a thorough understanding of what went right and what went wrong with the current project. Actions that led to success must be reinforced; those that led to failure must be changed or eliminated. Steps 1-3 focus on articulating these issues. In this step, I enumerate a prioritized set of recommendations for ensuring success on the next project. This set is typically divided into a "do" and "don't" list. Not all recommendations apply to all students. It is each student's responsibility to identify issues relevant to his performance.

Since any change is difficult, I encourage each student to consider selecting the one "do" and the one "don't" that had the largest impact on his development activities. For example, on the first project many students lost significant points for not following documentation standards. This resulted in two recommendations: "do" review the documentation standards; and "don't" wait until the last minute to document the code. This project also required the implementation of four classes, which was a major increase in design complexity for them. Several unsuccessful students failed to employ the "little steps for little feet" approach and instead tried to complete the project in one giant leap. This strategy worked fairly well in the prerequisite course, but proved a disaster for this project. Whether it was a "NullPointerException" or an "ArrayIndexOutOfBoundsException" debugging was an intractable problem for them. The inevitable result was a tangled mess of source code that met virtually none of the requirements. To remedy this problem I recommended, and illustrated in my presentation, that students "do" implementation using an iterative approach.

Impact of Project Debriefings on Student Success.

The primary impact of project debriefings was unexpected: A change in the way *I* do things! After analyzing the results of the first two debriefings, I realized that the largest factor contributing to lack of success was inappropriate planning. Even some students who started early were strug-

gling to finish. The cause was not the scheduling of enough time to work on the project, but not using that time effectively. Students were not adept at organizing a project into a series of successively more functional iterations. To address this issue I modified the structure the project assignments. Each assignment now includes a software project plan. The plan organizes the development effort into a series of 3-5 iterations. Each iteration addresses a small subset of project requirements. Depending on the length of the project, two or three milestones are defined with accompanying deliverables (design diagrams and source code). Since understanding the problem is a prerequisite to successfully completing any project, the first milestone always involves solving the associated problem manually.

The addition of the project schedule has had a very positive effect. Students can no longer fall prey to the temptation to procrastinate. Misunderstandings about project requirements are identified much earlier. Students always experience at least partial success: The initial iteration typically addresses the construction of a graphical user interface, a task that is most familiar to them. Such success inspires a "can do" attitude. I can also recognize the need for intervention soon enough to make a difference since I evaluate each iteration.

Project debriefings have also fostered critical thinking. No longer is the project forgotten as soon as it's turned in. In preparing the survey, students must reflect on their activities and make connections between process and product. They learn to recognize that certain behaviors lead to certain problems in meeting project requirements. These connections are reinforced by my presentation and recommendations.

The average project score has increased since instituting debriefings, but it is too early to tell if it is statistically significant. I am also still refining the debriefing process itself. The survey has undergone several revisions; likewise the in-class presentations. As the complexity of the projects grows it becomes untenable to present a detailed view of my development process. I therefore have chosen to present those portions that tended to cause the most difficulty with the students' projects. Students are left to fill-in-the blanks. Not a desirable situation, but a reasonable compromise.

The project debriefings are labor-intensive to prepare, and do take up four lecture periods during the semester. I do think the anecdotal results I've observed make this approach promising. Still, I wish I could perform a Vulcan mind-meld on the first day of the semester. It would make things so much easier. But until I master the mind-meld, project debriefings will serve as the next best thing for improving the performance of my introductory programming students. Program long and prosper!

Appendix

1) Did you succeed in meeting all project requirements?
2) If you answered "no" to item 1, what requirements did you succeed in meeting?
3) What about this Project did you find most difficult?
4) How many hours did you spend performing each of these program development tasks?
   a) Understanding the problem
   b) Identifying Responsibilities
   c) Class Design
   d) Algorithm Design
   e) Coding
   f) Testing/Debugging
   g) Documentation
5) Specify the number of hours you worked on Project 3 for each of the following days.

	25	26	27	28	29	30
31	01	02	03	04	05	06
07	08	09	**10**			

6) What do you think is the best explanation for your success or lack thereof on Project3?
7) Did you change anything about the way you approached Project 3 given your experiences in Project 1 or Project 2?
8) Do you plan on changing anything about the way you will approach Project 4 given your experience in Project 3?
9) Did you find the instructor's debriefing of Project 2 helpful? Explain.
10) Did you like the availability of Extra Credit?

Implementation and Utilization of Speech Recognition Technology for Student and Faculty Users

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You need to open the car window at the toll both as you drive your new Lexus, but being the safe driver that you are, you dare not take your hands off the wheel. Wait--you can simply say, "Driver's window, down."

The Evolution of Speech Recognition

The concept of speech recognition has been in development for nearly 30 years. However, technology in those early years was never at a point where speech recognition software could be developed that would allow the user to efficiently and effectively create text, format text, navigate documents, manipulate software, and even surf the Web. Early speech recognition software was targeted at the market of individuals with mobility impairments. Use of the software required extensive training and vast amounts of patience; the resulting text often had errors in formatting or word choice (homonyms) and took hours to create. Many companies, from Exxon to SCT, devoted many hours and many dollars in this endeavor only to abandon it before perfecting it.

My experience with speech recognition software also started in its early days. In the early '90s, I had the opportunity to try Version 2 of Dragon Dictate, as it was known then. Training the software took several hours and the speech recognition interface required the speaker to speak each word as a separate entity. Needless to say, I didn't use that software for very long.

By 1997, technology called CSR (continuous speech recognition) had arrived as Pentium II 266 MMX , Cost of RAM fell, Dragon NaturallySpeaking 3.0, the first large vocabulary, continuous speech recognition (CSR) product releases. By the fall, the first IBM ViaVoice became a viable product. This transformation resulted in Voice-type 100 - 140 wpm , 45 Minute Training Period, @ 95-98% accuracy, with about three weeks of practice, at a cost of $3,200 for the computer plus another $150 for software.

Due to these innovations in computer technology and software, in the late 90s Version 4 of Dragon NaturallySpeaking became available. As I was finishing a graduate program that required extensive writing, I decided once again to try the speech recognition software. This time I was much happier with the outcome. Training took just under 45 minutes and after several hours of using the software, I was able to achieve an accuracy rate of nearly 85 percent while speaking over 100 wpm. While this may not sound very efficient, as a veteran typing teacher I was able to

go back and correct my errors rather quickly. This version of the software also had limited correction capabilities. However, once I finished my graduate program I stopped using the software.

Quality speech recognition finally arrives in 2000 with the advent of the Pentium III 500 with SIMD Extensions, lower costs allowing standard 128MB RAM, and software that has really improved (Dragon NaturallySpeaking 5, Voice Xpress 5, and IBM ViaVoice Millennium), as well as headsets that had really improved (Plantronics SR1, USB headsets) with the result of voice-type 110 - 160 wpm , 5-7 Minute Training Period, 95% accuracy, With a few hours of practice, correcting errors properly, extra training (10 min) Acoustic Optimizer, 98-99% accuracy familiar topics at a cost of $650 Computer plus $150 Software

In 2000, a colleague mentioned to me that Version 5 had been released and that it was a vast improvement over the earlier versions. I took the bait and bought Version 5 only to discover that the software was now truly usable--even for a typing teacher. Training was reduced to less than 15 minutes and accuracy, after approximately an additional hour of use, rose as high as 92 to 95 percent. The only drawback was the necessity of using the built in word processing software, DragonPad, in order to utilize the correction features and natural language commands. (Natural language commands allow the speech user interface to manipulate the typical "mouse clicks" by voice.) It was quite usable as any text could then be cut and pasted into other software programs.

To Teach or Not To Teach

As a business education teacher, I am involved in the use of technology on a daily basis. I diligently try to ensure that my students will be prepared for the challenges changes in technology as they progress in their careers. After having success with this new version of the software I realized that this was not a fad and began to wonder where this change would lead. At Comdex 1998, Bill Gates said, "The future of computing is in speech recognition . . ." This is when I realized that students must possess the skill of manipulating voice recognition technology in order to keep pace with technology. Another push came from Pennsylvania's Director for Business and Marketing Education, Michele Govora, who has set as a standard that students will be instructed in multiple input technologies by 2008.

To increase my knowledge base in both use and teaching methodology, I participated in a training program known as the Summer of Speech. The objective of this program was to train as many business educators as possible in each state of the union in speech recognition technology so that they would become the trainers of the next generation.

Adequate technology is also essential for using this technology. Today's versions of speech recognition technology (speech recognition) require a Windows PC with Pentium III 500 or higher, 128MB RAM or higher (preferably 256MB), 300 MB hard drive space, Sound Blaster compatible sound card or USB port. (For Mac users, Any G3 or G4 Macintosh sold after January 2000 with 128 MB of RAM, USB headset will support IBM ViaVoice 9 PC or Mac Enhanced or OS X.)

Before my first class even started, Version 6 of the software was released. Now I had what I had dreamed of, speech recognition software that could be used in nearly every Windows-based

software program. In addition, in most Microsoft products, Corel products, and Lotus products the correction features, natural language commands, and alternate modes are available. Another exciting feature of Version 6 is language choices. Non-native speakers of English are able to choose from UK English, Indian English, Southeast Asian English, and ____ as their profile is being created. (In a conversation with Karl Barksdale, noted authority on using and teaching speech recognition technology, the rationale behind the absence of an Hispanic or Latino English language accent relates to the many, varied Hispanic or Latino accents.)

Repetitive Stress Injuries

Another aspect of the use of speech recognition technology is repetitive stress injuries. The number of persons suffering from computer-related RSIs continue to grow and the age at which the person is first affected continues to decrease. Less reliance on keyboarding is part of today's business education focus on preventing RSIs. The National Business Education Association National IT Standards admonish students to, "Use a variety of input technologies" and "Develop proper input techniques (e.g., keyboarding, scanning, speech recognition, handwriting recognition, and the use of a touch screen or mouse), including safety methods to avoid repetitive strain injury." (Page 85, National Standards for Business Education, www.nbea.org, ISBN 0-933964-56-0)

Implementation of Speech Recognition Technology Training

To afford my students the opportunity to increase their technology skills and avoid RSI (or in a few cases master data input although unable to use all ten digits), I created a one credit, 15-hour, pass/fail course that I named Voice Typing. The course is open to any student who wishes to register; there are no prerequisites or corequisites for the course. In part, I also hoped to provide students in developmental courses an opportunity for greater success. Some of my research had shown promise in this area (Raskind).

Imagine you are enrolled in a basic skills writing class—you don't know how to write well and you don't know how to type. Now your instructor tells you that you will be required to complete six to eight essays, with one or two revisions, to meet the class requirements. Would speech recognition remove one of the barriers to student success? Would speech recognition technology provide the kinesics learning found in the handwriting or typing process of learning writing skills?

In addition to offering a credit course for students, I was also the recipient of an Innovative Project Fund grant from my institution. These funds were used to prepare the course, to purchase software and to provide training to faculty, staff, and administration. Thus far, 17 employees of LCCC have been trained in speech recognition. Of this small number, however, 5 have already purchased the software and begun using it to complete their daily work.

Linda Novak, Associate Professor of English, was one of my first participants. Here is her viewpoint on utilizing this technology.

Faculty Advantages

As an English teacher, evaluation and grading is a big part of the job. I teach five writing intensive classes, and there are 20 to 25 students in each class. At least six or eight essays are required in each class. That's the equivalent of 150 plus essays each class, with at least two revisions of each essay. That's an approximate 500 plus essays for each class; multiply that by five classes and imagine the workload involved and time involved to grade those essays. Now imagine the slumped shoulders and sore wrists, arms and necks due to the grading of these essays. Now imagine the eyestrain.... I could go on forever, discussing the body ailments of a lowly English teacher. Many of us believe there was heavenly intervention when Dragon NaturallySpeaking was born!

Using Dragon can simplify the process and offer quicker feedback.. When a student submits an essay, Dragon can be used for evaluation; since the teacher's comments can be given in red, underneath the student's typed line, the teacher's typed comments are clear and easily decoded by the students for revision.

Often, when teachers revise essays, manually, abbreviations are used, editing symbols are often confusing and handwriting can be unclear. This often leads to additional frustration by the student attempting to revise drafts.

Because voice typing is a fast method of making comments (one can comment orally 10 times faster than commenting manually), it is easier for the teacher to tell a student simple revisions needed, such as spelling (SP), incorrect comma usage (INC C), or awkward phrasing (AWK PH); more complex revisions, such as the need for further detail, transposing paragraphs for smoother flow, or thesis statement clarification or focusing, have no shortened version and take much writing by the teacher in order that the student understand what is wrong, and then a revise/edit the essay. Reading the essay for clarity and then reading the essay for proper mechanics and flow and then commenting is a detailed process, taking 20 minutes to 25 minutes per essay. Using Dragon can cut the time in half. Comments can be read into Dragon, appear on the student essay in red, and a much easier fashion; these comments can be seen/read by the student much more easily and allow the student greater ability to revised.

In my writing classes, particularly in developmental courses, BSW 099/ENG 100, and in ENG 105 (Freshman English), I have students keep portfolios. After each draft and revision I contents in bullet format the types of major errors made in the essay. For example:

Essay No. 1 Narrative
- sentence fragments
- comma splices
- run-on sentences
- awkward phrasing

Essay No. 2 Argument
- sentence fragments
- run-on sentences

Essay No. 3 Comparison Contrast

- comma splices
- spelling
- punctuation (commas and semicolons)

I keep these sheets stapled on one side of their portfolios, and this technique allows the students to keep track of their errors, track the continuing progress, or lack of progress, of their errors and know what elements of grammar they need to work on for improvement, either on their own, in their texts, online in grammar web sites, or in the school's writing center via tutorials or tutors.

Having the ability to lengthen these comments, via Dragon, without having to handwrite or type them, will benefit my students and allow them to have expanded comment sheets. I can also offer some suggestions to change their text, or places to go for further help in correcting their errors. By the end of the semester the student will have not only the graded essays to look over for review of their writing, but a summary comment sheets, detailing errors of every essay written. What a tremendous tracking tool; what a great use of time and what a fantastic way for students to improve their writing skills.

Getting students to edit their work will also be easier, via Dragon. Revising is always easier when comments from the teacher or clear and detailed. In addition, since one major role of an English teacher is to get students to read, as much as possible (better readers make better writers), Dragon forces them to continually read -- read what they wrote -- corrector change what they wrote -- revised and edit what they wrote. Reading a teachers comments also forces them to read and revised; however, saying the correct structure allows that revision to register in the brain and eventually become systematic in their own writing.

Students can quickly comment on one another's work, in much the same light the teacher does. Perhaps students can comment in green ink, teachers can comment in red ink and the student benefits from a variety of comments in order to revise. This is similar to a writing workshop approach to writing.

Since many of our students are non-native ESL students, one technique I have used in speech class is to have students make tapes of either complete speeches, or read sentences, phrases or words into a tape. I then listen and comment on the speech patterns and sounds. It can be simple comments such as correctly pronouncing a sound: v/p/th or using words correctly in the sentence: adjectives preceding nouns, or using more specific words: first you do this: first one must mix the ingredients.

Since I live one hour from school and spend over two hours each day in my car, Dragon can be the best device on the market for the teacher. Imagine being able to talk/dictate comments on the student's work while driving. I currently cannot write nor type while driving, but can speak while driving. (I currently converse with talk radio hosts, either the literally or figuratively, or sing songs as they play on the radio.) Think of the constructive, timesaving ways I can do "schoolwork" while driving. I can listen to my student's language tapes and comment via Dragon; I can

complete several tapes before I arrive home. I can get students written feedback the next day. (That will certainly make me one on the most efficient teachers in the student's mind.)

I can also comment (via Dragon) on student's essays, or comment on something a student may have discussed in class that day. Ideas are fresh in my mind, I don't have to think, two days later, what the student said.

Student Advantages

- Documents are completed more quickly. They can speak over 100 wpm; they can handwrite or type only half of that.

- Those who cannot type on the keyboard never have to. So often the student will say, "I never learn to type..." I can now say, "just speak, Dragon will "type" for you." (Selfishly, I will never have to decipher horrible penmanship again!)

- Help students become better readers and hence, better writers.

- Help students become better proofreaders and therefore better writers.

- Help students become better editors and revisers, since teacher's comments are clear, understandable and expanded.

- Allows a student to "train" Dragon, even if they are non-native ESL students. Dragon has various "accent modes" from which to choose.

Summary

In less than one semester, 27 people have been trained in the proper use of speech recognition software. Two of those persons had limited use of their hands or arms, yet were able to create documents, format text, and manipulate the computer as quickly and efficiently (or even more so) than students in advanced keyboarding classes. My highest performing student was a gentleman who had attempted keyboarding class, but without success. He frequently struck more than one key and appeared to lack the eye/hand coordination to properly manipulate the keyboard and mouse. His final proficiency with speech recognition technology was 180+ wpm with 98 percent accuracy.

A young woman in the ESL class took the voice typing class concurrently with her ESL class and ENG 100. Her first language was Vietnamese, her second language French, and now she was mastering English. She selected the profile that complements a Southeast Asian accent. Her performance in the class was 111 wpm with 90 percent accuracy.

My personal story is part of what you are reading—it was created entirely with voice, no keyboarding. Today there is very little I do where I use my keyboarding skills. One area that truly stands out is correcting writing assignments for business communication classes. Most of my students either e-mail the assignments or give me a disk. I then open their work in Word and use

Dragon to highlight errors, write comments, and show the final grade on the assignment. When I compare the hours spent in this pursuit between my fall semester class and spring semester class, I can document that my time has been reduced by at least half. Yet, I can offer the student a more comprehensive critique of their assignment in that shorter time period.

The Future

The top selling product today is DNS Version 6 (and IBM ViaVoice for Macs), but the release of Microsoft Office XP may change that. Incorporated into the Word 2002 software is a speech recognition program (as well as a handwriting recognition program). In my opinion as well as others, today it is like using Version 4 of Dragon. However, because it is part of the Office Suite, its prevalence will surprise many of us.

"Eight years from now, everything we currently hold dear about computer education will be a distant memory. In the past year alone, speech recognition passed from the realm of an interesting novelty into a full-fledged educational necessity.

As we end 2001 and begin 2002, let's take a time warp back eight years. As 1993 ended and 1994 began, the Internet as we know it today did not exist."

- Sixteen years ago there was no such thing as Windows.
- Eight years ago the World Wide Web was in its infancy.
- Now, project ahead eight years.

Eight years from now, desktop PCs will become a thing of the past, and the new tools of computer input will include, speech recognition, handwriting recognition, scanner/OCR, and translation technologies.

It won't take long for this these powerful technologies to power their way into the k-12 and collegiate educational systems.

The instructional base upon which all computer and technical education is based has shifted. The required technology literacy skills are now:

- Speech recognition skills
- Handwriting recognition skills
- Translation skills
- Reasonably reduced and safe keyboarding skills
- Scanning and OCR technology skills
- Wireless and handheld personal and Tablet computer skills

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A Brief Introduction to the Unified Modeling Language and Rational Rose Software for Specifying Transactions in Simple Web-Based Systems

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Abstract

The Unified Modeling Language is a widely-accepted way to visually model the specification and design of systems using object-oriented techniques. UML is accepted to the extent that in designing their .NET architecture, Microsoft worked with Rational to seamlessly integrate .NET with Rational's specification and design software. This paper/talk will present a brief introduction to the UML and Rational Rose software for specifying transactions in simple web-based systems. Included will be a discussion of the author's experience with Rational's generous SEED grant program that, at no cost and with minimal strings attached, allows the use of Rational software for use in courses that cover systems design and analysis, software development, software engineering, etc.

Introduction

Since the beginning of the first programmable computer, the goal of software development, or software engineering, has been to produce fault-free software, delivered on-time and within budget, that satisfies the needs of the customer. What has been apparent for some time is that there is no easy solution to this problem. Specifying solutions to complex problems is nontrivial. There have been over time a number of magic solutions, sometimes called silver bullets, that have promised to solve the software development problem. Here are a few of them.

- 1950's: procedural programming languages (FORTRAN was marketed by IBM as able to make debugging obsolete)
- 1960's: on-line programming
- 1970's: third-generation languages
- 1980's: AI (artificial intelligence, reincarnated as data mining tools, etc.), CASE tools (reincarnated as UML, etc).
- 1990's: object-oriented programming, business process reengineering

Many of these magic solutions have advanced the state of the art, but have only moved the software development problem to a higher level of abstraction. One of the promising software development techniques today for managing this complexity is the Unified Modeling Language, or UML (see, for example, [2], [6]), as combined with a software development process such as the

Rational Unified Process, or RUP (see, for example, [5]). These efforts have been made, in large part, Grady Booch, Ivar Jacobson, and James Rumbaugh, three leading experts in the field of object-oriented design and implementation. In in the early 1990's, these three joined forces to unify their methods and form a company called Rational Corporation to operationalize, realize, and commercialize their prior efforts in a meaningful way.

Since this is a fairly sophisticated area of current importance to many people, this paper will present a brief introduction to the Unified Modeling Language and Rational Rose software for specifying transactions in simple web-based systems. A simple example, the login problem, has been used to provide such an introduction.

Rational Rose

Rational Corporation, at http://www.rational.com, markets a large number of software products designed to support software development throughout the entire life cycle of a software development effort. The key product offered by Rational Corporation is probably Rational Rose, an implementation of the UML visual modeling tool for software development, that is described on their web site as follows.

> *Rational Rose is the award-winning model-driven development tool that is part of Rational Software's comprehensive and fully integrated solution designed to meet today's software development challenges. If you're a Software Developer, Project Manager, Engineer or Analyst looking for proven ways to build better software faster, Rational Rose is your answer.*

The author has used Rational Rose software in an information systems course in systems analysis and design (at UNC, Charlotte, Spring, 1999), for undergraduate software engineering courses (at Winthrop University, Fall 1999 to present), and for a graduate course in software development (at Winthrop University, Fall 2001) that is also an MBA elective course. It is an understatement to say that integrating such a piece of software into a course or curriculum is a gradual process that involves a lot of thought and work. A software development system that is designed to develop nontrivial software products is, not surprisingly, a sophisticated and complex piece of software that one should not expect to learn in a few days, weeks, or even months.

Another problem is that as there is not a huge audience for Rational products as there are, for example, for common Microsoft products such as Word and Excel. So, there are not many reference books on using the software. Until the recent book [1], a good practical book for using Rational Rose did not exist (i.e., could not be found by the author).

Microsoft .NET Framework

Part of the design of the new Microsoft .NET application framework for software development has been a result of collaboration between Microsoft and Rational Corporation in order to streamline the use of software development tools as offered by Rational and Microsoft. For a few years now, the Enterprise version of Microsoft Visual Basic has included a Rational modeling tool, but the integration left something to be desired. Now, the .NET application framework al-

lows a tighter integration of software development between the products of both companies. In order to allow many languages to be supported by Rational Rose, major changes have been required to Visual Basic, ASP, etc. This means that converting existing Visual Basic and ASP systems to .NET is a major effort that can (currently) only be partially automated. Part of the motivation of the changes to ASP.NET from traditional ASP is to more cleanly separate the presentation layer from the business rule layer from the data layer. Thus, ASP.NET code is much more modular and less all-in-one. This allows multiple people with expertise in different areas (e.g, web page design, database access, etc.) to more easily work on separate parts of the project while using UML tools from Rational Rose to specify and implement the software development project.

Time will tell whether the integrated approach to the object-oriented design and implementation provided by systems such as Rational Rose, UML, and .NET will be accepted, but it certainly looks very promising.

Seed Program

One stumbling block to starting to use Rational Rose is obtaining the software, which is not cheap. To promote their software and development methods, Rational Corporation has a generous grant program for academic institutions, called the SEED (Software Engineering for Educational Development) program, that provides at no cost, distribution media and licenses to the software marketed by Rational Corporation. After filling out the paperwork, and requesting the desired products, the grant was approved quickly. After the software on CD arrived, the licenses could be set up for the desired workstations and the software installed. The software grant was for 12 months, with a renewal option at Rational's discretion. This has, in fact, now been renewed for a second year. In general, one would want to request an update to the licensing whenever Rational released a new version of the software being used. Since the license period runs for one year, it is best to start the new license during a time between semesters or sessions so that the license does not expire while students may be using the software to complete a class requirement.

There are two primary types of licenses for the Rational Corporation software products, a floating license and a node-locked license. A floating license is designed for network use and requires the installation and support of a license server. This installation caused no problems for the support staff who installed the license server on a Windows 2000 Server and installed the Rational Rose software on Windows 2000 client workstations on the network, making the software available to all students in the department. If drives are imaged, as is often done in a networked environment, then the floating license is the way to go. The other type of license is a node-locked license that is designed to run on a specific computer such as a faculty workstation (at work or at home), etc. It requires, using a Windows workstation as an example, that a node-locked license file be requested over the Internet after providing an account number and the computer name and serial number of the specific computer for which the node-locked license is to be obtained. Then, the license file is sent via email and is used during installation of the software on the specific workstation.

But, do not expect to learn the software overnight. It does take time and effort. To help the reader get started, a brief introduction to the Unified Modeling Language and Rational Rose software for specifying transactions in simple web-based systems is now presented. This will be done by way of a simple example that uses UML to specifying a web-based transaction. Needless to say, only a small part of UML will be used, but it is an important part as the parts covered are used in specifying almost any system. It is estimated that 80 percent of most problems can be modeled by using about 20 percent of the UML. The additional complexity comes in in that the UML, and corresponding Rational Rose software attempts to support the development of actual orking systems consisting of code, data, documentation, etc., over the entire life cycle of the software development process.

The Login Problem

The example here in this paper is the login problem which goes as follow. The user will start at the login form, enter a userid and password and select "**login**". If authenticated, a menu of allowable options is displayed. Otherwise, the login form is re-displayed with no indication of what went wrong.

Gathering and specifying requirements using UML involves identifying actors and use cases and depicting them in terms of use case diagrams.

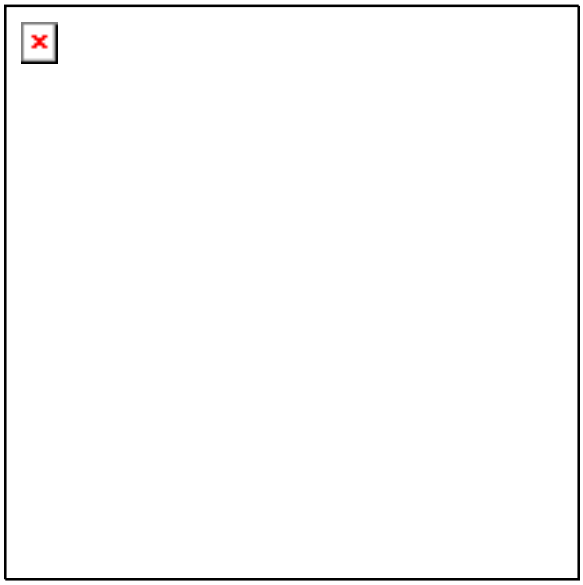
An actor represents anyone or anything that must interact with the system in order to input information into the system and/or receive output from the system.

- An actor is represented by a stick-person.
- An actor need not be human (e.g., a process can be an actor).
- An actor is a class with stereotype of "**Actor**".

In this problem, the actor is the user who is going to login to the system.

A use case is used to model the functionality of a system or part of a system, focusing on the behavior of the system from outside the system. A use case is depicted as an oval. The use case here is the "**Login**" use case.

A use case diagram combines the actors and use cases into a diagram.



For each use case, typical scenarios are created to depict what usually happens when the user interacts with the system for a specified use case. Use cases and scenarios provide a practical way to collect user requirements in a way that all stakeholders (i.e., users, clients, developers, etc.) can understand. Exceptional conditions are not handled in the typical case, but might be handled by another scenario. A scenario is described using text in what is called a flow of events.

A flow of events for a use case describes the things that the use case needs to do and the order in which the events should be done without getting into too many implementation details. The flow events is usually stored in a document or URL external to the project system. Here is the flow of events used for the typical login scenario for the login use case.

- 1. The user starts at the login form.
- 2. The user enters a userid and password and selects "login".
- 3. The user is authenticated.
- 4. A menu of allowable options is displayed.

Note that we would use a second flow of events for the case where the user is not authenticated.

Sequence Diagram

As a first approximation, we can model this flow of events between the user and the system as follows in what is called a sequence diagram, here experssed using just text.

```
User                          System
----                          ------
browses to URL  -------->
                <--------  displays login form
enter userid
enter password
select "login"  -------->
                           authenticate user
                           display menu
                <--------
```

One of the difficulties in any specification system is putting in too much detail or not enough detail. Good judgment come from experience. Experience often comes from bad judgment in the past. Thus, there is great variation in how one can do what is being done here.

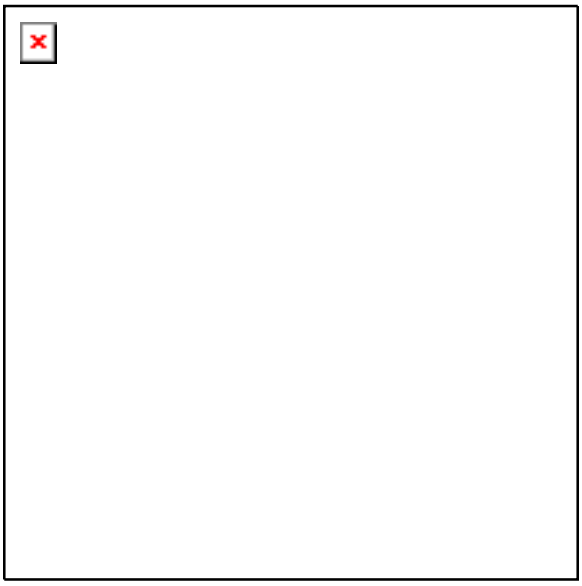
Let us now refine and operationalize this simple sequence diagram. For example purposes, this paper assumes a web-based system with the following software.

- Microsoft Internet Explorer web browser supporting client-side JavaScript
- Microsoft Internet Information Services web server supporting server-side ASP (Active Server Page)
- Microsoft SQL Server database server supporting T-SQL (Transact-SQL) and SQL (Structured Query Language)

Analysis

The next step is the analysis step. One way to do this is to identify boundary, entity, and control classes. Note that an object is an instance of a class. The class is the general concept. The object is the specific instance.

A boundary object represents interactions between actors and the system. This might be the user interface, but not every part of the user interface. For the login problem, the web browser will be considered a boundary object. In addition, any client-side JavaScript will be considered part of the user interface and, therefore, part of the web browser as a boundary object.



An entity object represents persistent information tracked by the system. The most common entity object is a database. The login problem requires that the user be authenticated. That is, the system must determine if the user is who the user claims to be. This is often done with a userid and password. There are many ways to authenticate a user.

- The ASP page can have the user name and password hard-coded into the page.
- The user name and password might be stored in a database.

It is assumed that the information to authenticate the user is stored in a database. However, these details are not important for this paper. Note that the database might just store a hash of the password (and a salt value) such that the user can be authenticated but the password is not directly stored in the database.

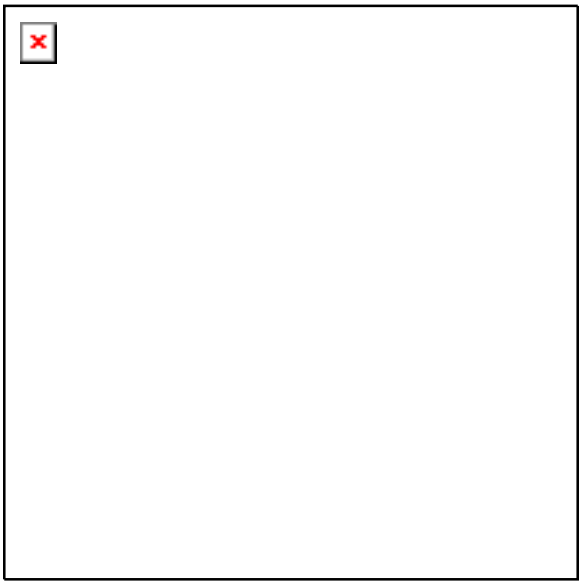
A control object represents tasks performed by actors and supported by the system. Control objects are the glue that coordinates the other objects. In the login problem, control objects include the web server (running ASP) and the database server (running T-SQL and SQL).

A web-based system is an example of a 3-tier client-server web architecture with a presentation layer, a business logic layer, and a database layer.

- The presentation layer is the client browser with HTML and JavaScript (for interactively and data validation).

- The business logic layer is the IIS web server with server-side processing using ASP (VBScript) and the database server supporting T-SQL.
- The data layer is a SQL database database that is on the database server.

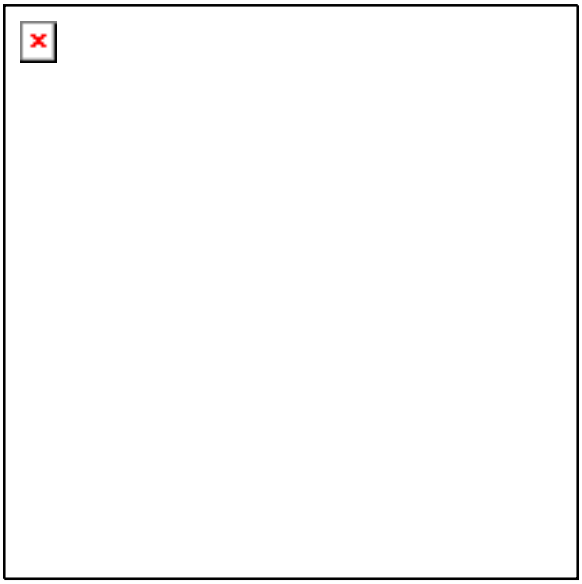
In a simple web-based system such as this, the system for the login problem could represent a combination of



- a web browser with HTML (Hypertext Markup Language) using client-side JavaScript processing,
- connected via HTTP (hypertext transfer protocol) to
- a web server running server-side ASP (Active Server Pages), and
- connected via ADO (ActiveX Data Objects)
- a database server supporting SQL (Structured Query Language).

SEQUENCE DIAGRAM

We can now refine our sequence diagram to the following using a UML sequence diagram created in Rational Rose. The steps are summarized here as the following flow of events.



- 1. The user clicks on a link to go to the login page.
- 2. The web browser requests the login page from the web server.
- 3. The web server sends the login page to the web browser.
- 4. The web browser displays the login page to the user.
- 5. The user fills out the login form.
- 6. The user clicks on the login button.
- 7. The web browser validates the information supplied by the user.
- 8. The web browser submits the login form to the web server.

- 9. The web server sends the authentication request to the database server.
- 10. The database server requests the relevant data from the database.
- 11. The relevant data is returned from the database.
- 12. The database server uses this data to authenticate the user and send the result to the web server.
- 13. The web server sends the menu page to the web browser.
- 14. The web browser displays the menu page to the user.

Note the following.

- The web server might cache the user authentication information as a session variable so that the database server need only be accessed the first time that the user is authenticated (for a given session).
- The database server would encapsulate the authentication code in a T-SQL stored procedure. Thus, the same stored procedure could be called from systems other than ASP systems, avoiding repetition of the authentication code in ASP pages and other systems. It also keeps the exact authentication method used secret and allows for the authentication method to be changed (e.g., going from a stored password to a hash and salt scheme) without changing the code that calls the authentication procedure.

Of course, as one moves toward implementing a real system, the specification required becomes more and more detailed. In supporting this level of specification, UML does become very detailed with the expected level of complexity of the software. For example, each ASP page, generated HTML web page, stored procedure, table in a database, etc., becomes becomes an object that requires specification. That level of detail is omitted here. A good source of more detailed information on using UML to design and implement web-based systems is [3]. Such implementation involves forward engineering, reverse engineering, and round-trip engineering. Forward engineering is generating implementation code from a specification model. Reverse engineering is generating a specification model from implementation code. Round-trip engineering allows forward engineering, reverse-engineering while supporting the reconciliation of differences in the existing specification model and/or implementation code.

Rational Rose can generate both a data (e.g., SQL) and a code (e.g, Visual Basic) framework for the system being developed using what is called forward engineering. There are limited facilities for taking an existing system and reverse engineering the models for the system. Round-trip engineering refers to going both ways. Of course, Rational Rose provides annotations in the code that serve as hints to allow both forward and reverse engineering. But even though a lot of data structures and program code can be automatically generated, the developer or student must still understand what is being done, especially if something does not work right. This can take quite a while to learn how to do effectively and efficiently.

Summary

This paper has presented a brief introduction to the Unified Modeling Language and Rational Rose software for specifying transactions in simple web-based systems. A simple example, the login problem, has been used to provide such an introduction.

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The Fundamentals and Practical Use of Certificate-Based Security in Secure Web-Based Systems

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Abstract

Secure key exchange, public key cryptography, and symmetric key cryptography help solve the problem of achieving secure communication between two parties. But how do you know with whom you are communicating securely? Certificate-based security is designed to solve this problem of identifying with whom you are communicating and is gaining increasingly widespread use as a way to identify web users, web servers, certificate authorities, etc. This paper/talk will discuss/present certificates from both a user point of view and from a server point of view as a prerequisite for supporting and using secure web-based communication using SSL (secure sockets layer) on a web server. The author will show how SSL has been used since Fall 1999 for providing students with secure web-based access to obtain scores, grades, etc., and for students to submit assignments and other written work as a secure alternative to unsecure email.

Introduction

Security is an increasingly important aspect of designing and implementing systems. Security is a natural by-product of systems design and implementation as an attacker will try to find the weakest link in a system and a good understanding of the entire system makes it easier to defend the system from successful attack. Attackers look for ways to attack systems, automate those ways, and share their knowledge and attack software with other via the Internet. Therefore, one must make sure that all the easy things have been done to protect the system. One must also keep up to date with any new protection methods (e.g., software patches and fixes) that must be installed. This is a time-consuming and tedious task. In addition, many software fixes and patches must be applied individually. The problem is made more difficult in that applying a software fix and/or patch may make the software fail in some way that adversely impacts the system on which the software is running.

For example, after a number of well-publicized macro viruses on Microsoft Exchange (server) and Microsoft Outlook (client), Microsoft added a few security patches and features that were automatically applied to Microsoft Outlook when the Office service pack was run. Among other things, the patch required that a program could only access mail items in a user's mail folders with explicit permission of the user, for a time period of no more than 10 minutes, requiring the user to point and click three times. The patch also required that any outgoing mail that used and/or automated the Outlook interface require that the user manually approve each outgoing email message with a built-in five second delay for each mail item. This broke quite a number of legitimate software programs that used Outlook to automate incoming and outgoing email. Un-

fortunately, once installed, Microsoft did not provide a way to un-install the patch without un-installing and re-installing the entire Microsoft Office package (and even that might not have worked). The author's own class administration software was impacted. The author must now do this in order to access existing email messages. To avoid the outgoing problem, the author modified the software to use direct SMTP outgoing email for sending email messages. The moral here is that one must often make decisions as to what fixes/patches should be applied. A good backup-restore system (e.g., disk imaging system) is invaluable in case something goes wrong, either from an attack or from applying a fix/patch to help prevent an attack.

There is no such thing as absolute security. Every increase in security has a price, and as long as humans are involved at some level, absolute security cannot be obtained. Many security mechanisms, such as combination locks, rely on the fact that someone will not use a large bolt-cutter on the lock, and will not spend the time necessary to try every combination. And security problems often come from places one might not expect. It is estimated that about 80% of security problems are from within the organization and not from outside the organization.

Accordingly, it is not far from the truth that when a terrorist attack occurs that breaks through security, the terrorists may, in fact, be part of the security that is being broken.

The author's interest in cryptography and security goes back to graduate school at Penn State and a course in number theory and where cryptographic algorithms were implemented in 8085 assembler to handle 2040 bit numbers (i.e., 255 bytes). These routines were interfaced to a Pascal system that handled the high-level details. The goal was to work with large prime and composite numbers, and to investigate aspects of both number theory and public key cryptography (i.e., the RSA algorithm). While Director of Academic Computing and network administrator at Shenandoah University from 1992-1994, the author got involved in many practical security matters. In recent years, the author has consulted on web-based e-commerce projects where security is very important.

This paper will first look at secure communication in general, the difference between cryptography and security, a brief background of secure communications methods in general, and then discuss certificate-based security in particular.

Secure Communication

Secure communication using cryptography can be abstracted to the problem of a sender encrypting a plain text message and transmitting it to a recipient so that it can be decrypted to the original plain text message by the recipient. The following attacks need to recognized and prevented.

- An attacker with access to the message should be unable to eavesdrop by decrypting the intercepted message to the original plain text.
- An attacker with access to the message should be unable to alter the message without the receiver knowing it.
- An attacker should be unable to forge a message to the receiver such that the receiver believes that the message came from the apparent sender.

Certificate-based security is intended to facilitate cryptography while allowing either or both sides to identify who it is with whom they are communicating securely. There are many problems with certificate-based security, but currently it seems to be the best solution that is available and practicable.

Cryptography and Security

Recognized cryptography and security expert Bruce Schneier wrote a best-selling book entitled "**Applied Cryptography**" [4] which described the mathematical basis for cryptography and provided source code that many a programmer has used to create secure systems. After writing the book, he started consulting for companies in the area of security. It was then that he found out how inadequate that book was in terms of the human factor of security. A friend told him that the world was full of bad security systems that were designed by people who had read his book. [5, p. xii]. The distinction between cryptography and security is important.

- Cryptography involves mathematics and proofs. It is neat, tidy, and exact. Cryptography appears to solve everything, at least on paper.
- Security involves people and systems. It is not neat. It is not tidy. It is not exact. But it is what really matters in real systems.

Schneier went on to write the book "**Secrets & lies: digital security in a networked world**". Anyone interested in security, as opposed to cryptography, should read this book. He states, "If you think technology can solve your security problems, then you don't understand the problems and you don't understand the technology. ... in order to understand the security of a system, you need to look at the entire system - and not at any particular technology." [5, p. xii-xiii]. A general information security system is sometimes discussed under the umbrella term of PKI (Public Key Infrastructure) which involves a system for managing the security of an organization.

As Schneier states, "***Security is a process, not a product.***". [5, 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. The term human engineering is used, especially in the hacker community, to refer to talking your way into getting the information you need from a human rather than getting it through a computer. Posing as someone else on the telephone, hackers can get password, configuration information, etc. For example, what would you do if someone called you who sounded like they knew what they were doing and said something like the following. "Hello. This is ***name*** from the IT department help desk and we are having problems with your account. If it is OK with you, all we need to fix it is your password so that we can login to your account, fix the problem, and then logoff. We'll let you know when we are done. It should only take a few minutes.". In a large company you might not know who is calling.

Secure Score and Grade Information

Since 1984, the author has provided score and/or grade information using various electronic and automated methods. A short summary of these methods is in [8]. The current method is a secure web-based method that uses SSL. This method is now briefly discussed.

From the teacher side, a "**Personal Page**" is generated for each student in the class by the author's classroom administration software [7]. The "**Personal Page**" uses **`https:`** security (e.g, SSL, or Secure Sockets Layer security), the same security used for most secure transactions (e.g., credit card, personal information, etc.) on the web. Active Server Page, or ASP, code is used to provide server-side processing of these pages to authenticate the user and to insure that the page has been called using the proper service connection. So, if **`http:`** was used but **`https:`** was supposed to be used, or **`https:`** was used but **`http:`** was supposed to be used, then the **`Redirect`** feature of ASP is used to redirect the page to the correct security service.

A student can access their "**Personal Page**" from the class web page. Since each page is generated individually, the page knows the student's login name. To authenticate the student, the student supplies their university network password. A special ActiveX control on the web-server allows the web page to determine if the login name and password are valid. Previously, and as a backup method, the author has used the classroom administration software to generate a "**Secret Name**" and "**Secret Number**" for each student and generate slips of paper for each student. The student then uses their "**Secret Name**" and "**Secret Number**" to login to their "**Personal Page**". The student's "**Personal Page**" includes the ability to do the following.

- check email received by the teacher
- check attendance record
- check scores and how they were determined
- check their estimated or final grade for the course
- submit assignments electronically (this part knows which assignments are due and currently uses SMTP email to send assignments from the web server to the email server)

By generating a separate page for each student, no database server is needed to access most of the information on their "**Personal Page**", except, of course, submissions by the student that are in the database.

The weak link in the system is probably the student's password (I won't tell you about any other possible weak links, or even if there are any known ones). The student's login name is public knowledge, as it is available through the student locator web page, so publishing that is not giving a potential attacker any

Information that is not already public knowledge. However, if the student does not have a secure password, then the system can be compromised. The next weakest link in the system is probably the web server, but the university has a vested interest in maintaining the security of the web server. In both cases, if an attacker guessed or obtained a student password, there are much more important things that would be compromised than just the information that the author publishes for each student.

Cryptography

Digest functions, or hash functions, are one-way functions that can be used to solve the tampering problem. That is, compute the digest of the message, append the digest to the message. Then,

encrypt the message. At the other end, the digest function can be used to determine if the message has been changed. This type of function, similar to a cyclic redundancy check, is commonly used in data communications and data storage/retrieval technologies. In cryptography, in addition, the messages must be securely encrypted where they originate and then decrypted when they reach their destination.

Efficient symmetric cryptography methods such as DES (Data Encryption Standard) exist to securely encrypt/decrypt messages by use of a symmetric key, provided that both sides have the key. The primary problem is in key distribution as encryption using the existing keys cannot be safely used to send the new keys. Otherwise, anyone who has broken the previous encryption scheme (i.e., determined the keys) would then have access to the new keys.

Public key cryptography, or asymmetric cryptography, partially solves the key distribution problem and makes possible the concept of digital signatures. The most popular public key cryptography method is the RSA (Rivest, Shamir, and Adleman), the details of which are not important here. What is important is that each user has a private key and a public key. Given the public key, one can encrypt messages, but one needs the private key to decrypt messages. Software can easily generate both private and public key pairs for any user, though generating large numbers of keys can be computationally expensive (there are hardware accelerators for such tasks, though). As public keys are public, the key distribution is partially solved.

The web version of public key cryptography is called SSL (Secure Sockets Layer) security. If enabled on a web server, it uses, by default, port **443**, for a service called **https:**, as opposed to the standard **http:** service on port **80**. SSL is easy to enable on a web server, if supported (as it is on IIS). The more bits used, the more secure is the communication. However, decisions involving how to use SSL are sometimes complicated. There is just one setting in one dialog box in IIS on the web server that sets the encryption strength security required to access the web server, and it is easily changed. The guideline for the client is that the client should use the strongest encryption available and that is supported by the server. The server can be set to always accept 128-bit encryption even if it is set to accept a lower level of encryption. The guideline for the server is less clear, as it involves making a business-technical tradeoff that can not be made based only on technical decisions. The decision depends on how much risk the server owner is willing to tolerate.

In general, asymmetric cryptography is much less efficient than symmetric cryptography. So, in practice, messages consist of two parts. One part uses asymmetric cryptography to form the digital signature and exchange symmetric session keys, good for only that message or session. The rest of the message uses the more efficient symmetric cryptography. This method was made popular by the email program PGP (Pretty Good Privacy) by Philip Zimmerman.

But if the keys are public, and anyone can potentially get access to them, how do we know that who claims to be sending the message is, in fact, the one sending the message? Since one can encrypt or decrypt plain text, user A can decrypt a plain text message first, then encrypt it with user B's public key and send it to B. Now, only user B can decrypt the message and then encrypt it using A's public key to make sure that it only came from user A, as only A can decrypt the message. This concept is the basis for what is called a digital signature.

But, how are we really sure that the person who claims to have sent the message is the one who really sent it? Digital certificates are used to help solve this problem and are sometimes called public-key certificates.

Certificates

The following are part of a X.509 certificate that is issued to a subject by a certificate authority such as VeriSign (a spinoff of RSA Corporation).

- version number of the certificate
- serial number determined by the issuer of the certificate
- signature algorithm that indicates the method used for the digital signature
- issuer name
- validity period when the certificate is valid (like an expiration date on a credit card)
- subject name
- subject public key information
- signed hash of the certificate data, encrypted with the private key of the issuer, to preclude tampering

A common extension of the certificate is to include a mechanism to determine a CRL (Certificate Revocation List). This is similar to checking a credit card revocation list to insure that the credit card has not been revoked. Another extension is to provide a list of ways in which the certificate may be used (e.g., login, e-mail, etc.). The problem here is that using a CRL slows web access for both client and server. As such, it may not even be maintained or used.

A close inspection of the contents of the certificate reveals the weaknesses of the certificate system. We can trust the certificate (that is, trust that the public key belongs to this organization) only if we trust the issuer of the certificate. By trust, we trust that the issuer has checked out and verified that the certificate is issued to who we think it is issued.

But who is the issuer of the certificate? That issuer has a certificate that is issued either by another issuer, who we have to trust), or themselves. So, the certificate system works by creating a hierarchy of certificates that involve cryptography and trusted company verification that the certificates are valid. Such a certificate system is similar to a driver's license that can be used to authenticate a person, but could possibly be forged. For more information the X.509 hierarchy of trusted authorities, similar to a notary public in the digital world, see http://ietf.org/ids.by.wg/pkix.html [as of Sat, Mar 30, 2002]. A root issuer of a certificate is called a root certificate authority. A root certificate authority signs their own certificate. Verisign is a well-known root certificate authority.

Certificates from well-known certificate authorities can be costly ($100 to $1000 or more per year for domain name use, $10 to $20 per year for client use). And, if you have multiple web servers and/or IP addresses, change domain names, change IP addresses, or lose your certificate or password, you will need to get a new one. To avoid these costs, you might choose to issue

certificates to yourself using Microsoft Certificate Server, included with IIS. The author found a few bugs in installing and getting it to work, but after applying some bug fixes (and fixes to the bug fixes) it worked as promised. However, there are an increasing number of vendors who offer software solutions to manage the entire PKI process as it makes little sense to have everyone in an organization to create and maintain their own security systems based on public key cryptography. Some of the problems that PKI and digital certificates do not solve are addressed by a paper available at http://www.counterpane.com/pki-risks.html [as of Sat, Mar 30, 2002].

Even if you get a certificate from a trusted source, such as VeriSign, there are other problems. Although there is a provision for revoking certificates (in a way that is similar to the expiration date on a credit card), most software does not support such revocation. In early 2001, a hacker posing as a Microsoft employee used human engineering to talk someone at VeriSign into issuing them two digital certificates with Microsoft as the trusted source as verified by VeriSign. Shortly after it was discovered, Microsoft started working on patches and VeriSign revoked the certificates, but the existing system for checking for revoked certificates is not really reliable or even used in most cases. Such a certificate would allow a hacker to have complete control over a client computer if that client computer downloaded an ActiveX control and trusted Microsoft the download. This would happen automatically if the user had checked the box to "Always trust Microsoft". In fact, not trusting Microsoft or VeriSign might make parts of the newer Windows operating systems stop working. The Microsoft fix would, presumably, check for that particular certificate, but there could still be problems. And many people do not update their software on a regular basis, if at all. Hackers systematically look for such prey.

Certificates on MSIE

Most users might be surprised to see how many certificates are on their computer system and how they are being used. For example, whenever you enter or leave a secure web site that uses **`https:`** SSL encryption, you might get a message warning you that you are entering or leaving a secure site, unless you have unchecked that option (details below). Every SSL connection requires some form of certificate trust. But do you get asked to agree to trust that site whenever you access it? If not, then you already have certificates on your machine to which you have given implicit permission to trust! Do you know what they are?

Before we look at the certificates on your machine, you might want to check out your current security option settings. To find these options in Internet Explorer 5.5, select "**Tools**", "**Internet Options...**", and select the "**Advanced**" tab. The following are included under "**Security**". The "**Certificate Status**" is "**This certificate is OK.**".

- "**Check for publisher's certificate revocation**"
- "**Check for certificate revocation (required restart)**"
- "**Do not save encrypted pages to disk**" (otherwise, anyone with access to your machine/account has access to these files)
- "**Empty Temporary Internet Files folder when browser is closed**" (if you check this, remember that it may take a while for the browser to close, especially the first time after you check this option)
- "**Enable Profiles Assistant**"

- "**Use PCT 1.0**", "**Use SSL 2.0**", "**Use SSL 3.0**", "**Use TLS 1.0**"
- "**Warn about invalid site certificates**"
- "**Warn if changing between secure and not secure mode**"
- "**Warn if forms submittal is being redirected**" (a redirected form submittal might indicate a security problem)

One way to inspect the certificates on your machine using Microsoft Internet Explorer 5.5 for Windows is as follows.

- Select "**Tools**", "**Internet Options...**".
- Select the "**Content**" tab.
- Under "**Certificates**", select "**Certificates...**". The following tabs are available.

    - The "**Personal**" tab contains your own certificates, if any.
    - The "**Other People**" tab contains certificates of other people.
    - The "**Intermediate Certification Authorities**" should list many certificate authorities.
    - The "**Trusted Root Certification Authorities**" should list even more certificate authorities.

- Select any certificate and select "**Advanced...**".
- Under "**Certificate purposes:**", any of the following might be listed.

    - "**Server Authentication**"
    - "**Client Authentication**"

    - "**Code Signing**"
    - "**Secure Email**" protects e-mail messages.
    - "**Time Stamping**" allows data to be signed with the current time.
    - "**Microsoft Time List Signing**"
    - "**Microsoft Time Stamping**"
    - "**IP security end system**"
    - "**IP security tunnel termination**"
    - "**IP security user**"
    - "**Windows Hardware Driver Verification**"
    - "**Windows System Component Verification**"
    - "**OEM Windows System Component Verification**"
    - "**Embedded Windows System Component Verification**"
    - "**Key Pack Licenses**"
    - "**License Server Verification**"
    - "**Smart Card Logon**"
    - "**Digital Rights**"

When you enter a secure site, the lock icon is displayed in the status area of the browser. When you move the mouse over the lock and hold it there, the fly-by hint might say "**SSL Secured**

(128 Bit)" meaning that SSL is being used with 128 bit encryption strength. Double-click on the lock to see the certificate information for the connection. For example, when a student accesses their "**Personal Page**", the certificate used by Winthrop University issued to "**faculty.winthrop.edu**" by "**Thawte Server CA**" is used. The certificate itself is, of course, public knowledge. To see this certificate, go to my web site at **`http://faculty.winthrop.edu/snyderr`**, select a current class, select "**Personal Pages**", select a student (even though you won't be able to login), enter secure SSL mode, and double-click on the lock in the status area. The "**Certificate**" dialog box appears.

One way to determine the encryption strength of the web browser that you are using is to select "**Help**", "**About**". The about box will display the encryption strength and provide a link that can be used to upgrade it, if desired. You should probably have **`128`** bit encryption strength unless you have a good reason not to have that level of encryption strength.

Note that the certificates being discussed have to do with the server, not the client. Client certificates can be used to authenticate the client, but are not discussed here. Another issue is that SSL certificates for the server are based on a URL that represents an IP address on the Internet. What is displayed on the screen may or may not represent information from the URL that is listed on the certificate.

To see general information about the certificate, select the "**General**" tab. The following is displayed for this tab.

- Under "**This certificate is intended to:**", the only entry is "**Ensures the identity of a remote computer**".
- Under "**Issued to:**", the value is "**faculty.winthrop.edu**".
- Under "**Issued by:**", the value is "**Thawte Server CA**".
- Under "**Valid from**", the value is "**4/16/2001**".
- After "**to**", the value is "**4/16/2002**".

To see the details of the certificate, select the "**Details**" tab.

- The "**Signature algorithm**" field is "**md5RSA**", a standard cryptographic algorithm.
- The "**Issuer**" field is "**E = server-certs@thawte.com CN = Thawte Server CA OU = Certification Services Division O = Thawte Consulting cc L = Cape Town S = Western Cape C = ZA**". Thawte is/was a company based in South Africa that was in the process of being acquired by VeriSign.
- The "**Valid from**" field is "**Monday, April 16, 2001 12:35:25 PM**".
- The "**Valid to**" field is "**Tuesday, April 16, 2002 12:35:25 PM**".
- The "**Subject**" field "**CN = faculty.winthrop.edu OU = Information Technology O = Winthrop University L = Rock Hill S = South Carolina C = US**".
- The "**Public key**" field is "**RSA (1024 Bits)** with value "**3081 8902 8181 0094 C89B FB69 683D E5EA 84D8 7F42 6C6C 2762 E9CF D8BF 3A62 FA6B 52E5 AB5B 5EB5 3287 41B5 42C7 BBAF 5DB5 39CC CEDB 2A41 542D 4CF4 66C8 045F B261 D333 0373 B686 AF3E 9C60 5298 2277 9223 6419 2A7E 23C8 C39F AAD8 2F2A 8D0C 126F 7176 00E7 C4A0 E80E DE19 2C56 8E42 857A 539F B1EF F71B 2B0A 4B38 C88B 3B1C**

EF14 8263 23A8 FECE 9502 0301 0001". Can you remember this key? There are **70*4** hexadecimal digits each representing **4** bits, or **1120** bits (some bits are for integrity checking of the key itself).

- The "**Enhanced Key Usage**" is field "**Server. Authentication(1.3.6.1.5.5.7.3.1)**".
- The "**Basic Constraints**" field is "**Subject Type=End Entity Path Length Constraint=None**".
- The "**Thumbprint algorithm**" field is "**sha1**", a standard cryptographic algorithm.
- The "**Thumbprint**" field is "**A979 B0D4 6C22 0076 E2F2 BE38 1209 9D44 31CB BC3E**".

To see the certification path, select "**Certification Path**".

- Under "**Certification path**" is displayed the path from "**faculty.winthrop.edu**" to the root CA, in this case, "**Thawte Server CA**".
- Under "**Certificate status:**" is "**This certificate is OK.**".

The certificate need not be installed if you trust the CA in the path of the certificate. To install the certificate, select the "**General**" tab and select "**Install Certificate...**". The "**Certificate Import Wizard**" appears.

- Select "**Next**".
- Unless you have a reason not to do so, use the default option of "**Automatically select the certificate store based on the type of certificate**". Select "**Next**".
- If everything goes right, the message "**You have successfully completed the Certificate Import wizard**" should be displayed. Select "**Finish**".
- A message box should then display the message "**The import was successful.**". Select "**OK**".

After installing the certificate, the certificate should be listed under "**Other People**". To see this, select "**Tools**", "**Internet Options...**", select the "**Content**" tab, select "**Certificates...**", and select the "**Other People**" tab. You can then select "**View**" to view the same details that were previously covered while at the secure site where the certificate was used.

Trusting or not Trusting Sites

Here is one way in Internet Explorer to determine which sites are being trusted and which are not.

- Select "**Tools**", "**Internet Options...**". The "**Internet Options**" dialog box appears.
- Select the "**Security**" tab.
- Select "**Trusted sites**". Trusted sites are sites that you trust not to damage your computer or data.
- Select "**Sites...**".
- You may wish to remove any sites that you do not trust. For example, my browser was set up to trust **https://www.aol.com**. However, I removed this site as I do not trust AOL.

- To add a site, type the URL of the site to trust in "**Add this Web site to the zone:**" and select "**Add**". For example, to trust T-Tech, type **`https://65.82.246.18`** and select "**Add**". The trusted site will appear in the "**Web sites:**" part of the dialog box. Do not forget to use **`https`** rather than **`http`** if the checkbox for "**Require server verification (https:) for all sites in this zone**" is checked, as it should be unless you have a reason not to do so.

Summary

This paper has covered a general introduction to certificate-based security in web-based systems, providing examples using Internet Explorer. As security problems are always being discovered, one must be sure to always keep up with the latest in security ideas and technology.

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An Introduction to Classy Software for Automating Classroom Management Tasks

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Abstract

Classy, developed by the author, is easy-to-use classroom management software that allows a teacher to automate many tedious and time-consuming administration tasks associated with a class. This paper/talk will present, demonstrate, and discuss Classy, to include the following features: Setting up semesters, classes, sections, students, dates, categories, total score formula, and requirements. Acquiring, cropping, and matching student images with names. Announcing requirements via email, collecting requirements via email, annotating submitted requirements with scores posted to the gradebook, and sending results back to students. Entering scores and assigning grades. And, very importantly, accessing any student submission or correspondence in a matter of seconds.

History

The original Classy system, as described in [1], was a mainframe-based system written in REXX for VM/CMS and used at Penn State from 1985 to 1990 to automate many class administration tasks. At that time, there was considerable interest in what Classy did, but the main question was, "But how can I make use of this great technology for my classes". Unfortunately, porting such software is not easy. Over the years, bits and pieces were rewritten from scratch, using the original ideas of Classy, in Turbo Pascal for DOS. But the system remained a somewhat disjointed collection of programs that worked, but were high-maintenance pieces of software. There were copy-update problems/features throughout the system that were adjusted as needed. Over time, Novell NetWare hooks were added, Visual Basic hooks were added, etc.

In December, 1998, the author made the decision to consolidate the functionality into one easy-to-use program that would run under Windows 95/98/NT and provide Internet hooks for certain tasks. Since much of the original code was written in Turbo Pascal, the natural upgrade path was to use the successor of Turbo Pascal, which is Delphi. That is, Turbo Pascal 7.0 used version 7.0 of the Pascal compiler. Delphi 1.0 used version 8.0 of the Pascal compiler. And so on. It is interesting that the primary architect of Turbo Pascal and Delphi is the same person who was hired by Microsoft to be the primary architect of C# and a chief contributor to the .NET framework.The rest of this paper describes the general functionality of the new and improved Classy, here just called Classy since the original version is no longer used.

Some future directions include creating a marketable version of the software. This is no easy task as the complexity and details required to do so are nontrivial. In the spring of 1999, the system

consisted of about 25,000 lines of Delphi Pascal code and seemed near completion. In 2002, three years later, the system is 100,000 lines of Delphi Pascal code, and there always seems to be something to be done. But, the end seems much closer than it did when the system was first started. The rest of this paper describes, in general, some of the design and implementation goals of Classy in its current form.

Goals

The general goal of Classy is to provide software that will help perform routine administration tasks that are required to teach a class.

- The teacher is the person teaching the class.
- The students are the people taking the class.

The functionality for Classy includes the base functionality that is ready for general use. Functionality that is under development but not ready for general use is not discussed. As this is a short paper, many user interface or convenience features are not discussed.

The following are the general areas of functionality for Classy. Most of these categories will be discussed in turn.

- Setup: Teacher, semesters, classes, sections, students, etc.
- Grading: Categories, total formula, requirements, scores, histograms, grades, letters, and subscores.
- Students: Broadcast, individual student, reports, etc.
- Attendance: Class dates, images, attendance, analysis, etc.
- Submissions: Resolver, and versions of Collect and annotate for dialogs, documents, presentations, etc.
- Exams: Rooms, seating charts, etc.
- Utilities: Find a student, security settings, WebCT hooks, etc.

Although the Classy system can seem somewhat overwhelming at first, every part of it is designed to put the most likely things that you will need to do at the point where you would be when you need to do them.

A user interface consideration is that the Classy system should attempt to remember where you were for each class so that you do not need to find your place again as you move from class to class.

Certain actions can be performed for all classes.

Currently, all of the user data files are stored in a subdirectory on the hard drive. For user convenience, the plan is to store all of these is a structured file so that the user has only one file of concern.

Classy Framework

The Classy application framework is supports the following.

- A multiple menu system that has separate menu systems for menu items that are in all applications like Classy, menu items that are part of Classy, and menu items that are part of the specific form being used. This helps alleviate the problem of looking for menu options that are specific to the form being used or the application being used.

- A toolbar allows quick access to any semester, class, class student, category, requirement, section, section student, or section date.

- Most colors in the system are user-configurable via drag and drop.

- A simple context-sensitive web-based help system is provided.

Setup

The setup consists of setting up the database structure of the class, briefly discussed here.

The most important required setting is the directory/folder where all Classy information is to be stored. This location is stored in the Windows Registry or can be specified on the command line. All other settings are stored in a `.ini` file that is in the Classy data directory.

The teacher provides information such an name, initials, userid, office phone, etc. A signature file is used to append information to messages. Outgoing email information includes email address, and up to SMTP outgoing email systems, one for home and one for work. This allows Classy to dynamically determine which outgoing email system to use to send email. Optionally, Microsoft Outlook can be used to send email in which case this information is not needed. Incoming email information includes the POP3 host, address, and password. Optionally, Microsoft Outlook can be used for receiving and storing incoming email. There are hooks for assisting in using Microsoft Outlook as the email system. The teacher can provide information about both the teacher's development web page system and production web page system. The teacher can provide FTP information to allow Classy to automatically update either the development web page system and/or the production web page system.

The top-level organizational unit for Classy data is the semester or term organizer.

The next level is for individual classes. Properties of each class include the school, school id (used to determine the letter grade scheme to be used for this class), the semester name, a short abbreviation for the semester, a long and short course title, credits, number of meetings, course prefix, and course number. The student email template and student web page template is used to determine the student's email address and web page address form their official userid. Some of the class properties have global default settings that are used whenever a new class is created.

Once a class is created, sections in the class can be created. Letters from **A** to **Z** are used to identify class sections although a short text label is also used to identify the section. The **Z** section always exists and is the dropped student section. Properties for the section include the registrar designation for the class, the section days, section time when the class meets, section room, and secondary registrar identification for the class.

Once a section is created, students can be added to the class. Student properties include the official ID, often a SSN, the official name, the class userid, the class name, gender, major,

official userid, and secret name and secret number, and information line to store something by which to remember the student. There are several ways to add students to a section. Manual entry allows students to be added manually. Clipboard automated entry allows text in the clipboard in a certain format to be pasted into the section. Text file fixed field entry allows the specification of the format of a text file so that the text file can be imported into the student list.

Grading

The grading subsystem works as follows.

A teacher creates categories under which course requirements are created. A letter from **A** to **Z** represents each category, so there are **26** categories. This is probably sufficient for any course. Some typical categories are as follows.

- **A** for assignments
- **Q** for quizzes
- **E** for exams
- **F** for the final exam
- **P** for projects

Each category has the following properties, briefly discussed here.

- Each category is given an integer point total for the course. The author usually bases the course on **1000** points, but any point total can be used. Note: Points can be scaled in the formula section, if desired.
- Each category has a description, color.
- The default text for each category is used whenever a work requirement is created from a category. For example, the default text "**Exam#%i%**" will create, in order, the work requirements **E1** with default text **Exam#1**, **E2** with default text **Exam#2**, etc.
- The default points for each category is used as the number of points for each created work requirement. Once created, the points for the work requirement can be changed.
- The category can be specified as an on-line submission either with or without a file attachment.
- For categories representing tests, the number of versions can be specified.

- A category can be hidden from the student when results are published as might be done for categories that are used by the teacher to organize material rather than be a student requirement.

As work requirements are created from categories, a visual indication is provided to indicate if too many or not enough points have been created for that category.

Once the categories used for student requirements have been created, a formula used to determine the total score for each student is created. For example, a teacher might allocate **`120`** points for the **`Q`** category, but specify the contribution to the formula as **`DROP(Q,1)`** indicating that one quiz score is to be dropped. In this case, the contribution of category **`Q`** to the total score is **`100`** points, not **`120`** points. Output from the formula includes a textual summary of the formula (e.g., to copy and paste into the class syllabus), a textual list of detailed rules for how the total score is determined (e.g., to copy-paste into a syllabus), and a pie and bar chart of the contribution of each category to the total formula.

Work requirements are created by dragging and dropping a category onto the requirements grid. Each work requirement has the following properties.

- Each requirement has an announcement date, a due date, a graded date, an optional redo date, and an optional re-grade date.
- The requirement point total, description, on-line submission status, hidden status, and versions (for exams, etc.) starts as the start value from the corresponding value in the category of the requirement.

Currently, all requirements that are on-line submissions share the same time of day when the original (or redo) is due. Requirements that are on-line submissions can be announced to students via email.

The scores form is the gradebook that is used to record student scores. The total column in the gradebook is where the calculated total from the total formula is displayed. Rows and columns can be moved as desired. A separate form can be used to inspect and edit an individual student's scores. This can be useful to personally go over a student's scores with the student without letting the student see another student's scores.

A histograms form allows the teacher to view stem and leaf diagrams (horizontal histograms) for every work requirement. This can be published so that students can see where their score places them in comparison to everyone else in the class.

The grades form allows the teacher to determine the letter grade that a student has earned for the course. All of the students for the course (except those in the dropped section) are ranked according to their percentage score based on the total score for the course that has thus far been assigned. Currently, there are two method for approximating the letter grade, a raw percentage cutoff and a guaranteed grade point average method. The teacher, however, is free to assign any grade desired to each student (but, hopefully this freedom does not go against any promises made in the syllabus, etc.). A bar chart is created for the distribution and the overall GPA is calculated

and displayed. Generated report options include no grade report, a tentative grade report, and a final grade report.

The letters form allows the specification of the allowable letter grades for the class. Multiple letter grade schemes can be created. A letter grade scheme needs to be assigned to the school id of each class.

Students

The students subsystem includes broadcasting messages, student information, and reports.

The broadcast form provides a simple way to manage and send selected students email messages.

The student form provides a way to inspect the scores and totals for a given student without letting the student see other student's scores and totals. The totals form provides a precise accounting of exactly how that student's total score was determined. There are three notes pages, one for general notes about the student, one for good comments about the student, and one for bad comments about the student. This allows these three categories to be kept secret. Other forms allow inspection of current attendance status and the scores that are made available to the student via a secure web-based personal page (not described in this paper).

Attendance

The attendance subsystem includes dates, images, attendance, and analysis of the attendance.

The dates form allows the easy specification of the dates for the class. The number of dates should match those specified for the class in the class form. Otherwise, a visual indicator is given of the mismatch.

The images form allows the easy capture and cropping of student images, matching names with faces, and the specification of the gender of each student. Recording the gender of each student can be useful in narrowing the search for a given student. The images make face recognition much easier. The entire process can be done very efficiently and effectively using standard video conferencing cameras.

The attendance form allows the teacher to visually and easily take attendance for each class meeting. The current settings for each student for class are absent, arrived late, left early, or present. Taking attendance visually assumes, of course, that a computer is available in the classroom. Another form allows the easy generation of a class roster to either pass around class or to be used to take manual attendance. Another form has a grid, similar to the score grid, that can be used to manually enter attendance information from the roster. An optional feature allows a message to be send to every student who missed class. Another form allows the message text for this message to be specified. The author's current attendance policy is to excuse a class absence if the student provides a reason why class was missed. The teacher, however, is free to use any policy desired (and can adjust the message text appropriately).

The analysis form allows the teacher to visually and quantitatively analyze the relationship between attendance and work requirements.

Submissions

The submissions subsystem provides a way to announce, collect, annotate, and return on-line submissions.

Requirements that are on-line submissions can be announced to students via email. There are two ways for students to submit on-line submissions. One way is to send every student a message with an encoded subject line. The student then replies to the message, without changing the subject line (any automatically added **Re:** or **Fw:** are ignored), and sends the reply to the teacher. This is now the backup way as most student submissions are now on-line submissions via their web-based "**Personal Page**".

Some students invariably send submissions without the proper subject line encoding. The resolver form can be used to process the inbox and place a submission into the proper work requirement for that student.

The teacher can collect assignments from all classes in the current semester by pushing the appropriate button.

There are a number of collection forms for dialogs, documents, presentations, web pages, and several programming languages. Each allows the teacher to incrementally create and add annotations and/or deductions to the submitted work in text form. A quick index feature allows quick locating of previous deductions. The highest score for each submission is automatically placed in the gradebook for that student. The submissions can then be returned to the students. An option synchronizes the point deductions and message text for all submissions for that work requirement for that class and creates a summarized list of the deductions suitable for publishing on a web page. A button allows a context sensitive action for that work requirement. For example, the documents form goes to the Word document. The presentations form goes to the presentation. The C++ form compiles the program and displays the output (note: a special batch file needs to be created for each programming language compiler that is to be added to the system). The web page form goes to the student's web page.

One nice feature of automatically collecting and annotating assignments electronically is that all student submissions for the entire course can be archived for future use. Note: This does not include, for example, on-line web-based systems that are not required to be submitted either as text or as a file attachment.

Exams

Currently, the exams subsystem provides a way to create/edit rectangular room layouts and then create seating charts for exams. The charts are randomly created, but, once created, students can be moved to particular seats, if desired. If the room layout is in a particular form as a Word document template, a more pleasingly visual layout chart can be automatically created.

Utilities

The utilities subsystem includes a number of useful utilities.

The find form, easily accessible from any form in the system, can be used to quickly find a student and return to the original form using that student as the currently selected student. The search can be narrowed by gender and/or by a text pattern. If images are used, the images of students remaining in the search are displayed as the search is narrowed. The goal is to quickly find a student in the class.

The security form allows the setting of the shading to be used for any part of the system that is considered confidential. In the worst case, that part of the screen is blacked out. But, many projection systems are such that setting the foreground and background colors for the security settings can allow the teacher to read the information on the screen while the students would be unable to read the screen off of the projection system. This form provides an easy visual way to test and save these settings on a section by section basis.

Advising

The Classy system can be used to assist in advising by creating an advising class and then adding students to the various advising sections. The attendance feature can be used to keep track of which students have been advised during that semester. The notes part of the student form can be used to keep advising notes during the advising section. And, of course, the email broadcast and individual email capability can be used to contact the student.

Summary

This paper has presented an overview of classroom administration software, created by the author, called Classy. It is an easy-to-use software program designed to help with classroom administration tasks.

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Technology Assisted Learning for Inclusionary Practice

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Today's teachers must serve as both effective classroom managers and facilitators of learning for all students. To be effective in the inclusive classroom, teachers need to be aware of the cognitive, physical and psychological needs of all students in the classroom. Technology assisted instruction enables teachers to meet the individual learning needs of their students. The academic challenge is to create learning environments that match the variety of learning styles, skills and preferences of today's students. While both college and basic education faculties are engaged in developing teaching methods to match student learning styles and skills, there has not been uniform integration of technology to enhance the learning process.

Research has shown that effective integration of technology into curriculum significantly enhances the student's interest and participation in the learning experience (Cromwell, C. & Worland, P., 1994: Monaghan, P., 1993). Active involvement in learning yields higher student involvement, lower drop out rates and increased overall learning. Technology can also provide for remedial support, enhanced exploration for the gifted and/or diversification of instructional methods.

However, college faculty preparing future teachers are not demonstrating effective use of technology in their own teaching. They have not had the appropriate training in the integration of technology into classroom teaching and in many cases do not have effective classroom environments to allow for such instruction. This is also true for many basic education teachers. Thus, the current generation of pre-service teachers have not had faculty demonstrate effective integration of technology and are not being supervised by cooperating teachers to effectively use technology in the teaching-learning environments. In addition, faculty have not been taught to teach for inclusion (i.e., variety of learning styles, learning disabilities) and therefore do not use technology to assist in expanding the learning environment. This cycle must be broken so that the next generation of teachers is prepared to fully utilize the technologies available to assist in quality instruction for all students.

Seton Hill in collaboration with three K-12 school districts served 2,210 students, including 260 pre-service students and 1,950 students in basic education through the Technology Assisted Learning for Inclusionary Practice (TALIP) project. The program integrated technology into the learning experience for these students by assisting 31 teachers (15 college faculty and 16 K-12 teachers) in the development of their technology skills. Further, the TALIP program introduced or refreshed their knowledge of inclusionary teaching strategies and provided training in the use of technology and technologically assisted pedagogical instruction to advance competencies in the inclusionary classroom. The TALIP program also created model teaching and learning environments at Seton Hill College to sustain on-going training programs for K-16 faculty for the long term.

Program Activities

TALIP participants were drawn from Seton Hill faculty directly involved with teacher training representing the disciplines of art, biology, chemistry, communications, early childhood, elementary education, English, home economics, music, history, and special education. Basic education faculty were invited to participate from three identified school districts and received six graduate credits for their study in inclusion and technology. Preference was given to teachers who had served as cooperating teachers or who were interested in serving in the future.

All participants completed a self-rated technology competency survey at the start of the project to determine their level of familiarity and skills with technology.

Inclusion Training. A five-day workshop was presented to raise the participants' awareness and commitment to students with special needs by providing information on each of the major disabilities, legal implications of inclusion and teaching strategies to address each disability. The disabilities chosen were limited to those that are included in the Pennsylvania special education certification for teachers of the mentally and physically disabled populations.

Technology Training. Participants were exposed to introductory usage of all Microsoft Office tools, course management software and synchronous distance learning. All instruction focused on skill application as related to teaching and classroom management. The following describes the specific components of the technology training:

- MS Word Training. Participants learned how to create, revise, manipulate, and print documents, as well as how to personalize MS Word in line with individual preferences. For the more experienced MS Word user, the training resulted in an inclusive review of MS Word essentials.

- MS Excel Training. Participants learned how to create, revise, and print worksheets. They also learned how and when to utilize common Excel functions, manipulate multiple worksheets, and create charts.

- MS PowerPoint Training. The training was designed to provide each participant with the ability to create professional presentations for classroom instruction. Participants learned how to create a blank presentation, add content to slides, add new slides, apply a design

to slides, manipulate slides, attractively format slides, animate slides, create tables on slides, and professionally present the final PowerPoint presentation.

- MS Outlook & World Wide Web Training. Training was conducted in MS Outlook and the World Wide Web to ensure participants were familiar with the essential functions and capabilities of each tool. Participants learned how to customize MS Outlook in line with individual preferences, compose new messages, send attachments, and manage messages. A brief history of the development of the World Wide Web and an overview of Internet terminology was also provided to the participants during this training session. Participants practiced opening Internet Explorer, setting a home page, adding and organizing favorite web sites, and finding information on the Internet. Improving Internet search results was also a focus of this session.

- Web-based Instruction. Participants were provided with an overview of web-based instruction utilizing the features of Blackboard.com, a free service that enables instructors to add an online component to their classes or even host an entire course on the Web. In addition to the overview of Blackboard.com, discussion revolved around the advantages and disadvantages of web-based instruction, learner characteristics beneficial to a distance learner, techniques for effective instruction, and effective online course development.

- Videoconference Training. In the videoconference training participants were introduced to the basic aspects of videoconferencing technology, the different types of videoconferencing systems, the appropriate uses of videoconferencing, and how to facilitate a multipoint videoconference. The training also focused on necessary planning considerations to promote an interactive learning environment, as well as important instructional strategies to keep in mind during a videoconference presentation.

Project: Course or Instructional Activity Integrating Technology. All participants were required to revise one course and/or instructional activity so that instructional strategies were enhanced by the use of technology. Such enhancement included the use of discovery centers, development of web pages, integration of multi-media learning tools, development of simulation activities, linkage with students in other schools or geographic areas to expand student diversity, incorporation of experiential learning activities supported by technology.

Outcomes of TALIP Training

The technology training assessment protocol required each participant to demonstrate functional facility for each training topic, with the exception of MS Outlook/World Wide Web and Videoconferencing, by completing a comprehensive activity at the end of the training session. Participants successfully fulfilled the requirements of the activity by demonstrating an achievement score of no lower than 85 percent. The overall activity was assessed as successful if 95 percent of the participants demonstrated functional facility for the activity.

Each training activity was assessed as successful because at least 95 percent of the participants demonstrated functional facility for each assessment activity: MS Word, 97 percent; MS Excel,

97 percent; MS PowerPoint, 97 percent; and Web-based Instruction, 97 percent. All participants submitted final projects consisting of one revised course and/or instructional activity, thus demonstrating a 100 percent success rate for the "Course or Instructional Activity Integrating Technology" project.

As part of the assessment protocol, each of the participants was required to write a reflection on their experience in the TALIP Project. Without exception, each participant found the training to be beneficial and, to a greater or lesser extent, alleviated their fears about using technology in their course preparation and made them more aware and willing to try new ways to meet the learning needs of students in their classes. The following reflections are representative of comments expressed by a range of participants:

- "The program has been the bridge that took me from wanting and needing to help my students learn without me to actually doing it. ...I would rate the TALIP program a "nine" on a scale of ten. The program has been of great value to me, and I would be willing to share my experiences with anyone interested." (High School Science Teacher)

- "TALIP has diminished my fears of teaching computers and how to use them in the classroom with various subjects. TALIP has created awareness in me to focus my curriculum on inclusion and technology. I have learned to adapt much of what I teach to inclusion of all students in my classroom. I'd rate my final TALIP project a ten plus. My goals are to continue to develop the other subjects I teach as I incorporate technology and inclusion. TALIP has sparked my interest in technology to improve my skills and make progress." (Third Grade Teacher)

- "I gained a clearer understanding of the diversity of learning styles represented by the students in my courses. I have learned that my students come from a variety of educational backgrounds and that they approach the task of learning in different ways. I also was sensitized to the possibility that I will have in my courses students with specific disabilities that I will need to accommodate." (College Faculty)

What to Consider for Future Training

In order to have a successful partnership between the college and local school districts, on-going communication is vital. The college liaison must have a good working relationship with the superintendent, principals and teachers in each school district. Understanding the school district's needs and circumstances is vital, including curricular and technological needs as well as practical needs, such as issues of providing qualified substitute teachers while the regular classroom teacher is involved in training activities, or scheduling training activities outside of the contracted school day.

The TALIP project attempted to train K-12 and college faculty simultaneously. It was assumed that by grouping teachers according to content area or interest, the training program would assist in developing a mutual understanding of the challenges faced at the different levels of education. Due to the anxiety many faculty and K -12 teachers brought into the technology training, mixing

learners was not as effective. In addition, college faculty and K-12 teachers have very different experiences related to the issue of inclusion. Since the level of accommodations necessary in K-12 is much greater than those necessary on the college level, K-12 teachers were more open to and able to apply inclusionary strategies, while college faculty needed additional assistance in applying inclusionary practices. In addition, presentation of legal issues must be different for each group, since the required accommodations are managed differently by higher education and college faculty; unlike K-12 teachers, college faculty are not required to participate in establishing Individual Education Plans (IEPs).

Creation of Technology Friendly Teaching Spaces

Seton Hill believed that faculty must have access to classrooms where it made it easy to integrate technology into instruction. As part of the TALIP project, six classrooms (Art Education and MacIntosh laboratory, Educational Methods Classroom, Humanities Laboratory, Music Education Computer Laboratory, Molecular Modeling Laboratory, and the Technology Enhanced Learning Classroom were originally designated to be made *technology friendly*. After the faculty professional development training took place, additional classrooms were outfitted because of the increased demand for technology.

In addition to the classrooms on the Seton Hill campus, the technology laboratory assistant consulted with the partnering school system to update the elementary school laboratories, develop a new login procedure that was more adaptable to young children and children with disabilities, and many teachers purchased equipment to support teaching in their individual classrooms.

In conclusion, based on course and lesson transformation, participant comfort with technology and understanding of inclusion issues the TALIP project is deemed successful. A similar replication in other systems would be useful in the training of pre-service and in- service teachers as well as college faculty in general.

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Seton Hill College Technology Assisted Learning for Inclusionary Practice Web Site: http:/ /www .setonhill.edu/~talip

ITraining - Changing Methods, Changing Your World

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Abstract

Incorporating presentation with active participation will give colleagues an appreciation for new training methods. Using a mock training session, this session will help faculty, staff and administrators see the need to use dynamic training methods. Trainees will become excited about technology and progress with its changes rather than focus on past capabilities. Understanding new methods will help promote new ideas and, eventually, change the world in which IT staff work.

Note: The author did not submit a paper before the proceedings were printed. It is not clear if this presentation will use a paper, but if it does the author will make it available in print or electronic form.

Electronic Portfolios: An Emerging Tool in Allied Health

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Abstract

Information technology allows us to break away from traditional means of evaluation techniques in higher education. Additionally, it links us together in ways that we never dreamed possible, by helping to overcome the constraints of distance and time. In the education and training of students, educators must develop cutting-edge tools to enhance the students' educational and professional development.

An electronic portfolio is an emerging tool in the professional development of students as well as being utilized as an evaluation method by faculty members. The portfolio serves several purposes:

1.Requiring the student to reflectively consider what professional development is and providing the opportunity for documented evidence of professional growth.

2.The portfolio proves the student, as well as the faculty member and potential employers, with a unique tool for assessing what has been gained through the academic career and through supervised clinical experiences.

The presentation will focus on the evolving technology in allied health, the rationale pertaining to electronic portfolios, and the benefits of the electronic portfolio for the student, faculty member, and potential employer. Additionally, the development of the electronic portfolio, parts to be included in the product, and the overall process of creating an effective electronic portfolio will be presented.

Finally, the presentation will focus on the actual implementation of the electronic portfolio in an allied health program graduate program. Although the presentation uses the allied health field as a model, faculty members are able to apply this concept in any discipline.

Note: This paper was not ready when the proceedings were compiled. The author will provide copies at the conference either directly or via the web or email.

Have an Angel on your side when you develop your courses on the web!

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Abstract:

Are you interested in providing web access for your courses? Placing your syllabus, lectures, quizzes, tests and more on the web what you want without having any web development skills. Angel is software that your university can obtain free of charge and you can use it to maintain your classes on the web. In this paper we will discuss what your system administrator must do to install and maintain the software and what you as a user will need to do to maintain a class using the Angel software. We will also discuss pros and cons of using this software from first-hand experience of a new user and system administrator.

Introduction:

In this paper we will discuss the use of Angel software that can be used to provide a presence on the web for a course. The software can be acquired for free in the basic format or if additional features are desired the full software package may be purchased. For our paper we will concentrate on the features that come with the free version of the software package. We will discuss what is needed to install and administer the software. We will also talk about implementing the use of the Angel software in the classroom and get feedback from the instructor, administrator and students who used this software.

Software Features:

Angel Software was developed to provide a web presence for courses. With this software you are able to provide many capabilities on the web for your course. Following we will list the features of the software.

Security
The software provides login capabilities to access all material on the web. Users have roles of either administrators, instructors and students and in order to access the software users must be assigned a username and password.

Courses
With the Angel software package you can set up multiple courses for each instructor. Students are only allowed access to the courses they are enrolled in. Instructors can maintain all courses they create.

Course Syllabus
Angel provides the capability to develop a standard syllabus in the software with a set of predefined fields that can be completed by the instructor. The package also allows you to link to a syllabus created and saved in a word processor such as Microsoft Word.

Course Enrollment
The package allows either the instructor to create student enrollments for a course or allows the instructor to set up parameters and allow students to enroll on their own.

Calendar
A calendar can be created for each course. This calendar is then available to the students to view activities and assignments that are upcoming in the course.

Creation of Folders
The Angel software allows the instructor to create folders that can be used to organize course material. These folders can then be linked to material developed by the instructor such as: class slides, lab assignments, exercises, and grades. Access to information in the folders can be controlled by a feature that determines the beginning and ending times that the material will be visible to the students. This allows the instructor to develop the material ahead of time and make available when required.

Student Activity
The software provides the instructor to monitor the student activity using the software. You are able to monitor in a graphical format the times that students logon to the system.

Tests and Quizzes
You can develop tests and quizzes for administering on the web. There are a variety of formats for questions including: true-false, matching, multiple choice, and essay. Questions are created in Angel and the instructor provides the answer and point values for each question. The instructor may also provide feedback that is displayed to the student if they give an incorrect response. The time that students can access the test or quiz can be specified and for practice quizzes and test the number of times a student may take the quiz or test. Students then login at the assigned time and take the quiz or test and submit it for grading. It is then graded by the software package and students receive their scores immediately. The scores are recorded for the student and the student and instructor can review their scores at a later time. Using charts provided by Angel students can check to see how they performed compared to the rest of the class. Instructors can also review the data in charts provided by Angel.

E-mail
When enrolling students in a class the instructor provides an email address for the student. Instructors and students can then communicate via email throughout the semester. In order to receive the email instructors and students must logon to Angel.
A notice is presented to the user notifying them that they have unread email. When students are enrolled the instructor can assign students to groups and emails can be sent to either the individuals, groups or the entire class.

Chat room
The Angel software allows the instructor to have a chat room setup for each class that they teach. This feature allows the instructor to have virtual office hours that can be utilized with instructors and students either at home or school.

Administration:

AngelSetup40.exe application program can be downloaded from http://cyberlearninglabs.com. This program is free for non-profit organizations, K-12, and higher educations in the United States. The latest version of the program is about 18MB if you are connected to the Internet via broadband. It should only take a couple of minutes to download. Once the download is complete you are ready to install. This program can be installed on any Windows-based machine with a web server running. Simply double click on AngelSetup40.exe and it will take you through all the setup procedures. Once the installation is complete the administration is also very intuitive and simple because it is 100% web based. The steps to install are detailed in the Appendix.

Using in CPT 172 Course:

In previous semesters I have used the web to enhance my courses. Using pages I developed in Microsoft Frontpage I provided students with web access to the course syllabus, schedule, lecture slides, course announcements and grades. For the most part I have been satisfied by the results and in student surveys, students have conveyed their satisfaction with the web access. When made aware of the availability of the Angel software I was willing to test the software out and compare to my own homegrown system that I developed based on my limited background using Frontpage.

I decided to use the Angel software in a three credit hour course called Introduction to Application Development. This course was offered in the Spring 2002 Semester. The course meets twice a week and contains a lecture and a lab. 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.

I decided to use the software in only one class the first time to allow me to get familiar with it. For the rest of my classes I used my traditional approach. I chose the CPT 172 course for several reasons. First, the section I was teaching that semester was a small course with an initial enrollment of about ten students and could be easily managed. Another reason I chose this course was that this introductory course typically provides many labs and exercises that I could make avail-

able on the web. The class typically has weekly quizzes that I thought would be a good and manageable test of the quiz facility that was available with the software.

The week before classes began I set up the CPT 172 Course. The administrator gave me access to the Angel software and I created the initial setup of the course. This was fairly easy to do although a user manual would have been nice to discuss the capabilities and instructions. Online help was available and although not great, it provided the information needed to get started. I typically create my syllabus in Microsoft Word. Since I had taught this class in the fall semester, I only needed to tweak it to use for the spring. For that reason I decided to link to my syllabus instead of using the form provided by the software. This would have required me to re-key my syllabus or cut and paste from my Word document. This proved to be very simple to do. I simply placed my document on the web server in a location designated by the administrator and typed in the proper link. The form provided looked as though it would have done a good job if I were developing my syllabus for the first time. It had typical section headers for each that you would find in a syllabus.

I decided to enroll my students in the course instead of having students do it themselves. I did this in order to get the class set up in advance and do a little investigating of the capabilities in advance to the beginning of class. Although, not difficult, it proved to be time consuming to key in the information about each student. The next time I think I would have students enroll themselves. This would save the instructor the data entry time and allow students to create their own usernames and passwords instead of having me distribute them to class. The first day of class would be a good time to introduce the software and have them enroll. This would also allow students to set up email to their personal email accounts. I enrolled students and used the campus emails provided on my class rosters. Many times students prefer to use their personal accounts. Other than a few typing errors on my part, this went smoothly. The first day of class I discussed the software, distributed the usernames and passwords and had students logon to the system to explore some of the features.

I created several folders that I planned to use for the course. I included folders for exercises, labs, quizzes, lectures and lab slides. This was very useful in organizing material to be used in the class. Although, I still provided students with paper copies of labs and exercises I could foresee eliminating the paper copies that I distribute in class. This did eliminate some of the typical requests that I get from students who have lost their copies of handouts provided in class. This along with the Powerpoint slides that I provided allowed students to access course material in a very convenient manner.

One of the features that I was really looking forward to implementing in the course was the quiz and test feature that the Angel software provided. In the CPT 172 course I typically give weekly quizzes over reading and lecture material. The thought of having these administered and graded by the software was extremely exciting. As mentioned having taught the class previously I had several versions of quizzes available that I had developed in Word. Most of these were true-false and multiple choice questions. Although, it would have been nice to load the entire quiz in the software (we always want things easier), the software required you to select a question format, enter the questions in one at a time and give the correct answer, question value and feedback. For new material this would be a good way to develop the quizzes. I was able to cut and paste

from my existing quizzes into the quiz generator. This required additional time for me to create the quiz, time that was made up by not having to grade the quizzes. In larger classes the time savings could be significant, especially if you use the software to generate exams. You are also able to provide directions and section headers to clarify different parts for the students. I maintain my grades in an Excel spreadsheet so I was able to logon to Angel and record my scores in my spreadsheet. A downside is that the quizzes were displayed with a percentage correct instead of a point value (the way I record quizzes in my spreadsheet). This required me to convert the percentages to a point value prior to entering them in my spreadsheet. Since all quizzes were worth ten points this was easy but it would have been nice to have the option of how you wanted scores displayed. Early in the semester we had several technical glitches where students had trouble accessing Angel. In some cases students would access Angel and it would "hang up" on them. For this reason I tended to create paper copies as a backup. Other than once setting the student access time to the quiz incorrectly I had no trouble using the quiz facility.

Another function that I anticipate using is the chat room capability. Students in the CPT 172 course are generally given a team project towards the end of the semester. They typically complain about finding time for meetings outside the normal classroom. In recent years they have increasingly grown dependent upon email to alleviate this problem. I think this will be an exciting feature to incorporate into the class so students can communicate with their teams real-time. It will also provide the instructor with a way to get involved in these discussions at different locations.

Another feature that I used was the calendar. I provide a detailed schedule in my syllabus but I found the format of the Angel calendar easy to use and a convenient way for students to view assignments and test a month at a time. Since this did not interface with the schedule I created in Word, I was required to reenter into Angel's calendar. I limited my entries to major dates such as test dates, lab and exercise due dates.

Student comments:

After Spring Break I surveyed the students about the Angel software. Generally, the comments about the software were positive. The students used assignments, lecture slides, quiz facilities and grade sections the most. They did not use the calendar, email and chat facility as often. As far as ease of use and usefulness students liked the calendar, lab assignments, slides, quiz facility and grade sections. By far the most used and favorite of the students was having access to their grades with the software. The biggest problem the students mentioned was technical problems that persisted early in the semester. Several students had used the other web-based tool available on campus. Of those students most agreed it was at as good or better than the OnCourse program being used by other classes.

Conclusions:

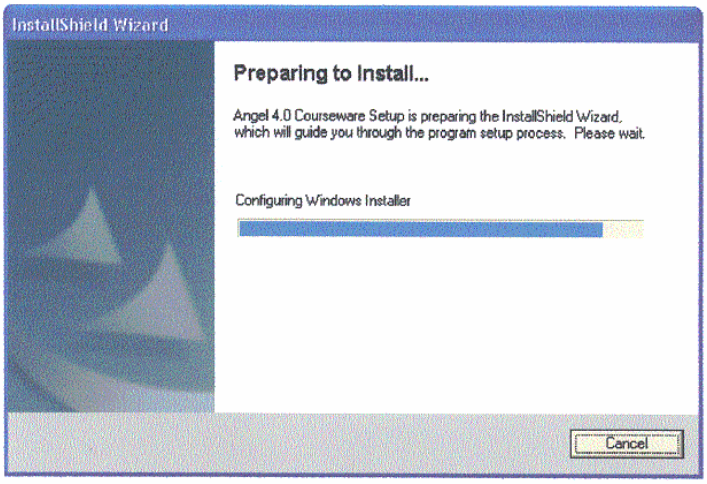
Overall, I found the Angel software easy to use and a good way to provide a web presence for a course. As mentioned earlier a user manual would have been nice. The online help was adequate enough to allow instructors and students to utilize the software. It proved easy to setup and maintain. As with any material on the web it must be maintained on a regular basis. It provided

all the features I offered on my creation developed in Frontpage along with some very nice additions. Especially nice were the features to develop and administer tests and quizzes online. The ability to view student activity was a nice feature and something I really appreciate was the ability of providing security to the materials that I have developed for this course. The few downsides that I noticed: technical glitches, having to cut and paste quizzes were outweighed by the positive features the software offered. For someone with no experience or desire to develop webpages this provides an easy way to provide a web presence for a course.

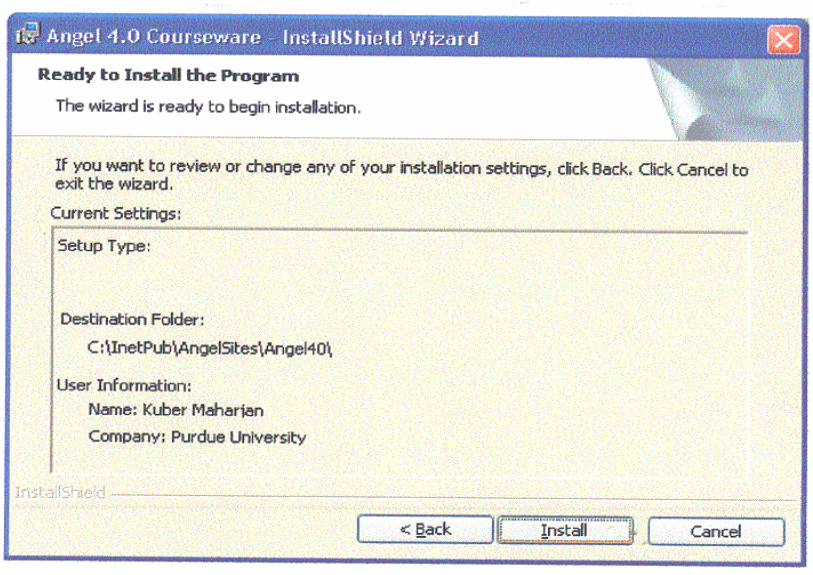
Appendix:

Installation of Angel Software

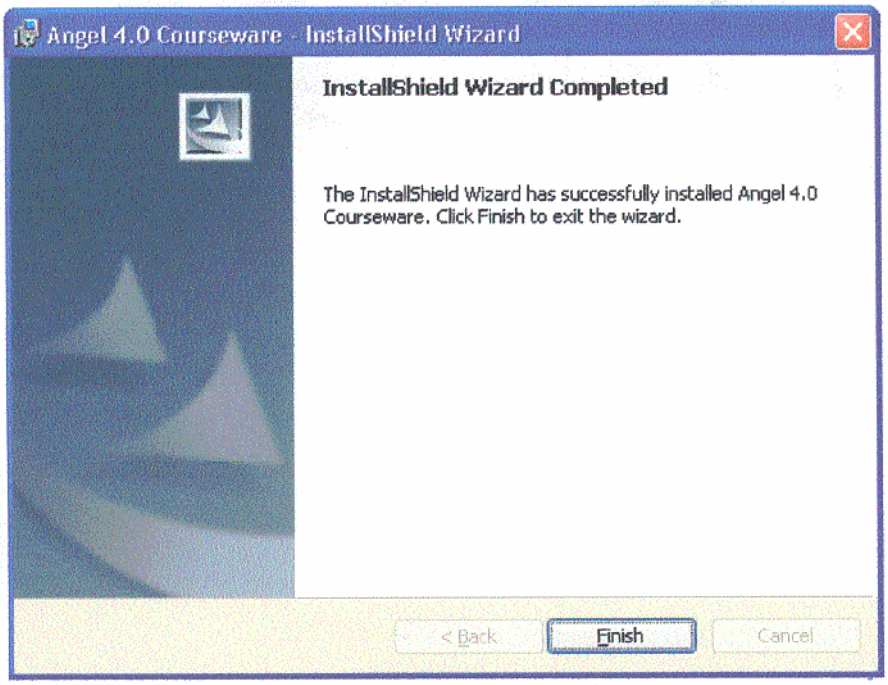
The following screen shots demonstrate the most steps to install Angel 4.0 Courseware which takes about 5 minutes to complete the procedure.



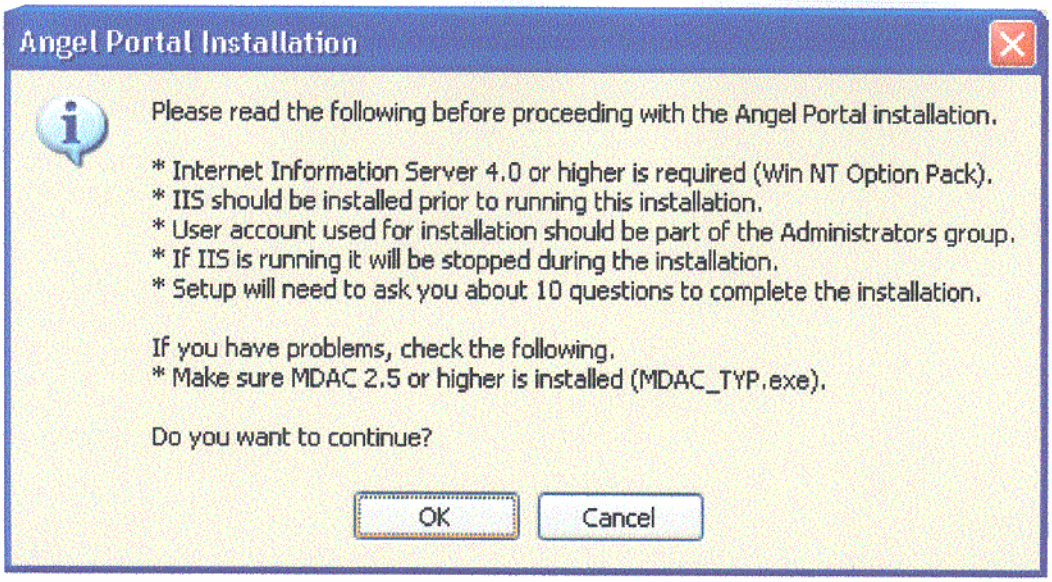
Upon accepting the terms of the license agreement and providing the administrator's name you will continue.



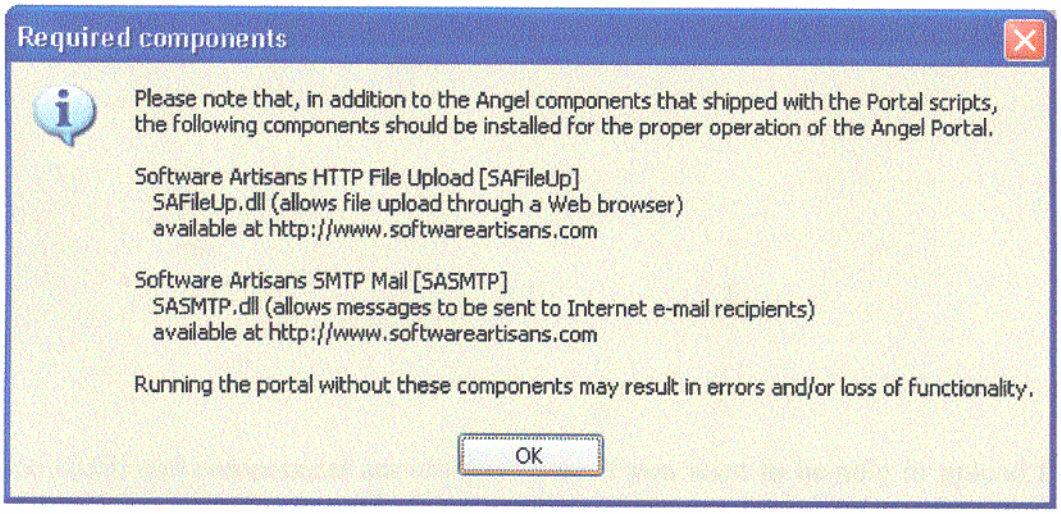
By default, Angel will create a subdirectory under InetPub of your web server. If you like you may install the program using default directory.



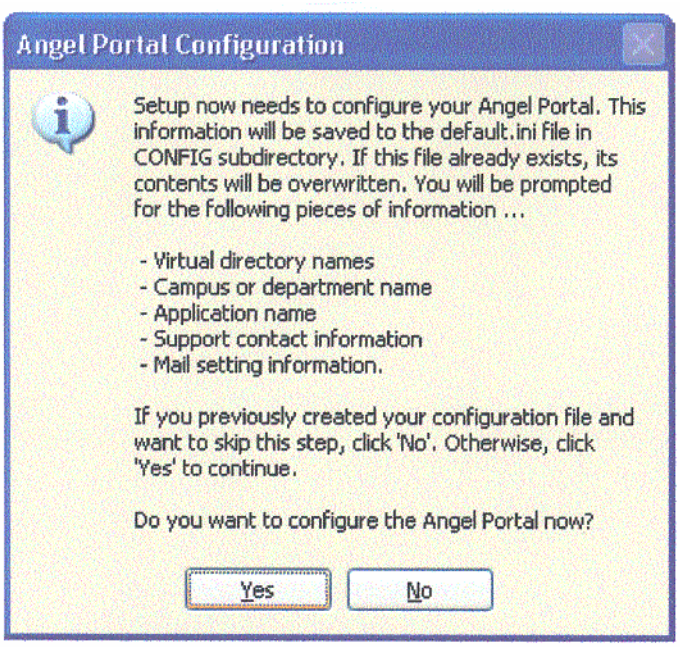
Installation is complete. The next step is to configure your Angel website.



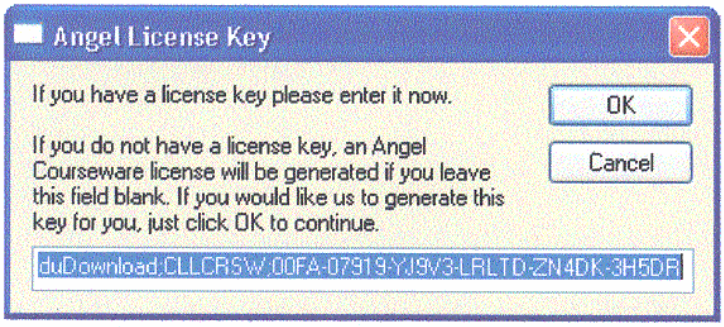
If MDAC 2.5 or higher is not installed just download from www.microsoft.com and install it.



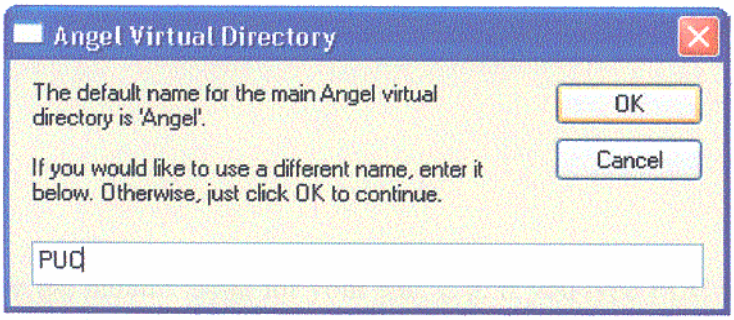
These additional components are required only if you want to be able to upload files and send email outside of courseware. These are separate components and are not free. Angel will function properly without these components. Email within the course will still work, which is very important. Upon clicking the "OK" button, you will be asked if you want to configure the Angel Portal and you should click on the "Yes" button. An Angel license key will be generated automatically.



Just click the “Yes” button.

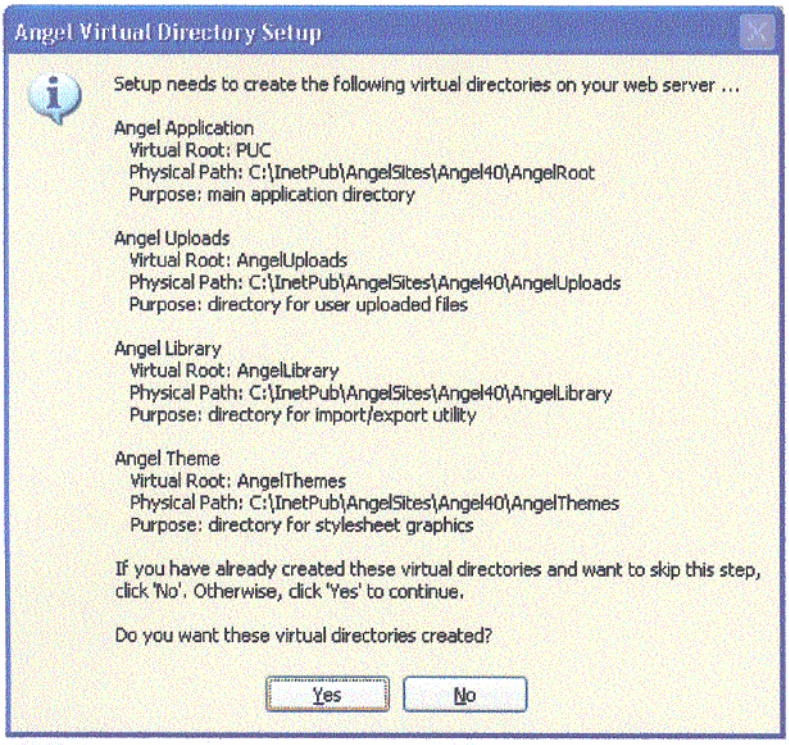


An Angel license key will be generated automatically. Just click “OK” button.

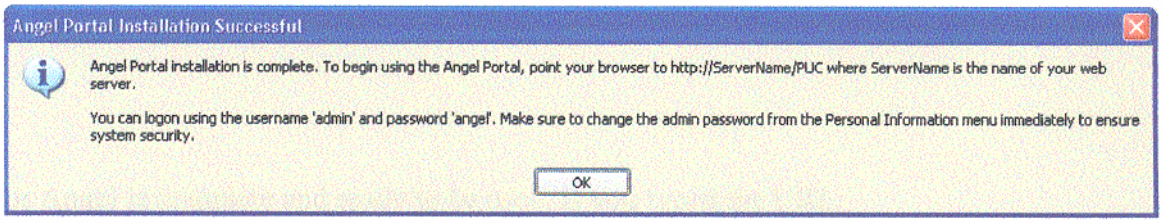


Type the default name for your site. E.g. if you type PUC your site and URL of your web-site is http://students.columbus.iupui.edu, then the URL for your angel site will be: http://students.columbus.iupui.edu/PUC

Following this screen you will be ask for an upload directory. You can leave the default upload directory as it is. If you did not purchase the upload component separately, this functionality will not work! After that you will be asked to provide the name of the institution, department, title of application, support person, support email address, support phone number, SMTP server, and system email. You will then be ask if you want to support frames and to confirm all of the information provided. The setup will need to setup several virtual directories and you will be prompted with the following screen.



Answer "Yes" and Angel will finish the confuguration upon which you will receive the following message.



Your Angel is complete and ready to be used. If you typed the URL: http://students.columbus.iupui.edu/puc you should get the following screen. Initially Username = admin
Password = angel
Both username and passwords are case sensitive. Change the admin password after your first successful logon as the administrator. You are ready for adding courses!

Collaborative Learning in Virtual Reality Environments

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Introduction

Virtual reality (VR) is emerging as a technology for creating and exploring alternative on-line learning environments. VR technologies now allow developing and deploying easy-to-use virtual reality worlds running on desktop personal computers. More recently, some virtual reality platforms have incorporated multi-user and collaboration features; a few of these environments accommodate intelligent agents that can provide information and interaction. These features suggest some intriguing possibilities for the next generation of visually-rich, collaborative, and interactive on-line learning environments.

This presentation discusses and demonstrates an ongoing experimental educational endeavor, the CIO World, at the Information Resources Management College, National Defense University. CIO World, created on the Active Worlds platform, is a collaborative and interactive environment for learning about public policy and the history of information resources management. The CIO World will be demonstrated, and discussions will encompass issues and challenges of world building, intelligent agents, and academic/intellectual content within virtual worlds.

Virtual Worlds

Virtual reality consists of computer-generated "alternate" worlds which "seem" and "feel" real. These alternate worlds allow for users to interact and explore environments that, because they are too expensive, too dangerous, too distant, or too physically limiting, could not be explored in reality. Although the development of virtual reality worlds is still somewhat difficult, already several worlds are available to assist in areas such as: 1) entertainment; 2) medical training; 3) education; 4) manufacturing; and 5), exploration. The use of alternate realities allows for exploration of these realities and, more importantly, experimentation in order to learn. Just beginning, is the use of virtual reality worlds for collaboration, allowing several persons to interact within the worlds.

Developing virtual worlds is part art and part craft; part vision, and a lot of sweat equity. It is the domain of true believers. Therefore, it should come as no surprise that little information is available describing the level of effort required to create a virtual reality world. A key goal of our project was to collect simple metrics related to virtual world creation.

CIO World

In November 2000 we drafted a proposal to create a virtual reality world to be used as an educational experiment. Approved in February 2001, the project began in May, and construction and texturing of the models for the world was largely complete by the end of 2001. The project is presently in content development, packaging, and insertion phase, with its first real test by students planned for September 2002.

The "CIO World," virtually represents the federal core of Washington, D.C. Its focus and theme is to promote awareness and understanding of the legislation, policies, regulations, and issues surrounding information resources and information technology in US Federal agencies. The Clinger-Cohen Act of 1996 requires Federal agencies to appoint a Chief Information Officer, or CIO – hence the name "CIO World." The Information Resources Management College of the National Defense University provides graduate-level executive education and research in critical information resources management subjects that support national security. For example, we intend to use the CIO World in both resident and on-line courses at the college, such as "Foundations of IRM," an introductory course covering IRM policy and its implementation, and the "New World of the CIO," a required introductory policy course in our CIO Certificate Program.

Most of the students taking these courses have technical backgrounds and work within the CIO organizations of their respective agencies. An avid interest in new technologies is considered a normal attribute of this student population. Using virtual reality and the CIO World in this learning experiment capitalizes on students' interest in new technologies, as a means of building interest in learning more about technology policy and the information age issues of importance to their careers. This presentation outlines some of the challenges and issues we faced in creating "CIO World;" in a topical sense these dealt with learning and the learning environment, virtual world building, and presenting policy content.

Learning Issues and Challenges

Projects such as the "CIO World" present unique challenges, in that no model or template exists to guide the researcher. Most virtual reality worlds have been built as models of physical spaces, models of imaginary spaces, or created as spaces for exploration (such as video games). Learning environments are likely to encompass some elements of each of these models. But given the paucity of research in this area, few tried and true approaches have been documented. To the best of our knowledge, this is the first application of virtual reality to a public policy topic. Pioneers are the first to see the promised-land; they are also easily identified by the arrows in their backs.

One of the first lessons we learned was that, in order to get funding for this project, it needed to be framed in terms of learning and in terms of educational goals, not just as a technology experiment. In practical terms we not only had to articulate and justify the technology, but also the learning objectives, the substantive area in which the learning was focused, and also the courses in which it was intended to be used. The last of these, targeting this project to courses, may be the most difficult challenge, a challenge addressed in more detail later.

Learning, and approaches to presenting information provided a second challenge. Constructing this learning environment required thinking about how we learn. This paper uses a sequential approach to presenting information for learning. But consider the challenge of writing a paper in which each paragraph must stand alone, yet contribute to the whole, even when read in a variety of random sequences. Virtual environments provide unlimited possibilities for navigating through the world. The developer must craft learning strategies and then embed those strategies within the virtual environment during its construction.

The work world of our students increasingly calls for them to collaboratively address problems and challenges. Yet models of learning remain focused on individual accomplishment, individual recognition, and individual reward. Active Worlds was selected for this project in part because of its collaborative possibilities. Our intent is to use and capitalize on the chat features for encouraging student collaboration, and on using the "chat log" feature as a means to using the collaboration results in related knowledge-building activities. We also intend to further explore the possibilities of group grading.

Building Issues and Challenges

Perhaps the greatest challenge facing the creators of a virtual learning environment is providing a focus for the project. Successful projects are the ones for which the creator or world builder can succinctly state, "The purpose of this project is to . . . ." Project focus, or intent, drives many choices, and answers many questions. For this project, we framed the purpose as, "The CIO World is an interactive educational environment for examining Federal information resources management policies." This framing implicitly focuses on present policies, but acknowledges the importance of policy history to understanding the contemporary policies and IRM practices in Federal agencies. You may also note that there is no mention of technology in this statement.

The framed project now required a visual face. What does an interactive educational environment for examining public policy look like? Indeed, what does public policy look like? Professional vocabularies frequently pair vision-related words with non-visual concepts; for example, we may want "to shine a spotlight on effective management." And even if we can describe an institutional context for highlighting effective management, what does it – effective management – look like? What does accountability, a key concept in CIO-related legislation, look like? Now presuming we creatively visualize such concepts, where and how do we showcase them within the virtual world?

Layout and design of a virtual reality world are integral elements of world building. To paraphrase Clement Mok in *Designing Business*, the biggest challenge virtual world designers face is giving meaning and a sense of reality to the visualization seen from the human side of the screen. We chose to model the "federal core" of Washington, DC, and selected the name "CIO World," two actions that set a context of the US Federal government, and introduced a set of content expectations – an executive focus, a policy orientation, and technological sophistication.

Our decision to model Washington's federal core simplified navigation and wayfinding, but created expectations about what one would see. We created a pseudo-reality in the virtual world that mapped well to lived experience. Students familiar with Washington, DC are able to navi-

gate around the VR model by familiar landmarks. However, modeling the entire federal core exceeded our budget, so we were left with blank spaces around the National Mall where landmarks, like the Smithsonian castle and the sculpture garden are normally seen. Despite these limitations most, if not all students recognize the key national landmarks when moving about. One moves about the world by walking (or speed-walking), gravity-free flight, or by teleporting to preset coordinates.

Active Worlds comes with a set of generic building objects that can be used to create buildings. When you reach the limitations of these building objects, or desire a more complex design, you must then create custom objects using a modeling tool. In creating the CIO World, much of the workload involved creating and texturing the custom objects in the shape of the various buildings. For example, one could use the generic building objects to create the National Air and Space Museum, but not to create the Capitol Building, the Washington Monument, or the White House. Models of specific buildings then require textures, images that are rendered over the geometry of the model. We found that the most specialized and work intensive part of modeling involved creating, preparing, and applying textures to the models. We were fortunate to have a perfectionist doing this part of the work.

Our first research objective (as opposed to the educational objectives) was to document the level of effort involved in building this virtual world. Not wanting to generate additional reporting requirements, we adopted our contractor's cost allocation scheme, and asked the project team to augment the hour allocation figures with brief narratives of the work. Over the course of the documented work, from July 9, 2001 through January 11, 2002, the team spent 784 hours on this project – 70% of the effort involved creating and texturing models, and situating the models in the virtual world; another 13% of the effort involved overall design, including a trip to Washington to photograph buildings for creating textures; and 14% of the hours were expended on project planning and documentation. Fortunately, team members were skilled in using modeling and photo manipulation tools (trueSpace and 3-D Max were used for modeling and Photoshop for texture preparations).

Content Issues and Challenges

As this paper is being prepared, we are confronting the substantive challenges of preparing, packaging, and inserting content into the CIO World. The question, "What are we portraying, what goes where, why, and how is it packaged and presented?" is the challenge. Rather than asking the question of how might one represent knowledge, creating a VR world poses a more basic question, "what story are you trying to tell?" In our case, the CIO World is telling the policy history story of information resources management. This story spans 26-plus years, 1975 through the present, and focuses on the interaction of public policy and information technology.

Visualizing content from a substantive intellectual field poses a key challenge to the imagination, what does "it" look like? Some concepts can be visualized readily: time can be represented linearly; collegiality can be represented as a network; conversations can be represented as reciprocal exchanges. Other intellectual constructs, such as ownership, policy, or values, can not be so easily represented. One of the better treatments of this challenge is found in Robert Horn's book, *Visual Language*, and in his recommendation to combine visual and textual information in ways

to enhance communication. Of interest, Horn uses the concepts of visual language in writing the book, making for a very different, yet fascinating read.

Beyond preparing, packaging, and inserting content in the virtual world, the world builder or educator must also be able to view the content from the students' perspective. In what ways can, or should the student interact with the material? An interactive virtual reality environment requires us to address that question. CIO World provides several types of interactions. For example, various objects, representing specific phenomena, have embedded hyperlinks. By clicking on the object one accesses specific information about that event or object in the Web browser window. Other objects have embedded scripts calling for certain actions – doors on key buildings open when clicked, allowing the visitor to enter the building and view content displays, or an entire display moves.

One last comment about content. For your new and novel virtual reality application to get in front of students, it may have to displace traditional materials and methods. While we hope you are enthusiastic about your VR world, other instructors may feel threatened by your novel approach. From our initial brush with this issue, we recommend using your class to introduce your virtual environment, and let student interest, enthusiasm, and buzz drive its adoption in other instructors' classes.

Intelligent Agents

Intelligent agents, out last technology-oriented research objective, examines the capacity of intelligent agents to mediate information access, and then to assess student reactions to intelligent agents. To that end several intelligent agents, or "bots" are being configured to present slide shows, respond to questions, or act as an expert, posing questions to a visitor about important substantive content.

Intelligent agents are software programs which function autonomously when triggered. Sometimes these applications are developed with anthropomorphic attributes, making them appear to have "intelligence" and/or human characteristics. Although agent technology is an emerging technology, it offers the promise of assisting with the vast information overload being experienced by all. Already, agent applications are available to assist in finding, filtering, and fusing information from various sources. Additionally, agents can be used for shopping, tutoring, and monitoring. By utilizing agent technology within the virtual environment, users can interact with alternate forms of life which might be able to provide an enriching experience.

Combining intelligent agents with virtual reality in an educational environment is a new and promising field. As agent technologies progress, one can imagine "bots" providing tailored assistance to students, and asking prompting or summary questions about the educational materials just viewed.

Summary

Interactive virtual reality environments for education, such as the CIO World described above, suggest some intriguing possibilities for the next generation of visually-rich, collaborative, and interactive on-line learning environments. That promise is mediated today with the challenge of crafting new approaches. From learning challenges, to building and content challenges, to interactivity challenges, the technologies of virtual reality, instant chat or messaging, and intelligent agents are being combined with the techniques and skills for visualizing information. Collaborative learning is a multi-faceted goal; the on-line, interactive CIO World discussed above provides one prototype for the next generation of collaborative learning environments.

This article represents the authors' views, and should not be construed as representing the policies of the Information Resources Management College, the National Defense University, or the US Department of Defense

Implementing a Smart Card Program

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Abstract

Are you thinking of revising your campus I.D.? Do you currently have an I.D. system that is more than just a photo, name, and student or employee number? Come hear how Pikeville College developed a relationship with CyberMark, a leader in card I.D. systems, and started this program in less than six months. This presentation will describe the services that Pikeville College is providing with their Smart Card and the relationship that the Institution has developed with CyberMark. You will be informed on the many exciting uses for this amazing I.D. technology. Take back to your campus useful information on how an I.D. solution like the Smart Card can benefit you and streamline your various processes campus-wide.

Introduction

In the fall of 2000 Pikeville College found itself looking at I.D. or account solutions for various areas on campus. The library automation project came to closure in the spring of 2000 with OPAC (Online Public Access Catalog) coming online. The plan at that time was for the library to begin issuing key-ring size cards with barcodes for electronic checkout. The cafeteria and Bear's Den (fast food type area) still had no electronic devices for patrons. And last but not least the printing in Public Access areas (computer labs, libraries, etc.) was getting completely out of hand. The I.D. equipment in the Student Affairs office was old and outdated. Students were requesting a universal solution and the administration wanted to provide it to them. With a collaborative effort the idea of a one-card solution sounded very attractive. The one-card solution could provide an answer to all of the abovementioned issues and allow for future expansion.

This presentation will briefly touch upon the makeup of Information Technology at Pikeville College, define what a Smart Card is, examine the project timeline at Pikeville College, identify services that have been added since the initial implementation, and discuss future plans and possibilities.

PCIT Overview

Most of the presentations that I have attended at ASCUE have ended with questions from the audience such as: How many IT staff members do you have? How many PC's do you support? What does your organizational chart look like? What is your network composed of?

In order to place all of this into perspective we will take a very brief look into the IT crystal ball at Pikeville College.

The Office of Information Technology was established in 1996 with one full-time employee. Since then we have grown phenomenally in the types of technologies that we support campus-wide and so has our IT staff. We now have a staff of thirteen full-time and four part-time employees in addition to several student assistants. Areas directly within the Office of Information Technology are: Communications, Library Technologies, Support Services, and the Community Technology Center. There are also four areas housed outside of our office that are directly related to technology and work very closely with us. Those areas include: Web Technologies, Media Services, Booth Programs, and Administrative Computing. The organizational chart will be displayed during the presentation in June.

Our Support Services staff maintain close to 350 desktop and 465 laptop computers. The large number of laptops is directly related to the laptop initiatives within our School of Osteopathic Medicine and our Booth Technology Program that shares a relationship with our Education division. Our Communications staff supports the Voice/Video/Data for the campus community. We have approximately 665 voice terminals operating on a Lucent Definity PBX and Lucent Intuity voicemail system. The video availability for the College is currently supported by three V-Tel systems on Point-to-Point T-1's and one Polycom ISDN unit. The data network is comprised of single-mode and multi-mode fiber optics between buildings and CAT-5e copper throughout each building. The majority of the network currently runs at 100mps. There is a wireless enhancement to this data network currently running at 11mps utilizing the Cisco Aironet technology. The Communications staff supports approximately thirty servers running a variety of network operating systems from Microsoft Windows 2000 Server to Linux. The administrative computing system currently runs on an AS/400 with TEAMS2000 software from Jenzabar.

Smart Card Defined

The term Smart Card is given to this card because it uses the Smart Chip Technology. That is, it has an on-board chip that can allow for multiple electronic purses (electronic cash holders), loyalty files, security keys and extra file capacity. The purses hold numeric data that is typically used for electronic cash applications. Various card devices located on campus can add to or subtract from the purses incrementally. There are a total of three purses on the Pikeville College Smart Card. Purse one is used for vending and computer lab printing, purse two is used for bookstore purchases, and purse three is for future implementation. The card also hosts a multi-sectioned magnetic stripe that is used on campus. Section one is used mainly for the Smart Card office, while section two is used for meal plans, library patrons and online locks. Section three is encoded for offline locks when the cardholder needs access to a controlled area.

Why Smart Card?

Why would a school want to take on such a project? Let's review a few of the reasons why. A One-Card solution is comprised of many different applications, each offering a different service p

but all residing on a single identification card. Once established, a true One-Card system will bring about a revolution of benefits and services to the campus. The initial function of any campus card program is the visual identification of the cardholder.

To allow cardholders to access library services or check out materials, the card is inserted into a special reader. The library number is read and then automatically communicated to the campus library system. No manual entry of library numbers is required and the existing library software need not be modified or replaced.

The card can be integrated into an existing mealplan system from any vendor, run an a la Carte plan using electronic cash technology, or assist your school with finding the mealplan provider that best fits your campus needs. With such diverse options, the Smart Card offers the highest flexibility in food service management.

You can integrate the smart card into an existing security system, identify a new provider of security technology, or choose to provide your campus with security components directly. The Smart Card is currently being used with many banks across the country to provide financial services to cardholders. Linking with a bank, the card can serve as an ATM and debit card for use locally and even worldwide. Market an affinity credit card from your card office and your card program becomes capable of providing a worldwide payment tool for students.

A number of campuses are finding significant amounts of both student acceptance and revenue generation from such an offering. There is also the option of a phone card feature. By adding calling card functionality and advanced telephony services to the campus card increases the card's value to the student while creating a revenue stream for the program. [CyberMark]

Advantages

One advantage that Pikeville College has had in implementing projects such as this is the opportunity to look at other institutions. By doing so, we have discovered their successes and challenges that occurred along the way. Research on campus I.D. options was available, but not prevalent. One resource we used was the popular higher education magazine "College Planning & Management." They found that there are four major benefits to a Smart Card system.

1. **Stored value.** Multiple accounts can be established on a card. Perhaps a parent would like to assure that their child has enough financial resources to purchase the books and supplies that they need for their classes, but do not want to see them spend it on pizza's and billiards. The parent can simply place the cash for the books and supplies on a purse that is for that use only. Of course if they want to see that their child does have some money for recreational purposes they can also specify that $20 be placed on a purse that will allow them to buy pizza and a game of billiards. The options do not have to stop there, if the institution has outside agreements there is the potential for money to be stored on the card for purchases at the local Wal-Mart, Kroger, or Pizza Hut.
2. **Entitlement.** The card can be used to determine if a student is currently enrolled making them eligible for free admission to various school events.

3. **Access Control.** This not only cuts back on overhead for management of controlled areas on campus, but more importantly allows for increased security. The student, faculty, or staff person can be granted access to various areas keeping an audit trail of whose card was used to access what area at a given time. This is not only being used at main entrance ways, but in individual dorm rooms, elevators, parking areas, classrooms, and labs. Some schools are even installing sophisticated video surveillance that activates upon the use of a Smart Card in a controlled area.
4. **Vending.** This defines everything from copiers and printers to soda and snack machines to laundry facilities and buses. Your library and technology staff will like it because it frees up time for them. The students will just plain love the convenience!

[Sturgeon]

Stony Brook University, located in New York, recently made the switch from magnetic stripe to Smart Cards for the following two main reasons. The main advantage to the chip is the ability to have several electronic purses. A purse can be designated to only allow purchases in a certain area. The example that Stony Brook uses is a parent wanting to purchase a $2,000 computer for a student from the bookstore. The $2,000 can be designated to a purse that is PIN-protected and can only purchase computer equipment from the bookstore. A purse can also not be PIN-protected and used in various locations on campus to do laundry, buy a candy bar, or pay a library fine. The second advantage is more choices for the future, particularly in regards to security. For example, a Smart Card can be programmed to access an area only after the card (with privileges to that area) is inserted in the lock device and a password entered granting entry. [Card Technology - Feb.]

The University of Ottawa also made the upgrade from magnetic stripe to Smart Cards. This was done for the same two reasons that Stony Brook University made the conversion – more security and multiple purses. [Card Technology - Dec.]

Drawbacks

We have examined the supporting reasons to obtain a Smart Card now let's name some of the drawbacks to this system that should be considered.

- Cards are relatively expensive
- Cards may not stand up to rough treatment
- Very little Smart Card equipment (readers, printers) is deployed in North America
- Privacy concerns (Big Brother)

[Card Technology - March]

Nikki Kettles of Integrated Card Technology (ICT) claims that even though there are drawbacks, such as those we just listed, that the following should definitely be a consideration in the decision making process of what type of one-card solution to adopt.

"The average magnetic stripe card can only store approximately 226 characters while a 1 KB chip can store approximately 1024 characters. The average Smart Card microprocessor is 16 KB at present - with a 32 KB chip having being launched in South Africa recently."

Furthermore, it seems that the Smart Card, because it can store so much more information than the magnetic stripe card, ensures that there is no need for masses of data storage hardware. This not only cuts down on the cost of the hardware, but also cuts down on administration. For a magnetic stripe card to work the service provider is required to swipe the card, the card then processes the information via an on-line system and will then authorize the card. A Smart Card works off-line and does not need to be processed on-line. This saves time and it saves on employment costs. In the case of loyalty programs, if a service providers system is off-line and a magnetic stripe card is being used, the consumer will be required to come back the following day, in a few hours time or even to phone-in to a queries line. This means that the retailer is compelled to have toll-free lines as well as extra personnel to deal with the queries.

When one looks at the costs of purchasing a Smart Card to that of a magnetic stripe card, the Smart Card appears more costly being priced at approximately $6.00 each compared to the magnetic stripe cards which can cost less than $1.00 each. Although the initial cost of the magnetic stripe card is lower, one must remember that a magnetic stripe card will require replacing after approximately two years, while the life of a Smart Card is approximately five years or longer. This added to the cost savings that a Smart Card provides in personnel, hardware and administration, should be taken into account when deciding which option would be best. [Hi-Tech Security Systems]

PC Smart Card Project – Initial Installation

For some time, Pikeville College had discussed the idea of a one-card system to tie several services on campus together. During the Fall, 2000 semester we initiated Smart Card talks with CyberMark. CyberMark is based in Tallahassee, Florida and is known as one of the leaders in the Smart Card industry. CyberMark has 15 years of experience with campus card development and boasts a million plus cardholders (For more information on CyberMark visit their website at http://www.cybermark.com). Once we had a better understanding of what the card was capable of there was no question that this was the correct solution for Pikeville College.

The first step was to identify how we wanted to use the card and what features our users needed. Pikeville College chose to initially use the Smart Card as the official College identification and have the following service options: Library card, meal plan card, Bear's Den debit, vending machine debit, and Public Access (computer labs, libraries, etc.) printer card. We needed a way for users to add value to the non-PIN purse of their card, so we decided to strategically locate four KIOSK machines throughout campus with the ability to add monetary value to a Smart Card.

For informational purposes, allow me to provide you with Pikeville College's definition of a KIOSK. A KIOSK is a machine that is closed in on all sides but has an opening in the front that is used for the vending or advertising of a product. This machine is set up in a public place where one can obtain information, e.g. campus information. The information is provided by a computer. The data may be stored locally (e.g. on CD-ROM) or accessed via a network using the World Wide Web. The Pikeville College KIOSK houses the Cash-to-Chip machines and interactive touch screen that provide information about activities at the College.

Secondly, CyberMark helped us develop a Project Plan/Task List similar to what is found below:

1. Contract/Agreements
    a. Finalize Master Contract
    b. Statement of Work
2. Card Fulfillment
    a. Select type of card stock
    b. Order card stock
    c. Design back of card
    d. Sign-off back of card
    e. Design front of card
    f. Sign-off front of card
3. Marketing
    a. Marketing materials
    b. Cardholder agreement
    c. Card policies
4. Database (Card Production)
    a. Determine database requirements
    b. Send test file to CyberMark
    c. Modify/revise test file
    d. Final database to CyberMark for verification
    e. Determine legacy database requirements
    f. Configure exports in database system
    g. Determine networking requirements
    h. Run tests on Pikeville College network
    i. Load database on Pikeville College card production server
5. Card Production Equipment
    a. Select equipment
    b. Order equipment
    c. Configure equipment (CyberMark)
    d. Install equipment (Pikeville College)
    e. Train Pikeville College staff
    f. Review equipment maintenance agreement
6. Point of Sales (POS) Equipment
    a. Purchase equipment for printers
    b. Configure and install equipment for printers
    c. Purchase equipment for KIOSK's
    d. Configure and install equipment for KIOSK's
    e. Purchase equipment for vending machines
    f. Configure and install equipment for vending machines
    g. Train Pikeville College and Vendor staff
7. Establish CyberMark Account Manager for Pikeville College

The above process typically takes 12 to 18 months; we completed this process in approximately three months. This was due to the timing of the grant and the availability of CyberMark staff

and resources to apply to the project. Our implementation process would have been much easier had we been able to allow for more time.

Each Pikeville College Smart Card is customized to include the status of the cardholder (student, faculty, staff, etc), the cardholders name, library number, identification number, digitized signature, digitized color photo, and ISO number. The ISO number is a unique 16-digit number used as the main identifier for the Smart Card system. ISO stands for the International Organization for Standardization and is a worldwide federation of national standards bodies from some 140 countries, one from each country.

It is necessary to expand on the description of ISO. ISO is a non-governmental organization that was established in 1947. The mission of ISO is to promote the development of standardization and related activities in the world with a view to facilitating the international exchange of goods and services, and to developing cooperation in the spheres of intellectual, scientific, technological and economic activity. The format of the credit cards, phone cards, and "smart" cards that have become commonplace is derived from an ISO International Standard. [International Organization for Standardization]

The card office itself houses the system for making Pikeville's Smart Cards. The equipment consists of the following:
Camera and Tri-Pod, DNP 410 Printer, Signature Pad, Omni 395 Chip Writer/Reader, two Computer Workstations, two Chip Card Readers, two GMX 200 Transaction Collecting Devices, two Psion Devices, and a Mag Stripe Reader

The equipment allocated for printing in the ten Public Access printing locations consists of 10-Verifone 552 Card Readers. There are 3-Mag Strip Readers for use in the two libraries for patrons, 2-Mag Stripe Readers in the cafeteria and Bear's Den, 17-Debitek Vending Card Readers installed on various vending machines throughout campus, and 4-Debitek Cash-to-Chip machines (one with a built-in card dispenser) in KIOSKs to allow users to add value to their Smart Chip for debit purposes.

There was also other equipment involved that we needed to purchase on our own. The Smart Card database is housed on a Dell PowerEdge Microsoft SQL v.7.0 server. We purchased the server and its operating system. The print stations in the Public Access areas needed a desktop computer in each location. Ten Dell Optiplex desktop computers were purchased for this purpose.

In addition, there were other items needed to complete the four KIOSK machines. We purchased NEC plasma displays, infrared touch screen overlays, small-form factor computers, battery backups, and hardware for the case of the KIOSK. Our Public Affairs staff worked out the vinyl designs for the case and we had everything that we needed to construct the KIOSK. We have three "Type I" and one "Type II" KIOSKs on campus. Our "Type II" model seems to be the most popular style as it is recessed in the wall and is more professional looking. It was easier for us to place "Type I" in areas that had mortar or block walls. We are negotiating a fifth KIOSK that will be placed in our local hospital, but will not have Cash-to-Chip functionality at this time.

The initial implementation of all the abovementioned items totaled approximately $230,000.

PC Smart Card Project – Add-ons

Over the course of the past year we have added physical location security to our services. We have acquired both Simplex online and Best offline locks for use with the Smart Cards. Each online lock appears as a node on our Ethernet network. All activity is done in real-time and allows for more convenient monitoring and more options for administrators (such as the ability to grant and deny access at the click of a mouse). An offline lock does not connect to a network and is self-contained. Each Smart Card must be placed in a card reader located in the card office each time it is granted permission to a specific offline lock. Any changes with the offline lock must be performed manually via a PDA with the appropriate cable connection.

Pikeville College has added 27 online locks and 28 offline locks to two different resident halls, the Community Technology Center, and PCSOM Library/Telemedical Center. Each online lock costs approximately $4,000 and each offline lock costs approximately $400. We also had the one-time cost of a computer workstation to manage the offline lock system and a computer workstation to manage the online lock system. In addition, the offline lock system requires a card reader and PDA with special cables for connection to an offline lock. Our Safety and Security Office also has a desktop computer with software to monitor online lock areas.

PC Smart Card Project – Future Plans

As of Spring 2002 our future plans include expansion to copiers and the bookstore. We also are exploring the idea of debit in the Bear's Den and local restaurants/merchants. The idea of forming a partnership with a local bank so the card can be used world-wide is also very appealing and currently being studied.

Each copy controller will cost approximately $850 each, the Magic 6000 Debit Device for the Bear's Den and local restaurants/merchants are $400 each, and the Omni 1250 for the bookstore debit is $400. Forming partnerships with local restaurants, merchants, and a bank can prove to be quite beneficial to the College, financially speaking. This would also be very attractive to students and provide for added convenience.

We have discovered that a program such as this demands financial support from businesses as our annual cost for license fees, supplies, reconciliation, and support are already totaling $23,000. This is not to mention the staff overhead cost that is involved. Our Support Services Coordinator manages the Smart Card Office and relies on the help of a receptionist year around. Often during new card distribution times an additional two Desktop Support Technicians and student workers help with the completion of applications/forms, orderly lines, and the programming of offline locks.

Summary

As smaller institutions compete against larger universities for students, technology can put us on the cutting edge. Providing convenient and personalized service is easier to do on a small cam-

pus. A comprehensive and integrated technology package is attractive to prospective students. Pikeville College's implementation of the Smart Card has been well received by most users. As we look toward the future, we know we have chosen more than just a campus I.D. system. The Smart Card will allow Pikeville College to be a convenient, cohesive, and safe place to get an education.

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Abstract

SAM XP is the pioneer of Microsoft Office XP testing software that helps you gain a true understanding of your skills. Using state-of-the-art technology, SAM XP enables you to perform real-world tasks in Microsoft Office XP while you work in an authentic, simulated Office XP environment. TOP is a MOUS-approved training tool for Microsoft Office XP. TOM lets you choose the level and pace at which you want to learn, provides a practice environment to learn each skill, and tracks your progress by providing a comprehensive report which integrates with the reports generated in SAM XP.

Dynamic, Web-Based MS Digital Dashboard Reporting and Decision-Support Application

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Abstract
One of the perennial issues associated with implementing faster, more powerful information systems is what may be called the wealth of data, dearth of information dilemma. The problem is compounded in the multi-vendor, multi-operating-system environments commonly found on campuses today. Last year ABT incorporated MS Digital Dashboard technology in its PowerCAMPUS software releases; in doing so, we have discovered some powerful, cross-platform reporting and decision support capabilities that may be used to help busy office managers and administrators get the information they need, in the format they need it. Users need only learn some of the newer functions of MS Excel and FrontPage released with MS Office 2000 in order to create their own dynamic, Web-based reports and decision-support applications.

Essentials of e-Learning

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Abstract
E-learning is gaining momentum in many higher education instituations. E-learning can enhance traditional face-to-face (F2F) classroom courses or replace F2F classes by offering instruction completely over the Internet.

E-Learning (or online learning or distance education), provides a new instructional medium that college personnel need to know. However, even as higher education turns to e-Learning, higher education faculty and administration remain largely unaware of e-Learning's benefits and challenges. This presentation will be a primer addressing the elements in e-Learning. These elements include philosophical (Is e-Learning better than traditional classroom learning?) and practical issues (How do you give an online test?). The PowerPoint presentation will focus on the experiences of a current e-Learning instructor and former state government training director. Actual online courses will be visited during the presentation so that attendees can see e-Learning firsthand.

With the use of e-Learning, traditional professional development courses can morph into experiences in which students become 24-7 learners, especially if government managers and executives have the grasp of the elements inherent in e-Learning.

The ideal audience would be college faculty and administrators that are looking to get involved with e-Learning or have already begun using e-Learning.