Handheld Learning: Exploring Issues and Ideas Related to Integrating Portable Technology into the Classroom

Kristine Anderson
Saint Francis University
CERMUSA
117 Evergreen Drive
PO Box 600
Loretto, PA 15940
(814) 472-3934
kanderson@cermusa.francis.edu

Abstract

The "Amputation and Amputation Care" handheld training program was developed in response to the increasing number of amputees from the Iraq War into the American health system. Medical professionals and students currently in health fields that will treat these patients are in need of effective continuing education. The content in the program was developed to be independent, cooperative, project-based learning opportunities that are student-centered (based on John Dewey, Jean Piaget, and Lev Vygotsky's constructivist learning theories). The program is distributed on handheld devices to research if they can effectively provide multimedia content to enhance the curriculum and increase knowledge retention.

Introduction

The "Amputation and Amputation Care" training program will make a difference by addressing the reality of war. Currently, 28% of United States amputees are from the Iraq and Afghanistan wars (Moniz, 2005). In pale comparison, only 10% of American civilians have an amputation (Moniz, 2005). This doubling of amputees entering the American healthcare system has caused a strain on medical professionals needing additional training and exposure on the care and treatment of these patients. By working with rural physicians, orthopedic therapists, physical therapists, university instructors, Iraq and Vietnam veteran amputees, their families, and the National Naval Medical Center, this program developed holistic continuing education. This paper will discuss the educational theories, handheld technologies, and research plan implemented in the study.

Handhelds are not likely to replace other technologies. Instead, they can address specific problems and needs. In this study, subjects will use the following handhelds: Palm T/X Handheld, Video iPod with MyVu Personal Media Viewer, Creative Zen Vision M, Archos 404, and a portable DVD player. The study subjects were selected due to a critical need in the medical profession for enhanced education concerning persons with amputations. This study will focus on if the handhelds can effectively provide multimedia content to enhance the curriculum and increase knowledge retention among the subjects in the study. Assessment strategies are also beginning to be developed for the handheld platform. StudyMate software produces interactive gaming for use on handheld devices that will be implemented in the study.

Educational Theories

The pedagogical theories that the content for the program were developed from are based on the Case Study Method of Learning and the Interactive Method of Learning. The Case Study Method uses technology as a catalyst for change in classroom processes. Instead of the case experience being a text-driven didactic experience, the content is transformed into an interactive case study where any wrong decisions with their virtual patient will have no actual negative implications on to a human life. This safe environment for students to try what they learned in the classroom permits a more eclectic set of learning activities that include knowledge-building situations for students (Sandholtz, 1997). This Interactive Method of Learning focuses on independent, cooperative and project-based learning opportunities (Land, & Jonassen, 2000; Johnson, Schwab & Foa, 1999). These theories are examples of student-centered learning (John Dewey, Jean Piaget, and Lev Vygotsky's constructivist learning theories).

The constructivist approach to curriculum and instruction of a distance learning course can also direct students to create effective techniques of learning and studying. Such as asking the reference librarian for additional resources on a certain topic or obtaining a copy of an educational game.

> "Constructivists believe that knowledge is constructed, not transmitted. Knowledge construction results from activity, so knowledge is embedded in activity. Knowledge is anchored in and indexed by the context in which the learning activity occurs" (Jonassen, et al., 1999, p. 3).

We can only interpret information on the context of our own experience. Knowledge building requires articulation, expression, or representation of what is learned. It is important for students to engage in activities but they must also articulate what it meant. The constructivist approach is learner-generated.

The goal of constructivism is to produce students who are self-directed learners, possessed of extraordinary abilities to solve problems in academic and non-academic settings. Instructors can foster this capacity by allowing students to experience multiple modes of constructing and acquiring knowledge.

Arthur Shapiro (2002) points to less obvious outcomes of constructivist education. He states that learners in this environment gain the ability to deal more effectively with conflict, set goals and directions, manage their time and improve their decision-making and general interpersonal skills. All of these are necessary aptitudes for thriving in an increasingly complex society. In the context of curriculum planning this suggests that instructors should encourage collaborative, problem-based and inquiry-led learning, and cognitive apprenticeships. Without giving up control of their classes, instructors should create environments in which diverse students can work in teams, assign tasks based on their strengths, resolve their differences and generate meaningful outputs.

John Dewey and Jean Piaget, who stressed the importance of defining learners as active inquirers, espoused Constructivism. Phillips (2000) alluded to John Dewey's scathing criticism of the typical classroom in the twentieth century that forced students to be passive recipients rather than active creators of knowledge. During that time, progressivism was the dominant educational

theory. It was considered to be a viable alternative to the traditional or classical teacher-centered method. Phillips, reflecting on this theory, asked if constructivism might be an updated form of progressivism.

As facilitators of learning, instructors should use techniques that include experiments and questioning in order to refine and develop students' inquiry skills like the medical case studies. They should develop assessments that are supportive of collaborative learning, promote ownership in learning, as well as coach and guide learners who lack pre-requisite skills. This would have a great impact on the education of students. As self-directed learners they will be motivated to pursue higher education and to learn for the sake of learning.

Health education at a distance has to connect learners and deliver course content (Gay & Airasian, 2002). Students should understand materials, knowledge gains obtainable and have opportunities for authentic assessment. This training program also recognizes consideration of the audience receiving streaming technologies and limitations of its Internet infrastructure (such as rural and remote locations, technology capabilities).

Handheld Technology

The training program was developed by performing a needs analysis based on the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model. The development team designed storyboards and scripts to capture the multimedia content and referenced scholarly texts for the manuscripts and evaluations in the program. The resources utilized in the development of the content include web authoring software, video production equipment, and streaming technologies.

The handheld devices that are used in the program permit scaffolding learning experiences (Jerome Bruner's cognitive psychology theory). Since, the devices have the ability to display realistic multimedia (pictures such as x-rays, photographs, diagrams, dosing charts; sounds such as abnormal heart rhythms, pulses, lung auscultations; videos such as how to perform a monofilament test, how to conduct proper wound care, how to properly wrap a below-knee amputation etc.) they are very valuable tools in the medical curriculum.

There's a growing body of research related to the effectiveness of handheld devices in the classroom. This program will collect data in the form of affective and cognitive assessments to study if the handhelds can effectively provide multimedia content to enhance the curriculum and increase knowledge retention among the students in the program. The assessments will be completed by students with innovative interactive gaming situations involving virtual patients with amputations. The training program also has a comprehensive online companion website that contains a medical reference of amputation care.
(Visit: http://courses.cermusa.francis.edu/ortho/index.html)

Formerly only for busy executives, handheld computers -- also known as handheld devices or portable digital assistants (PDAs) -- are making a transition from briefcase to backpack (Brown, 2001). This training program seeks to experiment with integrating handhelds into the classroom. A handheld device is a pocket-sized computing device, typically utilizing a small visual display screen for user output and a miniaturized keyboard for user input. The key to the handheld is its

portability. Great for field trips, home use, and anything requiring quick information access and recording, these devices can be used without the hassle of heavier technology.

Handhelds are not likely to replace other technologies. Instead, they can address specific problems and needs. In this program, students have access to the following handhelds: Palm T/X Handheld, Video iPod with MyVu Personal Media Viewer glasses, Creative Zen Vision M, Archos 404, and a portable DVD player. The students were selected due to a critical need in the profession of physical therapy for enhanced education concerning persons with amputations.

Handheld Devices

The following is a short description of the capabilities with a photograph of the handhelds. To see the actual devices in a video produced for this training program visit: http://courses.cermusa.francis.edu/ortho/handhelds.html.

1. Palm T/X Handheld (with cradle) $299
   - Capabilities include: video, audio. pictures
   - Unique capabilities: 128 MB memory with expansion slots, large display screen that can be viewed landscape or portrait, user can write on screen, attach to email, log-on the Internet, save changed visuals to a computer

2. Video iPod (30 GB $249 or 80 GB $349)
   1. Capabilities include: video, audio. pictures
   2. Unique capabilities: large memory, need to convert multimedia prior to upload (QuickTime), interacts with iTunes software, unique menu structuring

b. MyVu Personal Media Viewer $299.95

1. Glasses that enable portable video and photograph viewing, glasses present media in 3-D (offering depth and a different point of view)

3. Creative Zen Vision M (30GB $249 or 60GB $299)

- Capabilities include: video, audio. pictures
- Unique capabilities: universal platform for media upload, similar structure to other media players

4. Archos 604wifi $299.99

3. Capabilities include: video, audio. pictures
4. Unique capabilities: 30GB memory, wireless internet capability, built-on exterior speaker, can be easily hooked up to a display monitor (e.g. television)

5. Portable DVD Player $99
    3. Capabilities include: video, audio. pictures
    4. Unique capabilities: plays DVD disk of contents, remote control

Future Plans

The handhelds are used in the training program in conjunction with Internet based case studies. The case studies present video patients that students can interact with in a safe and secure environment where any wrong decisions will not have a negative effect on to an actual patient.

The case study has been designed to simulate a realistic patient visit. A patient will come into the office for some medical help on a problem that he/she is currently having. The student has been assigned to help this patient. The student will need to follow all of the steps that they would in real life. They need to question the patient to find out what the problem may be, examine the patient to discover the extent of the problem, and finally diagnose and treat the patient.

The case studies are a tool of authentic assessment for instructors to test their students. While standardized tests and state national curricula have become a feature of the American education system. More often than not current curriculum, including forms, texts, syllabi, and teaching manuals, do not allow room for constructivist teachings. Shapiro, (2002) and Ben-Peretz (1990), share the view that even if the curriculum is prescribed, the manner and order in which it is to be taught, how it is to be organized, and how teaching is to be delivered, are left to the discretion of the teacher and or team. This is also a case for Erikson's (1998) concept-based teaching that facilitates the infusion of constructivist practices in daily instruction.

The case studies and handheld devices are researching assessment of concept-based teaching by providing content for competency-based exams. Competency testing documents the thought process and skills a student has achieved in the classroom into a setting with an interactive patient. This study will research if the instructional material delivered on handheld devices has instructional validity.

The research plan to be implemented in the 2007-2008 academic year is to first study the impact of the case studies as the basis for a competency skills exam as part of the final exam for a 500 level course in the Physical Therapy department. The handhelds will be tested during a summer session course on teaching and learning in physical therapy. In this course, the students will participate in community education projects with the handhelds, demonstrating how the handhelds can be used for patient education. Additionally, case studies on patients with unique neurological

conditions will be created and delivered to students in the fall 2007 semester. The results of this study will be used to partner with agencies such as the National Amputee Coalition to accomplish the program's goal of better care for war veterans.

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Student Engagement in Business School Programming Classes

Corrine M. Brown
Ohio University
College of Business
Copeland Hall
Athens, OH 45701
740-593-1987
brownc@ohio.edu

Abstract

To engage students, we made a conscious curriculum shift to emphasize programming for the web in our programming courses. Engaging students in their learning experience is a critical component to their success. Today's students are the "web generation" and their expectations are different than past generations (Johnstone et al, 2002). Developing interactive web pages grabs the student's interest since they can identify with the application. This paper will describe how a shift to web development in the first programming course has helped increase enrollment in the MIS program. The presentation will include a demonstration of Web Developer and show how easy it is for students to create interactive web pages.

Introduction

Are your students actively engaged in learning programming languages in their first programming course? Student engagement is difficult to measure but is an integral link to student learning (Haymore et al., 1994). Newmann (1986) argued that engaged students commit themselves because their work has value outside of the classroom. How many of your students are "wowed" by a console application that displays "Hello World"(Luce et al., 2006)? Today's students function in a graphical world where they point and click, mouse over, and drag and drop, yet many introductory programming courses have students create applications at the command prompt and display output on the desktop. Introductory programming courses have students focus on command prompts rather then solving business problems using active authentic experiences.

Process

Many introductory programming classes currently teach desktop applications. Available introductory textbooks in programming languages cover desktop applications, either using the console for input/output or creating forms. Many courses are designed around available textbooks, which may contribute to the prevalence of these types of courses. How do students share their work with parents, friends and prospective employers if their work is not available over the web? When students walk into the beginning programming course, they are already comfortable with using web applications. In an effort to capitalize on this comfort level, we moved all of our programming courses to the ASP.NET 2.0 environment starting with the 2004-2005 school year. The first course in the major introduces programming concepts using VB.NET in an ASP.NET 2.0 environment (Luce et al., 2006).

The first course uses VB.NET in an ASP.NET 2.0 environment to create interactive web pages and emphasizes basic programming principles of variable declarations, assignment statements, data types, conditionals, passing parameters, iterations, and database integration. Students learn how to implement presentation layer components such as buttons, text boxes, radio buttons,

check boxes, et cetera. The class covers the validation of user input, some of the components used to pass data between pages, and how to acquire and render data from data access objects. The decision to teach programming principles using web applications does have its shortcomings. If you wish to try this you must either try to adapt a book that focuses on desktop applications, which we have found confusing for beginning students, or create materials, handouts, and on-line references on your own (Newmann, 1986). All class materials are developed in-house since textbooks at the introductory level emphasize creating projects using the console or as desktop applications.

Why go to the effort of designing a course where there are virtually no commercial materials available? Students are engaged in the learning process because they can relate the class assignments to their life experiences. Students produce products that they can share with parents, friends and future employers. Student projects can be easily displayed in their Electronic Student Portfolio. After developing their first interactive web page, comments such as "wow this is cool" are common. Students regularly verify that their parents and friends can in fact check out their web pages. Many students go beyond the requirements of the class assignments, expanding the projects by applying additional skills and knowledge.

The course is taught using Microsoft's Visual Web Developer Express 2005. Visual Web Developer supports web development in VB.NET, C#.NET and J#.NET. Visual Web Developer is currently available as a free download from the Microsoft Web site (Visual Web Developer, 2005).

Visual Web Developer offers several advantages over previous versions of Visual Studio. Students can develop and test web applications without deploying the application to a server. Visual Web Developer contains a built-in version of Internet Information Server (IIS) and treats a web site project as an application. This means students can develop and test applications without copying files to a web server and without needing the administrative access to the server required to create an application. Because web pages run in this restricted web server environment, it is possible to use the full debugging and tracing facilities built into the product and to do it from student machines, without administrative access to the system (Newmann, 1986).

Results

Figure 1 shows enrollment in the beginning programming course from the lowest enrollment point in the 03-04 school year through the 06-07 school year. Student enrollment in the beginning programming course has increased 135% since we have changed the course content to develop interactive web pages.

Figure 1. Enrollment in Beginning Programming Course

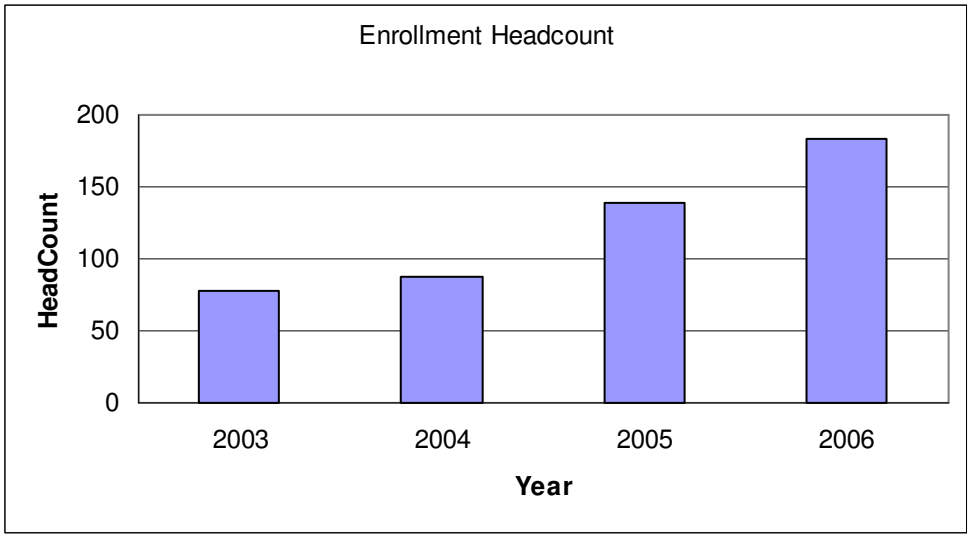
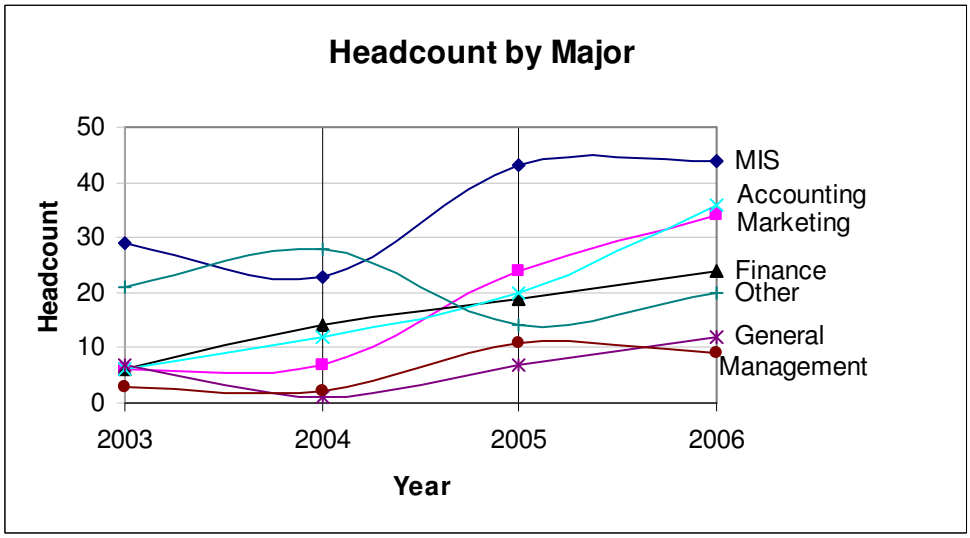


Figure 2 shows the enrollment in the beginning programming course by major.
The total enrollment of business students who have double majors has increased over 300%, with the enrollment of double majors in Accounting and Marketing leading the way with 500% increases and double majors in Finance increasing 400%.

Figure 2. Enrollment in Beginning Programming Course by Major



Summary

Active engagement in interesting, relevant material will keep students motivated. Teaching programming in a web based environment has been a successful strategy for introducing students to the major. Students who are already familiar with using web applications enjoy getting their web application to work the way they want. Increased enrollment in the beginning course in the major indicates that students are interested in the material.

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The Development of Campbellsville University's Information Literacy Plan

John R. Burch Jr., Ph.D.
Montgomery Library
1 University Dr.
Campbellsville, KY 42718
jrburch@campbellsville.edu

In February 2006, Dr. Frank Cheatham (Vice-President for Academic Affairs), Dr. Beth Kemper (a faculty member in the English Department, and Dr. John Burch (Director of Library Services) attended the Council of Independent Colleges' "Transformation of the College Library Workshop" in February 2006. Over the course of the workshop, we developed an aggressive plan for incorporating Information Literacy into Campbellsville University's curriculum. The plan was as follows:

1. Introduce Information Literacy as a concept to the faculty.
   a. The first presentation was to be made at the annual WEL workshop in May 2006.
   b. The second presentation was to be made at the Faculty Workshop that begins the 2006 academic year.

2. Build Information Literacy components into the existing freshman composition classes.

3. Develop a one hour course on Information Literacy for that could potentially be required for all incoming freshmen.
   a. Solicit input from Deans & Chairs during the Fall 2006 semester.
   b. Use the input to develop a syllabus by the end of the Fall 2006 semester.
   c. Submit course to the Curriculum Committee during the Spring 2007 semester.

4. Begin offering the course to students by the Fall 2007 semester.

The presentation at the WEL Workshop was held as scheduled in May 2006 to mixed results. Dr. Kemper and Dr. Burch had a very interesting discussion with the faculty members in attendance about Information Literacy but there seemed to be little interest expressed by the faculty members present in helping develop a course. Since the originators of the plan believed it was necessary to enlist support from additional faculty members, Dr. Burch proposed holding a faculty retreat in hopes of identifying potential partners among the faculty.

Thanks to a Faculty Enrichment in Library Resources (FELR) grant from the Appalachian College Association's Bowen Central Library of Appalachia, the library staff was able to schedule a retreat in early August 2006 to discuss how to address Information Literacy on our campus. The retreat was to be broken into two components. Dr. Burch was going to begin the morning's session with an introduction of Information Literacy as a concept. Dr. Cheatham would then discuss how Information Literacy related to accreditation and the Campbellsville University mission statement. Dr. Kemper was to conclude the session by demonstrating how Information Literacy could be used to supplement the research skills taught within specific disciplines. The main point of the morning session was to show that instituting an Information

Literacy program was not just the responsibility of the library staff, but rather the responsibility of the entire campus community. The afternoon session was to be a general discussion with all of the participants at the retreat. It was hoped that the afternoon session would identify faculty partners for integrating Information Literacy into the curriculum. Ideally, these faculty members would also help make the general presentation to the faculty that was scheduled for the opening faculty meeting of the 2006-2007 academic year.

Due to a combination of events that could not have been foreseen, the plans for the retreat nearly fell apart. The situation was such that the retreat would have been cancelled had we not already expended the grant money we had received to hold the retreat. The library staff cobbled together a morning session that ended with the group agreeing on a definition of Information Literacy, that we renamed Information Mastery, which we would use to construct the proposed class. "Information Mastery is the life-long process of integrating information literacy skill into all the relevant concerns of daily life, including interaction with the wider community, personal ethics and decision-making." We settled on Information Mastery because the faculty members in attendance felt that the term Information Literacy was insulting because it implied that many people were information illiterate.

During the afternoon session, we discussed a wide-variety of topics, including plagiarism, intellectual property, copyright, and the influence of social networking sites such as My Space and Facebook. The discussion resulted in the determination that a one-hour course was not going to be able to address all of the concerns that were raised, thus we opted to develop a three-hour course. Everyone was so energized by the discussion that we also planned the presentation to the entire faculty for the first faculty meeting. All of the participants at the retreat agreed to help make the presentation.

At the opening faculty meeting of the academic year, Information Mastery was introduced to the faculty. Dr. Burch made some introductory comments concerning the development of the plan up to that point. Ms. Sandra Riggs, the Electronic Resources Librarian, made a detailed presentation on Information Mastery. Mr. Jason Garrett, a member of the Communications faculty, provided a case-study of how he used information technologies in his classes. Dr. Cheatham discussed accreditation issues and the many ways that Information Mastery related to the university's mission statement (life-long learning) and quality enhancement plan (student engagement). The presentation concluded with a panel discussion that included the aforementioned participants, plus Dr. James Moore (faculty member from the School of Music), Dr. Mary Wilgus (Dean of Arts and Sciences), Mr. Tim Hooper (Archivist), and Ms. Chris Hines (faculty member from the School of Business and Economics).

The task of putting all of the disparate ideas that arose during both the retreat and the faculty meeting fell to Ms. Riggs, who authored much of the syllabus that was developed collaboratively through the library staff, the faculty, and members of the university's administration. The level of collaboration is evident in the resulting class, which does not look like a library course at all, with the exception of the course number. The joint ownership felt by all of the interested parties resulted in the course being put before the Curriculum Committee well-ahead of the original schedule. The course was introduced, and approved, by the Curriculum Committee at its first meeting of the Fall 2006 semester. The course was offered for the first time during the Spring 2007 semester, although it failed to enroll enough students to be taught. Campbellsville University is presently revising its core curriculum, and the Information Mastery course is a

candidate to be included as part of the core graduation requirements once the process is completed.

APPENDIX

CAMPBELLSVILLE UNIVERSITY SYLLABUS

LIS 150 Information Mastery

Course Description

This course is designed to prepare students for life-long learning in and out of the workplace. Overviews information mastery, beginning with basic information literacy skills: access, retrieval, format identification and evaluation. Students place information usage in historical and cultural contexts. Students learn and discuss ethical and legal issues in authorship, copyright, and the virtual world.

Course Goals:

- Students will identify information needs and appropriate means of accessing information
- Students will retrieve information using a variety of technologies, data formats and search methods
- Students will apply criteria for evaluation of information
- Students will understand the role of technology as an agent of historical and cultural change
- Students will understand the changing concept of authorship, and legal implications in a digital environment
- Students will understand responsible and ethical use of digital technologies
- Students will successfully research to problem-solve and inform
- Students will present and disseminate information in various formats.

Required Texts:

None – due to the ever-changing nature of information topics, the readings will be drawn from a variety of current journal and magazine sources. Readings will be delivered to the students through the password protected course website, in compliance with typical "e-reserves" guidelines. (See recommended resources) Students who prefer "hard copies" should budget for photocopying or printing costs.

Other Required Resources:

- Access to a computer, Windows 2000 or XP (campus lab access should be sufficient)

- A Flash drive of at least 512 MB (aka USB or Key drives)
- Recommended Resources **(**Recommended items will be on reserve in the library**):**
- Selections from many of these items will be used for outside readings
- A copy of the original resource will be on Reserve
- These may also potential resources for the group projects!

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MWF Course Plan – Sections, Activities and Assignments

Week 1: Online Learning

W: Instructor will go over syllabus; Discuss goals of class and why information mastery is relevant

Assignment: Outside Reading on Workplace Skills

F: Instructor will show students the class website; Explain the parts of an e-learning Interface; Compare interfaces

Week 2: Information Technology and Cultural Change

M: Class discussion, "how are grandparents/parents/children different in using technology?" View media, and see how many students can identify them and how they work. (Fiche, micro-film, LPs, tapes, Flash drive, etc.) Introduce concept of technology causing cultural change.

Assignment: Outside readings on books and printing as technologies

W: Quiz on outside readings; Printed bibles as an agent of change – view video "Ink & Blood."

Assignment: Response to "Ink & Blood"

F: Cont'd Lecture on Cultural Change

Assignment: Give students the timeline for Group Project #1. Each group will present a technology and describe how it has been an agent of change. Students will choose a technology and group members. Projects will be due the week ***after*** Midterms.

Week 3: Pre-Assessment: Students' current relationship to technology

M: Questionnaires on Technology Use for students to complete; Class discussion

Assignment: For one full day, keep track of all the technologies that you use. How and why did you use them? How long did you use each technology?

W: Discuss images of researchers, librarians and information-seeking in the media. Show video clips from *National Treasure*, *Lord of the Rings*, *DaVinci Code*, *Desk Set*, *Party Girl* and *Buffy the Vampire Slayer*.

Assignment: "Fictional People Project" instructions given out – due next class period

F: Class discussion in small groups – students will make a list of information that they will want to have this semester. (EX: answers may range from "how can I study better," to "when are all the home baseball games") Class discussion of information needs.

Assignment: Instructor will give out interviewee list and "Real People Project" instructions. As this requires setting up an interview, more time is given. The assignment is due, Monday of week 5.

Week 4: Academic Integrity in the Information Age

M: Definitions of academic integrity go beyond cheating and plagiarism; Class discussion in small groups

Assignment: Complete outside readings on Academic Integrity cases and return written responses to individual discussion questions

W: Lecture on Plagiarism; discuss citing and show examples of summarization, paraphrasing and direct quotation.

Assignment: Students are given several passages from articles and must do a summarization, paraphrase and direct quote for each example.

F: Small group discussion of Academic Integrity pledges in use at other schools. Students compose and take a pledge for themselves.

Week 5: Traditional views of Authorship: Copyright & Intellectual Property

M: Lecture on Definitions of Authorship, Rights of Authors; Are there copyright police? "Real People" project due today.

Assignment: Outside reading on "Knowledge Management" and response to individual discussion questions

W: Lecture "Corporations as Authors: Intellectual Property and Information Capital"; Patents; Clip of Frieda Giebert's performance of William Stevens' *Two Part Inventions on texts from the U.S. Patent Office* (1990).

F: Lecture "Authorship in Academia – the peer review process"; Music Authorship

Assignment: "Track Down the Source" due next class period.

Week 6: Community Authorship and the *Wikipedia* Model

M: Lecture "What's a Wiki"; How Wikipedia articles are created; The Wiki Community

Assignment: Post to the Wiki on our class page. Report on what happens to your post.

W: Lecture "The Legal Issues behind Wikipedia"; The GNU Free License

Assignment: This is your largest individual assignment, and counts as 10% of your grade. A Wikipedia Project instruction sheet will be provided. You will need to work on a Wikipedia page over the next few weeks, and document all your work and your interaction with the Wiki Community.

F: Early Start on Week 7, Seeking and Evaluation -- How Google gets results; How Amazon finds you a book; Broad explanation of algorithms.

Week 7: Information Seeking and Evaluation

M: How does a database Work? Controlled language vs. keyword searching; Boolean searches

Assignment: Searching exercises. Record how the use of Boolean searching affects your result numbers.

W: What goes in a database? Taking a look at databases that don't have articles: Classical Music Library, ARTstor, Early American Encounters, Digital Library of Appalachia

F: Small group class activity: describe objects for your "database." Class discussion on your choices

Week 8: Evaluation Criteria

MWF All week spent on Evaluation Criteria: Authority; Bias/Objectivity; Accuracy; Currency; Coverage

Assignment: Perform website assessment using hand-out as a guide. Website links will be available from class website, or use direct URLs.

Week 9: MIDTERM WEEK

Week 10: SPRING BREAK

Week 11: Group Project#1 – Presentation Week Mar 19 - Mar 23

M: Group Presentation – Self Evaluations and Group Evaluations of Teamwork Due

W: Group Presentation – Self Evaluations and Group Evaluations of Teamwork Due

F: Group Presentation – Self Evaluations and Group Evaluations of Teamwork Due;

Instructor will hand out instructions for Group Presentation #2 -- Technology News Show

Week 12: Technological Systems and Our Roles

M: E-Commerce (Online Purchases), Identify Theft Issues

Assignment: Outside readings on Identity Theft

W: Social Networking and MySpace

Assignment: Outside readings on MySpace

F: Accountability in Online Communities; Netiquette

Assignment: Participate in two online communication sessions through the class website. One must be a discussion, and one must be a chat session.

Week 13: Images as Information

M: Unrealistic Images of the Human Body – View video "More Human than Human"

Assignment: Use ARTstor database to view old advertisements in our class folder.

Answer discussion questions on handout to assess changes in how human images are used in commerce.

W: Persuasive Images and Politics – View video "Art of Persuasion"

F: Manipulation of Images Possible in the Digital Age – Small group discussion "What are the problems that occur when it is difficult to figure out what is a 'real' image?"

Assignment: Find 3 "impossible images" on the Internet. Rate how likely you think someone is to be deceived by the image. OR Find "un-hyped" images of celebrities. Can you? How can you prove it?

Week 14: Presentations of Group Project 2

M: Group Presentation – Self Evaluations and Group Evaluations of Teamwork Due

W: Group Presentation – Self Evaluations and Group Evaluations of Teamwork Due

F: Group Presentation – Self Evaluations and Group Evaluations of Teamwork Due

Week 15: Presentations of Group Project 2, Cont'd

M: Group Presentation – Self Evaluations and Group Evaluations of Teamwork Due

W: Group Presentation – Self Evaluations and Group Evaluations of Teamwork Due

F: Group Presentation – Self Evaluations and Group Evaluations of Teamwork Due; Wikipedia Project documentation is due for all students.

Week 16: Post-Assessment

M: Class critiques of Group Presentations; Discussion of Wikipedia Project results

W: Retake technology Questionnaires; Class discussion on "How my relationship to technology has changed"

F: Closing comments; Student assessment of Instructor

FINALS WEEK

Grading
A = 90% and above
B = 80% to 89.99999999999999999…
C = 70% to 79.99999999999999999…
D = 60% to 69.99999999999999999…
F = Anything below 60%
Please note, grades are not rounded up or down. The grades are determined by the following:

TEAMWORK--- Two Team Projects

- Projects **20%** (Two projects of 10% each)

- Ability to work as a Team Member **5%**

Grade includes Work Documentation, Team Evaluations and Self Evaluations

INDIVIDUAL WORK

- Weekly assignments **20%**
- Online communication (keeping up with class e-mails, website, chat, netiquette, etc.) **5%**
- Wikipedia Project **10%**
- Exams
    - Midterm **20%**
    - Final **20%**

Campbellsville University is committed to reasonable accommodations for students who have documented physical and learning disabilities, as well as medical and emotional conditions. If you have a documented disability or condition of this nature, you may be eligible for disability services. Documentation must be from a licensed professional and current in terms of assessment. Please contact the Coordinator of Disability Services at 270-789-5192 to inquire about services.

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Information Fluency: Goals and Outcomes

Mary V. Connolly
Associate Professor of Mathematics
Saint Mary's College
Notre Dame, Indiana 46556
574-284-4497
connolly@saintmarys.edu

Introduction

Certainly every college and university wants to graduate information and technology literate citizens. Various groups over the last few years have attempted to define exactly what this might mean, even as the technology and student experience change rapidly. Surely we want our students to be able to find, evaluate and use information which is appropriate to the task at hand. The Association of College and Research Libraries, in its Information Literacy Competency Standards for Higher Education, points out that "The sheer abundance of information will not in itself create a more informed citizenry without a complementary cluster of abilities necessary to use information effectively." [1] Technologically literate citizens must be able to do far more than just know how to use a particular piece of software. Such citizens must be life long learners, able to adapt quickly to new software and to evaluate the social, ethical and legal issues surrounding the use of new technology. For purposes of this paper, information fluency will include excellent research skills, including the ability to understand the types and sources of information available, the ability to assess the credibility of the information, and the ability to use the information effectively to solve problems and answer critical questions. Information fluency also includes the ability to use the technology tools available effectively. This involves knowing what tools are appropriate and why as well as how to use the tools in the problem solving process. Simply knowing how to use a spreadsheet or a word processor is only the tip of the iceberg here. The focus of this paper is on the general college or university students, i.e. not the student majoring in computer science, management information science, or other fields where there will be an obvious abundant use of technology.

What Do Our Students Know When They Enter?

Current popular thinking claims that students today are computer savvy, much more so than their parents. However, look carefully at what students really know as they begin college. At Saint Mary's, virtually every student arrives with a computer. However, not every student sets up her own computer! We can count on the fact that our students know how to use a word processor, although this may be a very rudimentary knowledge. As an example, students in an advanced first year mathematics class did not all know how to type a superscript. If one asks a current student how to begin a search for information, the answer is likely to be "a google search." This suggests that students do not think of academic databases, scholarly journals and other sources of scholarly information first. At Saint Mary's, every first year student takes a two session course introducing her to technology at Saint Mary's. As part of this, students were asked to take a twenty question survey designed to assess their research skills. The results were less than promising. There were 19 sections of this course, with an average student enrollment of 16.8 students per section. A significant portion of the students (30% or more) gave incorrect answers to half of the questions. Students had difficulty identifying a scholarly journal, suggesting that they really did not know what such a journal represents nor how the articles are reviewed. Students also had

difficulty in identifying the best set of key search terms for a research question. Particularly disturbing was the number of students who could not understand the difference between a search by author (for works by that author) or a search by subject for information about the author. Students failed to identify the importance of checking the bibliography, once a good article had been found on the desired topic. Students were also unable to read a bibliographic citation correctly to determine the kind of source being cited. All this suggests that our students do not know as much about research as they think they do. Clearly there is work to be done during the college years.

Do Our Students Know the Goals We Have for Them?

If we expect our students to become information and technologically literate citizens, the first question to be asked is whether we actually tell them that this is part of their education. A survey of the stated educational goals of over 30 colleges and universities produced some surprising results. The author began by examining the stated learning goals on the web sites for twenty colleges and universities. These schools were selected because they are on a list of aspirant schools that Saint Mary's uses for a variety of purposes. Often, in the search for learning goals, it was necessary to follow links to the school's catalog. Of the twenty schools, only six include information or technology fluency among their goals. Beloit College lists its goals immediately after its mission statement. One of the goals includes a core of what are labeled essential skills, with information literacy listed as one of those skills.[2] Connecticut College's general education requirements include a technology requirement. Students are expected to acquire skills in library research, database searching and Internet research. They are also expected to integrate technology into their research in whatever ways are appropriate.[3] Depauw University does not include information fluency in its goals, but very rich resources are provided for students who wish to develop their IT fluency. Under START (Student Technology, Assessment, Resources, and Training), pre-assessment prior to taking a workshop or online training course is encouraged. Post-assessment is also available, as are a number of ways to document student knowledge in ways that employers will recognize.[4] Earlham includes as one of its goals for general education the ability to gather and critically evaluate information from print and electronic sources.[5] Gettysburg structures its curriculum around four key elements, one of which is communication skills. "An effective education must teach students how to evaluate information, to marshal relevant evidence persuasively, and to communicate effectively – in person, in writing, and in technologically enhanced ways."[6] Macalester College recognizes the need for students to develop the ability to use information and communication resources effectively in its statement of purpose and belief. Computing skills are particularly mentioned under basic competencies.[7]

Schools Making Special Efforts in Information Fluency

The author became a bit discouraged by the lack of stated learning goals concerning information and technology fluency among the aspirant schools and thought, perhaps, the problem was the emphasis on liberal arts. Hence other schools were investigated, beginning with some mentioned in the 2006-2007 edition of Training College Students in Information Literacy, published by Primary Research Group. [8] This report describes the efforts of a broad range of schools, all of whom are working on some aspect of information literacy. Ulster County Community College received the 1996 ACRL Innovation in Instruction Award for its work in developing a web-based information literacy template that is now available to all SUNY campuses. Students at Ulster are required to take an information literacy course unless they test out. The course com-

bines basic computer skills and research techniques and requires students to locate, evaluate and synthesize information from a variety of sources.[9] Central Connecticut State University lists eight objectives for its general education, one of which is to develop computer literacy. Listed among the relevant outcomes is the ability to use technology for research, analysis and expression.[10] Southeastern Oklahoma University has a computer proficiency requirement which can be satisfied by taking one of two courses or by testing out. The courses emphasize skills more than information fluency.[11] The author also attempted to explore some large universities. However, learning goals in such schools are usually included in the particular colleges within the universities. For example, the College of Literature, Science and the Arts at the University of Michigan lists as part of its goals the expectation that students will express what they have learned in traditional written form and through technological media.[12]

ASCUE Schools

In a final attempt to find schools which really do list information fluency as a goal, the author looked at nine schools which were part of the 2002 annual ASCUE meeting, Only three of these really have well stated IT fluency goals. Winthrop University expects students to use critical thinking, problem-solving skills and a variety of research methods, incorporating technology competently.[13] The McAnulty College of Liberal Arts at Duquesne University specifically states that it trains students to use and appreciate the most current technologies for their chosen fields.[14] Monmouth University requires a course in information technology of every student. The course addresses research, problem solving, information literacy and ethics as well as basic skills.[15] It should be noted that the author's home institution faired no better in this survey. Saint Mary's general education program is currently focused around different ways of knowing. However, the campus is undergoing a complete review of its general education program, and at least one of the proposed models addresses accessing and evaluating information in a digital age.

Assessment

The assessment process properly begins with a set of stated goals. It is clear that in the area of information and technology fluency, not many schools have even arrived at this first step. If we can not agree on such goals, we can not expect our students to achieve the IT fluency they need. The schools discussed above certain will be capable of assessing whether or not students have met their goals if students are required to take a course which has these goals as its objectives. Monmouth University, for example, can surely structure its course assessment around its goals. Assessment of IT fluency becomes much harder when the goals are to be achieved across the curriculum. In this regard, DePauw's START model gives powerful opportunities to students who choose to take advantage of the assessment tools. However, most of us are not even at the first step of assessment.

Next Steps

It seems clear that many schools need to begin thinking about how to state their information and technology fluency expectations for their students in clear, visible language. Since most of us have a lot of work to do in this regard, we can at least think about assessment at the same time. The technology itself allows all of us to use a wide variety of assessment tools – projects, portfolios, research experiences, online assessment surveys, etc. As we expect students to move beyond simply mastering skills such as using a spreadsheet into the work of gathering, evaluat-

ing and applying information from all kinds of sources, we will need to be creative in our assessment approaches. The challenge will be in keeping our goals, programs and assessment tools up to date.

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Extending Internet2 to Rural Schools

James F. Gerraughty
Electronic Classrooms/Media Production Manager, CERMUSA Department
jgerraughty@cermusa.francis.edu

Kent P. Tonkin
Assistant Director of Information Technology, CERMUSA Department
Saint Francis University
117 Evergreen Drive
Loretto, PA 15940
(814) 472-3389
ktonkin@cermusa.francis.edu

Abstract/Introduction

Extending the reach of high-speed communications networks to rural school districts is a challenging endeavor, especially in regard to transportation and access costs. Chief among the services often denied to students on the wrong side of the digital divide is Internet2. Internet2, a high-speed network formed by an international consortium of colleges, universities, and research partners, has the potential of extending high quality/high-bandwidth content and services to the most under-served teachers and students.

The Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA), an active member of the Internet2 community since initially connecting in 2003, has recently become an "aggregation point" for three Pennsylvania Intermediate Units encompassing approximately 70 school districts throughout the most rural regions of the state. This research project, dubbed "the Rural GigaPoP," represents the logical progression of CERMUSA's involvement in distributing and producing content for Internet 2. Over the past three years. CERMUSA has used Internet 2 for the provision of a myriad of interactive distance learning programs, including foreign language, medical simulation, and musical education.

This paper will outline the processes and lessons learned from implementing the network, and the outreach to the various schools regarding the use of the technology.

Background

There were several components involved in creating the rural aggregation point.

The Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA):

Saint Francis University's Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA), a Department of Defense-funded telehealth and distance learning applied research initiative, has been researching ways to deploy high-speed communication for distance education and telemedicine in rural areas since 1994. Extending Internet2 access to isolated communities fits closely to CERMUSA's mission to bridge the digital divide between rural and urban America.

CERMUSA joined Internet2 in 2003 and has performed research in a variety of areas, most notably with patient simulation at Naval Health Research Center - San Diego. CERMUSA's Internet2 research efforts have also been publicly discussed and disseminated at academic conferences and publications including Internet2 Annual Member conferences. The Rural GigaPoP project was conceived and supported by CERMUSA, and has its roots in previous and ongoing CERMUSA research projects such as the Wireless Campus, Portable and Mobile Classroom (PortMoC), and Mobile Communication Platform (MCP). The proliferation of affordable rural broadband and potential Internet2 access within the educational community over recent years has enabled CERMUSA to experiment with more robust types of distance learning, particularly interactive video.

Internet2:

The availability of cost-effective bandwidth is a major stumbling block to providing distance education or telemedicine. This problem is compounded in rural or remote areas where economic issues preempt any solutions that may be costly. Telecommunications, broadband Internet, and other communications providers often choose not to upgrade rural infrastructures, due to the lower potential for return on investment from declining population bases. As a result, individuals in these areas often pay higher rates for lower levels of service than their urban counterparts.

A wide range of research has been compiled regarding the issues of connectivity and telemedicine/distance education. The Scott Report in the mid-1990s described the lack of data connectivity and the needs of rural physicians. A report from 1995 regarding rural economic development in Pennsylvania stated:

> Telecommunications can help overcome challenges to rural economic development by providing a cost-effective substitute for capital in the production process, improving the quality and the reach of modern medicine into rural areas, and introducing distance learning applications that can improve educational achievement in rural areas. Even relatively small geographic areas can be affected by investment in telecommunications infrastructure (Cronin, et al, 1995).

A further study in Australia found that:

> Heavy reliance on paper-based learning material can become a limiting factor in the learning process. It is our judgment that information systems learning from an enterprise management view is enhanced by integrating the communication (e-mail) capability provided by the Internet with paper-based material (Cooke and Veach, 1997).

The string tying these pieces of research together is a need for Internet connectivity to enhance education in rural areas. Rural areas, as cited by Cronin et al above, demonstrate this need for expanded access to information. However, not all information, especially on the Internet, is useful for education or training. Some of it can be detrimental to the learning process. Individuals are familiar with the negative aspects of the Internet, from the annoying, such as spam and pop-up ads, to the malevolent, like viruses and Trojan horses. These "side effects" of the Internet can interfere with the transmission of education and information. This is the current state of what is known as the "commodity Internet."

Internet2 is not hindered by the trappings of the commodity Internet. As a subscription-based consortium, Internet2 is devoid of for-profit commercial traffic and runs on a private, high speed fiber data infrastructure known as the Abilene Network. This network crosses the country and interfaces with other international high-speed education networks. Internet2 has membership requirements that block unwanted and bandwidth-abusing activities such as spamming, peer-to-peer file sharing outside of research, and commercial activities.

Research and education activities thrive within Internet2, including virtual cadaver dissection, foreign language education, and distributed supercomputing, among others. Internet2 is being utilized in colleges/universities and some school districts in urban/suburban areas. Despite the obvious advantages of high-bandwidth and lack of competition with commercial Internet traffic, Internet2 has not been fully utilized in rural areas, mainly due to the cost of communication network deployment. CERMUSA realized this need among the rural schools and set up an Internet2 aggregation point to address the issues of cost and access.

CERMUSA connects to Internet2 via the Metropolitan Area GigaPoP Philadelphia (MAGPI) at the University of Pennsylvania, Philadelphia, PA. MAGPI is a regional GigaPoP (high-speed network distribution **P**oint **o**f **P**resence) for Internet2, connecting sites in Pennsylvania, Delaware, and New Jersey. In addition to the Internet2 connectivity, MAGPI provides content services and promotion of Internet2 events among their members.

Rural Aggregation Point:

History:

A number of steps led to the creation of the Rural GigaPoP. CERMUSA first identified the Glendale School District in Flinton, PA as an institution capable of improving curriculum via access to Internet2 resources. As a recognized innovator in technology applications, Glendale has shown willingness in the past to explore new approaches in education. Some examples of this integration between technology and education include:

- Provision of laptop computers to the Junior and Senior High school students
- Creation of an integrated website and student performance record, enabling parents to follow their children's progress in school
- Provision of computer training for the communities Glendale serves
- Creation and support of wireless and wired networks in the school and local community for provision of broadband internet access to large portions of the school district population base

CERMUSA planned to assist Glendale in gaining access to supplemental music instruction from the Cleveland Institute of Music (CIM), a nationally-recognized provider of musical distance education. Due to Glendale's rural location, students did not have ready access to specialized music instructors for master classes or other training. CIM regularly offers such types of instruction at a distance; as such, services from CIM were retained for this connection. Due to the level of audio and video clarity anticipated to be necessary for successful remote music instruction, Internet2 appeared to be the best possible solution to achieve this link.

For these music activities to happen, the Glendale School District had to be connected back to CERMUSA via a high-speed connection. The incumbent local exchange carriers, had proven to be both exorbitantly expensive and unreliable; as such, Glendale had recently replaced their

wireline-based internet service provider (ISP) in favor of a new wireless approach from Sting Communications of Lebanon, PA. CERMUSA contracted with Sting to provide a regional wireless link between the John P. Murtha Telehealth Research Laboratory in Loretto, PA, with the Glendale School District.

Sting planned to install radio transmitters using unlicensed frequencies in the 5.8 Gigahertz (GHz) range. These radio transmitters had the capability of connecting two sites wirelessly by transmitting up to a 72 Megabit per second (Mbps) connection. These radios would also interface with CERMUSA's computer network, thereby being the bridge between Internet2 and Glendale at a throttled speed of at least 10 Mbps. Additionally, Sting presented CERMUSA with a plan to migrate its existing backbone WAN connections to a hybrid wireless and fiber optic network. This proposed network would enable CERMUSA to cease reliance on telecommunications carriers and to increase overall connection speeds at existing WAN sites without a substantial change in cost.

This project was of research interest to CERMUSA for several reasons. The primary reason was an assessment of the technical issues that surrounded long-distance non-licensed data transmissions. Other research ideas that arose pertained to education. Pedagogical questions of interest to be researched were:

- How do the "online" students fare against their regularly-instructed students?
- Could this approach be used for other education, such as language education?

CERMUSA hypothesized that access to Internet2 would positively affect education in primary and secondary schools. The idea was not to replace teachers in the classrooms with televisions or computers, but to enhance the students' education with Internet2. Examples of these enhancements include live, two-way video teleconferences with authors or scientists, or live electron microscopy, to name a few

During this time, CERMUSA also contracted Sting Communications for network transport services and migrated all core Internet and Internet2 connectivity to a hybrid wireless/fiber optic system in Summer 2005. Due to a series of technical difficulties, this transition was nearly three months behind schedule.

In addition to the events going on at CERMUSA, the Pennsylvania Department of Education established Act 183 as a means for school districts to receive grant money to build high-speed networks in their districts. Telecommunications companies were invited to bid on the Internet2 transport provision to the 29 Intermediate Units (IUs) in Pennsylvania. Sting Communications was the sole bidder to IUs 8, 9 and 10. CERMUSA was named as the Internet2 service provider.

IUs 8, 9, and 10, collectively known as the Regional WAN Consortium, invited CERMUSA to submit pricing for the provision of Internet2 Connectivity to 60+ schools within the three IUs. CERMUSA would act as a connection point for the IUs, with digital transport being provided by Sting Communications' wireless/wired network. CERMUSA submitted discount pricing to the consultant handling contract negotiations for IUs 8, 9, and 10 and was awarded contracts on a one-year per IU basis during the Fall of 2006.

Due to several technical problems, including radio frequency interference and severe network outages, CERMUSA discontinued contractual relations with Sting Communications in the spring of 2006. As Sting Communications still had the contract to fulfill with the local school districts, CERMUSA agreed to allow the company to continue equipment co-location at key facilities in anticipation of becoming the IU 8, 9, and 10 aggregation point.

Current State of the Network:

In 2006, the 72 school districts in IUs 8, 9 and 10 had the opportunity to opt-in to the Internet2 network. Districts that chose to opt-in had to set up networking equipment, paid by Act 183 dollars. The IUs budgeted for the Internet2 service from CERMUSA based on negotiations during the Spring of 2006. CERMUSA negotiated individual contracts with each of the IUs based on their anticipated bandwidth requirements. Despite the labor involved in this project, CERMUSA sold this bandwidth at a partial loss as a means of recovering costs for the core Internet2 connection in order to maintain this link as a university resource.

The IUs themselves determine the levels of connectivity available to each individual school district. Because all bandwidth ultimately is routed from a shared link at CERMUSA, connection speeds can be raised or constricted upon request, so long as the speeds do not exceed the backhaul to MAGPI. Because of this network management, should a school district need more speed on their connection for demonstration, CERMUSA and the respective IU can provide it for a limited time.

Figure 1 shows the Regional WAN network configuration and connection to CERMUSA:

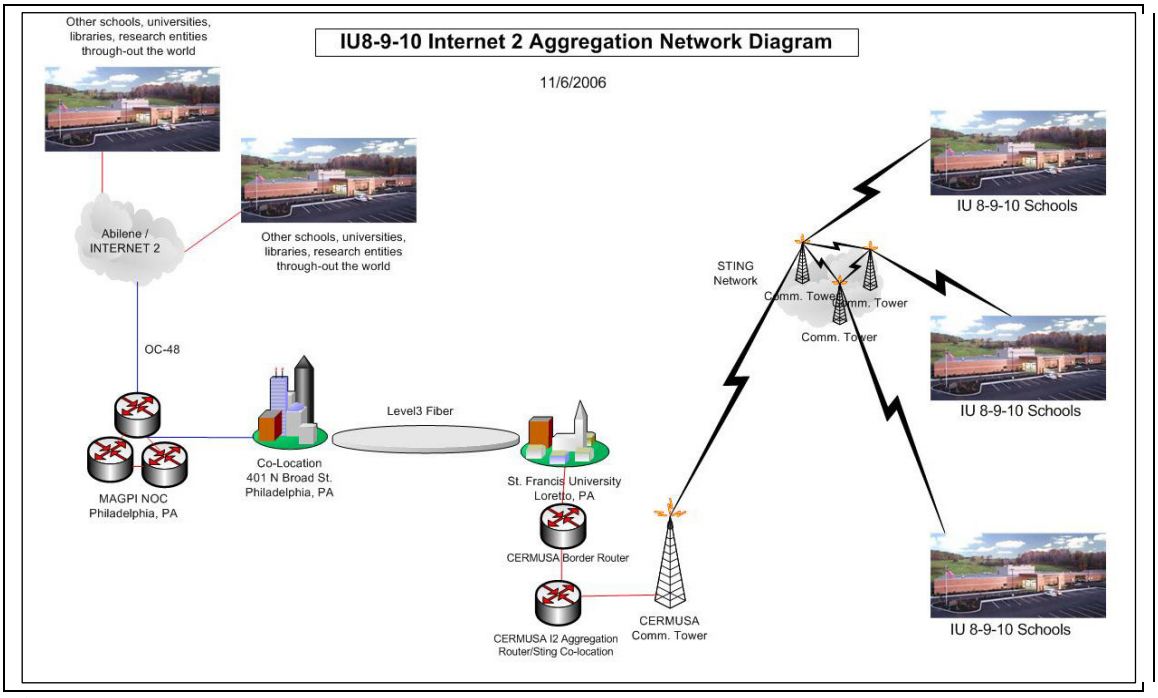

Figure 1

As of this writing, the CERMUSA Internet2 network extends into 46 school districts in Intermediate Units 8, 9, and 10, as shown in figure 2:

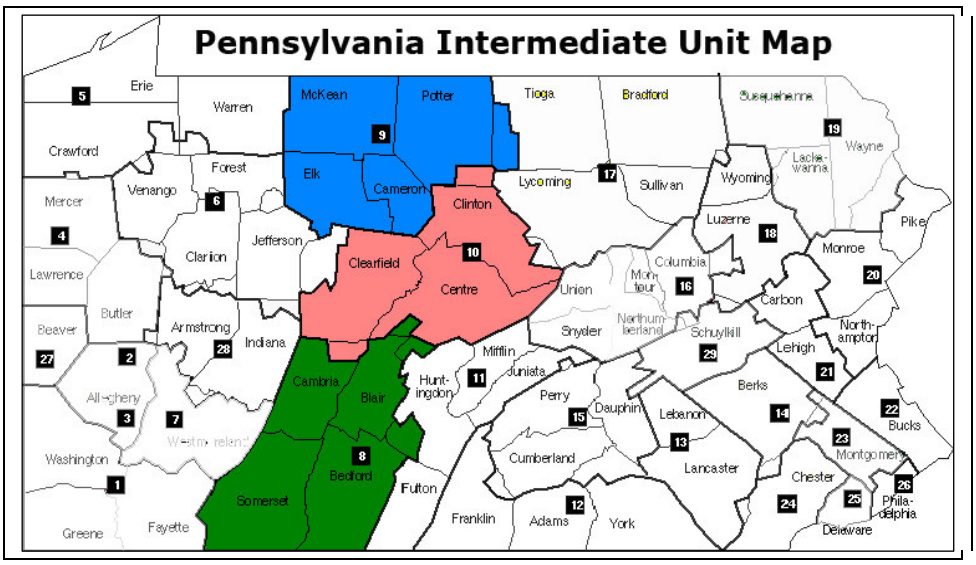

Figure 2

With CERMUSA and Sting working together to provide the Internet2 service, an agreement on demarcation and responsibilities had to made between the two. Lines of responsibility were set as follows: CERMUSA was responsible for logical management of IU and participating school access to Internet2 via an established fiber link between Loretto, PA and the MAGPI network operations center (NOC) in Philadelphia. Sting was responsible for the wide area network (WAN) connecting all participating schools and IUs to a common carrier and ultimately back to CERMUSA. To use a crude analogy, Sting was deemed responsible to keep the "pipes" connected and CERMUSA to keep the "water" flowing.

Due to the somewhat abstract and complex nature of the relationship between Sting and CERMUSA, CERMUSA developed a troubleshooting guide for network administrators, which was posted on our project support website. This guide is reproduced below as figure 3:

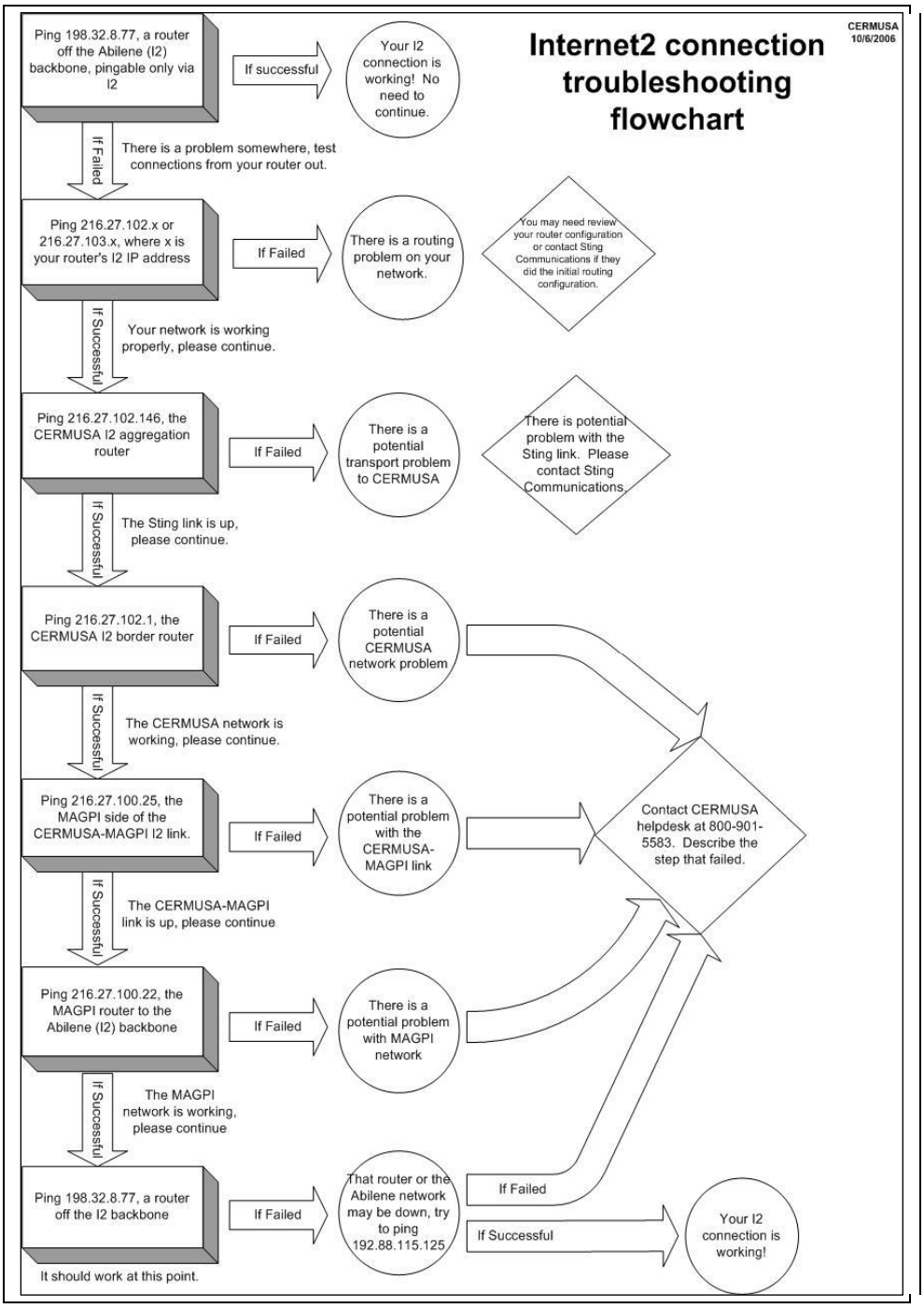

Figure 3

Schools and Internet2:

Since becoming the rural aggregation point of Internet2, CERMUSA has been involved in every aspect of Internet2 integration in the IUs and districts. CERMUSA has visited many of the associated IUs and school districts, and has hosted a number of instructors and educators at the University for demonstrations and questions and answers. Additionally, CERMUSA also created a web presence/blog (www.cermusa.francis.edu/internet2) and an email listerv to assist schools in

troubleshooting and to disseminate information about upcoming Internet2 events, both for teachers/students and network certification.

Findings/Lessons Learned:

The knowledge from the network setup and testing proved invaluable to this and other CERMUSA prototypes.

Although no conclusive data is yet available concerning the efficacy of the licensed-spectrum links, the setup portion of this prototype revealed the inherent weakness of non-licensed-spectrum communications and networking equipment. Despite manufacturer claims that non-licensed-spectrum gear can be co-located with other similar gear, the issues caused by spectrum interference (as well as the vendor's inability to recognize this problem) caused severe setbacks to this project. Additional vendor problems included lack of adequate backup power, non-functional error-checking, questionable wireless engineering skills, lack of follow-up from technical support, and assorted periodic unscheduled downtime due to lack of redundancy.

These delays, in addition to hindering the progress of the network, also prevented any research from getting started with the Glendale School District. However, Glendale was able to participate in several CERMUSA and MAGPI events over Internet2, such the Holliday Traditions Conference, an annual program run by CERMUSA to showcase holiday traditions from around the world, and "America Reads the Constitution," a program from MAGPI that has Constitutional experts interacting with classes around the country.

Organizations or companies wishing to deploy wireless infrastructure as part of a production WAN should carefully analyze the pros and cons of both licensed and non-licensed-spectrum networking gear, as well as the pedigree of the wireless communications services providers they are considering. In addition, companies opting to use a contract services provider rather than building their own infrastructure should carefully assess that provider's ability to deal with spectrum issues.

Schools and IUs became the critical piece to this project's success. Some lessons learned in the process of integrating the teachers and schools to the Internet2 network:

- Marketing: Teachers and schools did not necessarily understand what Internet2 was. The most effective method for explaining the value and benefits of Internet2 was live demonstration. When shown a live demonstration of a specific application, the teachers began to grasp the value of Internet2 within their classrooms and had very positive things to say about it to their colleagues and to the IUs. Some of the live demonstrations included:
  - The Internet2 Electron Microscope at Lehigh University (PA)
  - A simulation exercise with NASA's Goddard Space Flight Center
  - The Ann Arbor (MI) Hands-On Museum
  - Spanish language instruction from Saint Francis University

- Contact: It was found early on to have separate distinct points of contact at schools and IUs for both technical and pedagogical issues. This differentiation was important in that if CERMUSA had to perform any network upgrades or services, the network administrator in the district would be the one to call. However, the same network administrator may

not have the contacts in the district to advertise a 4th grade-level history project being presented on Internet2 to the teachers, for example. Therefore, it is important to separate the network contacts and the content contacts.

- Communication: Items like the listserv and the Internet2 blog were helpful in addressing both teachers' and system administrators' questions and concerns.

Future Plans:

CERMUSA hopes to grow its own Internet2 connection from its current DS-3 (45 Mb/s) connection to a higher speed connection, based on the growth in overall demand. In addition to the bandwidth growth, increased redundancy for a higher quality of service is also in the future plans.

CERMUSA also intends to make this aggregation project a self-sustaining entity, thus moving to a service provider rather than research model. Although CERMUSA does not want to run the aggregation point as a for-profit entity, a higher number of subscriber schools will be necessary in order to break even on this project.

To this end, CERMUSA also wants to bring on more schools in the IUs to Internet2. In the past year, CERMUSA has seen growth in participation in the connected schools in IUs 8-10, not only from our presentations, but presentations hosted on Internet2. CERMUSA also participates in outreach to show schools that are not connected what they are missing and to bring them on board.

Conclusion:

This project showed the challenges of bringing high-speed data communications and Internet2 into rural school districts. However, the greater challenge lies ahead in utilizing the network to enhance education. The lessons learned in constructing and implementing the network, and getting educator buy-in for use in classes will make this project self-sustaining and provide a benefit to rural areas and the educational community at large.

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Revisiting an Earlier Knowledge Creation Model

Sam Hijazi
Florida Keys Community College
5901 College Rd
Key West, FL 33040
305-809-3541
hijazi_s@firn.edu

In the summer of 2006, the author presented a model of knowledge creation at the Society for Applied Learning Technology Conference (SALT) in Arlington, Virginia. After serious discussion with other participants in the conference and closer examination of the model, a new revision was needed. It was stated that in the process of creating knowledge within the organization, knowledge must lead to an action. Further, action must lead to a sustainable performance. To make this model more helpful, an additional probing is needed to show how an action is turned into a desired performance. This paper reexamines the existing model to discover what concepts and techniques are needed to guarantee that action taken in the process of a knowledge creation leads to the desired outcome, that is, the sustainable performance.

Quick Revisit

Still the model (see appendix One) deals with the data as the basic input to create information. Information needs to be processed further to create knowledge. Knowledge is created as a result of combining two types of knowledge: tacit knowledge and explicit knowledge. The greater part of existing knowledge in any origination is hidden in peoples' heads as tacit knowledge or as intellectual capital.

The process of creating knowledge must lead to action. The action must be evaluated and examined closely. As noted from the previous study, actions are influenced by multiple factors that can turn into a sustainable performance. These include:

1. Leadership. Leaders must lead themselves before they can lead others. Leaders should not fear failure, and should share some of their mistakes with employees.
2. Dealing with change. Just like taxes and death, change is going to happen regardless of our attitude toward it.
3. Dealing with politics. Politics is a critical part of any organization. The acknowledgement of politics and peoples' ability to balance between performance and the talent of applying the culture rules wisely can lead to many positive results.
4. Trust. Not many tasks can be completed without building a trusting, working environment first. Trust should be always mentioned as a prerequisite to any accomplishment. Teamwork is required to complete many projects. Without trust, very rarely can anything be achieved.
5. Learning as a lifelong endeavor. Not only do organizations need to create a learning environment, but also the concept of learning about learning must be established. Knowing what people need to complete a project is constantly changing. They need to build the ability of finding the solution on their own. Researching the Internet, databases and different knowledge bases is a must in order to survive the overwhelming increase in the amount of information.

Clear Emphasis on Action

With all that in mind, we need to investigate the additional requirements that train an action into a sustainable one. It is not enough to plan and state what is to be done. Additional descriptions of the nature of the action must be discussed, examined and measured. As a result, only knowledge translated into action is useful knowledge. The time it takes a company to plan, analyze, and design knowledge management systems may be lengthy. Of course, we should not forget the cost in the investment. Just like many information system built in an earlier period could not produce the desired outcome, knowledge management systems can have the same fate if they were not geared toward a tangible action. Action is the heart and natural conclusion to a long and costly investment in any system.

What does it take to produce an action that will generate sustainable performance? There are many ways of creating an atmosphere that supports an actionable knowledge. These are some points that can be used as a check list during planning and implementation within a knowledge sharing environment. Remind the group through the different phases of building a knowledge-sharing environment that actions produce sustainable performance and therefore are the goal of the study.

1. Actions should be explicitly stated and discussed frequently.
2. Gain support from top management for actions.
3. Create a graph, chart, or pictorial element that reminds the team that knowledge management will not produce any outcome without action.
4. When thinking about outcomes becomes the norm instead of producing action, a corrective action must be taken to keep the involved team on the right track.
5. The team as a whole must work to reduce the risk of slowing down the process. They must face any challenge that can divert the team from obtaining the desired outcome.
6. Create a log of the errors committed during the implementation of the plan to insure that resources are not wasted over and over again.
7. Before or during an action, be aware when technology can be used as an effective communication tool. Further, we need to be aware when technology is not the right delivery method and that human interaction is the most beneficial method to produce the right action.

Knowledge management is directly related to any academic setting. In reality, any educational institution is considered an engine for producing knowledge. Producing knowledge in academic settings does not guarantee an action that produces positive change. Therefore, we need to continue to see effective learning through a sustainable action (Stähli, 2006). In his article "Effective learning for sustainable action," Stähli asked three great questions to elicit a response and incite thinking in regard to sustainable action. These are:

1. "What do we generally understand by 'sustainable action?' "
2. "What requirements must be fulfilled to enable sustainable action?"
3. "How can you train young or older persons to enable them to act in a sustainable manner?"

From the Internet Time Blog by Jay Cross, the author referred to the work of Jeffrey Pfeffer and Robert I. Sutton and asked the question as to why our actions are not consistent with our knowledge of what needs to be done. The author stated five reasons why organizations know what to do but fail to do it. Members in the organization:

1. Use talk to replace action. A presentation is a replacement of a useful action.

2. Use their memories instead of acting. Constant thinking without finding the right tools to produce the right action. Most go back in their memories to find a solution to a recent problem where many variables have become obsolete and unable to provide a new action.
3. Allow fear to control their knowledge. As a result, no action is produced. Fear could include the fear of failure, the fear of facing unusual challenges, and just plain old fear from rejection.
4. Allow "measurement to obstruct [their] judgment." Sometimes, the use of strict tools to measure the completion of a certain task makes it hard (if not impossible) to move to the next step.
5. Let internal rivalries exist. As a result associates become hostile toward each other. Jealously, for example, is a common feeling among employees. This negative feeling could produce a blinding approach in order to carry out tasks effectively.

Ironically, from another website with the title of "The Managing Leading Edge," the author referred to Pfeffer and Sutton in order to find a solution to the above-mentioned problem. The author focused on eight points that must be looked at closely in order to turn knowledge into action. These include:

1. Focus on "why" before "how." To know the reason behind doing anything is very important. The author called on management to explain why procedures are applied and the reason for the new knowledge. It should not be about a new learning method or "following order," rather it should be about understanding the purpose behind the new knowledge.
2. Teaching others produces a learning atmosphere. Any new knowledge must create an action as quickly as possible. These actions should include practical approaches, e. g., learning how to transfer new knowledge into a new behavior. Lectures should not be considered the end of the learning cycle.
3. Elegant plans and concepts are not a substitute for actions. So much of an organization's resources get wasted because a plan is evaluated to death and every sort of possible benefit becomes either untimely or ineffective.
4. Mistakes are part of taking an action. Acknowledging that making mistakes is part of any project allows employees to view taking risk as rewarding. "Smart companies" create an incentive mechanism for taking risks and learning from mistakes. On the other hand, "dumb companies" usually tend to punish people for making mistakes. Discouraging people from taking risks by not allowing room for mistakes in order to produce a totally safe environment will diminish growth.
5. Try to eliminate fear. Any action that takes place should be based on trust, and leaders should do their best to minimize fear.
6. Our energy should be spent to compete externally as opposed to internally. It is so easy to foster internal competition and lose track of our purpose within an organization. Management should do their best to work around creating a competing working environment by encouraging knowledge sharing and cooperation. People should be encouraged to cross boundaries within an organization to help each other.
7. Don't measure everything. Measure only those tasks that produce action from knowledge. It is critical to measure a few core performances but we need to avoid measuring too much. Too many examined pages along with many numbers to crunch make it hard to generate value. "It is especially valuable to measure work-in-progress instead of past results."

8. Leaders should lead by example. How leaders act and spend their time are important indications to how knowledge can be turned into actions. What leaders and managers practice and enforce can shape the corporate culture. The actions taken by leaders should be a blueprint to other employees in their daily actions throughout the organization. Maureen Crowley, Vice President of Instructions, emphasized that trust and understanding a role every leader must assume. Crowley stated that as leaders we must "strive to reflect a garden like atmosphere responsive to change and adaptive to new initiatives. It is this internal climate of a garden that provides for the respect and trust necessary to insure the personal and professional development of all employees. Leadership strives to foster understanding, respect, dignity, and a climate of cooperation and freedom to take risks."

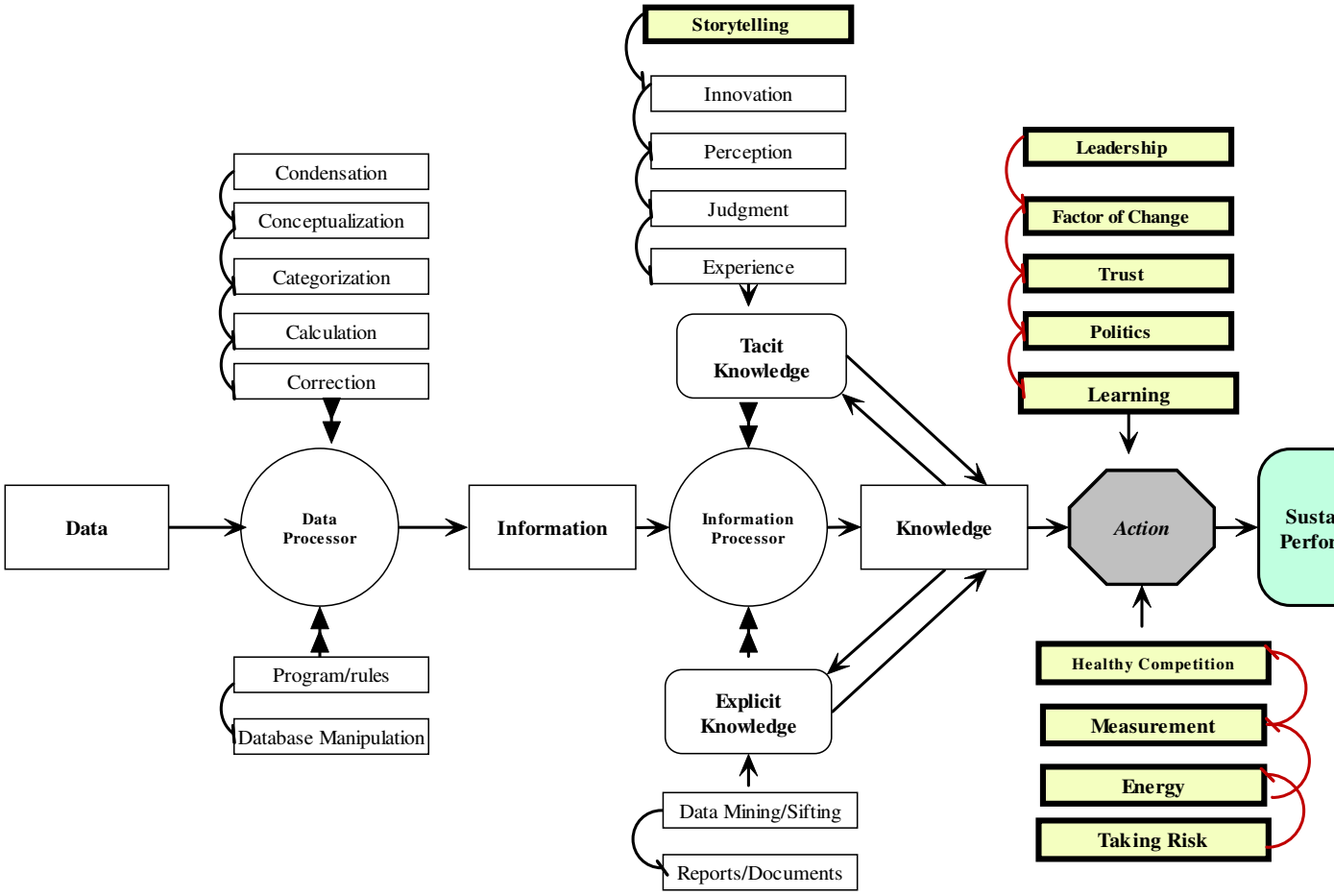
In a conversation with Professor Roland Fisch who teaches education and anthropology classes at Florida Keys Community College (FKCC), he referred to Benjamin Bloom Taxonomy of Educational Objectives. Professor Fisch made it clear when he stated that knowledge must be followed by understanding and understanding itself should lead to an application. This proves that unless application is utilized, there will be no action. Professor Fisch supported the notion that our ability to transfer our knowledge to action is very much needed to create a knowledge creation environment which itself must lead to a sustainable performance.

In another conversation with Jean Mauk, Vice President, Financial and Administrative Services at FKCC, she stated that a follow-up is always needed to insure that an action is being sent in the right direction. Further, Mauk stated that we need to ask the question, "Is that what happened?" and "Why." Questions are wonderful tools to assist us in the formulation of an action. Questions are helpful in reminding us that answers are there, and unless we seek them, our situation will continue to be vague. A conversation with Sharon Toppino, Vice President of Students Affairs at FKCC, resulted in similar support of the study. Toppino stated that we need to examine our present issues, and to remind ourselves of those guidelines. Who are the other people who are involved in the production of an action? Can we include more seasoned people to create a different perspective? These questions were asked by Toppino who supported different input in the knowledge creation process. She finished by saying the involvement of many people in the process certainly will produce an action that is sustainable.

Conclusion

In our attempt to create a sustainable action, we need to look at many issues. These issues should produce an environment that assures a sustainable performance. We should start by asking "why" since why give us a higher level of understanding. We need to value ideas that emphasize actions since elegant plans by themselves will not solve business problems. Mistakes should be tolerated and taking risk should not be restricted. Fear can create a crippling factor and business should discourage employees to compete internally. Business should not create a suffocating working environment by trying to measure every process to precise list of standards. Finally, leaders should lead by example and their behaviors and stands should become a blueprint for good and productive business practices.

Appendix One



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What's in a Lab? Online Science Laboratories

Janet E. Hurn
Physics Department
Miami University Middletown
4200 E. University Blvd.
Middletown, Ohio 45011
hurnje@muohio.edu

Why Do We Have Laboratories?

There are many reasons we choose to offer laboratory classes. For students that do not plan on working in a science field, we seek to offer basic laboratory and measurement experiences. It fosters critical thinking and gives students some basic skills they might utilize around the house or in the workplace. These experiences also shed light on basic data collection and manipulation. Although students may not realize it, they collect data daily and make choices based on that data. For example at the store they may be looking at prices of a certain product. That is simple data collection. They may find themselves collecting data in the workplace even though they are not in a scientific field. We as everyday individuals are bombarded with statistics and it is important to understand the interpretations. Every person should understand the scientific method. We are taught parts of this method throughout our educational experience. In addition to these practical applications, the kinesthetic learning style is one that many rely on as their primary learning style. It is important that these students are allowed to experience the scientific concepts from the classroom in the laboratory setting. And finally some students are planning on working in a laboratory field and need to practice skills they will perform throughout their careers.

What Can Be Done Online?

In order to teach a lab course that utilizes the Internet, there are several models we can follow. First we can teach a totally web based course that includes no class meetings. In this model all communication and activities are done via the Internet. Second, we can use an inverted model. In this model pre-activities and/or practice activities can be done outside of the classroom and the actual lab can be performed in the classroom. For example a difficult chemistry lab could be practiced virtually online with no spilled or wasted chemicals and then students would know what to expect come lab day. A similar model to the inverted model is the hybrid model. In this model some of the work is done online while some is done in the classroom. How this work is divided would be up to the instructor. Finally, in the web enhanced model, most of the work is done in the classroom but there are some research or assignments done online. In our project we chose the totally web based model for our approach.

Is It for Real?

Obviously there are two ways to perform a lab experiment: virtually or really. The real way includes actually touching the equipment and performing the lab in real time. There are multiple methods to perform a lab virtually. One way is through a computer simulation. The student can manipulate parts of the simulation and run the experiment multiple times. The student is actually interacting with the experiment and they are free to try outrages combinations if they want to.

Things can be shot and blown up with no real damage. Another virtual laboratory approach is using a remote approach. Experimental apparatus is actually manipulated by the student from a remote location via the Internet. For example a camera or telescope can be moved and focused by a student from a remote location. These types of experiences tend to be expensive to create and maintain. A third approach to virtual labs is to have the lab experiment recorded in either still photos or a movie. The student then takes data from the actually video or pictures or some of the data is provided from the original experiment. This can be very useful when the apparatus is expensive or an experiment is difficult to recreate. The down side is that the student cannot really interact with the experiment. They cannot change the variables and experiment. Students have reported that they like having "good" data that they know will work but often prefer to do the lab themselves. (Bhargave et al., 2006) We used a combination of these approaches in our project.

Considerations When Choosing a Lab Approach

It is important to keep several things in mind when choosing the right lab experience for your students. Obviously the danger of the experiment is important. The expense of the lab equipment is also an issue. Can your students afford lab equipment if they are asked to purchase it and to take it home? The distance your students will be away from the campus is a consideration as well as what the exact objectives and goals are. Our project was focused on the data collection and manipulation as well as the scientific method more than the complexity of the experiment. That gave us some flexibility.

Why Put PHY 103 Lab Online at Miami Middletown?

In addition to myself, Mrs. Sue Ellen Radcliffe and Mr. Dwight Portman worked on this project. Concepts in Physics Laboratory (PHY 103) is a one credit hour course that meets the Miami Plan liberal education requirement for a physical science laboratory. The lab can be taken by students from any one of a number of support courses: Astronomy, Physics in Sports, Energy and Environment, Physics and Society. We had already put Astronomy, Physics and Society and Energy and Environment in an online format for our nontraditional students. The online classes were very popular, especially in the summer. It seemed a logical conclusion to put the lab online as well.

There are advantages and disadvantages to putting this laboratory online. The advantages include flexibility for the busy student. They can perform their lab when it is convenient for them. One of the best advantages is that they are encouraged to work with others when they gather data. Students have worked with significant others, each other's children and even grandchildren. Physics is enjoyed by the whole family. This is a great thing. The lab course is somewhat self-paced. The students can take their time on a lab activity or work more quickly. They can even repeat the lab as often as they need. Most laboratories move at the pace of the fastest person in the group which is not advantageous for other students.

Disadvantages include the fact that the teacher is not readily available during the lab activity. If a student has a significant question, they must wait until they get a reply which can be frustrating. On the other hand they may be more apt to find a solution on their own. Another disadvantage is that we are limited in the equipment that we can use for the labs as well as the expense. Preplanning becomes crucial. Flexibility can also be a disadvantage as students tend to put off doing their lab until right before it is due and then they become frustrated and perform poorly.

Types of Labs Used in PHY 103 at Miami

We have a variety of labs in this course. We have a majority of the lab exercises which are actual hands on laboratories. The students purchase a kit and utilize the contents to perform the labs. Much of the equipment is either measurement tools or toys. We include toy cars, balls and poppers just to name a few. In addition to the hands on labs we have a few simulations and a couple of video analysis labs. The variety is nice for the students.

Lab Components

Each lab contains similar components. The students know what to expect for each lab.

- Objectives – clearly state what each students should know at the completion of the lab.
- Review web links – these are links chosen by the instructor that review the material that the lab covers.
- Support Material – short lectures or examples of the calculations found in the lab.
- Lab – each lab is posted in WORD format so the students can download it, fill it in, and upload back to the Blackboard CMS.
- Blog Journal Entry – The students are given a topic to reflect on in an online journal. Students are placed in groups and can read each other's reflections.
- Lab Quiz – There is a short online quiz of 5 questions that the students complete at the end of the lab. Questions are randomized and reflect the objectives.

How the Project Began

The pilot course was created with the assistance of an internal grant that supplied money for the lab writers as well as seed money for kit equipment. As kits are now purchased, new kits can be created. The pilot was successful and now the class is in its third offering. Student attitudes toward a science lab activity improved and their confidence in doing it themselves improved as well. (This is based on an anonymous survey given before the class and after completion of the course.)

Kit Contents

- spring scale(10N)
- polarized film - 2 sheets
- platform scale
- safety ruler
- balloons – 2
- windup measuring tape
- stop watch
- battery car
- pull-back car
- chalk
- 2c batteries
- 3 poppers
- 3 balls
- foil
- centripetal force apparatus
- yellow and red filter paper
- ABC block
- tower block
- CD

Issues Encountered to Date

There have been a few issues that we have encountered and attempted to deal with. The procrastination of the students is a big issue. They wait too long to start their lab and then get frustrated or have questions that it is too late to answer. One strategy to deal with this has been to offer a proof read to those students who hand in their labs 1-2 days early. They then have a chance to make changes. Not many have taken advantage of this. Another was to give a bonus point for early submission. Another problem is that many classes feed into this lab. Some may have covered a topic more thoroughly than another. I have been adding short tutorials that give examples of the lab calculations. This has seemed to reduce questions to some extent. We have also battled the false view that this class is "easy". I think many students have been shocked as to how difficult the course was. We try to inform students up front so they are prepared. We have also had some minor technical issues but they were dealt with on a case by case basis.

Assessment

The course has been assessed utilizing multiple means. We have done online Small Group Diagnoses (SGID) which allow the students to bring up course issues and then vote on how important those issues have been. In addition we had a pre and post survey about student attitudes toward lab courses. And finally the department evaluation was posted. All students are invited to participate in an online survey for all Miami online students but participation is voluntary.

Conclusion

I believe that this course is a useful laboratory course for students in need of their Miami Plan physical science lab requirement. It allows students with awkward schedules to complete this requirement. The objectives are being met in a flexible format. It also greatly compliments our other online physics courses.

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Navigating the changes to the A+ certification requirements

Mary Insabella
(614) 287-5207
minsabel@cscc.edu

Debra Dyer
Columbus State Community College
550 East Spring Street
Columbus, OH 43216
(614) 287-3886
ddyer3@cscc.edu

Abstract

CompTIA has made a significant change to the way it tests for its A+ certification. Instead of testing on software and hardware separately, CompTIA has combined these two areas into one test called "Essentials." Certification candidates then choose from one of three area specific tests: 220-602 (IT technician), 220-603 (remote support technician), or 220-604 (depot technician). We will discuss the changes to the structure and content of these tests.

Certifications

There are so many certifications floating around the technical world these days that it is hard to tell what all of the acronyms mean. A quick search of the internet turns up an alphabet soup of certifications to put behind your name. Each year brings a new list of the top ten certifications. In 2006 the top ten certifications, according to certification.about.com were the following:

1. Cisco CCNP
2. Cisco CCNA
3. Cisco CCIE
4. CompTIA Network+ & Microsoft MCSA
5. CompTIA A+ & Microsoft MCSE
6. Microsoft MCSD
7. CISSP
8. Microsoft MCP
9. PMP & Microsoft MCDBA
10. Cisco CCDA

You can see that Cisco, Microsoft and CompTIA lead the pack and have, in some combination, for the past few years. CompTIA's A+ certification has been on the list for years and is considered by many to be the most valuable entry level certification.

CompTIA A+

In the past, CompTIA had required an applicant to complete two tests, one focused on hardware and one on software. The last time the tests were updated was in 2003 when they changed the focus away from the Windows 9X family to the Windows NT family of operating systems. The 2003 version of the exam will be available until June 30, 2007.

In October of 2006, CompTIA made another update to the test by combining the basic software and hardware components together to form one test call Essentials. A second, required test is more specialized. Candidates have the choice of taking #220-602 IT Technician, #220-603 Remote Support or #220-604 Depot Technician. "The changes to CompTIA A+ reflect the evolution of skills and job responsibilities for computer science and support personnel," *www.comptia.org*. The resulting tests are the subject of this paper.

CompTIA A+ Essentials (#220-601)

The essentials test is taken by everyone. It is a combination of the old software and hardware tests. All of the tests include subject matter in the following 8 domains:

Domain 1: Personal Computer Components
Domain 2: Laptops and Portable Devices
Domain 3: Operating Systems (Windows 200, XP Professional, Home and Media Center)
Domain 4: Printers and Scanners
Domain 5: Networks
Domain 6: Security
Domain 7: Safety and Environmental Issues
Domain 8: Professionalism and Communication

The last domain has been added as an acknowledgement that many of the holders of the certificate are working in user support areas and have a good deal of contact with the public. The objectives of Domain 8 are:

8.1 Use good communications skills, including listening and tact/discretion, when communicating with customers and colleagues.
8.2 Use job-related professional behavior including privacy, confidentiality and respect for the customer and customers' property (e.g., telephone, computer)

CompTIA has made a conscious effort to put a greater emphasis on soft skills and security and safety issues in the essentials portion of the exam. Applicants have 90 minutes to complete the 100 questions that make up the essentials test. A score of 675 is required to pass the exam.

IT Technician (#220-602)

According to the CompTIA , the *220-602 exam is targeted for individuals who work or intend to work in a mobile or corporate technical environment with a high level of face-to-face client interaction. www.comptia.org* Job titles associated with this exam include service technician, IT technician, computer technician, field pc technician and it administrator. Candidates are tested in all seven domains. Examples of the objectives for this exam are as follows:

Domain 1: Install, configure, optimize and upgrade personal computer components
Domain 2: Identify fundamental principles of using laptops and portable devices
Domain 3: Identify the fundamental principles of operating systems
Domain 4: Identify tools and diagnostic procedures to troubleshoot printers and scanners
Domain 5: Install, configure, optimize and upgrade networks

Domain 6: Perform preventative maintenance for security
Domain 7: Use job-related professional behavior … and respect for customer.

There are 90 questions on this test. A score of 700 is required to pass each of the three non-essentials tests.

Remote Support (#220-603)

The 220-603 exam is *targeted for individuals who work or intend to work in a remote-based work environment where client interaction, client training, operating system and connectivity issues are emphasized*. www.comptia.org Jobs associated with this exam include remote support technician, service desk technician, help desk technician and call center technician. There are six domains areas for this exam. Objectives for this exam include:

Domain 1: Perform preventative maintenance on personal computer components
Domain 2: Install, configure, optimize and upgrade operating systems
Domain 3: Identify the fundamental principles of printers and scanners
Domain 4: Identify the fundamental principles of networks
Domain 5: Install, configure, optimize and upgrade security
Domain 6: Use job-related professional behavior … and respect for customer.

Depot Technician (#220-604)

The 220-604 exam *is targeted for individuals who work or intend to work in settings with limited customer interaction where hardware related activities are emphasized.* www.comptia.org Job titles associated with this exam are depot repair technician and bench technician. This test emphasizes computer repair and troubleshooting. Candidates are tested in 5 domain areas: Personal Computer Components, Laptops and Portable Devices, Printers and Scanners, Security, and Safety and Environmental Issues. Objectives include:

Domain 1: Install, configure, optimize and upgrade personal computer components
Domain 2: Install, configure, optimize and upgrade laptops and portable devices
Domain 3: Identify the fundamental principles of printers and scanners
Domain 4: Install hardware security
Domain 5: Identify potential hazards and proper safety procedures

Salaries

The *certification.about.com* site lists average salaries based on primary certifications. The following is a list of the 2006 top ten certifications and the salaries associated with them.

Cisco - CCNP: Salary: $61,487
Cisco - CCNA: Salary: $47,173
Cisco - CCIE: Salary: $91,454
CompTIA - Network+: Salary: $35,930 **Microsoft - MCSA**: Salary: $34,428
CompTIA - A+: Salary: $30,982 **Microsoft - MCSE**: Salary: $72,955

Microsoft - MCSD: Salary: $66,398
CISSP: Salary: $76,955
Microsoft - MCP: Salary: $70,546
PMP: Salary: $87,161
Cisco - CCDA: Salary: $171,666

As you can see, there is good reason to acquire certification.

Acronyms

CompTIA has a six-page list of acronyms that appear in the exams covering the 2006 objectives. They encourage applicants to review the list and have a working knowledge of the list. There are some 300 acronyms ranging from AC to ZIP. Visit CompTIA's site at http://certification.comptia.org/resources/objectives/comptiaaackronyms.pdf for the full experience.

Practice Tests

There are a large variety of sites that have practice tests and study guides to use for certification tests. A search for A+ practice tests gives pages and pages of sites advertising free demo tests. Most of these sites have some free study material, but want to sell you material that is *guaranteed* to get you a passing grade. We've gathered materials from several sites to use for our A+ student study groups. Below is a sample of questions we use in our group.

1. In Device Manager, the following symbol indicates that automatic settings were not used and resources have been manually assigned:
   a. exclamation point
   b. blue I **
   c. green question mark
   d. red X

2. The following is a method to keep your computer secure:
   a. when traveling, turn your personal firewall off
   b. don't use AV software
   c. keep windows updates current **
   d. set Microsoft internet explorer for minimal security

3. To control power using the BIOS, use the following menu from the CMOS setup:
   a. DPMS
   b. ACPI
   c. APM
   d. Power **

4. What is the maximum throughput speed for an 802.11b network:
   a. up to 1 MBPS
   b. up to 5 MBPS

c. up to 7 MBPS
d. up to 11 MBPS **

5. In the following mode, the CPU processes 32 bits of data at one time:
   a. real mode
   b. long mode
   c. protected mode **
   d. extended mode

6. The following recovery console command creates and deletes partitions on the hard drive:
   a. diskpart **
   b. expand
   c. fixboot
   d. fixmbr

In conclusion, the changes made to the A+ certification will allow candidates to be more precise in the skills they need to master for the job they have or would like to apply for. As skill sets become more specialized, employers will be better able to gauge the expertise a potential employee has by the certificates they have acquired. This, in turn, will make a better fit of employee into position.

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Looking Back to Instructional Strategy Basics, Charging Forward, Methods for Transitioning from the Classroom to the Online Environment

Robert Logan
Assistant Professor
College of Technology
Kent State University, Salem Campus
2491 State Route 45 South
Salem, Ohio 44460
330-337-4265
rlogan@kent.edu

Larry Froehlich
Associate Professor
College of Education, Health, and Human Services
Kent State University, Trumbull Campus
4314 Mahoning Avenue, NW
Warren, Ohio 44483
330-675-8914
lfroehli@kent.edu

Abstract

Growth of online learning both in terms of the number of institutions offering online courses and in the number of students enrolling in online courses continues to rise at an accelerated pace. Current course management tools such as Blackboard and WebCT and an array of screen capture and courseware authoring tools have been adopted in order to create and distribute learning content in this new online environment; however, many faculty are reluctant to undertake online learning due to concerns relating to the time and effort required for online learning, and a lack of understanding of how to transition their "proven" classroom techniques to the online environment. This article will address ways that many effective and commonly used classroom learning activities can be transitioned to the online environment by putting pedagogy before technology.

Introduction

According to the Sloan Consortium publication "***Making the Grade: Online Education in the United States, 2006"*** There has been no leveling of the growth rate of online enrollments; institutions of higher education report record online enrollment growth on both a numeric and a percentage basis. Nearly 3.2 million students were taking at least one online course during the fall 2005 term, a substantial increase over the 2.3 million reported the previous year."

Linda Harasim, in the publication "*Learning Networks: A Field Guide to Teaching and Learning Online"* (Harasim, 1995), said "all education – face to face, distance mode, online – requires understanding the nature of the medium in order to conceptualize and design it as an educational environment". Effective pedagogy (teaching and learning) requires the awareness of the limitations and opportunities of any mode of delivery. Are we letting the technology drive the educa-

tional experience and overlooking that sound pedagogy must be present regardless of the delivery method?

Distance education has a long history, starting in the 1800's (Moore and Kearsley, 1996), using the postal system and printed materials, were they pedagogically sound? Later was the advent of recorded audio "lectures", which could supplement the written material. Next were audio and visual presentations that could be recorded and sent or otherwise made available to students, assignments were completed and returned via postal mail. We now have the Internet, e-mail, two-way video conferencing, blogs, course management programs, chat rooms, and high speed wireless connections in coffee shops.

Distance education can be defined as "planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as special organizational and administrative arrangements" (Moore and Kearsley 1996).

Distance learning has some inherent differences compared with face to face instruction and as mentioned earlier, we need to pay attention to the nature of the medium. It is usually communicated by computer via the Internet; communication can be synchronous, students are all on-line at the same time, like a chat room or asynchronous when communication can take place from anywhere, at any time. The nature of the learner is also different in distance learning, students participate differently on-line than they do in a classroom. The medium itself changes the nature of the learning environment. The instructor has less control of the class becoming more of a facilitator or moderator (Ascough 2002).

Pedagogical Foundations

According to research by Glasser we remember: 10% of what we read; 20% of what we hear; 30% of what we see; 50% of what we see and hear; 70% of what we discuss with others; 80% of what we experience personally; and 95% of what we teach to others.

Regardless if it's face to face or on-line, effective instruction begins with clear objectives/statements of behavior for students. What are the students going to be able to demonstrate as a result of the instruction? The first step of instructional design is to write the performance objectives, were more commonly known as the behavioral objective. The behavioral objective has three components; the first component describes the skill or behavior that the student will learn. The second describes the conditions that will prevail when the student completes the task or lesson; such items as; will learners be allowed to use a computer? or will they be given a paragraph to analyze? The third component describes the criteria that will be used to evaluate the learner's performance. The criteria are often stated in terms of the limits or ranges of acceptable answers. The criteria answer such questions as, "Does an answer have to be exactly correct or is 90% acceptable?"

After the conditions, behavior, and criteria are written as an objective, the objective helps guide the instructor determining the best format for your assessment instrument. Once the assessment is developed, it is time to begin the development of the instructional strategy. How will the instruction be presented to the student? What concepts will be used? What delivery methods will be used? Some examples of common delivery systems include the traditional model; lectures to

students in a classroom, also correspondence courses, large group lectures, course delivery by broadcast video tape, two-way interactive video conferencing, computer based instruction, web based instruction, self paced instruction, or combinations of any of the above.

What are the basic steps involved in instructional development? The first step is to sequence and cluster the content of the instruction, assigning various objectives to specific lessons. Then select the best instructional strategy for each lesson. The basic learning components are the same regardless whether you are designing instruction for cognitive skills, for verbal information, for a motor skill, or for an attitude, for classroom instruction or on-line instruction.

The last step is the actual design and production of the instructional materials. These materials should include a variety of instructional activities: materials to present information to students; participation materials for student activities and evaluation/assessment materials. Once the original materials are developed they will most likely be revised on a regular basis in order to be most effective.

Most instructional design and materials development are based on Blooms Taxonomy of Educational Objectives. Blooms taxonomy for the cognitive domain starts with the lowest level of learning, that being *Knowledge*; the ability to recall information; terminology, specific facts, vocabulary, etc.

The next level is *Comprehension* which is understanding the meaning of the information and materials. Students are able to translate, describe, discuss, give examples, summarize, etc.
Application is when students use previously learned material in new situations to solve problems; the students develop, discover, establish, implement, solve, utilize, etc.

With *Synthesis*, students create something that did not exist before, creatively apply prior knowledge and skills to produce new ideas; students adapt, anticipate, compare, formulate, generate, negotiate, modify, revise, etc.

The highest level in the cognitive domain is *Evaluation*; when students judge values against a given standard; students compare and contrast, conclude, criticize, critique, judge, etc.

Examples of Common Classroom Activities

The problem this paper is attempting to address is "How can classroom instructors take their best practices, most intriguing classroom activities, and when teaching on-line use technologies to best replicate those activities for students?" How can technology be used to engage students as well as they are engaged in a face-to-face environment? We must remember that we can use technology to enhance and support sound pedagogy, not let the technology drive our curriculum development or instructional design! As part of this study, the authors, who have a computer technology background and an educational psychology background, felt it would be important to ask instructors from various disciplines what their in-class instructional strategies were. What were their most effective classroom (face to face) activities? The authors then took those activities and, in the next section of the article, give some examples about replicating them in an on-line environment.

The following comments were extrapolated from those interviews of full-time faculty

Business Management

Discussion questions are distributed prior to class meeting. During class each question is discussed with all students being required to contribute to the discussion. To assure that all students participate, the instructor uses a class roster to call on each student during the class.
Small group work is also utilized. The instructor determines group membership attempting to place at least one strong student in each group and separating close friends into different groups. This group approach is used for single class assignments and for semester long projects (example: writing a marketing plan).

Current events are folded into class discussions wherever possible, and students are required to make presentations to the class using PowerPoint.

Chemistry

Most learning is facilitated with a lecture followed by demonstration. After demonstration, students are given a similar problem to solve in class. After students have had a reasonable amount of time to complete their solutions, the solution is demonstrated and explained.

This approach is used for a range of content areas including balancing of chemical equations and drawing of Lewis diagrams.

Educational Foundations

For each reading assigned, the instructor provides a sheet that contains several statements that relate to the reading. Each student is asked to mark a plus (+), minus (-), or question (?) for each statement to represent the students understanding of the statement. A plus indicates that the student agrees with the statement. A minus indicates that the student disagrees with the statement. A question indicates that the student is unsure of their feelings regarding the statement.

After each student has marked their sheets, they are formed into groups to discuss their feelings and come to a group consensus regarding the statements. Group consensus is then reviewed by the entire class to form an overall consensus.

Semester long projects are also done using groups. Students assign themselves to groups by selecting a question to research. The instructor may intervene in the group assignments if necessary to balance the groups. At the end of the semester each student must present an independent paper that is built from the group research performed by each group on the class.

Mathematics

After lecturing and demonstrating techniques for problem solution, the instructor assigns problems to be worked on in class. As students work on their solutions, the instructor moves through the class providing one-on-one assistance to students as needed.

History

The instructor utilizes small groups with membership selected by the instructor. These small groups will be given a reading passage or an image that they must discuss to identify the historical significance of the topic or scene depicted. Typically the groups will be given between 5 and 15 minutes to talk among themselves, and then are asked to share their thoughts with the entire group.

Maps, response "clickers", journaling, videos, and presentations are other forms of classroom interaction that are utilized.

Tools for Online Content Creation and Management

There are two classes of tools that are of importance for the creation and management of online learning content: Course Management tools and Content Authoring tools.

Course Management tools provide a framework for hosting learning content, assessments, and student information, and also typically provide tracking tools to assist in monitoring student progress and participation. There are several Course Management tools in general use today, including Blackboard, WebCT, Angel, and Moodle. These tools are all very similar in terms of the capabilities they provide and the ways that users, whether course designers, instructors, or students, interact with them. Regardless of what you are teaching or what medium you are using, it is important to maintain a consistent and familiar environment in order to maximize students' opportunities to learn. In an online delivery environment the use of a Course Management tool helps to provide that consistent and familiar environment while at the same time providing administrative features like class rosters and grade books.

Content Authoring tools are a more diverse set of tools than are Course Management tools. The features provided by these tools, and the skills required to use them span the spectrum from the amazingly simple to the unbelievably complex. This diversity can be seen by examining the nine content creation offerings from Adobe: Acrobat, Authorware, Captivate, Presenter, Contribute, Creative Suite, Director, Dreamweaver, and Flash.

At the heart of most content authoring tools is the ability to create content in web-friendly formats that includes some combination of text, pictures, video, animation, and audio. Higher end products will include support for creation of content that is SCORM (Sharable Content Object Reference Model) compatible. The authors have evaluated several available tools in this category including:

- Microsoft Producer, a free (to owners of Microsoft PowerPoint) utility that integrates with PowerPoint to provide the ability to record a PowerPoint presentation to a video format complete with an audio track
- SmartGuyz ScreenCam, a $250 product that can create video recordings of anything displayed on your computer screen and also is capable of importing existing audio and video files.
- Tech Smith Camtasia Studio, a $150 product that has all the features of ScreenCam, plus the ability to add interactive elements and to create SCORM modules.

- Adobe Captivate, a $200 product that has comparable features to Camtasia Studio, and also will integrate directly into Adobe's Flash animation engine.

All of the evaluated products are effective in creating web-friendly formats, but can be differentiated based on the limitations in the types of content that can be created, and the degree to which user interaction is supported by the content created. The selection of a screen capture tool will be influenced most by the intended application of the content created. Users that are planning to create narrated lectures for web distribution as a supplement to classroom lecture will be well served by a product like Microsoft Producer. Users that will be creating demonstrations of software application use, such as Microsoft Office or Adobe Photoshop, will want a more robust tool such as ScreenCam, Camtasia Studio, or Captivate. Users that desire a product that supports interactive elements such as branching that can be used to incorporate remediation will want to use a product like Camtasia Studio or Captivate.

Effective Translation of Classroom Activities to Online Environment

When determining what type of online activity to use when transitioning from the classroom to the online environment, it is important to examine the purpose of the activity with respect to the learning objective and to consider the role that the instructor plays in facilitating the desired student behavior. For example, we previously identified several faculty from disciplines ranging from Business Management to History that incorporate one or more forms of discussion in the classroom. One might assume that a classroom discussion should become a threaded discussion topic in an online environment. However this assumption does not address the role of the discussion with respect to learning objectives and student behavior, nor with respect to the role the instructor wishes to play in guiding the discussion.

Threaded discussions are of greatest benefit when it is desirable for students to have time to reflect on the details of a question, crafting logical, well researched answers that can be shared with others in the class. For example, in a web-based Customer Service class an instructor assigns students one or more discussion questions based upon readings from the text. Rather than have the students submit their responses to him directly, he has the students post their responses in a threaded discussion and also requires each student to read the responses posted by the other students posting replies to at least two of these other responses. In this way, the instructor is replicating a classroom discussion that exposes all students to a variety of viewpoints while at the same time encouraging students to think deeply about the significance of the material covered. This application of threaded discussion also allows the instructor the ability to provide guidance and clarification as needed by posting his own replies to the students' posts.

A threaded discussion would not be appropriate in a situation where the discussion is intended to demonstrate students' ability to apply knowledge to a situation and make quick decisions. Nor would it be appropriate when the instructor wishes to have more control of the flow of the discussion. In these situations a chat room (either text or audio) is a more suitable technique.

Although chat rooms are synchronous activities and many online classes are asynchronous, this technique is still of value in the online environment. For example, in a web-based Survey of Information Technology class an instructor used a text chat room to facilitate interviews with information technology practitioners. When this class was taught in the classroom environment, practitioners would visit the class to answer students' questions about their field of expertise.

During the interview, students would raise their hands and be recognized by the instructor in order to ask a question. Students absent on the day of the interview would miss the opportunity to ask a question or hear the answer. In the online environment, students raised their hands electronically in order to be unlocked so that they could ask a question. All questions and answers were logged and after the interview was over log was converted to a transcript and published so that all students had access to the discussion.

Earlier we described a classroom technique used by both Mathematics and Chemistry instructors to teach concepts such as solving equations and drawing Lewis diagrams of chemical compounds. The instructor would first present the underlying principals and concepts using lecture, and follow with a demonstration using several examples. Finally the students would be given the opportunity to demonstrate what they had learned. In an online environment these activities could be replicated using a combination of lecture and demonstration techniques described in the following paragraphs.

Lectures can be recorded as audio files for playback in the online environment. Once recorded, lectures can be transcribed, either manually or using a speech to text translation program, so that they can also be made available in textual form for hearing impaired students and for students that are visual learners. If the lecture includes diagrams, charts, PowerPoint or other visual material, these items can be digitized for online viewing and synchronized with the audio using a software package such as Captivate.

In the classroom, an instructor is able to observe the students and ask questions to gauge comprehension and provide remediation when needed. In the online environment, while the instructor cannot observe the students directly, it is possible to incorporate occasional questions into a lecture presentation to assess student understanding. Products like Captivate can branch from these questions providing remediation when needed, or allowing the student to move forward through the lesson. Demonstrations can also be recorded (both audio and visual elements) using a tool such as Captivate or Camtasia Studio.

Summary and Areas for Further Study

In summary, the major responsibility of instructors is to develop instructional material and strategies that are pedagogically sound, reinforcing the objective of the lesson. Do not be overwhelmed by the technology and allow it to dictate what and how the material is presented or how students interact with the instruction, the instructor, or with other students. On-line instruction should closely replicate face-to-face instruction.

The selection of tools will sometimes be dictated by university standardization; training and support should be readily available. These would include a course management system. Institutions are not likely to support more than one course management system due to higher cost, lack of continuity, and support issues. Content tools, for the most part can be determined by individual instructors; however the availability of on campus training and support and existing site licenses should be considered.

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Electronic Surveys: A Valuable Feedback Collection Tool

Steve McKinney
Center for Information Technology
Moravian College
120 W. Greenwich Street
Bethlehem, PA 18018
610-861-1442
mckinney@moravian.edu

Purpose

This paper presents suggestions on the use, benefits, concerns, design, and evaluation of electronic surveys and their results. It is not to make one an expert on survey techniques and analysis. Regression, median, mode, arithmetic mean, etc. are not included in this discussion.

Overview

Surveys provide a useful tool to garner feedback from a select population in response to a specific event, service, or identification of a respondent's desires. According to the Merriam-Webster Dictionary, "feedback is the transmission of evaluative or corrective information about an action, event, or process to the original or controlling source". Feedback from a customer base, whether from a commercial, corporate, or educational organization, will help organizations improve their product or service and help to identify their customer's wants.

Surveys come in many different styles, but fall primarily into three categories: in-person whether face-to-face or via telephone, paper, and electronic, e-mail or web-based. Each type of survey has its purpose depending on issues such as the number of questions, targeted audience, or survey population. Electronic surveys are not always the best type of survey to use. E-mail surveys are different from web-based surveys in that e-mail survey questions are included in the body of the e-mail message, whereas a web-based survey takes the user to a website outside the message. A hyperlink to the survey website may be included in the e-mail message. Microsoft's Outlook has a simple survey tool with its yes, no, approve, and reject options. Other e-mail surveys have questions embedded in the message's body. This paper focuses upon web-based electronic surveys and how they might be used by institutions of higher education.

In today's electronic information rich world, just about anyone with a computer and Internet access can conduct a survey. This in itself presents a problem for those seeking feedback since respondents can be overwhelmed by, and desensitized to, surveys. When being inundated with electronic surveys, it is very easy to delete those requests for feedback. Organizations must be careful to avoid saturating users with surveys to the point of monitoring which department in their organization is sending out a survey and when they are sending it out. Even though you may have a short, well designed survey that would take a few minutes to complete, if users have just completed another one, they are less likely to complete your survey.

An electronic survey is an easy way for educational institutions to quickly reach many people to gather feedback on a myriad of topics, such as, user's knowledge of technology, future technolo-

gy insertion desires, student quality of life issues, academic class work, conference organization and operation, guest lecturer feedback, course evaluation, meal selections for organizational functions, etc. Collecting feedback from individuals can be challenging, but with a properly designed electronic survey, it can be much simpler. Unfortunately, electronic surveys improperly constructed may not provide useful feedback.

Electronic Survey Benefits.

- Cost savings. Savings will be realized in material and labor. With electronic surveys, there is no need for paper, envelopes, or stamps, and there will be reduced printing costs whether in-house or out-sourced. Labor to stuff and mail envelopes and to process returned paper surveys are also eliminated. Using electronic surveys instead of person-to-person interviews, removes labor costs.

- Speed to reach your targeted audience. Once a survey is created it iselectronically sent to the targeted audience. No longer is there a delay because of stuffing and mailing envelopes.

- Responsiveness from recipients. Respondents can quickly complete an electronic survey shortly after an event or service received. Their impressions are still fresh in their minds and will not have become stale by having to wait for a paper survey.

- Simplicity to complete. With the click of a mouse, respondents can answer a survey question and submit their response. They do not have to put the paper survey in an envelope and drop it in a mail box.

- Ease of data compilation and exportation to another product. Electronic surveys permit results to be automatically tallied and easily transferred into other spread sheets and databases or converted into another format.

- Ease of tailoring questions. At the last minute, designers can quickly change, add, or delete a question before sending out the survey.

- On their own time. Respondents can answer the survey when they choose without having to speak to someone in person or over the telephone.

Electronic Survey Concerns

- Recipient's access to a computer and user's comfort with a computer. With today's connected generation of college students, comfort with and access to computers is just about eliminated as a concern. However, faculty and staff access to and comfort with computers are still concerns with survey designs.

- Computer's download speed. Download speeds may present a problem if the recipient is using a dial-up or slow DSL or cable connection. Graphic intensive surveys may also present download problems on average Internet connections. Keeping a survey simple will help to mitigate slow download speeds and help to keep recipients motivated to complete the survey.

- Privacy & anonymity. Many users today understand that whenever you connect to anything via a network or the Internet, you leave an electronic signature. Leaving this electronic signature voids their anonymity so earning and maintaining their trust of survey data confidentiality is essential. Do not request e-mail addresses in a survey as respondents may choose to not complete the survey or leave out their e-mail address.

- Limiting access to only targeted audience. To prevent unauthorized access to a survey, password protect it. Passwords will aid in ensuring that only the targeted audience completes the survey.

- Credibility & reliability. Consider your audience if they have grown up with paper and in-person interviews. These skeptics can be enlightened through an education process of sharing results of previous surveys and, if feasible, letting them help design the survey. By keeping surveys short and simple, even these skeptics are likely to complete an electronic survey, proving that they do indeed, "have enough time" to complete an electronic survey.

- Survey spam. As e-mail in-boxes fill up with unsolicited messages, and electronic surveys become more prevalent, surveys may be considered spam. (Practical Assessment, Research, & Evaluation, p. 9.)

Electronic Survey Design

What is the overarching issue that you wish to address? Survey designers must first determine the survey's purpose and goals. If your goals are unclear, your survey will not be focused to your audience. What do you hope to achieve by the survey? Are you looking to improve a product, service, or gather input about the audience's desires? Who is your targeted audience? Are they students, staff, or faculty? Each of these groups has its own culture that will impact survey design and feedback.

Some Design Considerations

- Create a professional survey. Respondents are more likely to complete a survey that has the appearance of a well thought out series of questions. Consider font size, font type, background color, layout, etc. in your design.

- Length of survey. Self-administered surveys should be no longer than four pages (SPSS Survey Tips, p 13.) Users are less likely to complete a long survey; keep it short.

- Ability to start, stop, and resume. On a longer survey build in the ability to start, stop, and resume a survey, giving respondents the ability to restart at the point previously paused in the survey.

- Capture the audience. The first question is key to gaining the interest of a respondent. Ensure "the first question is interesting, easy to answer, and related to the topic of the survey." (First Monday, p.9)

- Know your targeted audience. Knowing your audience in a survey is much like knowing your audience in a classroom or lecture. This is necessary to focus your questions' design.

- Choose your question format and be specific in your wording. Single multiple choice may be quicker to answer, but does not provide the detail of a text response. When respondents try to evaluate the ease or difficulty of a particular task, a scale may be best. If a question may not have an answer that fits or if the respondent wishes to add comments, design in a text box. A text box offers more space for input over a single text line. Word choice is important since a question's wording may inadvertently direct the respondent to an answer without realizing that the design directed them to that response. Testing and Evaluation, addressed in a latter section, will help alleviate this pitfall.

- Understand the audience's interest. There are principally two groups of respondents, those that have a true desire to answer the survey to provide useful feedback, and those that want to simply "check the box" to get it completed. Incentives may provide a motivation for respondents to take the time and thought to answer survey questions.

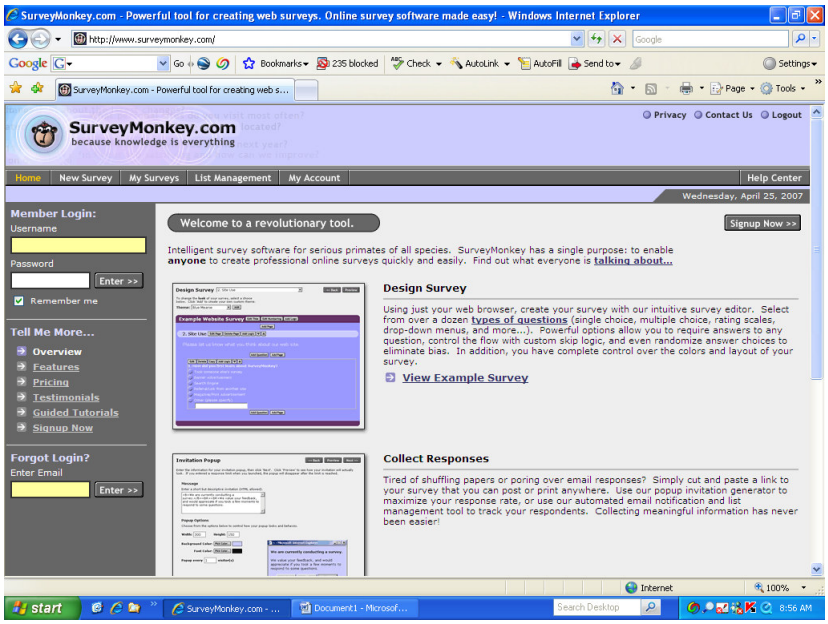
Electronic Survey Testing & Evaluation.

Have someone who has not been involved in the design of the survey test the survey. A few tips:

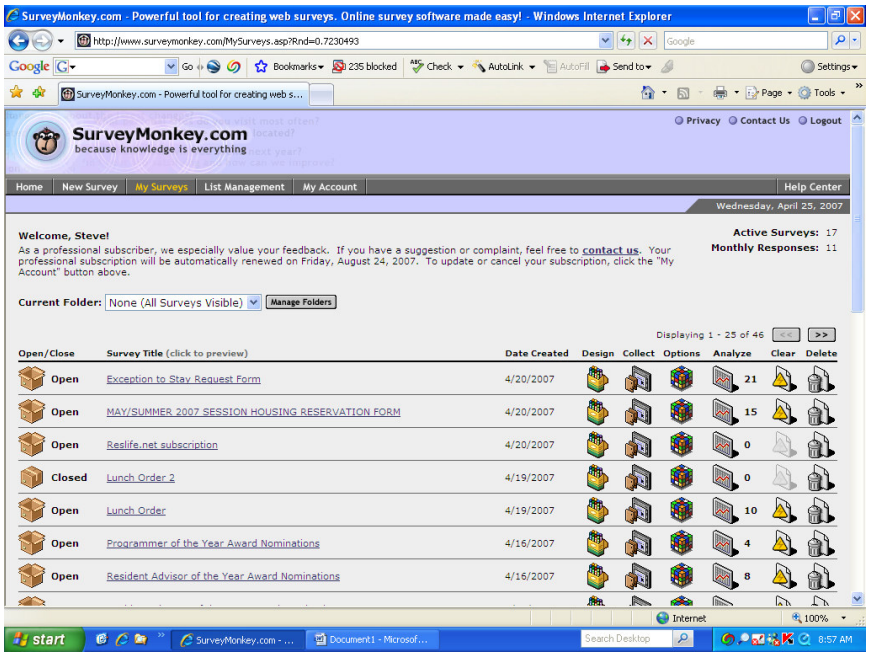
- Read each question out loud to determine if it reads as it should.
- Look for over-used conjunctions such as "and", "or", and "but".
- Minimize use of common prepositions such as "with", "except", and "by".
- Provide adequate space for open-ended questions.
- Eliminate redundant questions.
- Ensure instructions are clear.
- Test the time necessary to complete the survey. (SPSS Survey Tips, p26.)

An Electronic Survey Tool: Survey Monkey.

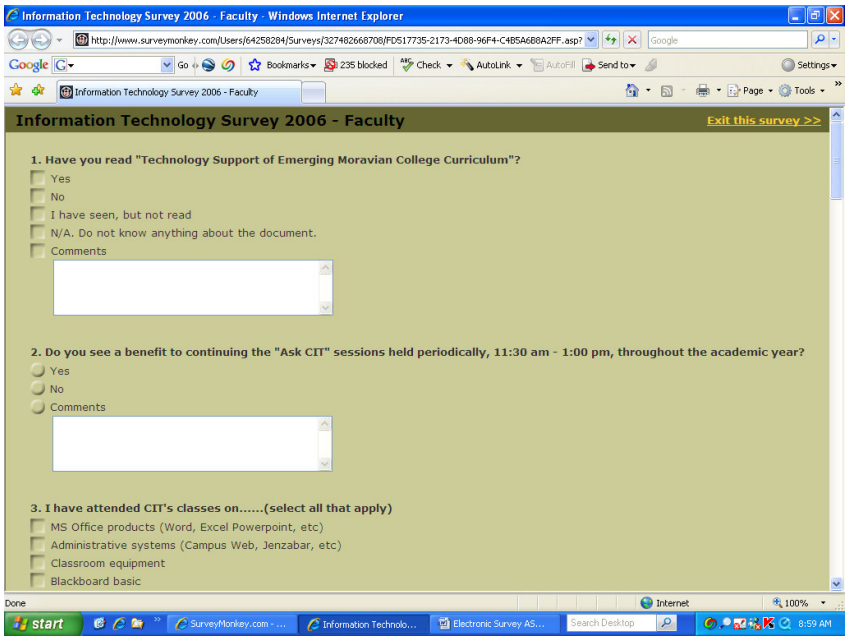
There are many electronic survey options to include the popular products: Blackboard, SPSS (Statistical Package for the Social Sciences), and PHP (Hypertext Preprocessor) and others. This paper will introduce an inexpensive, flexible, easy-to-use web-based survey product called Survey Monkey, www.surveymonkey.com. The following pages include some screen captures of Survey Monkey and brief description of the web-based survey tool.



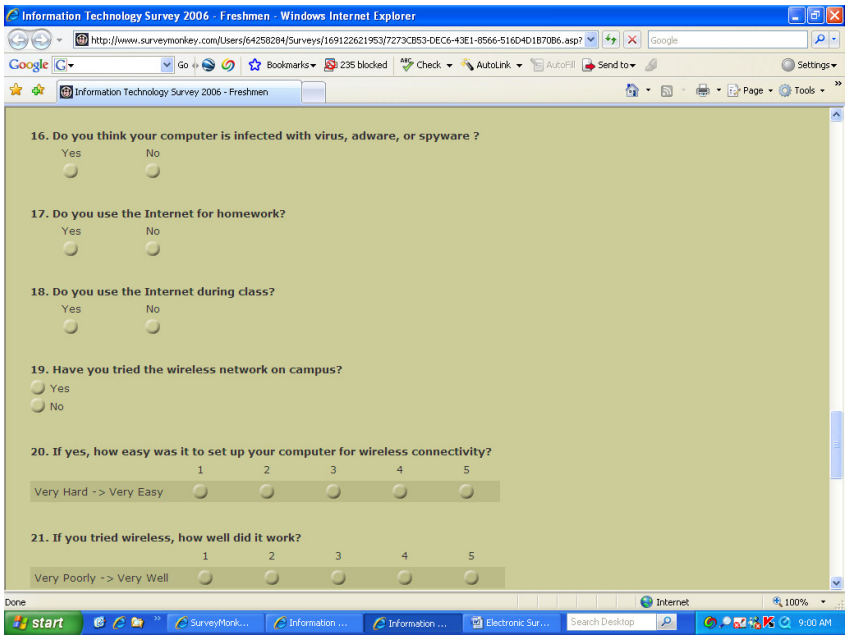
* Professional: $200/year, 1000 respondents/month, unlimited surveys, use of tools to analyze and export results, can electronically share results, no banner ads
* Basic: Free, 10 questions/survey, 100 respondents, no ability to export results, no banner ads



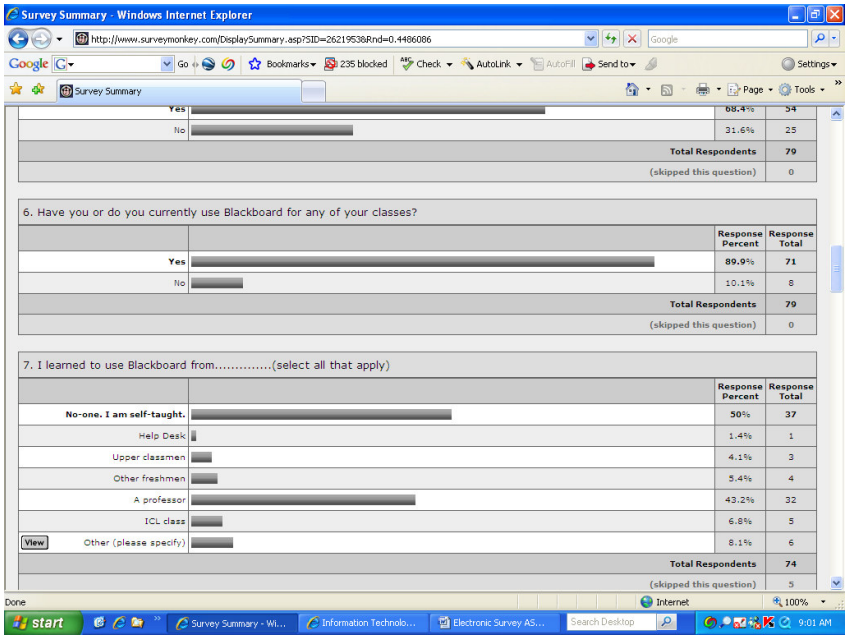
* Simple to navigate between surveys and tasks: design, collect, options, and analyze
* Open and close surveys with a mouse click
* Can require password to access survey.
* Can establish a time period for when they survey will be available



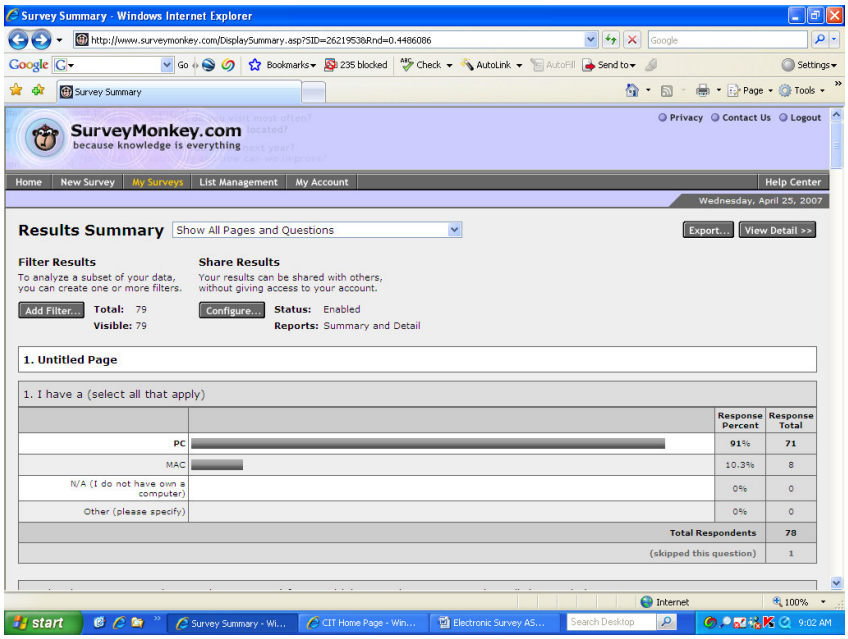
* Question styles, background colors may be changed
* May be password protected to access individual survey
* Use text lines or text boxes
* Simple to build using pull-down menus



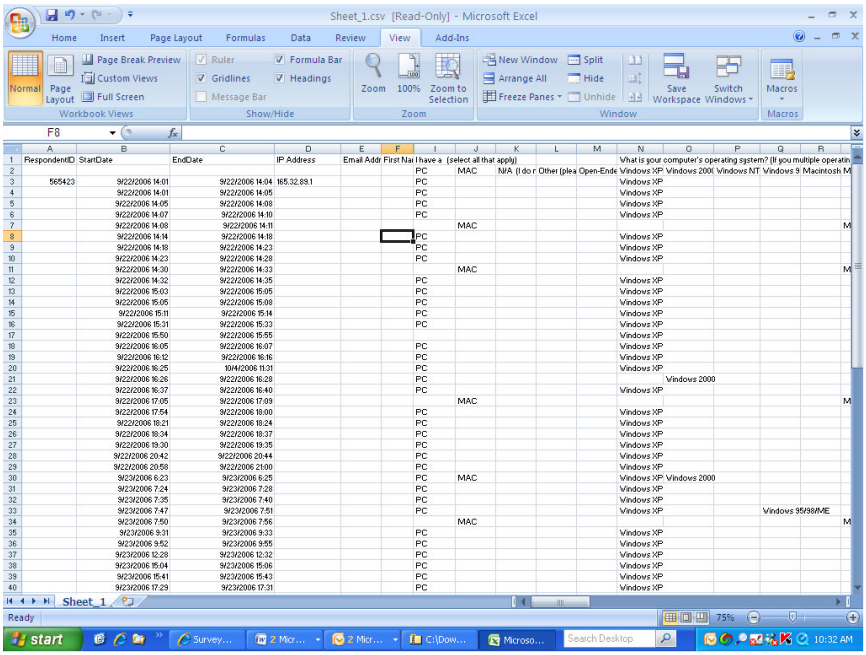
* Answer selections may be vertical or horizontal
* Number scales can be tailored
* Answers may be multiple choice with a single answer or multiple answers
* E-mail survey hyperlink to recipients along with introduction of and purpose of the survey



* Automatically records and reports results as users complete each survey
* Records text comments
* Results may be shared with others through a web-link to the report only page
* Designers may allow users to skip questions or require an answer



* Ability to configure how to share results, detailed or summary
* Results may be viewed in default format, shown above, or exported
* Eliminates need to print out results to share
* Respondents may complete the survey on their own time, but designers may establish a time window in which the survey must be completed.



* Results may be exported to spreadsheet, relational database, and HTML in full result set or summary only

Conclusion

Survey Monkey is one example of an electronic web-based survey that is easy to use and affordable providing the ability to quickly create, distribute, and analyze surveys. Electronic surveys may be cheap and easy to use, but may not always the best type of survey to use. Each type of survey, in-person, paper, and electronic has its purpose. Feedback from surveys helps teams, departments, and institutions improve their product or service and helps to identify student, staff, faculty, and parent desires. A web-based survey like Survey Monkey is another "tool for the toolbox".

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Is Your Information Systems Curriculum Evolving?

Thomas A. Pollack
Duquesne University
School of Business
600 Forbes Avenue
Pittsburgh, PA 15282
412.396.1639
pollack@duq.edu

Abstract

This paper will examine current literature findings and reports on technological developments, trends, and predictions for the technology sector. Information Systems publications such as the January 1, 2007 edition of Computerworld have provided extensive information regarding the current status, future trends and employment opportunities in the technology sector. Most educators involved with technology-based programs will readily admit that the technology field is constantly evolving and changing. The author contends that significant technological changes create a need for different competencies and preparation requirements to qualify students as contenders in the entry level employment market. It therefore becomes critical for technology-related educators to monitor organizational developments, assess curricula, and make appropriate program modifications to ensure that our graduates are sufficiently prepared to compete. Educators also need to consider the extent that external factors and national trends such as offshore outsourcing are impacting entry level technology positions in the U.S. As educators, we need to assure ourselves and our students that our programs will provide the appropriate educational preparation that qualifies our students for the opportunities available upon graduation.

In addition to summarizing the issues mentioned above, this presentation will also include an interactive component during which the session attendees will be asked to share their program strengths and goals, speculate on future directions, and consider possible curriculum revisions to meet future needs.

Introduction

Never in our history has technology played such a vital role in organizational success. Expectations for cost reductions, productivity increases, and overall competitive advantage through technology abound in today's organizations. Also, in today's organizations, both technology managers and general managers must be aware of what the other is doing. The technology manager is expected to understand business processes and have in-depth knowledge of technology, whereas the general manager is expected to understand key management issues and relate them to appropriate aspects of technology (Pearlson, P.8). Managers are challenged to provide an infrastructure that efficiently and effectively serves the needs of both internal and external customers of the organization (Kibiloski, pp. 58-59).

Technology is described as a force and byproduct of change, and it is impossible to separate technology from overall business strategy. It is also difficult to manage organizational change, because change is basically unplanned. Organizations are constantly changing, and technology is

an integral part of many changes. It is imperative that managers be capable of managing the change process. Because people generally resist change, this is not a simple task.

We are faced with similar problems in higher education. Frequently, the situation in higher education involves our willingness to change curricula and thus change the educational program that we provide for our students. Comfort zones are good, and the temporary discomfort that results from change is bad. The end result is an educational program that becomes "out of touch" and frequently "out of date" with the realistic needs of a group of stakeholders known as the employers of our students. Technology educators must overcome this resistance to change, assess the needs of the marketplace and modify curricula to meet the needs of the stakeholders.

The Business Environment – Current and Future

Many organizations are questioning how their technology departments are adding value rather than simply providing service. To add value, technology must play a significant role in business processes (Gibbs, p.46). Return on investment measures are frequently being applied in measuring the overall success and contributions of technology (Gibbs, p.46, Gruman, p.2).

Some desirable characteristics for successful technology departments of the future include flexibility and scalability. An agile work environment that is able to respond to organizational needs on a timely basis is essential. It is also imperative that organizational architecture be adaptable to future expansion and growth. It is anticipated that in the future, the focus of work competency will shift from simply providing services to being an integral part of processes. It is also predicted that the focus of internal staff of the future will be on providing user access and data resources on a network that will exist to connect to outsourced applications and services (Gibbs, p.46).

Another area of intense growth is information security. Worldwide, there are more than 500,000 people employed in information security roles. Expectations are that over two million people will occupy these roles by 2010, a growth rate of nearly eight percent per year (Hadfield, p. 48). The International Information Systems Security Certification Consortium (ISC) 2 certifies information security professionals and is actively engaged in recruiting people to become certified in information security (Hadfield, p.48). Unfortunately, identity theft is a growing problem, and it is anticipated that it will worsen.

A recent Department of Labor Report indicated that some of the fastest growing occupations in the next seven years will be in the areas of network systems and data communications analysts, with an expected growth rate of 55 percent. Computer software engineers are also classified in the high growth areas. Generally speaking, information technology jobs have rebounded, and salaries are increasing with opportunities (Whitaker, p. 3.25-26).

According to a Robert Half survey reported by Whitaker, technology skills in greatest demand included Windows administration, network administration, database management, web development, programmers, network security and project management. It was also reported that there is particularly high demand for service level project managers, experienced software quality assurance specialists and people who have experience with Microsoft's .Net technology (Whitaker).

The encouraging news reported by Katherine Spencer Lee, Executive Director of Robert Half Technology is summarized by the statement: "We're seeing companies investing in technology to make them better, faster, and stronger" (Whitaker).

Another area that warrants consideration involves predictions for the current year and near term future. For instance, the January 1 issue of Computerworld identified the following as the top five "hot skills" where hiring will take place in 2007 (McAdams, p.29):

1. Programming/Application Development
2. Project Management
3. IT Business Analysis (critical thinking)
4. Security
5. Help Desk/Technical Support

McAdams (p. 30) also summarized the type of work environment that appeals to today's entry level employees. Preferred is a "decentralized, independent, collaborative and innovative work environment…that values contributions, provides clear expectations and feedback, and above all provides supervisors who mentor and guide."

Although at this time, we don't know the actual result of 2007 predictions, it is interesting to read some of the predictions that were published by experienced writers who are considered to be experts in the technology field. Some very specific predictions for technology can be derived from an article by Dave McClure (p.26) writing in the CPA Technology Advisor. McClure's predictions include the following:

1. Cable mergers will occur
2. Monitor and TV prices will continue to fall
3. PCs will continue to be in demand
4. Spam will get worse
5. CRM will dominate business software
6. Consumer electronics will get easier
7. Privacy will become increasingly important
8. Satellite broadband will provide rural access to the Internet
9. Vista will arrive and gain acceptance
10. Fiber will dominate discussions on broadband

Another consideration that was implied earlier in this paper involves the role of the information systems professional within the organization. Many contend that software delivered over the Internet is becoming much more acceptable, even in larger organizations. This practice was once a consideration only for smaller organizations. The Gartner group predicts that 25% of new business software will be delivered as a service by 2011, a dramatic increase from the five percent delivered in 2005 (Network World, p.15).

Finally, another emerging trend involves the renewed interest on the part of big business to provide IT services for small companies. According to IDC, a market research firm in Framingham, Massachusetts, small businesses make up the majority of U.S. companies, and it is established that only 3.5% of companies with five or fewer employees have a full-time IT staff and 4.2% of companies with fewer than 10 employees have a full-time IT staff (Flandez, p.R8).

Companies like Dell, CM IT Solutions, On Force Inc., and Best Buy's Geek Squad now provide a wide range of IT services for small companies. Of course, many smaller companies dispute the quality of service and personal attention provided by the large organization and claim that smaller organizations provide better personalized service than larger firms and outsourcing organizations (Flandez).

Of course, it is extremely important to know which jobs and therefore which skill sets are in demand in the job market. Familiarity with the Occupational Outlook Handbook is essential for help in making this determination. The Handbook projects, for ten years, the anticipated number of job openings in thousands along with median annual earnings. Technology-related titles such as computer software engineers, systems software, computer and information systems managers and computer system analysts reflect large numbers of openings in the 2004-14 time span. Anticipated median earnings are also reported as being quite high as in the range of 66-92 thousand dollars (Crosby, pp.47-49).

We therefore have some idea of market conditions, but the question that remains unanswered involves the subject matter content of our curricula. Are we delivering the material that will enable our students to qualify for opportunities in a very competitive job market? For example, a recently completed research study (Banerjee, et.al, p.284) identified seven critical entry level skills for systems analysts. The identified skills include the ability to do document analysis, observations, individual interviews, prototyping, group interviews, joint application design and questionnaires or surveys. We should make certain that we are developing these competencies in our systems course.

The Occupational Outlook Handbook is also a valuable resource for identification of qualifications. An excerpt on the position of computer and information systems managers, for instance, states "must possess strong interpersonal communication and leadership skills…They must also possess team skills…" (U.S. Department of Labor, computer and information systems managers). Computer support specialists or systems administrator candidates must "have strong problem-solving, analytical and communication skills…" (U.S. Department of Labor, computer support specialists and system administrators).

Although not all of the above points are relevant to curricula in higher education, we should have a sense of awareness and, where appropriate, we should incorporate relevant information that maintains the currency and relevancy of the courses we deliver. Each of the trends or practices mentioned will require competent faculty to effectively deliver the desired content.

Evolving Curricula

One will readily agree that the technical and managerial aspects of information systems constantly evolving and advancing. Tracking changes in the field and deciding what is relevant to our educational programs is difficult. Furthermore, change is difficult, and it is especially difficult with curriculum issues that must be agreed upon by a team of faculty. Deciding where to make major changes and where minor changes are adequate sometimes creates quite a controversy among colleagues. Of course, philosophical questions also arise. Some educators contend that the development of good critical thinking skills will suffice and produce successful graduates. Others contend that critical thinking must be coupled with the most relevant technical and mana-

gerial skills in order to produce truly successful graduates. Coming from a business school perspective, the quality of entry level employment opportunities for which graduates qualify is an important measure of success in the author's viewpoint. The author therefore advocates constant monitoring of regional employment opportunities and constant identification and inclusion of new entry level skill requirements.

A question that all educators in the IS field must answer is how can we maintain currency and relevance in our program? We want our graduates to be successful. We want our graduates to contend for the best jobs. Our reputation is built largely on this measure of our success. Studies have concluded that undergraduate information systems programs in the U.S. are quite diverse (Kung, et.al., p.295). Each of us must identify those program elements that make our program attractive.

Several recommendations for the maintenance of program currency and relevancy warrant mention. Unfortunately, there is not a single recipe for success. Following are several suggestions:

1. Maintain an agenda of research and reading that helps develop a keen sense of awareness of current trends, practices, and skill sets.
2. Develop contacts with the regional employers who will hire your students. Formation of an advisory board that will work with your program by providing advice on curriculum, internship and placement opportunities is invaluable.
3. Become involved with a professional organization related to your discipline. Consider forming a student chapter of the organization, and arrange for students to attend some of the regular meetings of the organization.
4. Solicit feedback on the overall preparation of your students from internship sponsors. They will likely be able to identify strengths and weaknesses that reflect on current content and practices within our educational programs.
5. Survey or talk with recent graduates. Solicit constructive feedback and recommendations for program enhancement.
6. Monitor research findings and articles in both research and trade journals.
7. Closely monitor changes that are suggested within model curricula.

Another point of relevance that warrants our consideration involves possible program modifications to deal with offshore outsourcing. We must exercise extreme caution that we are not placing excessive emphasis on the development of skills for positions that are being outsourced offshore. An effort to compete on technical skills alone, when it is actually cheaper to train in India can put a program at a disadvantage. Instead, an emphasis on both business and technical skills with the capability to manage outsourcing contracts is desirable. This will encompass interpersonal skills, project management skills, relationship management skills and sourcing skills. The general consensus is that technical skills alone constitute a short-term skill set (Goodwin, p.39).

The final section of this paper will focus on what we as educators might be able to gain from thorough analysis of model curricula. Model curricula that originate with professional societies can be helpful to universities by providing a number of inputs including the following (Gorgone, et.al, p.5):

1. A general common body of knowledge expected of graduates regardless of geographic region
2. A program structure with suggested courses and sequence

3. Program rationale and resources required
4. Rationale for investment in faculty development to keep pace with changing technology and management practices

For forty years, four organizations have developed computing curriculum guidelines for collegiate level programs. The organizations and their areas of specialization are (Cross, p.5):

1. Association for Computing Machinery (ACM) – founding in 1947; developed computer science model in 1968 and information systems model in 1972.
2. Association for Information Systems (AIS) – founded in 1994 and began curriculum efforts with ACM and AITP in 1997.
3. Association for Information Technology Professional (AITP) – founded in 1951 as the National Machine Accountants Association, became the Data Processing Management Association (DPMA – in 1962 and became AITP in 1996. Focuses on professional computing; provided first IS curriculum in 1985.
4. Computer Society of the Institute for Electrical and Electronic Engineers (IEEE-CS) – merger created IEEE in 1964 and became the Computer Society. Began providing curriculum recommendations from an engineering perspective in 1977.

Today instead of separate curricula from each society, the societies cooperate in creating curriculum standards and thus send a single message to the academic computing community (Cross). The Overview Report that resulted from the collaborative efforts of the above mentioned organizations recommended coursework in five major computing disciplines. Included are Computer Engineering, Computer Science, Information Systems, Information Technology and Software Engineering (Cross, pp.13-15). Depending on the focus of a given program one can gain valuable insights from the work of this collaborative group. The work represents the contributions and thinking of many professionals from the world of computing.

A final consideration with regard to model curricula is a snapshot of the recently released MSIS 2006: Model Curriculum and Guidelines for Graduate Degree Programs in Information Systems (Gorgone, et.al.). The curriculum is a result of a joint effort on the part of professionals from ACM and AIS. Although designed as a graduate program, there is much transferability of ideas to undergraduate programs. Not only are specific courses recommended, but suggested content for each course is also suggested. A very wide range of career tracks including computer forensics, consulting, data management, warehousing and mining, database systems, enterprise resource planning, knowledge management, project management, security, systems analysis and design and telecommunications are addressed (Gorgone, p.26).

It is understood that an institution will emphasize tracks based largely on local industry needs and capabilities for program delivery (Gorgone). The model curriculum accommodates programs with requirements for 30-60 credits (Gorgone, p.27). Speaking in general terms, graduates will acquire the following from adherence to the model curriculum (Gorgone, p.13):

1. A core of IS management and technology knowledge
2. Integration of IS and business foundations
3. Broad business and real world perspective
4. Communication, interpersonal and team skills
5. Analytical and critical thinking skills

6. Specific skills leading to a career.

Conclusion

Maintaining a sense of awareness of developments in the information systems field is an important dimension for a faculty member teaching in the discipline. The field is constantly evolving and changing, and it is our responsibility to provide current knowledge as we prepare our students for the opportunities that await them in their profession.

It is important to develop a strategy for monitoring the changing needs of employer stakeholders. It is more important to decide how to integrate or modify our curricula to incorporate the current desirable skill set preparation. U.S. Department of Labor publications such as the Occupational Outlook Handbook can be a valuable source of information that can impact the content of our curricula.

In addition to soliciting feedback from regional employers, model curricula can be a valuable source of information in reinforcing the need for ongoing curriculum development, change and enhancement. Model curricula originate with professional societies and reflect expectations that extend far beyond regional boundaries. Model curricula can be a source of valuable ideas and provide a rationale for investment in resources and faculty development.

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Addressing a Decline in IT Students

Gary S. Rogers
Alicia David
Steve Greene
Macon State College
100 College Station Drive
Macon, GA 31206
478-471-2700
grogers@mail.maconstate.edu

The Problem

It is clear that there is a perception among many young people that technology is not a reliable field to enter in terms of landing suitable employment. How do we know this? Decline in IT programs nationwide are in a period of decline. And, this problem is apparently quite real. CS, SE, and IS enrollments are down drastically, and some educational institutions have talked about either closing IT down or merging it into some other academic discipline.

The reasons for this are many, but prevailing in studies on this issue is the psychological impact from the IT (e.g. dot com") bubble bursting in 2001.

With the widespread perception from both current and prospective students that off shoring and a weak domestic information technology sector have left few information technology jobs available, students have simply been shifting to other programs such as business and away from information technology programs. This also leads some in the information technology field to begin to have concerns about a coming shortage of information technology workers.[1]

An example is the University of New Hampshire in Durham, New Hampshire. Enrollment in the computer science program has dropped 62 percent in the last five years — from 67 students in the fall of 2000 to an expected fall 2005 enrollment of 25.[2] Other colleges throughout the nation are reporting similardrops in enrollment, so the phenomenon is definitely widespread.

A strong statement to make this point even clearer perhaps can be made.: "The public's perception of the status of the high-tech economy is that it is still weak and that all the jobs are going overseas. The public has got it wrong," said Dr. Philip Hatcher, chair of UNH's Computer Science Department. "The tech bust is over. We're really going through a slow but steady recovery. And outsourcing hasn't really had as big an impact on job losses as you think."[3]

While it's not as dire as UNH's situation, J. Stephanie Collins, chair of the Information Technology Department at Southern New Hampshire University in Manchester, said SNHU's undergraduate program has experienced a decrease in computer-related program enrollment, but the backslide has begun to slow. "We have 45 students in the program now — that's up slightly from last year," she said.[4]

Collins and her colleagues in New Hampshire recently completed a survey of colleges and universities nationwide on the subject of declining IT enrollment.

Sixty-six percent of the respondents reported decreasing enrollment in information technology programs. “Students perceived low employment potential due to off shoring. This includes those considering graduate and doctoral programs, not just undergraduate,” said Collins. Her own university cited similar reasons for lackluster undergraduate IT enrollment.

James Isaak, a technology professor at SNHU and board member of New Hampshire’s IEEE chapter — the Institute of Electrical and Electronics Engineers — said students also cited the impression that the major was “too hard”. Another intriguing response was that they perceived technology had little benefit for the common good.

Expectations may play a role as well (how often have we all heard this one?) “We’ve all heard the stories a few years ago of kids graduating high school with programming skills, making $60,000 and driving a BMW. There’s a sense of entitlement out there, a sense of immediacy,” said Isaak.[5]

And, this perception issue may be inaccurate in another area as well. For example, much of the news publicity about firms off shoring work to places like India, Russia, Thailand and Singapore chiefly applies to large companies. Why? Some speculate that smaller, more dynamic and nimble firms have discovered that outsourcing hasn’t worked for them. They’re finding it is more effective to have one information technology professional down the hall than several in places like Russia or India.

In summary, once you distill many of the studies recently performed on this issue, it appears that prospective and even current information technology students are dealing with an inaccurate assumption, namely that offshore outsourcing is cutting heavily into the availability of computing jobs in the U.S. This is highly inaccurate. For example, hiring in the IT field is rising. As one example of this, there is a “hiring binge” in Silicon Valley[6]. Also, at Google there is “a current target of hiring 10 employees a day.” In addition, recruiting site Dice.com reports that it’s “job postings have doubled since Oct., 2003. Finally, the U.S. Bureau of Labor Statistics says that the only fields growing faster than software engineering are medical assistants and home health aides. In fact, the BLS reports that 8 of the 10 fastest-growing occupations between 2000 and 2010 will be in information technology[7].

So, these students basically suffer from a misperception that large numbers of IT jobs are being outsourced, according to David Patterson, president of the computing society ACM. An ACM-commissioned study[8] finds that, in fact, only 2-3% of IT jobs are being outsourced offshore. Also, that same study found that job growth in the U.S. was increasing faster than that 2-3%, meaning that there is a net gain of IT jobs in the U.S.

And, it should be noted that this phenomenon is not limited to the United States. In Canada, we see the identical problem surfacing. According to a survey by the Computing Research Association, enrollment in information technology declined by 70 per cent over a five-year period between 2000 and 2005.[9]

Even in high school, and despite a high degree of computer proficiency, fewer students are enrolling in information technology programs, said Michael Katchabaw, an assistant professor at the University of Western Ontario's Department of Computer Science, at a recent forum on IT ca-

reers.

The declining number of IT enrollees could be attributed to the dot-com bubble bursting, explained Katchabaw.

"Right after the bubble burst, everybody who used to think that computer science was the place to go to get a job is now very wary of it."

He said the more common question that parents have about information technolgoy studies is whether there will be jobs available for their children when they graduate.

"And the answer is, of course, that there are jobs available, and there are plenty of them," said Katchabaw.[10]

In conclusion, we leave with a telling statement from a noted expert in the field: "We're fighting a terrible perception in computer science that there is some notion that the IT industry, since the [dotcom] bubble burst, is in the doldrums," said Barton Miller, a professor in the University of Wisconsin-Madison Computer Science Department and chairman of the Industrial Affiliates Program. "But from what I've seen, there is a very vigorous hiring market going on out there."[11]

So, we have concluded that there is indeed a real problem in information technology enrollments nationwide. Do we at Macon State College suffer form this effect? The answer is an unequivocal “Yes!” Our enrollment in our Bachelor of Science degree in Information Technology program has suffered a 14% loss in students since the dot com burst of 2001. This may not seem like much to some whose programs have suffered even greater losses, but we at Macon State College feel a true sense of loss. This loss of students affects us financially, for example, since funding in the University System of Georgia is largely established by number of students and majors. Plus, one of the primary missions of the College is information technology, so this can be seen as a negative for the College in community perception.

After investigation via several means such as interview with local officials as well as informal surveys of students, we believe this decline is due to the following factors:

1. The inaccurate perception by many prospective and current students that the information technology field is no longer a suitable employment destination due to the 2001 dot com burst.

2. Potential saturation of our local market for students. The Middle Georgia/Central Georgia area which the College recruits its students from is approximately 150,000 in population. Due to aggressive recruitment efforts in the past by Macon State College as well as aggressive recruitment efforts form the other local colleges surrounding (Wesleyan College, Mercer University, Fort Valley State University, and two local technical colleges); it is felt by some that we have basically achieved a saturation point in this arena.

3. A possible loss of division leadership due to turnover in the chair position leading the Division of Information Technology.

4. The dilution of some of our majors due to new major snow being offered by the College as is evidence by the following table (e.g. information Technology students decided to shift to another Bachelor's program now being offered):[12]

Bachelor Programs: Pre-2001	Bachelor Programs: Post 2001
• Business & Information Technology • Communications & Information Technology • Health Information Management • Health Services Administration • Information Technology Nursing	• Biology • Business & Information Technology • Communications & Information Technology • Education • English (starting in Fall 2007) • Health Information Management • Health Services Administration • History (starting in Fall 2007) • Information Technology • Mathematics • Nursing • Public Service

The Solution?

In order to address this decline, the Division of Information Technology is pursuing several efforts as follows:

1. The College has recruited a hard-charging and dynamic Chair who has a superb record in recruiting students in this field as well as solid and highly-respected managerial accomplishments.

2. Efforts have been underway to seek ABET accreditation. ABET accreditation is assurance that a college or university program meets the quality standards established by the profession for which it prepares its students. For example, an accredited engineering program must

meet the quality standards set by the engineering profession. An accredited computer science program must meet the quality standards set by the computing profession.

Why Is ABET Accreditation Important?[13]

- Accreditation helps students and their parents choose quality college programs.
- Accreditation enables employers to recruit graduates they know are well-prepared.
- Accreditation is used by registration, licensure, and certification boards to screen applicants.
- Accreditation gives colleges and universities a structured mechanism to assess, evaluate, and improve the quality of their programs.

3. Internal retention efforts are underway, namely we are attempting to educate our current student base that there are indeed employment opportunities in the information technology arena nearby, contrary to what they may believe. It should be noted that the off shoring efforts being seen in many locations are not reflected by the local employers).

4. Curriculum review is undergoing to assure our curriculum and its individual emphases and even courses are relevant to our local employer base. This employer base primarily consists of information technology positions at Robins Air Force Base, the third largest USAF base, educational institutions nearby (the local k-12cschool systems), IKON, GEICO as well as others, including smaller mom-and-pop operations.

5. Accelerating out efforts in placing interns out into the local community. We have discovered that many of these interns end up being hire, full-time, at their intern locations once they have graduated with their degree.

6. Cementing more effective partnerships with local businesses including the possible resurrection of a business liaison council.

7. Introduction of an entirely new online Bachelor of Science In Informatino Assurance degree.

Conclusion

Macon State College has experienced a decline in students in our Bachelor of Science in Information Technology program for the identical reason mentioned in the literature, primarily a perception by prospective and current students that employment opportunities no longer exist or are lessened significantly in the information technology field. Through the diligent application of corrective measures, we feel or enrollment will significantly increase and modest increases have already been observed.

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History and relevancy of Enigma machine encryption to present day wireless security issues

Robin Snyder
Savannah State University
126 Jordan, P. O. Box 20359
Savannah, GA 31404
(912) 356-2716
snyderr@savstate.edu
http://www.RobinSnyder.com

Abstract

A century ago, the wireless revolution involving radio signals created security problems (at a national level) that are similar to many wireless security problems faced today (at institutional and personal levels). One historical result was the Enigma Machine used by Germany in the second world war. This paper (and talk) will discuss (and present) an overview of this history in general and the Enigma machine in particular. The author has written an Enigma simulator used to generate problems for students. The students then use realistic online Enigma machine software to decrypt the messages. A discussion of current day wireless security involving SID broadcasting, MAC address filtering, WEP, WPA, TKIP, etc., will be covered as an extension of the historical context of the Enigma machine.

Introduction

Secret communication via codes, ciphers, etc., have have existed since ancient times. Some references on the history of codes and ciphers, including the Enigma Machine, are [2], [3], and the classic [1]. Much of the material in this paper is from the author's previous work in this area ([5], [4]).

With the advent of wireless communication, from Marconi's work in the late 19th century, naval commanders in the home country were able to command and contral warships throughout the world. Soon, the enemy was always listening so that encryption techniques were continually refined and further developed.

On the wireless networks of today, hackers are often listening. Recently, breaking the standard WEP (Wireless Equivalency Privacy) method has become a game for hackers breaking into Wi-Fi networks. The time to break such encryption is now under a minute. The WPA (Wi-Fi Protected Access) method is much more secure, but as it is not the out-of-the-box default, many users do not use WPA encryption - with a pre-shared (and secure) key.

At the start of the 20th century, there was a desperate need for secure wireless communication. Various methods were developed, refined, and used. Much of the early security relied on code books whereby recognizable words were looked up in a dictionary to find their meaning. Such codes were unwieldy, not that hard to break, etc. A general purpose cipher system was needed.

Between World War I and World War II, the news of the breaking of the German codes during the war by the British and the news of the breaking of the Japanese codes (after the war) by the

Americans motivated both Germany and Japan to search out more secure, cipher-based, methods of encrypted communication. The technology developed by the Germans, and the breaking of that technology by the Allies provided the basis for the modern general purpose programmable computer.

Germany adopted a version of the Enigma Machine that was created as a business venture in the 1920's. The Enigma Machine had a series of rotor wheels where each rotor wheel modified the typed letter to some other letter, which was then reflected (another transformation) and then passed back through the rotor wheels. Plug boards were added at the front (and then, on the way back, at the back) of the machine. The symmetry allowed the encryption and decryption to be done if one had an identical Enigma Machine with the identical initial settings at the other end. Of course, security policies had to be in place and followed for the security of the Enigma machine to be not so easily breakable.

The design of the Enigma Machine had a subtle design weakness, later exploited by the Allies, in that no letter could be encrypted to itself. Thus, the concept of a crib (coined by Alan Turing) was developed. That is, if one could guess at a word or phase that would be in the message (e.g., near the beginning) then one could narrow down the possibilities to put the decryption within the reach of the mechanical tabulating machines, called bombes. For example, suppose that the crib were "**HELLO**" and the encrypted message appears in the first line, line 0, of the following.

```
0. ???L??OL?????????
1. HELLO
2.  HELLO
3.   HELLO
4.    HELLO
5.     HELLO
6.      HELLO
```

The only position where the clear text "**HELLO**" could occur is in line 4. The other lines would be ruled out as colliding with the encrypted message. In addition, the codebreakers used other methods to get cribs and hints, including capturing ships, learning the habits of operators, etc.

Simulators

There are many online simulators for the Enigma machine.

Figure 1: Enigma simulator (top view)

Links to these simulators are provided to the students. One of the most popular realistic Enigma Machine simulators is at http://www.conferencemgt.com/cgi-bin/seektrack.exe. This Enigma Machine appears in figure 2. Once the settings are made to the machine, the sender types the letters on the keyboard and the corresponding encryption (or decryption) appears lit up in the upper keyboard. If any keys are pressed out-of-sequence, there is no easy way to go back once a key is mistyped. The plug settings appear in figure 2.

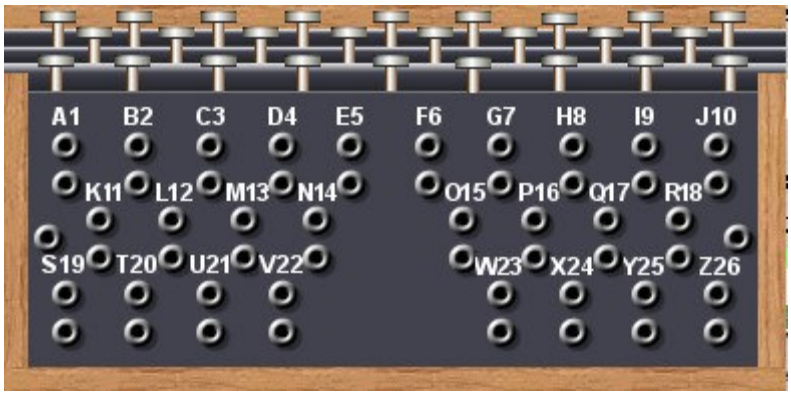

Figure 2: Enigma simulator (plug view)

On the plug board, there are **13** possible cables to connect **26** letters. This provides a very large number of ways to connect the cables (analysis omitted). Under the lid, the rotors can be changed and (internally) rotated. This appears in figure 3.

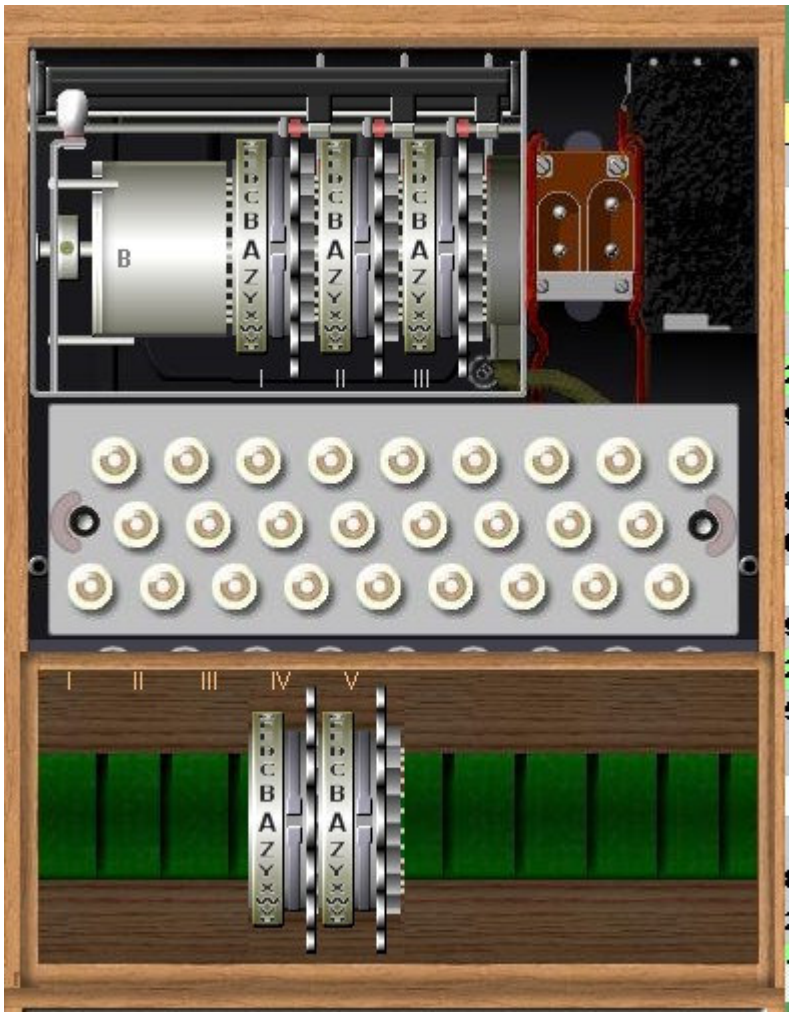

Figure 3: Enigma simulator (inside view)

In order to generate individualized problems for the students, the author created a functional Enigma simulator. The simulator did not have to be visually accurate as such simulators exist on the internet for download and use. The primary obstacle became one of replicating quirks of the original Enigma machine. This was eventually resolved and only the most common Enigma machine was simulated. The simulator appearing in figure 4 was not provided to the student as it would have made their assignment much easier and not nearly so interesting.

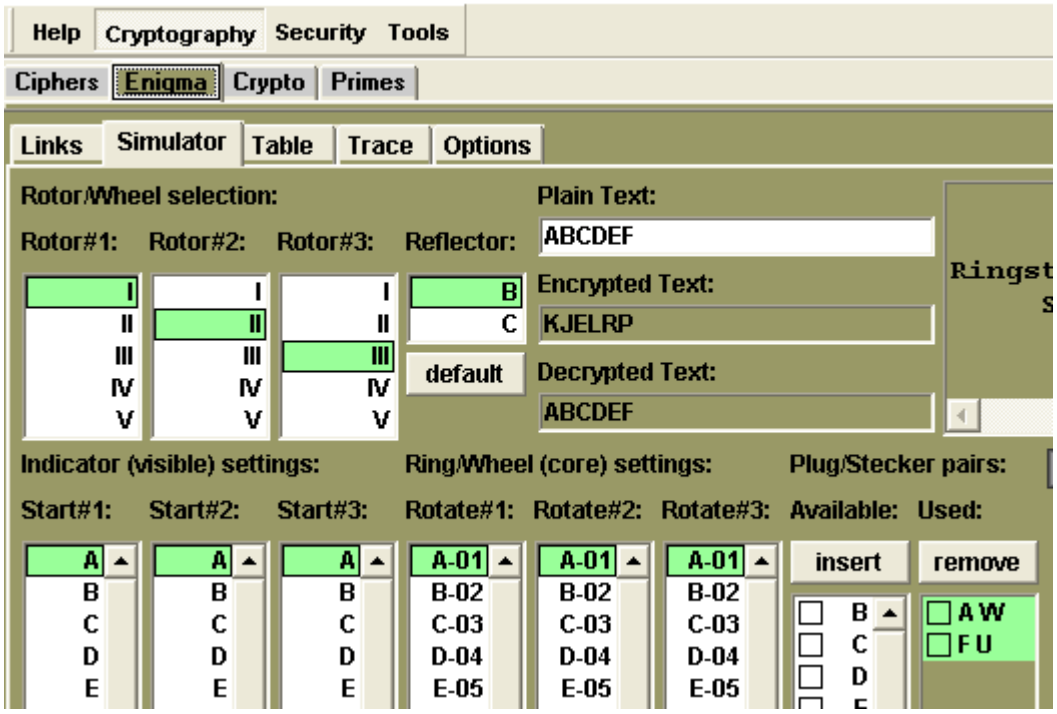

Figure 4: Enigma simulator written by the author

The author used the following method to create individualized problems for the students. First, the initial Enigma Machine settings are generated. For example, the trace of the encryption of the clear text "**ABCDEF**" to the encrypted text "**KJELPR**" using the default settings is as follows.

```
Encrypt:
   [l:m:r][l:m:r] .S #3 #2 #1 #R #1 #2 #3 S.
   [A:A:A][.:.:+] AW XS RG GD DH HP PU VL KK
   [A:A:B][.:.:+] BB DH FI IV VW WN NT VL JJ
   [A:A:C][.:.:+] CC FL IX XR RB BW WM PH EE
   [A:A:D][.:.:+] DD HP LH HQ QE EA AA EP LL
   [A:A:E][.:.:+] EE JT OM MO OM MC CP UW RR
   [A:A:F][.:.:+] FU AB VY YC CU UR RG MV PP
   [A:A:G]
Decrypt:
   [l:m:r][l:m:r] .S #3 #2 #1 #R #1 #2 #3 S.
   [A:A:A][.:.:+] KK LV UP PH HD DG GR SX WA
   [A:A:B][.:.:+] JJ LV TN NW WV VI IF HD BB
   [A:A:C][.:.:+] EE HP MW WB BR RX XI LF CC
   [A:A:D][.:.:+] LL PE AA AE EQ QH HL PH DD
   [A:A:E][.:.:+] RR WU PC CM MO OM MO TJ EE
   [A:A:F][.:.:+] PP VM GR RU UC CY YV BA UF
   [A:A:G]
```

The above trace is useful when debugging the simulation of the Enigma Machine. On the left, the rotation of each rotor is clearly indicated. The single and double stepping of the rotors when certain notches are encountered must be precisely simulated. Some of the quirks of the machine reduce the total number of possibilities for each encryption.

Here are the default settings, except for the plugs (i.e., Stecker), which are shown as an example.

```
          UKW: B
       Walzen: 1  2  3
Ringstellung: A-01 A-01 A-01
     Stecker: AW FU
```

The format used is similar to the settings used in World War II. The above is interpreted as follows, using the most conventional Wehrmacht (i.e., Military) Enigma Machine.

- The reflector is **B** where the choices are **A** or **B**.
- The rotors are, physically from left to right, **I**, **II**, and **III** but the forward pass in the machine is from right to left.
- The rotor settings are all **A-01** where the possibilities are from **A-01** to **Z-26**.
- The plug settings switch characters **A** and **W**, and characters **F** and **U**.

The above settings would be determined and issued secretly well before the day when they were to be used. The initial settings for the rotors that are displayed on top, however, are transmitted at the start of the message. This often became a human issue as some operators become very predictable as to the nonrandom initial settings that they would use.

A message is generated for each student. To keep it simple, the following is the format of the messages.

```
ONEXXTWOXXTHREE
SEVENEIGHTTWOXX
FIVEXTHREENINEX
```

The pattern should be obvious and lets the student know if the decryption is correct (with very high probability). Note that the original Enigma Machine supported only the **26** letters of the alphabet. The letter '**X**' was used for a space. Other abbreviations (omitted) were used to reduce the size of the encoded/decoded messages.

To make the exercise general, **1,000** problem sets from **000** to **999** are generated. An XML file is created for this purpose. The relevant fields are the settings text (i.e., the part that forms the question) and the expected answer text (i.e., that must match exactly).

Each student is given a series of, say, **5** messages to decrypt. These are selected, at random, from the **1,000** problem sets. At the end of the **5** messages, the student must write a paragraph to answer a question. The answer is then submitted to the online database. Later, the submission is graded by the teacher. The results are then made available to the student via the online database (after login, of course).

Here is an example of the XML where `1,000` problem sets are generated. Some details are omitted for space reasons.

```
<?xml version="1.0" standalone="yes"?>
<rmsTable ext="" seed="741" content="">
<row index="1"
 input="PBG BTLGRBMMKUGPRUHZKW"
 output="TWOXXXTENXXXTHREEX"
 data="Machine settings:
 &lt;br&gt;UKW: B
 &lt;br&gt;Walzen: 4 1 5
 &lt;br&gt;Ringstellung: T-20 Z-26 S-19
 &lt;br&gt;Stecker: BX DH KM"
 mark="0"
 />
<!-- and so on ... -->
</rmsTable>
```

Classes of students are then mapped to the problem sets. Here is an example of the XML. Again, some details are omitted for space reasons.

```
<?xml version="1.0" standalone="yes"?>
<rmsWorks steps="4" parts="1" file="0" content="" >
<account type="teacher" sid="99999" login="..." name="...">
<work index="0" general="Encrypted message to decode">
<part index="0"
 question="LVU BEKQNGSFEWLDQGWUJT"
 answer="SIXXXXTENXXXNINEXX"
 extra="Machine settings:
 &lt;br&gt;UKW: B
 &lt;br&gt;Walzen: 3 5 4
 &lt;br&gt;Ringstellung: N-14 P-16 D-04
 &lt;br&gt;Stecker: BL CP HM"
 file=""
 />
</work>
<!-- and so on ... />
</account>
<!-- and so on ... -->
</rmsWorks>
```

Note that each step could consist of multiple parts (e.g., expected answers), but this example has only one part per step. Since each student has a different problem, copying is not easy. Instead, the only way for a student to help another student is to actually do the work for that student (which may or may not result in the student learning the work from the student helping).

The web-based ASP code permits the use of the exercises, encoded in an XML format, with a document customized to the particular exercise (e.g., with links to help, explanations, etc.). The first step in the Enigma decryption requirement appears in figure 5.

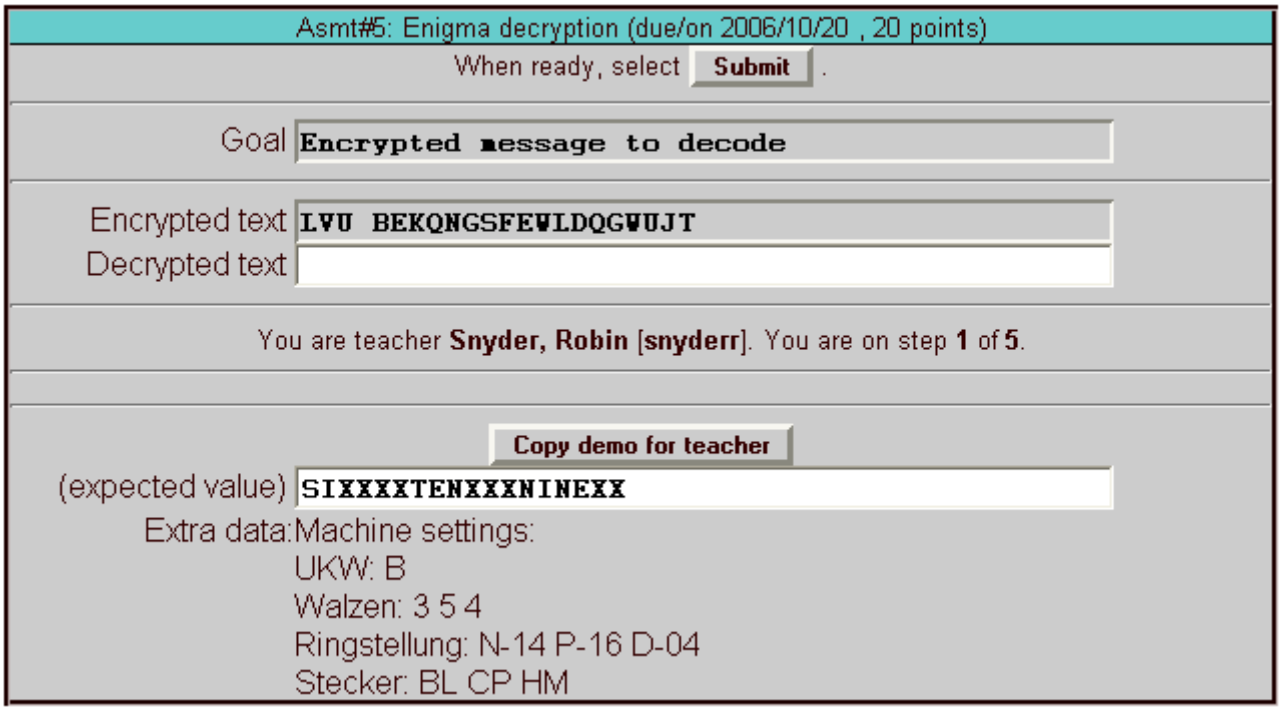

Figure 5: First step in the decryption requirement

For demonstration purposes, the teacher has quick access to the actual answer (i.e., the button for "**Copy demo for teacher**"). The students, though, do not have such access. In addition, to answer the inevitable student questios, the teacher has quick web access to all problem steps and answers for every students.

At exam time, the student must do some of the exercises (this is but one example) in real time. Instead of `5` of the same exercise, however, it may be `5` different exercises. Since the XML records only the question explanation text, expected answer text (and optionally some extra text), the ASP (or PHP) code that runs the web-based interface need not know about the details of the problem. The code can just present the question explanation and let the student proceed if the expected answer text matches.

Videos

The author has been experimenting with audio-video using Camtasia Studio. In the case of this assignment, a demo in class is done while capturing the audio and the relevant parts of the screen. The author has developed a custom interface to act as a decision support system with Camtasia Studio to help manage, produce, and publish the videos for student use.

Summary

This paper has presented an overview of this history in general and the Enigma machine in particular. The author has written an Enigma simulator used to generate problems for students.

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Is XE for Me?

Dewey A. Swanson
Associate Professor, C&IT
Purdue University School of Technology
4601 Central Avenue
Columbus, IN 47203
Fax (812) 348-7258
dswanson@purdue.edu

Abstract

Have you ever wanted to utilize Oracle's Database Management System in your curriculum but found the cost too prohibitive? Were you turned off by the fact that the academic license does not allow you to deploy it unless the user has an Oracle license, making it difficult to develop real projects for smaller clients? Oracle has developed an entry level database, Oracle Database 10g Express Edition (XE) which was released within the last year. The database is free to develop, deploy, distribute and download from Oracle. Beginning in the fall of 2006, we made the database available to students in several classes. I will discuss how we utilize Oracle XE in our classes and compare Oracle 10g XE to 10g Enterprise Edition for students, faculty, and support staff.

Introduction

For the past ten years the Computer and Information Technology Department (C&IT) program in Columbus has used Oracle RDBMS in most of our classes utilizing database software. In the C&IT Bachelor of Science program we have seven courses that focus on database design, development, programming and administration. We use Microsoft Access in our introductory class and in five of the classes we utilize Oracle's RDBMS. In C&IT we try to give our students an edge by incorporating tools they will use in their jobs, not just in the database curriculum but for all of our courses. By all accounts Oracle continues to be the overall leader in the worldwide relational and object-relational database management systems software market. By using Oracle in our classes we feel like we are helping our students to "hit the road running". Many of the larger companies in the Columbus area use Oracle and they have generally commented they feel it is a plus to utilize the software in our classes.

Currently, C&IT at Columbus is a member of the Oracle Academy, formerly known as Oracle Academic Initiative. Oracle Academy helps provide select Oracle development, database and application server products for classroom use. This enables institutions to offer cutting-edge technology coursework for degree programs like computer science, engineering, or information systems. Following are a few of the benefits of becoming a member of Oracle Academy:

- Access to Oracle's 24/7 technical support
- Free Oracle software
- 50% discount for Oracle Academy faculty and technical support staff through Oracle University
- 40% discount on Oracle certification exams
- 50% discount on Self Test Software

- Ability to purchase subscriptions to curriculum developed by and for Oracle University

The cost for a department to join the Oracle Academy is $500 annually. The C&IT department at Columbus has been a member for the past ten years. We have found the program to be very beneficial for our program, faculty and students. In the past we have utilized the discounts for faculty training and purchase of Oracle curriculum. Our students join Oracle Academy and are eligible for discounts Oracle offers. We are a commuter campus and many students drive from outside the Columbus area to take classes. Many of our students use the Oracle Academy agreement to download the Oracle database to their home computers. Others download a client-side version in order to access the Oracle server on campus. This allows our students to finish labs at home and not make additional trips to campus. There have been a few downsides to using the Oracle Enterprise Edition for students at home. The biggest downside for newer students is installing and administering. This has been troublesome typically for the more inexperienced of our students typically freshman and sophomores. If students have dial-up at home the actual download is virtually a day long event. Finally, the Enterprise and Standard Edition of Oracle 10g tends to be a resource hog and for students with older machines this can be problematic (I will go into this topic later). Installing the client-side version of Oracle has been well received by students with only minor complaints. Again for students with dial-up, access can be tedious. Also, in the past we have had some problems with hackers into our Oracle server and availability was intermittent at that time. This problem was virtually eliminated when we upgraded from Oracle 9i to Oracle 10g Release 2 last summer.

Overall, we have been very pleased with our participation in the Oracle Academy. We feel like it has been beneficial to students, faculty and staff and plan to continue our participation in the program.

Introduction to ORACLE XE

In February 2006, Oracle made an entry-level database named Oracle Database 10g Express Edition, otherwise known as Oracle XE, available on its website. The free download is a mere 157 MB versus Oracle Enterprise Edition coming in at 697MB in zipped files. Oracle states that Oracle XE "is an entry-level, small-footprint database based on the Oracle Database 10*g* Release 2 code base that's free to develop, deploy, and distribute; fast to download; and simple to administer" (Oracle, 2006). Oracle XE can be used by developers working on a variety of platforms including SQL, PL/SQL, Java, C, PHP, .NET, HTML DB, C++, ODBC, OLE DB (Foot, 2006). The Oracle XE site also claims support for XML and even some open source applications (Oracle, 2007). Oracle also claims it could be beneficial to educational institutions and students if their curriculum calls for a database.

Oracle XE retains some characteristics of the commercial database; however, it does have several differences and limitations. Oracle XE can be installed on computers with any number of processors; however, it will only use one processor per machine. Similarly, no matter how much memory and hard drive the system has Oracle XE will only use up to one gigabyte of system memory and up to four gigabytes of disk space (Oracle, 2006). Listed in Table 1 is a comparison of Oracle XE features versus Oracle Standard and Enterprise Edition.

Oracle Summary of Features

Key Feature Summary	Express Edition	Standard Edition	Enterprise Edition
Maximum CPUs	1	4	No Limit
RAM	1GB	OS Max	OS Max
Database Size	4GB	No Limit	No Limit
Windows	Yes	Yes	Yes
Linux	Yes	Yes	Yes
Unix	No	Yes	Yes
64 Bit Support	No	Yes	Yes
Server Managed Backup and Recovery (RMAN)	No	Yes	Yes
Real Application Clusters	No	Yes	Option
Stored procedures deployed in database in Java and PL/SQL	PL/SQL Only	Yes	Yes
Application Express	Yes	Yes	Yes
XML Support	Yes	Yes	Yes
Enterprise Manager	No	Yes	Yes
Partitioning	No	No	Yes
Oracle Warehouse builder	No	Core ETL features included	Enterprise ETL, data Quality and Connectors Options available

Table 1

The CPU, RAM and database size limitations are nearly identical to Microsoft's SQL Server 2005 Express Edition. Like Oracle XE it also has the limitations of using only one processor, one gigabyte of system memory, and one gigabyte of hard drive space (Oracle, 2007). Though Oracle XE does not support 64-bit like SQL Server Express, it can be installed on the Linux distributions of Debian, Mandriva, Novell, Red Hat, and Ubuntu (Wall, 2006). Following in Table 2 are the minimum requirements for Oracle XE.

Oracle XE System Requirements

Requirement	Value
System architecture	Intel (x86)
Operating System	One of the following 32-bit Windows operating systems • Windows 2000 Service Pack 4 or later • Windows Server 2003 • Windows XP Professional Service Pack 1 or later
Network protocol	TCP/IP

Disk space	Server component: 1.6 GB Client component: 75MB
RAM	256 MB minimum, 512 MB recommended

Table 2

The installation of Oracle XE also differs from previous version of Oracle. Oracle XE does not use the typical universal installer, rather questions are asked by the installer and the Windows services are installed automatically. With these and other changes, Oracle XE can be installed and up and running in a few minutes, even if the user has no previous experience with Oracle. In my C&IT 272 Database Fundamentals class I demonstrated for the class the Oracle XE install. To install and add a new user took approximately 20 minutes. This was much more straight forward than the typical Oracle 10g Enterprise Edition install through the Oracle Installer.

Another feature of Oracle XE is the built-in web graphical user interface (GUI). The main buttons are: administration, the object browser, SQL, and utilities as displayed in Figure 1. Administration allows users with sufficient privileges to manage and monitor the database users, memory, and storage. The object browser lets users create and view tables, views, indexes, and sequences among other things. The SQL button permits a user to enter SQL commands, create, view, and upload SQL scripts, and to use the query builder.

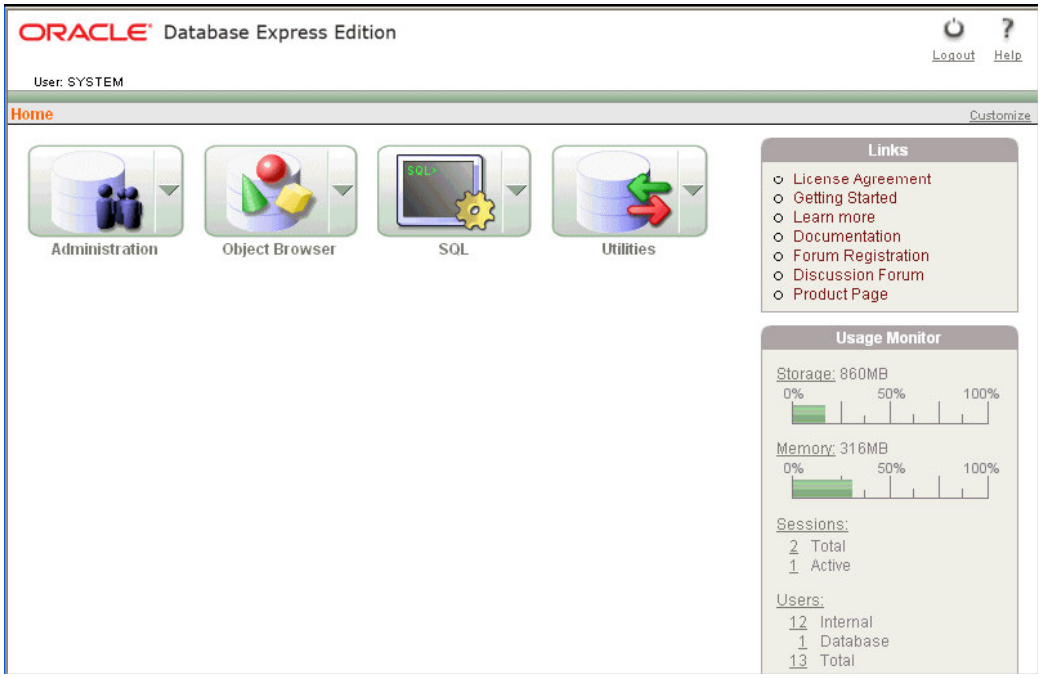
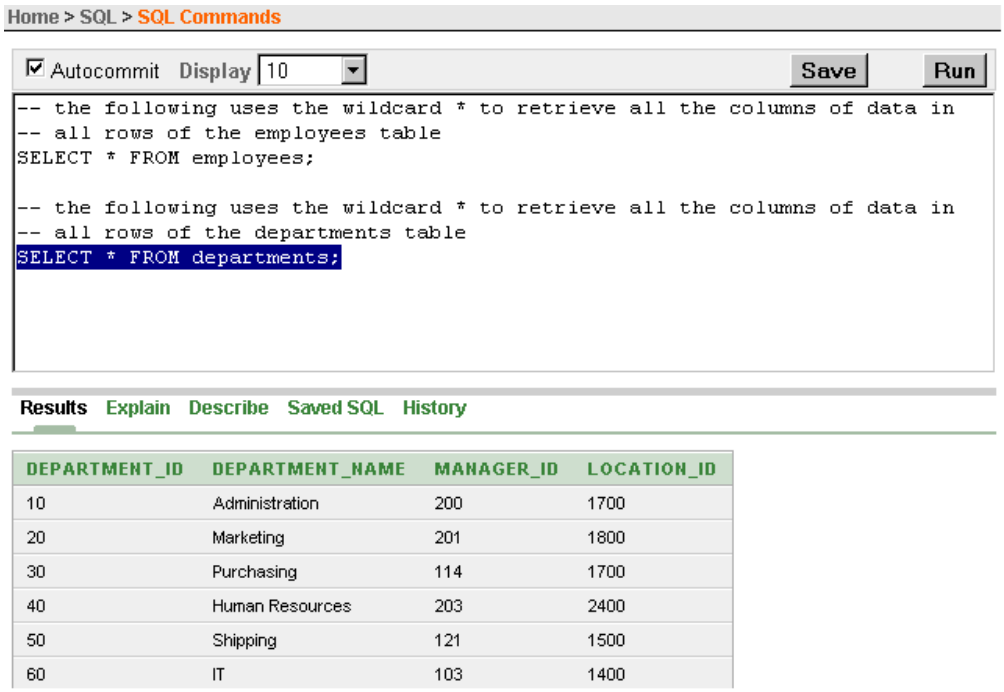


Figure 1

The query builder is similar to the one found in Microsoft Access. The GUI lets the user join tables and select fields with the click of the mouse. Then conditions can be entered for the selected fields. Oracle XE builds the SQL for the query and like Access, users have the option of viewing and modifying the SQL. The results of the SQL are instantly viewable. When finished, users can save the query or perhaps copy and paste the code into whatever application is being written as displayed in Figure 2.



DEPARTMENT_ID	DEPARTMENT_NAME	MANAGER_ID	LOCATION_ID
10	Administration	200	1700
20	Marketing	201	1800
30	Purchasing	114	1700
40	Human Resources	203	2400
50	Shipping	121	1500
60	IT	103	1400

Figure 2

The application developer could be described as a combination of the form and report wizard in Microsoft Access. It also takes user defined conditions that link and control the flow through the application. Using this tool, it is possible to create web-based applications with little to no written code. Displayed in Figure 3 is the Application Builder home page.

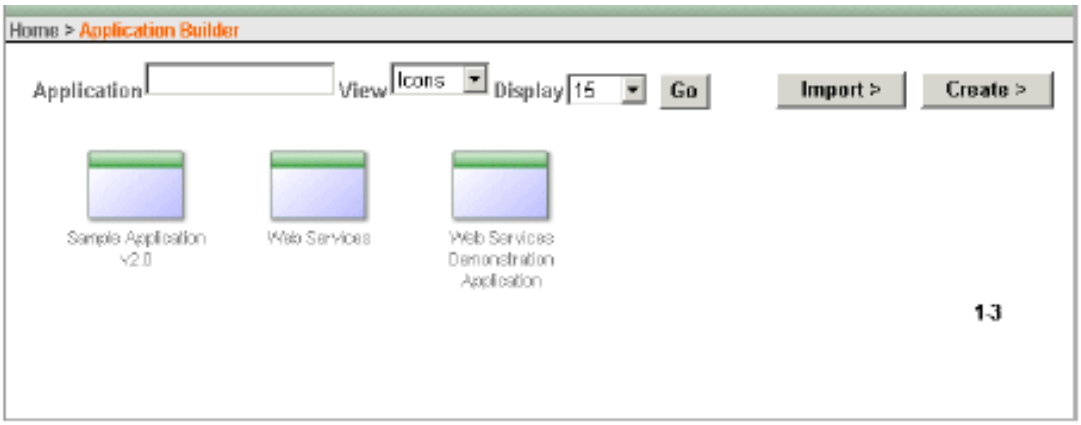


Figure 3

Reaction to Using ORACLE XE

At the time of writing this paper students are still using Oracle XE in my C&IT 272 Database Fundamentals class. At the end of the semester I intend to survey the students on their impressions of Oracle XE. Informally, I have requested comments from students based on approximately ½ semester using the product. I also have a student doing an independent study using Oracle XE as part of his class assignment.

First, I will give my own initial reactions and then add some comments from students. Having used Oracle since Oracle release 5 as a developer, DBA and instructor I have seen several things that I've been impressed with. The installation was very easy and relatively short. Typically, an Oracle installation uses Oracle Installer, however that was not required with the Oracle XE install. I found the install quick and easy even for relatively novice users. In fact because of time constraints I usually don't demonstrate and install in my introductory database class C&IT 272. This semester I did a install at the start of class and finished the install and had added a new Oracle user in about twenty to twenty-five minutes which is pretty impressive for Oracle. Another thing that I was pleased with was the documentation. Oracle provided a nice tutorial and documentation for DBAs and developers. Most was very easy to access and use. I have not had a chance to use the Application Builder development tool so I cannot offer an opinion on that functionality. Running Oracle XE on my home desktop I found it not to be a typical drain on resources that Oracle can be. Also, it can be easily started and stopped.

The user interface is easier for the inexperienced user as the typical interface we use in the C&IT 272 is the command line SQL*Plus interface displayed in Figure 4 as opposed to the SQL Command interface displayed in Figure 2. Students typically found it easier to navigate the user-friendly Oracle XE SQL interface.

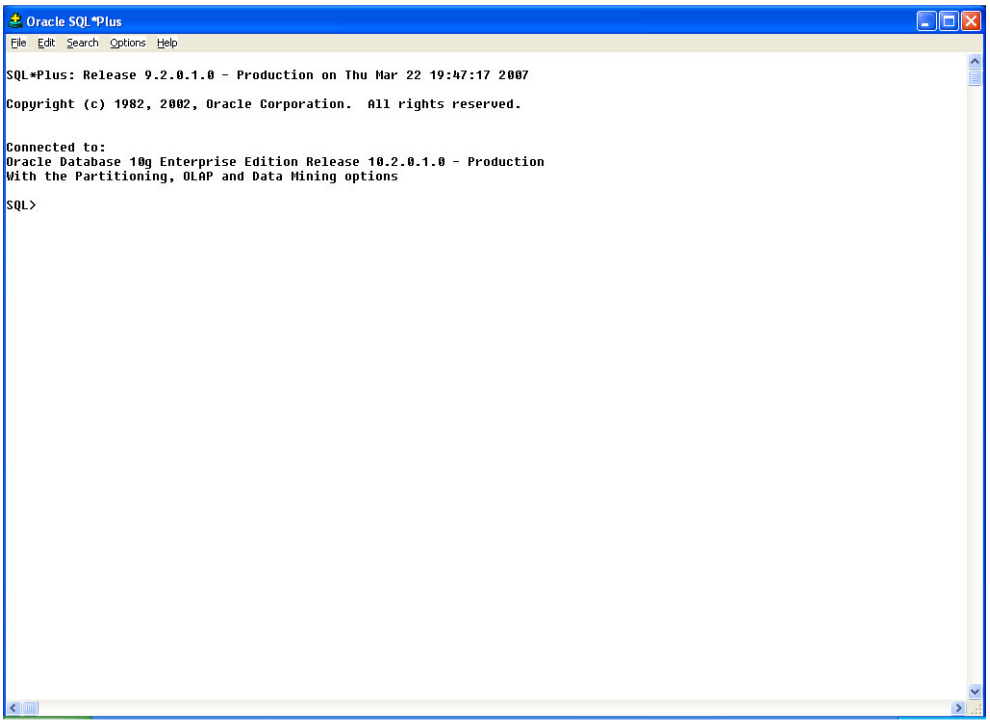


Figure 4

A downside I found with Oracle XE was a limitation on the size of a script file to run. The size limitation is 4K on the script files. Students typically load three databases for the class. Two files worked fine but the third file was too large for it to run. Also, SQL*Plus commands embedded in the script file produced error messages. The error messages were not a problem because the script would still execute with the errors. For the script file that was too big the two options used were: to break the file into parts (typically the create statements and populate state-

ments), or even easier was to run the script from the command line interface. Probably the biggest downside of using Oracle XE in class was not anything to do with Oracle XE but rather the fact that students in some cases ran Oracle XE at home and on campus we used Oracle 10g Release 2 with the standard SQL*Plus interface. On top of that some students also installed the Oracle 10g Client side and a few installed the Oracle 10g Enterprise Edition at home. This led to some student's confusion. Because of their inexperience they were not sure what version they were running, if it was connecting to school, etc. Most students have not had experience with a database other than Microsoft Access. That was probably the biggest complaint from the students and most comprehended the differences but there was a few who struggled for a couple weeks. A plus that we are going to attempt to explore is the fact that Oracle XE can be used in development and no purchase is necessary. This will make it much easier to use small live projects in class. In the past it was virtually impossible because we could only deploy an application for a user that had a valid Oracle license. Because of Oracle's pricing most small businesses and non-profits don't have Oracle installed. Now our students can develop and deploy using Oracle XE because it is free to develop and deploy. This semester the student doing an independent study is developing an application for our Student Services area using Oracle XE and the Application Builder tool provided.

The reaction from our lab support staff was very favorable. According to our lab manager the Oracle XE was easy to install, much simpler than the Enterprise Edition of Oracle. Also, it was not a drain on disk or RAM on the server. Finally, Oracle XE was also easy to set up to be accessed on the network.

Based on the features of Oracle XE it will not satisfy the needs of all classes in our database curriculum. For instance, in our C&IT 392 Enterprise Data Management we have content that deals with data partitioning which Oracle XE does not support. In our C&IT 487 Database Administration we utilize Enterprise Manager to manage multiple instances and use Installer to install add on products. Both of these products are not used by Oracle XE. However, in our C&IT 272 Database Fundamentals it handles most of the tasks required and I believe in our C&IT 372 Database Programming where students create packages, procedures and functions using PL/SQL it should also be fine.

One assignment for my independent study student was to load Oracle XE on his laptop and try it out on a few assignments. On the laptop he noticed a few performance considerations. By default, Oracle XE starts up with Windows. While for the most part it runs quietly in the background, there are times when Oracle XE would use over 300 megabytes of system memory. The upside is Oracle XE can be quickly and easily stopped by running the stop database command from the start menu. At the present time the student is working with the Application Builder on the Student Services project and I hope to have an update by the time of the ASCUE conference.

Summary

Oracle calls Oracle XE an entry-level database fast and easy to download and administer with the added benefit that it is free to develop, deploy, and distribute. Having utilized Oracle XE for the past semester I would have to agree. Even with some of it's limitations it provides students experience with a database based on Oracle 10g Enterprise Edition. For students it provides a good experience with a GUI interface superior to the SQL*Plus we typically use. We will not

drop our Oracle Academy subscription because it offers many valuable features: access to Oracle Enterprise Edition which is needed in some upper lever classes, discounts on Oracle training for faculty and staff, ability to purchase Oracle course material, access to Oracle support for an annual fee of $500. I think Oracle XE is a nice complement to have. For our students it has two plusses. It is easy for students to install and use at home, and we can have students utilize it on real projects for small businesses and non-profits which as mentioned earlier in the paper was not possible because of the license issue for the small companies. The second is a big advantage because we like to have "live" projects in classes if possible. Is Oracle XE right for your institution? It will support a multi-user environment and is easy to install and to administer which is always a plus since most smaller institutions don't have support staff trained to support and administer Oracle. Using Oracle gives students experience with the market leader in relational database area which is useful to students seeking jobs. And finally, the price is right for institutions with a limited budget, it's FREE! If your institution offers one or two classes in database curriculum Oracle XE may be all you need. At any rate it can be a complement to your current setup.

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Introduction to Web 2.0 in the Classroom: What Is It—Why Use It?

George Weimer
Teacher Education Department
(317) 788-3256
weimer@uindy.edu

Beth Kiggins
Director, Instructional Technologies
University of Indianapolis
1400 East Hanna Avenue
Indianapolis, Indiana
(317) 788-6154
kiggins@uindy.edu

Abstract

Session is an overview and demonstration of several free Web 2.0 tools we have used in the classroom. It is intended for teachers who are somewhat familiar with blogs and wikis, but have not used them in courses. Questions to be addressed include: What is Web 2.0? What online resources may be useful? Can they make learning more meaningful? Do they hold power to improve learning? What resources are needed for faculty at smaller institutions to use these resources? At the end of the presentation, attendees will take away new methods of integrating Web 2.0 technologies into their courses. They will be more familiar with useful, new Web technologies (beyond wikis and blogs), and they will know strategies for creating successful, secure assignments using them. They will understand that obstacles may stand in the way of integrating new technologies into their teaching, and they will know ways to overcome them.

Introduction

Evolving Web applications and utilities appear with amazing speed and in impressive numbers. Some of these have potential to improve instruction in the education segment identified as grades 9-16. Our experiences at the University of Indianapolis with undergraduate teacher education candidates show that students become actively engaged in their own learning when using some of these tools under careful guidance of the instructors. We have also found that with proper planning and presentation, some Web tools help to make the instructor's challenge, how to use evolving technologies and still have time to teach and attend meetings, manageable. At the University of Indianapolis, our instructors have been forced to find free Web resources for our classes, and we have had little to no support from the IT staff. Still, we have been successful. In this paper we attempt to show how we have solved some interesting problems and empowered our students to use free Web 2.0 tools to engage actively with problem-solving activities to enhance their learning.

Project-Based Learning

We have traveled a path of redesigning the initial educational technology course taken by both elementary and secondary education candidates at the University of Indianapolis to make it more engaging, more current, and more constructivist. Our intention has been to use more authentic

assignments and to involve students in these assignments in authentic ways. To that end, we adopted some of the principles of Project-Based Learning (PBL). David Moursund believes that "PBL has a high level of 'authenticity.'" He describes the ways in which it allows students to work in a more adult way to solve problems (Moursund, 2003). Generally project-based lessons begin with a big question that students must answer (in other words a big problem to solve). They are often assigned into groups to solve the problem. They are sometimes assigned roles within the group and group members are often provided with online resources to help to solve the problem. At the end of the project, some final product is produced. It may be a model of a bridge, a PowerPoint presentation, a replica of an article in a newspaper from the Civil War, and the like. (Moursund, 2003). Moursund has a useful website designed to support a workshop, a short course, or self study on Information and Communication Technology (ICT)--Assisted Project-Based Learning. There are enough materials for a two-day workshop or a one-credit course" (Moursund, 2003).

For those who seek ongoing information related to PBL, the Edutopia Website has proved to be of great use and inspiration to us as we design assignments (http://www.edutopia.org). Edutopia is funded by the George Lucas Educational Foundation. In addition to the Website, which contains numerous links to Project-Based Learning articles and videos (several of which we have shown to our classes), they publish a free weekly newsletter with additional resources for teachers at various levels. They also have a free print journal. We strongly recommend that if you are new to the Project-Based Learning model you visit the Web site, investigate what is there, and sign up for their free publications.

What is Web 2.0?

Tim O'Reilly coined the term Web 2.0 in 2004 to describe the changes that were happening on the Web as users were allowed to participate to a greater extent through activities such as social networking, publishing directly to the Web and sharing files of all kinds, including photos, movies, music, and more (http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html). Web-based applications that serve as good examples of Web 2.0 include blogs, wikis, podcasts, MySpace, FaceBook, YouTube, sharing photos through Flikr, and sharing mp3 files of music in various ways. Virtual Reality Web sites such as Second Life (http://www.secondlife.com) are also being used in educational settings by the more adventurous. Google Docs and Spreadsheets (formerly Ajax Writely) are also useful tools in collaborative learning environments.

We are continually impressed with the wonderful work published on the blog of Will Richardson (http://www.weblogg-ed.com/) and printed in his new book: *Blogs, Wikis, Podcasts, and Other Powerful Web Tools for Classrooms* (Richardson, 2006). We also invite you to visit our workshop blog listing numerous useful resources with working links at: http://uindyworkshop.blogspot.com/. The workshop blog contains definitions of some of the terms used in this article that may not be known to all readers.

Google Docs and Spreadsheets site (http://www.google.com/google-d-s/b1.html) is another free resource that can be used to create on-line collaborative, authoring environments. One interesting feature is the ability to convert a Word document to a Google doc, edit it in a collaborative envi-

ronment, while tracking all changes and contributions made by multiple authors, and later save it as a Word document.

MySpace is another resource powered by Google that connects people. With MySpace you can invite your friends to your *space* and share what is going on in your life. Facebook is yet another resource used by students of all ages to connect with one another. You cannot only find out what's going on with your friends, but you may connect with friends that you only occasionally see, or get in touch with friends you haven't seen since high school.

YouTube (http://www.youtube.com) is an online resource used to stream and share videos. The embed code found next to YouTube videos may easily be copied and pasted as html code into a Blogger post. When the blog is viewed, the YouTube movie's first frame will appear ready to show the entire movie by clicking the play button. YouTube is a source of many very fine, short educational videos.

Flikr is an online resource for storing and sharing photos. In addition, it has utilities to search and sort photos.

Second Life is a 3D virtual reality world, created, owned and inhabited by its residents. As of April 20, 2007 it was inhabited by 5,730,340 people from around the world. A basic membership to Second Life is free. However, currency is exchanged using Linden dollars. Money is exchanged and made in SecondLife. For some, SecondLife is source of income. For a growing group of college educators, it is a space for compelling online, interactive instruction. (To read about an example, go to the Web site of Sarah Robbins, AKA Intellagirl at http://home.intellagirl.com/.)

One key here for us is that many Web 2.0 applications are at not cost. Some require that you create a free account with a login and password to be used each time you enter. Experience has shown that creating a large number of these accounts has not been a problem. We have not been spammed as a result of having these accounts. We get occasional e-mail updates listing new features and urging us to continue using the application. The greatest problem is keeping track of all the login names and passwords we have created. There are online password solutions to this dilemma that are beyond the scope of this paper.

Student agreement

In order to prepare our students for the eventual and likely sharing of student work at conferences and for the possibility that others might participate on their blogs and wikis, we ask them to sign the following agreement (Hall and Weimer, 2006).

I agree to the following terms of use for shared communication resources on the Internet for this class:

1. *I will not post inappropriate material to blogs, wikis, or podcasts shared for this class.*

2. *I will not provide my full name, e-mail address, photo, or personal information about myself to areas shared for this class.*

3. *I will not reply to any inappropriate material that may be posted.*

4. *I will report any inappropriate material posted to Internet resources used by this class to the instructor.*

5. *I understand that inappropriate use of shared Internet resources for this class will result in a lowering of my grade and other possible action.*

Your signature below indicates you agree to abide by these statements.

We also had concerns about copyright considerations in the classroom and attempted to follow the law with our student projects. (For more information on the Copyright law as it applies to classrooms, do a Google search for "TEACH Act.")

What online resources may be useful?

Go2web states it is "the complete Web 2.0 directory" (browse to http://www.go2web20.net/). As of April 17 go2web Listed 1107 Web 2.0 applications.

Use of Blogs, short forWeblogs, appears to be a growing phenomenon. http://www.sifry.com/alerts/archives/000493.html reported that in April 2007 there were "70 million weblogs," "about 120,000 new weblogs each day, or… 1.4 new blogs every second." How can anyone keep up with what's happening out there? We can't! but would like to provide the following suggestions:

The best Web 2.0 applications meet our **"4f" criteria: free, fast, forever, and fantastic**. We have tried a number of these tools and have several we do not hesitate to recommend.

Blogs and wikis have been extremely powerful writing and reflection tools for use with our course. We have used Blogger (https://www2.blogger.com) and pbwiki (http://pbwiki.com/) with success. Blogger has been purchased by Google and now requires users to get a free gmail account. Pbwiki is a powerful, free wiki tool that is easy to use and provides free password protection to users assigned to a site (that is somewhat unique among the free wikis).

What resources can the instructor use to make life in Web 2.0 easier?

One problem that plagues the instructor who visits multiple blog sites is the need to track all of the different blog Web addresses. We use Bloglines (http://www.bloglines.com) to create a list of all our student blogs. One visit to my free Bloglines account shows me in list format those students who have new posts since my last visit. One click on the link takes me directly to their blog. After reading the new post, and possibly replying, I return to the bloglines page and choose whether or not to mark that post as "read." Students may also create Bloglines accounts to check blogs from other students as well.

Instructors join the wiki pages created by students and receive automatic e-mail notification when anyone has changed anything on the wiki page. We can track changes or, in the event of no activity, urge students to participate more actively.

What methods may be used to use Web 2.0 in my course?

In our experience if you put the tools out there for students to use and ask them to create and use a blog or wiki, or such, they will absolutely avoid it like the plague – unless it is a part of the course requirement! If it's not required, it doesn't exist. It seems to be another level of complexity in an already complex course. However, bribery works. We have identified informative Web articles presented in such places as edutopia.org and invited our students to read them in a focused way. The general instructions, sent to students through e-mail, read something like,

"This is an extra credit opportunity: Please point your browser to an interesting article at http://www.somethingorother.com. Read the article then post the following to your blog: first, list three major points made by the author. Second, reflect on the points and write your reaction to them. Finally, evaluate the overall quality of the article. You may earn up to 20 extra credit points based on the quality of your reflection and writing."

Even with the offer of extra credit, not all students choose to do the assignment. To remedy that, we have designed a project-based lesson in the *Technology in Education I* course that requires students to use these tools. Students are placed into groups of four by the instructor. Students must decide which group role they will assume and what to name the group. Their task is to design a project-based lesson for a content area and K-12 developmental level of their choice. Each group has a Leader, a Standards Expert, a Technologist, and a Scriptwriter. The Standards Expert checks to be sure that as many of the National Educational Technology Standards for Students are addressed as possible (http://cnets.iste.org/students/). The Technologist creates a group blog and wiki and ensures that all group members know how to use these tools and participate on them. They also check to be certain the lesson is rich in use of technology. The Scriptwriter assists with other tasks and is responsible for writing a two- to three-minute script describing the lesson. Scripts will become the content of the class podcast. At the conclusion of the assignment, each group presents their lesson to the class, often using a PowerPoint slide show or a WebQuest. Then the instructor assists them in recording a podcast from the scripts they have written. The podcasts are placed on the Web. Podcasts from our classes may be heard by pointing a browser to: http://feeds.feedburner.com/uindyedtech.

So many exciting Web 2.0 tools exist. We advise new users to begin in a small way with one or two assignments. Will Richardson's blog is a wonderful way to begin learning about what works for teachers in the new world of Web 2.0 (http://www.weblogg-ed.com/).

What obstacles are out there?

There is little doubt that the teacher who chooses to incorporate Web 2.0 technology will invest significant time learning effective and efficient ways to integrate these tools into instruction. A fast Internet connection at home is a must. Though cost is not a factor for most of the new services, there is some question of whether the application will exist for another semester or another year. We have noticed that our faculty blogs and wikis are available on the Web while some student-created content has been removed for unknown reasons.

How may obstacles be overcome?

University students understand and use social bookmarking Websites like MySpace and Face-Book. Some of them have blogs, or regularly read someone else's blog. In every class where we've encountered a problem using a blog or wiki site, we have found a student who already had found the answer without assistance from the instructor. Hopefully some technology support will be available from the IT department or an instructional media specialist. As noted in the references below and throughout this article, print and Web support is available. Watch for or suggest high quality, hands-on workshops on Web 2.0 integration at or near your institution, and attend or present!

We were honest with our students when we initially incorporated new technologies in an assignment. We took care to have the students evaluate success or failure and to comment on how the assignment could be improved. Generally student response has been very favorable.

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Moodle - an open source CMS for the masses?

Shawn Beattie
Educational Technology Manager
Augustana College
639 38th St
Rock Island, IL 61201
309-794-7647
shawnbeattie@augustana.edu

Abstract

Augustana College has been using Moodle as its primary CMS (Course Management System) for 2 years. Moodle is an open source CMS, which many find attractive because of skyrocketing annual fees from commercial providers. Does Moodle fit the bill? What are the pros and cons of implementing Moodle as the supported course management system? This and other questions will be covered, followed by a live software demo.

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

ePortfolio and Laptop Program Initiative Project

Thomas (Ty) Brennan
AVP for Technology / CIO
Salve Regina University
100 Ochre Point Avenue
Newport, RI 02840
401-341-3232
brennant@salve.edu

Abstract:

The offices of Academic Affairs and Information Technologies at Salve Regina University collaborated on a project to develop a useful means of assessing the effect of an enhancement to the university's Core Curriculum on student outcomes through the implementation of an electronic portfolio program coupled with a laptop program initiative for all first year students in the fall semester 2006. Utilizing pilot procedures in both the electronic portfolio and the laptop support programs in which important partnerships were formed with key vendors in the previous year, the project was fully implemented in a timely and cost-effective manner. The presentation will include a review of the project scope and plan, the vendor selection process, the risk assessment before and during execution and lessons learned from the experience.

Report:

Realizing a vision in any enterprise can be an exciting journey that can require several years of accomplishing small but critical steps. In the case of an academic initiative, given the process of incorporating a change in the way teachers and students interact, the path may take several semesters of effort. So it was with the experience at Salve Regina University in advancing a dual threaded vision of creating a valid assessment tool for student learning (electronic portfolio) through the means of state of the art technology (wireless laptop computer). This report will describe key elements of the multi-year journey of implementing a student electronic portfolio and required student laptop program. Various strands of the report will describe efforts initially undertaken in response to a new university goal and the creation of a new Core Curriculum that resulted in the formation of a number of academic and administrative committees, faculty development programs, technology configuration designs, business partnerships and project team implementations that came to fruition in the fall semester of 2006.

The seeds for infusing more technology into the academic curriculum were planted in response to the university goal "to create a vibrant learning community that generates new standards of academic excellence and is charged with intellectual excellence, diversity of thought and centrality of purpose." Mindful of the key tenets of the new Core Curriculum (2002-3) which were to provide an education with a Catholic identity, to provide a liberal education, to form responsible citizens of the world and to cultivate lifelong learning, actions were undertaken to create a vibrant learning community through the use of technology. From an academic perspective, the primary purpose of utilizing technology in the curriculum is in support of faculty and student efforts to enhance their learning experience. To this end, actions included the greater utilization of the learning management system, additional installations of teacher station configurations in classrooms (consisting of a computer, an Internet connection, a projection unit, a screen, a

VCR/DVD player, a sound system and, in many cases, a document camera), and the introduction of laptop carts in specific classrooms to integrate access to the vast reservoirs of information on the Internet within class activity.

In the fall of 2004 an academic team consisting of the dean of undergraduate studies and selected faculty participated in an assessment conference in which the student electronic portfolio was described as a means for students to express visually and textually the effect of their college education. This idea was extended to possibly serve as a means to demonstrate evidence of the impact of the newly formed Core Curriculum at Salve Regina on student learning for assessment purposes; this result could be very important during accreditation visits and also for interested constituencies such as students, parents, alumni, benefactors, among others.

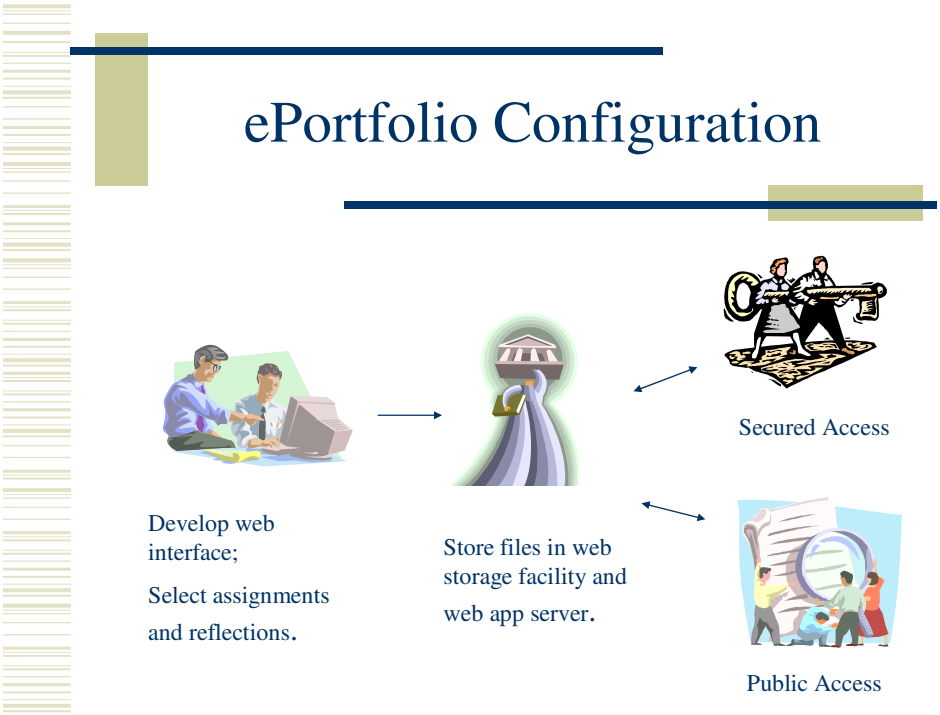
The academic team led by the undergraduate dean met with a small group of faculty and IT personnel in August 2004 to share their recent conference experience and to solicit input and assistance in developing a prototype of an electronic portfolio. One of the underlying principles of the ePortfolio is the process for the student to "collect…select…and reflect on" examples of their educational experience. Colleges offering exemplar ePortfolio programs at the time included Portland State University and LaGuardia Community College; these programs were ones that particularly excited our academic team in that they depicted an interesting design of an underlying technical framework interwoven with a creative fabric that would enable students to express themselves in a free manner utilizing not only written text but other more engaging multimedia elements.

The university's director of Web Services conducted research on various software tools available at the time that could be used to develop an electronic portfolio (ePortfolio) and proposed the use of the Macromedia (now Adobe) product *Contribute 3*; this product offered students a software tool to easily (and safely) update web pages with text, graphics, pictures, videos and other digital objects. As a storage component for the electronic portfolio, the university already provided a web storage facility (WSF) product offered by Xythos. The ePortfolio configuration therefore consisted of the reflective development component using Macromedia's *Contribute 3* and the back end storage component using Xythos' web file storage product WFS (renamed as *MyData* for the Salve Regina community); initially the selected reference documents were imported into the *Contribute 3* server environment to be incorporated into the ePortfolio.

A pilot ePortfolio project team was formed for the spring semester of 2005 consisting of five (5) New Student Seminar sections from the First Year Experience program each including an instructor, an upper class student mentor and fifteen (15) first year students. The pilot would be using the prototype *Contribute 3* based configuration with the primary Xythos WFS storage facility; much had to be learned and accomplished in a very short period of time to be ready for the pilot to begin.

During the actual pilot period, another academic-based team selected by the undergraduate dean was assembled to determine the best means to assess the ePortfolio. What made this engagement particularly challenging was the scarcity of precedents and the paucity of experiences and training paradigms for such an endeavor. For example, it was one exercise to have an English professor or History professor grade a submitted subject matter paper; it was another exercise, however, to assess the reflection that a student may have within the ePortfolio to a previously graded paper. Based on the feedback from faculty and students who participated in the initial project,

the pilot was considered successful and the overall positive experience led to the development of a more expansive pilot for the subsequent year.



The second ePortfolio pilot for the 2005-6 academic year was expanded to twelve (12) sections of the New Student Seminar from the First Year Experience program as well as selective Education major sections. By including the Education majors in the ePortfolio pilot, a new dimension of the ePortfolio was addressed which involved the tracking of achieved objectives in the Education program by the student teachers as they progressed through their chosen academic program. The *Contribute 3* configuration for supporting the ePortfolio program was enhanced by the university's director of Web Services working closely with Macromedia / Adobe parties; the application was now integrated with our Microsoft *Active Directory* authentication process and retained the capability of referencing selected documents stored in the Xythos WFS system. One restriction remained, however, in that the use of *Contribute 3* for students was bound to the location on campus where the application software was installed, that being the University Computer Labs (UCL) in the garden level of the McKillop Library. This result made the training and development of the student ePortfolio location-centric. Another solution was needed in order to provide full deployment to the full undergraduate student community.

During this period, there was much interest within K-12 and higher education institutions on the merits of a student portfolio, particularly an electronic portfolio. A group was formed in the New England area, called the NEePP (New England ePortfolio Program) peer group that convened three or four times a year at different universities to discuss and debate the various interpretations and solution configurations of an electronic portfolio. The director of Web Services at Salve Regina University participated in several ePortfolio workshops and conferences, and made

numerous presentations. He became a respected ambassador of the ePortfolio program at Salve Regina, and its unique configuration, to other universities.

In support of the greater acceptance of the key tenets of the new Core Curriculum, particularly the lifelong learning element, two new faculty development initiatives were begun; they were the Writing Across the Curriculum initiative and the Information Literacy and Technology Across the Curriculum (ILTAC) initiative. For the ILTAC effort, the core support group included parties from the Library and the IT Office working in close contact with the undergraduate dean. Each semester a series of workshops was provided in support of faculty development in providing instructional materials for faculty to apply to students to facilitate the learning of essential information literacy skills and technology fluency, regardless of the academic discipline (see ASCUE presentation June, 2004). A typical cohort of faculty participating in a semester ILTAC program included Nursing, Philosophy, Business and English professors. The program provided a non-threatening, nurturing environment in which ideas pertaining to instruction on the use of information literacy skills and technology fluency could easily flow among the faculty members.

During the 2004-5 academic year, the vice president of Academic Affairs (VPAA) announced that an inclusive committee of university parties would be formed to articulate a future vision and identify a strategy for using technology in the curriculum at the university. The committee, named the Academic Technology Planning Committee (ATPC) included representatives from Academic Affairs, faculty, Library, IT and students. A survey was provided for students based on a national Educause template to obtain insights into the feeling and appreciation of using technology in the curriculum from a student perspective; the results of the survey revealed an interest by students for employing a moderate degree of technology in the classroom. This finding suggested the utilization of carefully planned technology in the classroom to enhance, but not replace, the current teaching methodology.

After the year-long committee study on the future vision and strategy of using technology in the curriculum at the university, the VPAA announced at the May, 2005 faculty assembly that she was recommending the adoption of a required laptop program to be used initially with the student development of an ePortfolio; this initiative would commence with the incoming class for the fall of 2006. Later that summer of 2005, however, the VPAA left the university and in September, the director of Network Services also departed. Thus within a month's time, at the outset of this important project, the university lost a key academic champion and a key network architect for the ePortfolio and Laptop Program initiative. Nevertheless, knowing that others would rise to the occasion, the president of the university announced at the opening of school in September, 2005 the commitment to the ePortfolio and Laptop Program initiative beginning in the fall 2006 semester.

Visits to other schools with Laptop Programs were continued. Over the course of several years, parties from both the Academic Affairs area and the IT office made visits to higher education institutions who had embraced a Laptop Program; these included Bentley College, Babson College, Bryant University and Sacred Heart University, among others. Various lessons learned from the visits included the selection process of the laptop model and software image, the faculty development resources provided in using the laptop and technology for instructional purposes, the faculty classroom support procedure, the placement and utilization of wireless access points inside and outside of classrooms, the logistics of laptop distribution, the operation of the Laptop Support Center, among other items.

In order to prepare for the laptop required program, the undergraduate dean requested that the university distribute laptops to all undergraduate faculty in the 2005-6 academic year. In turn, the IT office decided to offer the same laptop model for students as a 'recommended' model in the same year; this action would allow faculty to become accustomed to the features of the laptop both on and off campus and the IT office would be provided with an opportunity to prepare an equipped laptop support location and prototype operation before the required program began.

From the Academic Affairs office and with a faculty development, support and training perspective, the undergraduate dean and the interim VPAA immediately began a series of meetings on the impact of the laptop initiative on the academic program. Although laptops were distributed to half of the faculty in the summer of 2005, more formal faculty development programs had to be enhanced to meet the imminent deadline. The basis for the programs had been started with the ILTAC workshops but now had to be escalated to address the needs of many more faculty members. Several aspects had to be addressed including not only the functionality of the laptop itself, but more importantly, the selective use of the laptop for in class student activities and outside of class individual and collaborative assignments.

The dean established a series of workshops offered to faculty on two occasions during the academic year addressing the management, teaching, research, assessment and communication components (MTRAC) of using technology, including the laptop. The workshops were offered during the spring semester of 2006 in tri-weekly sessions and also at the end of the semester in a two-day faculty development workshop. The feedback on the acceptance and effectiveness of the training workshops was very positive. The faculty could now look forward to the fall 2006 commencement of the ePortfolio and Laptop Program initiative with a greater degree of confidence.

In parallel with and in support of the faculty development efforts and the expanded ePortfolio pilot, the IT office formed a Laptop Infrastructure project team in January, 2006 to prepare for the classroom environment and lay plans for the distribution, support and utilization of the laptop by the incoming class of students in the fall of 2006. The team consisted of representatives from IT, Library, faculty, Registrar, Purchasing, Facilities, Finance, business partners, among others. The team followed a formal project management format with biweekly project status meetings; the project manager for the team was the IT director. There were many deliverables included in the Work Breakdown Structure of the project; these deliverables are described in the following paragraphs.

Deliverable 1: Laptop and Software Image Selection. The selection of the laptop began in 2005 as part of the process to prepare for the future use of technology in the curriculum at Salve Regina. The chosen vendors to review included IBM (Lenovo), HP and Dell; for students interested in Mac computers, the university offered three Mac Lab locations on campus for use particularly with Art technology programs. Research and analysis were conducted on the various products offered by each vendor; multiple presentations were provided to university representatives including Academic Affairs, Finance, IT and faculty. The chosen vendor and laptop based on cost, functionality and support was the HP nc6230 laptop for the faculty and as the recommended laptop for the 2005-6 academic year (Year 0 of the Laptop program). During the 2005-6 academic year, feedback on the use of the chosen laptop was favorable and the number of repair or maintenance request was minimal. As a result of this initial experience, the project team recommend-

ed the same HP nc6230 laptop for the commencement of the Laptop Program initiative in the fall of 2006.

Deliverable 2: Physical, Classroom and Network (including wireless) Infrastructure. The classrooms needed to be enhanced to some degree to be ready for the Laptop Program. Several classrooms had teacher station configurations (about 42%) but more were needed to accommodate the planned expanded use of technology in the classrooms. Because of the heterogeneous nature of the campus classroom layouts, teacher station designs that accommodated the classroom layout in traditional classrooms did not necessarily apply to classrooms located in historically preserved buildings. Further, many classrooms had tablet arm chairs that would cause a challenge for students who needed a larger work surface. Rather than rush to a total forklift of the classroom formats, the project team suggested a plan that could be implemented over a few years; the means for establishing such a plan was to work closely with the Registrar's office to determine the particular classrooms typically assigned for first year courses. In this way, the university would be able to accommodate the present needs with the capability to adjust and expand as the Laptop program took hold.

In a similar vein, the use of wireless technology was essential for classroom laptop activity. The IT office had experimented with various wireless technologies in particular zones of the university areas (Library, lounges, selective classrooms), but now it took on a much more important strategic importance. Several vendors had been considered including Cisco, Aruba, Chantry, among others. After initially choosing Chantry (Siemens), the IT office altered course and selected the Cisco wireless solution; this action allowed the IT Network staff to focus on learning wired and wireless network skills required by one vendor Cisco, rather than by multiple vendors. The communication closets within the campus buildings where wireless access would be available needed to be enhanced with new switches with an advanced Power over Ethernet (POE) capability to support the wireless access devices. These switches emitted more heat and required more electric power than the previous data switches; the Facilities department, therefore, was requested to provide a better vented or conditioned environmental solution to the communications closet area and a more dedicated provision for electric power for the technology configuration enhancement.

Deliverable 3: Laptop Security and Maintenance. The pervasiveness of viruses and other malware affecting computers is always a challenge and would be an important concern in supporting a Laptop Program. Included in the software image installed on each laptop were Symantec *Norton Anti-Virus*, Microsoft *Windows XP Pro* with SP2, and Lavador's *Ad-Aware* software; these software elements accompanied by best practice guidelines mitigated the risk of a malware out-

break during the launch of the Laptop Program. With regard to physical security, each laptop was to have an asset tag number in addition to a serial number that would be recorded in the university's asset tracking system (BMC *Magic* / *Service Desk Express*). Rather than include Absolute's *CompuTrace* program for remote asset tracking, the project team recommended that students' parents consider rental insurance or a rider on their home owner insurance. From a maintenance service perspective, the university planned to offer a conveniently located Student Laptop Center with flexible business hours for student support; the Student Laptop Center was located on the garden level of the McKillop Library across from the University Computer Labs. The student laptop package included a fourth year of maintenance and accidental damage protection; the latter element allowed the provision of free repair or replacement in the occurrence of a serious accident (one per year).

Deliverable 4: Academic Instructional Technology. In an effort to assist instructors in the use of technology, particularly the laptop, the IT office collaborated with representatives from Academic Affairs and the Library on several workshops offered to the faculty in general as part of the aforementioned MTRAC program. For instructors involved in the New Student Seminar program, special instruction would be needed because it was the New Student Seminar program where the development and support of the student's ePortfolio was to occur. Thus, in addition to the MTRAC program, the New Student Seminar instructors had to learn about the development of the ePortfolio using the Adobe *Contribute 3* / Xythos *WFS* (a.k.a., *MyData*) configuration; due to the workload and time constraints on these instructors, this activity was particularly challenging.

Deliverable 5: Staffing. A new program with new technology requires new staffing provisions. For example, the project team had to plan for a new Student Laptop Center, the use of a new Asset Tracking System, a support of new wireless access configuration, among other items. In some respects, these items provided opportunities for staff to learn new technical, operational and management skills. There was a need, however, for additional staff (professional and student work study) particularly in the Student Laptop Center and in the classroom support of faculty using technology in the classroom; this request was recommended through the project team and provided by the university.

Deliverable 6: Finances. The financing of such a large undertaking takes on new dimensions in challenges. The finance member of the project team, who is the controller for the university, aware of information from technology parties and experiences from other universities offering Laptop Programs, preferred the financing of a one-time distribution, four year laptop rather than a two year laptop refresh program. To this end, he devised a procedure in which the student would pay for the laptop program (laptop, software, services and warranty) in the fall semester of the first year; financial aid would be available on an 'as needed' basis through the financial aid package offered by the university to the student. The financing of the laptops by the university would be provided through a two year lease for each year of laptop distribution. In this way, the university had two years to pay off a lease with funds that would be collected early in the first year.

Deliverable 7: Communications Plan. Communications is a socio-cultural aspect of a project that is frequently overlooked, especially by parties in the IT office. Yet, communication is of critical importance so that those affected by practices or decisions from the IT area are properly informed in a timely basis, both of the notification and of the impact of the change. Of particular

challenge in the launching of the Laptop Program was the absence of the initial champion of the program itself, the departed VPAA. The communication of such a program has to begin early in the admissions recruiting cycle. For example, prospective high school students typically visit universities of interest in their junior years. The presence or absence of a required laptop program at a school is an important item of consideration. With the recommendation and announcement of the Salve Regina University Laptop Program in Summer 2005 presented key challenges for the Admissions department to ensure that brochures, catalogs, pamphlets, etc. were reflective of this offering. Adding more to the complication was the delayed decision of providing a one-time purchase of a four year laptop as opposed to a two year laptop refresh program and also whether the one time fee was to be included or excluded from tuition. The message had to be consistent throughout the various avenues of communication; this was not a simple task. Fortunately, a Laptop Program web site was provided to communicate timely and accurate information to the many university constituencies.

By focusing on these seven deliverables, the Laptop Infrastructure project team worked steadily for over eight months to ensure that the university's facilities and support were ready for the arrival of first year students and the commencement of a full-class ePortfolio and required Laptop Program in fall 2006.

In the spring of 2006, a new director of Network Services arrived and, with the involvement of such a seasoned veteran, the logistical planning for the distribution of the laptops greatly benefited. A site location was chosen and prepared, activities with vendors (HP and Computopia) were coordinated for ordering, shipping, imaging, testing and delivery components, recruitment of staff and supporters for the Labor Day distribution were extended and the laptop overview presentations were planned. Because of the multitude of factors involved with the laptop distribution, some that can be controlled and others that cannot be controlled, an assessment of possible risks had to be managed.

As part of a risk assessment exercise for the laptop distribution, several possible events were identified and assessed; more risk events should have been included but became part of the 'lessons learned' category. For example, to mitigate the occurrence of an incorrect software image, several tests were conducted between the university's network staff and the business partner charged with providing the initial laptop software image load. To minimize the risk of theft or damage to the laptops on delivery to the university, special provisions were made by the university's security office to the laptop storage location. Also, a week before the distribution date of the laptops, a significant rain storm caused a significant leak in one of the main distribution rooms for the laptops; alternative locations were explored but it was decided to accept the risk of the original location based on the assurances of the university's facilities office.

Laptop Distribution Day, September 4, 2006, finally came. Five hundred seventy two (572) laptops were distributed on Labor Day Monday, September 4, 2006. Based on utilization of some basic queueing theory concepts regarding arrival rates and service rates, the plan was to invite 75 students per hour to the distribution location to receive their laptop and sign their laptop agreement. The service element for the student flow through the distribution location included stations for check-in verification, contract distribution and signature, laptop and accessory bag distribution using an asset tracking application; a separate area was conveniently located in case the student wanted to make additional purchases of printers, external hard drives, flash drives, laptop

bags, etc. Over twenty staff members participated in the distribution day, along with representatives from our business partners of Computopia and HP.

Although the distribution and service components of the Laptop Program initiative proceeded very well, the initial utilization of the laptops in the New Student Seminar program for the ePortfolio activity encountered some challenges. For example, even though the Adobe *Contribute 3* – Xythos *WFS* configuration remained intact from the two pilot experiences, there were three shifts in the escalation process to a full class deployment that were problematic. The first shift was the installation of the required *Contribute 3* files in the Xythos WFS directory identified for ePortfolio use; several students had experienced difficulty in importing the appropriate ePortfolio files to the Xythos WFS directory. The second shift was the change from the computer lab wired environment to the student laptop wireless environment; some students had difficulty utilizing the *Contribute 3* software using the wireless access infrastructure. To complicate matters further, the third shift was achieving a heightened level of confidence and competency among all of the New Student Seminar instructors; with the time and resource constraints on providing necessary training of the instructors on the ePortfolio configuration, several instructors felt somewhat uncomfortable in providing a first level of technical support when difficulties arose. A concerted collaborative effort by the New Student Seminar administrative team along with key IT representatives restored confidence in the program after some fairly frustrating experiences.

To gauge the acceptance by first year students of the ePortfolio and Laptop Program initiative, a multi-part survey was provided to the students after the Fall semester. For most of the queries in the survey pertaining to laptop functionality, support, wired and wireless access and overall ease of use, effect on collaborative learning and improved ability to do class assignments, the returns were quite favorable in that greater than 80% mentioned no dissatisfaction at all. Feedback from first year students on the initial full class ePortfolio endeavor is in progress.

After a full year of the ePortfolio and the Laptop Program initiative, the university has several lessons learned and to learn.

- Since the driving path of utilizing the laptop in the classroom was through the New Student Seminar program and its development of the student ePortfolio, an improved procedure is needed from the IT office to establish the required configuration of ePortfolio *Contribute 3* files for each student within their respective Xythos WFS ePortfolio directory before the student attempts to develop their ePortfolio. Further, the New Student Seminar instructors have to be provided with additional training and support in order to be an effective resource in and out of the classroom in assisting their students in the development of the ePortfolio.

- Regarding a laptop model selection, the university seeks to develop plans to provide support for a Mac laptop for students enrolled in the Art department program for Fall 2008. Most of the technology programs utilized by the Art faculty require Mac computers. Thus, even though the university provides three Mac lab environments with over 40 Mac computers for Art students, it is important that students in these related disciplines be able to use a university-supported Mac laptop.

- From a program communications perspective, steps have already been taken to ensure that all pertinent communication stakeholders agree on a consistent message and plan of deployment.

The justification of the ePortfolio and Laptop Program initiative stemmed from the academic strategy to infuse technology in the curriculum, in and out of the classroom. The initial driving activity was the development of the student ePortfolio by the first year students in the New Student Seminar. Using this course, the desire was that other faculty and disciplines would adapt to the opportunity presented by the laptop and would consider methods to utilize the laptop in other activities. Another opportunity to infuse technology in the curriculum is through the selective use of a Learning Management System (LMS) by faculty for their course. In addition to providing an easy means to store the course syllabus, assignments, discussion threads and presentations, the LMS provides the opportunity to offer an ePortfolio self-paced 'course' that can assist and guide students in building their ePortfolio through their remaining years of reflection and growth at the university culminating in a final thematic component for the senior year.

The many paths of planned activities over several years conducted by the Academic Affairs office and the IT office lead to the realization of the shared vision of assessed student learning in a technology infused educational environment. The university has taken a giant leap in the formation of an academic program that includes the development of a student ePortfolio and utilization of a required laptop. The stakeholders in this effort included faculty, students, administration, staff and a myriad of support parties. There were a few missteps, setbacks and lessons learned along the way, but with the perseverance of the many stakeholders and the leadership of senior administration and surrogate academic and technology champions, the ePortfolio and Laptop Program initiative was implemented on time and within budget. The next phase in the continuous exploration of instructional strategies to enhance the learning experience, including the appropriate use of technology in the classroom, particularly the laptop, is ready to embark.

Music from the Mountains: Providing Live Music Arts Education Using Internet2

James F. Gerraughty
Electronic Classrooms/Media Production Manager, CERMUSA Department
jgerraughty@cermusa.francis.edu

Kent P. Tonkin
Assistant Director of Information Technology, CERMUSA Department
Saint Francis University
117 Evergreen Drive
Loretto, PA 15940
(814) 472-3389
ktonkin@cermusa.francis.edu

Abstract/Introduction:

Saint Francis University is in the process of expanding the reach of live fine arts, humanities and music education to remote audiences via Internet2 video teleconferencing. Beginning in Spring 2006, Saint Francis University provided live interactive lectures to a national and worldwide audience free of charge via the Internet2 Commons. The impact of these sessions was immediately apparent; with very little time to promote them (two weeks) and a very small budget, the initial sessions each garnered audiences from 60 to 80 participants. Subsequent programs have attracted as many as 600 simultaneous participants. Requests for these music sessions have come from areas as remote as Pakistan and Australia. Sessions presented included instruction and lectures on the didgeridoo, the tabla, the Ngomo drums, Native American culture, African culture, music performance anxiety, and basic song writing.

This paper will detail the technical steps taken by Saint Francis University, a small rural private institution, to build an online music education series on Internet2. With a heavy emphasis on lessons learned, Saint Francis University staff will reveal their "common sense" methods of producing high-quality music education via compressed video, as well as plans for future program expansion.

Background:

The Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA):

This project was conceived with and supported by Saint Francis University's Center of Excellence for Remote and Medically Under-Served Areas (CERMUSA). CERMUSA, a government-funded telehealth and distance learning applied research initiative, has been experimenting with remote video communications in education since 1994. The remote music and humanities project had its roots in previous and ongoing CERMUSA research projects such as the Wireless Campus, Rural GigaPoP, Portable and Mobile Classroom (PortMoC), and Mobile Communication Platform (MCP). In the past, CERMUSA maximized content for dial-up speeds, due to the telecommunications limitations of a rural audience. This motif usually limited online content to basic applications, such as text chat and less graphically-intense web pages. Interactive video

was limited to costly toll services such as T-1 and ISDN lines. The proliferation of affordable rural broadband and Internet2 access within the educational community over recent years has enabled CERMUSA to experiment with more robust types of distance learning, particularly interactive video.

Internet2:

Internet2 is a research consortium of schools, government departments, and corporations that runs on a high-speed fiber data infrastructure known as the Abilene Network. This high-speed network crosses the country and interfaces with other international high-speed education networks.

Research and education opportunities are present within Internet2, including virtual cadaver dissection, foreign language education, music education and distributed supercomputing. Internet2 is being utilized in colleges/universities and some school districts in urban/suburban areas for these educational opportunities. Nothing has been done for music education in rural areas using Internet2. CERMUSA addressed this need by establishing an "aggregation point" model for these rural schools. The aggregation point model was established in the following way: CERMUSA receives its Internet2 service from MAGPI (see below) and distributes the Internet2 service to local schools in the central part of Pennsylvania. Currently, CERMUSA provides service to 40 of these rural schools. CERMUSA joined Internet2 in 2003 and has performed research in a variety of areas, most notably with patient simulation at Naval Health Research Center - San Diego. CERMUSA's research efforts have also been publicly discussed and disseminated via academic gatherings and publications including Internet2 Annual Member conferences.

CERMUSA connects to Internet2 via the Metropolitan Area GigaPoP Philadelphia (MAGPI) at the University of Pennsylvania, Philadelphia, PA. MAGPI is a regional GigaPoP (key network interconnection point) for Internet2, connecting sites in Pennsylvania, Delaware, and New Jersey. In addition to the Internet2 connectivity, MAGPI provides content services and promotion of Internet2 events among their members.

The Internet2 Commons is a resource to Internet2 provided by the Ohio State University. The Internet2 Commons provides a location for groups from around the country and the world to meet utilizing video teleconferencing. The video teleconferences from the Saint Francis University Online Music program were housed on the commons. Additionally, the commons offered extensive support for network and video teleconference administration.

Saint Francis University Fine Arts Department:

The Saint Francis University (SFU) Fine Arts Program spans a large part of the University's history. SFU Fine Arts, which includes music, theater, and visual arts, is alive and well in the 21st century, with steadily increasing student involvement and more activities and classes on campus. Much of this continued momentum can be attributed to the new initiatives of existing and new arts faculty.

One of the catalysts for this change was the addition to the faculty of Jim Donovan. Mr. Donovan is best known as the drummer for the Grammy-nominated rock band Rusted Root. An accomplished and published musician in his own right, Mr. Donovan had also been teaching semi-

nars for the university over the past 4 years, prior to his appointment to faculty in the SFU Arts program during Spring 2006.

Creation of the SFU Online Music Program:

Conceptual discussions for the SFU online music program began in February of 2006. SFU President Fr. Gabriel Zeis personally introduced Jim to CERMUSA Director Jay Roberts in the hopes of generating interest in collaborating. CERMUSA immediately recognized the potential in including a seasoned and technology-friendly musician as part of SFU's Internet2 programs.

Mr. Donovan's initial vision was to extend the reach of traveling performers and artists visiting SFU to a worldwide audience. A combined video production and IT team from CERMUSA met with Jim Donovan to go over production technical needs. The group agreed that the concept was sound and worthy of preliminary testing.

Methods and Materials:

As of March 2006, Jim Donovan already had performers scheduled in the spring and fall semesters. Fortunately, all of them were willing to participate in the Internet2 music program. Instructional design for the students was handled by Jim Donovan and the lecturers. Each of the 6 programs followed a similar pattern:

- Lecture
- Performance
- Question and answer from the remote sites

The following is a list of the performances in 2006-2007:

- "The Didgeridoo: Exploring the Dreamtime" with Jim Gagnon, a combined lecture/live performance featuring aboriginal Australian instruments.
- "The Universe of Song" with Paul Purple, a "do it yourself" songwriting workshop.
- "Ngomo: A Conversation about Music, Dance, and Life in Central Africa" with Elie Kihonia, a discussion and performance about the Ngomo drum and its importance in the culture of Central Africa.
- "The Tabla: An Introduction to the Classical Drumming of North India" with Jim DiSpirito, a discussion about the tabla drum and its presence in the culture of northern India.
- "Rainbow Eagle: An interactive presentation of Native American teachings through song, stories and multi-media," with Rainbow Eagle.
- "400,000 people. Carlos Santana and Me" with Jim Donovan, a recount of the proper way to do a drum solo and performance.

Technical Background:

Following initial discussions, CERMUSA performed extensive experimentation with reproducing live audio via VTC. CERMUSA leveraged partnerships with both the Cleveland Institute of Music (CIM) and the New World Symphony, both innovators in music broadcast over Internet2, to act as remote evaluators for our progress. The team worked with Jim to try a series of microphones, VTC units and audio settings in our Distance Learning Prototype Lab (DLPL) and relied

on the trained ears of our remote partners to tell us when we "got it right." Based on the early successes in these tests, CERMUSA scheduled an inaugural online music session for April 3, 2006.

CERMUSA also performed network quality-control activities in order to deal with a problematic network transport services provider. This provider had experienced a string of service outages in the weeks leading up this performance, potentially jeopardizing all CERMUSA Internet2 activities. CERMUSA enlisted network administrator Robert Dillon to ensure that our local network was interfacing correctly with our transport services provider, and with MAGPI, our Intetnet2 service provider.

Overcoming Technology Challenges:

CERMUSA Production and IT staffs worked with Mr. Donovan to devise a basic testing methodology to determine the best practices for transmitting live music performance via videoconferencing. As mentioned earlier, CERMUSA enlisted the help of the Cleveland Institute of Music (CIM) and the New World Symphony, as remote evaluators.

CERMUSA engaged Mr. Donovan on a two-phase testing methodology:

- Acclimation to compressed audio
- Use of compressed audio for live music reproduction

Acclimation to Compressed Audio:

Before coming to SFU, Mr. Donovan had never participated in VTC activities or transmitted live music via compressed audio. Because of some of the characteristics of compressed audio, the CERMUSA team decided that Mr. Donovan should be acclimated to these limitations before deciding to move forward.

VTC equipment is designed to compress audio signals (i.e. "squash" high and low frequencies and volume levels) to successfully reproduce remote conversations. As such, standard VTC audio inputs and microphones are optimized for the frequency range of human speech. These audio components were never designed to transmit guitars, drums, or even singing. Additionally, most existing VTC systems, including those owned by CERMUSA, are designed to transmit mono audio and are incapable of generating stereo or surround sound audio signals.

CERMUSA staff contacted the New World Symphony and provided them with copies of several of Mr. Donovan's songs. Mr. Donovan then listened to the songs over a live VTC to judge the sonic reproduction of these recorded pieces. Based on his knowledge of his own material, Mr. Donovan felt that the transmission, although compressed, still elicited the key sounds and dynamics of these songs. Based on Mr. Donovan's decision, the team moved forward to live music reproduction.

Use of Compressed Audio for Live Music Reproduction:

Maintaining audio integrity between the sending and receiving sites was the team's largest concern. In a traditional classroom music experience, both instructor and student will experience the same acoustic response from a musical instrument. Subtleties, such as a strike on a hand drum

rim (treble tone) versus the center (bass) tone, are immediately apparent. These subtleties and other audio details can easily be lost over VTC due to audio compression.

CERMUSA called upon our colleagues at CIM to act as a receive site for our audio tweaking sessions. We were fortunate to make contact with Adam Philips, CIM Manager of Distance Learning Programs. In addition to administering CIM's online presence, Mr. Philips is also a trained drummer with strong experience in reproducing live music via compressed audio.

CERMUSA decided on a two-tiered approach for testing. Operating in the DLPL, a VTC-enabled television studio, the video production team attached video and audio feeds from the control room into several video teleconferencing units. Our goal was to identify the right combination of VTC unit and microphone arrays to produce the best possible audio reproduction. CERMUSA technical and production staff selected drums as a first test instrument, due to the dynamically-challenging acoustic properties (lots of high and low frequencies).

Early tests with standard room microphones proved unsatisfying and unsuccessful in all video codecs. Our receive site reported that the audio ranged from "flat" to "garbled." It was immediately apparent that more specialized microphones would be required. Despite the less than favorable initial results, the Tandberg 6000 codec produced the most desirable transmit audio of all the units tested.

Our team was fortunate in that a member of our production crew was a professional live sound engineer with a strong background in percussion. Based on his recommendations, a multiple-microphone setup was specified. The microphones used were Audio Technica ProAT37R condenser microphones and Shure Beta52A dynamic microphones, all routed to and controlled by a Mackie 8 input audio mixer board.

CERMUSA tested several microphones and configurations with the Tandberg 6000 codec connecting to CIM at connections speeds ranging from 128 to 768 Kbps. The instruments in the test were a djembe hand drum, shown in figure 1, and a pair of didgeridoos that Jim Donovan and James Gerraughty had in their possession.

Figure 1

During testing, CERMUSA's network was monitored to ensure there were no packet collisions or other network anomalies that would interfere with the video teleconference.

The results were:

- Mr. Donovan and MR. Philips both felt the sound of compressed audio was still "flat," but emphasized the key elements. Moreover, it was adequate for educational purposes.
- The receive site reported that all key elements of the instruments selected could be easily identified.
- The sub-mixing on the Mackie board and microphone placement was key to having good audio for the far end.
- The Tandberg 6000 had the best audio reproduction. Other VTC units tested were a Polycom Viewstation FX and a LifeSize HD system.

Thus, the solution to this challenge was to use proper microphones and placement and to perform adequate test calls prior to an event. Despite the ultimate simplicity of these solutions, this level of audio production was new ground to CERMUSA. Our production and IT personnel documented the results in order to apply them to all the music classes that were offered via VTC.

Results:

Based on the success of this testing, SFU offered its first live online music event, "**Exploring the Dreamtime with Jim Gagnon**," in April 2006. An audience of 12 sites, including a location in Australia, attended the session. A second session, "**The Universe of Song**," was offered several weeks later with similar attendance. Both the SFU and CERMUSA administrations were pleased with the progress made by the joint Fine Arts/CERMUSA team, and funding was allocated by the SFU VP for Academic Affairs to continue project work into the fall of 2006 and spring of 2007.

Other Difficulties/Lessons Learned:

Far end participation:

A constant challenge encountered was that some of the remote participants did not have much experience with VTC sessions and related support. Fortunately, CERMUSA had a good support network through MAGPI and the Internet2 Commons that mitigated some of technical issues at the far sites. The most common issues encountered included familiarity with global dialing schemes (GDS) and use of microphone mute controls.

Instructor experience with VTCs:

Although Jim had not participated in VTC activities prior to this project, up-front training with CERMUSA staff was very effective. Jim was then able to act as a trainer for visiting artists participating in our online sessions.

Internet2 vs. Commodity Internet:

Several sites over the course of the six classes contacted CERMUSA to see if they could participate over commodity Internet. Once again, the Internet2 Commons was helpful in allowing commodity Internet access. Where this accommodation was not possible, CERMUSA often included other sites via our own MCU. Technical observations were that sites connected over commodity Internet had a higher rate of audio synchronization issues (lips weren't synchronized, video cut-outs), even though they were connected at the same speed of 512 Kbps. This was indicative of the higher rate of packet collisions on commodity Internet.

CERMUSA is currently exploring the option of limiting specific performances to Internet2 only to ensure the overall audio/video quality of each event. Non-Internet2-enabled sites will have the option of viewing a video stream of the event courtesy of MAGPI.

Quality of receive sites:

Just like a disruptive pupil can distract the teacher and the other students, remote sites that did not mute their microphones or did not know how to do so were very distracting to the music classes. The solution that was employed was to constantly remind far sites about mic muting during the test calls and the actual performance.

Sub bridging – multiple school bridging into MCUs:

Some schools could not connect to the Internet2 Commons using their own systems and were required to dial via a centralized Multipoint Control Unit (MCU). MCUs allow multiple sites to connect to one point that will then connect to a video conference. This is usually done within networks to economize on Internet Protocol (IP) addresses. Unfortunately, most MCUs cannot dial the GDS number that the Commons required. There were two solutions to this issue: Either have the Commons set up a direct-dial IP address, or make the far-end MCU "think" it's dialing an IP address through GDS spoofing. GDS spoofing was a solution given to us by Megan Troyer of the Internet2 Commons.

Unanticipated presenter requirements:

Sometimes presenters arrived in the studio with extra instruments that had not been tested or changes to their presentation materials. Unfortunately, we were not always able to accommodate the performer. The solution to this challenge was to establish early-on the needs of the performer and hold them to it.

Equipment/network failures:

During the course of the classes, we had several pieces of equipment break down. The most notable were video input failures on two separate VTC units. The solution was to always have a backup VTC unit in case one fails. Fortunately for CERMUSA, the DLPL was designed with built-in VTC redundancy.

Several of the early online sessions were marred by network errors at CERMUSA. These problems were resolved via a change in network carrier and replacement of a failing copper to fiber converter.

Future plans:

CERMUSA was astonished to see the popularity of the SFU online music sessions grow with each subsequent offering. By the last online performance, "400,000 people, Carlos Santana, and Me," CERMUSA had to put attendance caps on sites participating. It was exciting to see something grow so fast inside of a year's time. With this success capping a year of rapid progress, CERMUSA is in the process of making future growth plans as of this writing.

Future growth plans include:

- Local support from Saint Francis University
- Grant applications to federal agencies
- Possible fee structure to create a self-sustaining operation
- Research into the educational efficacy of the programs

Jim Donovan is also in talks with Saint Francis University to increase funding for the music education classes. Both the Vice President for Academic Affairs Dr. Wayne Powell and the President of the university Fr. Gabriel Zies were impressed with the popularity of these courses. As of this writing, funding was secured for Fall of 2007.

In addition to the local support from Saint Francis University, Kent Tonkin and Jim Donovan applied for a grant from the National Endowment for the Humanities to further the program and purchase equipment for a digital music/education archive that would be housed at Saint Francis University. This archive would be accessible for students and teachers worldwide.

Research into other online programs, including music programs, indicates that many institutions charge a per site/per session fee for participating. CERMUSA is in process of conducting an ongoing cost/benefit analysis to determine a "break-even" cost. At this point, CERMUSA and SFU are hoping to offset part, if not all of, the costs of operation in order to create a self-sustaining program. As these sessions continue and our knowledge base increases, our team hopes to further build the SFU online music program via competitive grants and other outside sources of funding.

Finally, as part of the CERMUSA distance education mission, research would be conducted in order to find out how much the participants are learning. Educational research such as this could be critical to schools and colleges in justifying distance education programs.

In conclusion, the Saint Francis University Online Music Program was a great way to determine our strengths and fix our weaknesses with regards to video production, video teleconferencing, and network administration. The lessons learned with the audio transmission, remote sites interaction, and network monitoring will make the SFU online music program into a smooth-running operation that can be sustained and provide a benefit to the educational and musical community at large.

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Turning Online Lectures into Interactive Dialogues

Paul Hamilton
Asst. Prof. of Economics and Director of Economic Development Research
Marshall University
1 John Marshall Drive
Huntington, WV 25755
(304) 696-2382
HamiltonP@Marshall.edu

Abstract

The major shortcoming of online coursework is the curtailment of the give-and-take lecture model. Virtually all lecture information is passed onto the student in a linear, static format (e.g. printed notes, PowerPoint's, etc.). The delivery method is efficient and can be effective for conveying the fundamental information. Distance learning courses have been sharply criticized for essentially giving the students the notes without making them attend class. There is little opportunity for students to actively engage the material by asking probing or even tangential questions that represent the hallmark of higher education. There have been some attempts to engage students ranging from on-line chats to email exchanges with the professor but for the most part these activities are either underutilized or over hyped.

This paper proposes a holistic, contingent approach to online learning. The student's learning experience is a mixture of short readings, listening to brief lectures, step-by-step problem solving, and quick assessments. The student has the opportunity to explore the information according to their interests (within reason) and understanding. Assessments using contingent branching (e.g. quizzes that ask progressively more difficult questions with correct answers or easier questions if the student is missing mid-level questions) customize the learning to each student's level. Students having difficulty can request or be sent to remedial material and highly-motivated students can be directed to advanced topics.

The contingent approach is illustrated using Macromedia Captivate. This software has the capability of organizing modules such that users can voluntary select or automatically be directed to the most pertinent information. Competing software (e.g. Camtasia, PowerPoint) have similar capabilities but are not as adapt at setting up contingent paths. In this paper I provide a case study of how Captivate can incorporate a holistic, flexible approach to learning that mirrors what we see in the best traditional classrooms in tandem with the automation and distribution power of online learning.

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

Free Software for the Educator

Janet E. Hurn
Physics Department
Miami University Middletown
4200 E. University Blvd.
Middletown, Ohio 45011
hurnje@muohio.edu

Abstract

This will be a demonstration of free software available for the educator. I will introduce the software and demonstrate possible classroom applications. A handout will be available to participants. The software could be useful for face-to-face as well as online classrooms.

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

A Distributed Presentation System with TabletPCs

Frederick Jenny
Instructional Technologist
Grove City College
100 Campus Drive
Grove City, PA 16127
724-458-2071
fjjenny@gcc.edu

Abstract

Grove City College (GCC) is in our 12th year of our laptop initiative and the 3rd year of using HP/Compaq Tablet PCs. Thus all freshmen, sophomores, and juniors have Tablet PCs.

The tablets have enabled GCC to investigate the classroom use of distributed presentation systems such as DyKnow and Classroom Presenter. These systems allow instructors to distribute prepared class lecture notes dynamically to student tablet systems. The instructor's ink annotations made during class are distributed as well. Students are able to add their own notes by typing or inking.

This presentation will feature one instructor's experience with University of Washington's Classroom Presenter. Advantages and disadvantages will be discussed

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

Teaching Art History in a Digital Age

Michael Kress
Vice President of Information Technology
kress@mail.csi.cuny.edu

Mark Lewental
Director of Library and Media Technologies
College of Staten Island – CUNY
2800 Victory Blvd.
Staten Island, NY 10314
(718) 982-4013
lewental@mail.csi.cuny.edu

The Early Days

Using digital images to study art history had been proposed by the Office of Information Technology when the College of Staten Island (CSI) moved to its new campus in 1993. At that time, the available technology consisted of CRT based projectors with a maximum resolution of 640 x 480 pixels, along with 486 computers with 120 megabytes of disk storage, but this was inadequate to show high-resolution images of major art works. Over the following years, both computers and display technology evolved, and the Office of Information Technology attempted to entice faculty to reconsider "going digital." CSI's art historians were not thrilled with the demonstrations, however, and repeatedly stated that slide film was the only acceptable means of displaying images in a classroom setting. We were also reminded that computer projection systems could never match the image quality or resolution of slides. Clearly, the technology was not suitable for the demands placed on it.

Paradigm Shift

There were several key events that finally induced the faculty to consider digital image display in the classroom. The first of these was the Internet. This evolved into the World Wide Web and technologies came into play that allowed the storage, access and transmission of high quality images, resources such as ArtStor became inevitable. Also, when you consider the wealth of images that Google can provide, it is no wonder the professors' interests were piqued. The next event was the decision by Kodak to leave the slide projector market in 2004. This fundamentally signaled a transformation in the world of slides as the universal switch from analog to digital took place. Gradually other technology, such as projectors and computers, improved as well, creating a realistic alternative to slide projectors and slides.

The Digital Art History Classroom

In the summer of 2006, the College of Staten Island built two state-of-the-art classrooms that were dedicated to digital Art History instruction. The key to making these rooms successful was to incorporate features that faculty needed and then extend these by using sophisticated technology. The collaboration between the faculty and the technologists was necessary to provide a framework for the design of these rooms. A critical element that the faculty required was the ability to mimic the dual slide projector format. Use of a split screen display did not provide a

large enough image to suit the needs of faculty who where used to having two independently controlled slide projectors in the classroom. As a result, the dual projector model became the key feature of the design. This would was both a challenge and an opportunity to create a space that had not existed at CSI before, and so the staff began to research whether such a design had been implemented at any other college in the vicinity. The idea was not to re-invent the wheel, but to implement and perhaps improve an existing design. Several colleges with art programs were contacted and a search of the Web did not yield any similar projects in our immediate vicinity. It became apparent that we would have to design and create the space ourselves.

Our main concern was to make these rooms user friendly and to mimic a dual slide projector set-up as closely as possible. In order to accomplish this, we realized that only one computer should serve both projectors. We wanted the faculty to be able to easily control either projected image and to have a preview monitor that would act as a main control display. After researching how to effectively display a unique image on multiple monitors, the video gaming world seemed to offer the answer. It had long held the ability to use a multi-headed display card with several monitors. Looking at what was available at the time, a Matrox G450[1] quad display adapter was purchased. This card has the ability to display an image on four monitors simultaneously. For our purposes, only three outputs are needed, so the fourth would be a spare. The next issue was what software to use to accomplish this task, and since the art historians were already using PowerPoint[2] for their classroom presentations, it was agreed upon to continue that, especially because this would minimize retraining, as well as increase the comfort level of the faculty. Although PowerPoint has the ability to use dual monitors, this mode failed to meet our needs. Once again the Web was consulted in search of software that would allow PowerPoint to display a separate image on each projector and provide a control interface for both presentations on the preview monitor. The package that met these criteria was a plug-in to PowerPoint called Powershow[3]. It allowed for the independent display and control of multiple PowerPoint presentations and had an easy-to-use interface. After installing the graphics card and software into a spare PC, the functionality and performance of the system was tested, and everything worked as expected. At this point it was time to demonstrate this prototypical system to the art history faculty to get their feedback before proceeding any further. The total investment had been minimal, so if this did not meet with faculty needs, we would have the chance to go back to the proverbial drawing board.

A demo was arranged with a group of art history faculty in the classroom designated to be converted to the digital image classroom. The prototype was brought to the room and preloaded with several PowerPoint presentations that were used in class by the art historians, so that there would be a common point of comparison. Prior to their arrival the equipment was set-up and connected to two portable LCD projectors and a monitor. The demonstration began when the faculty arrived. Their first comment concerned the accuracy of the color compared to slide images. We explained that this system had not been adjusted in any way from the factory defaults, but that there were a multitude of adjustments that could be made. The faculty then had an opportunity to try to operate the slide show to test its ease of use and the level of control, and they were quite satisfied with the software. At this point a decision was made with the faculty to proceed with the permanent installation, and since the faculty seemed quite confident with this design, we decided to convert two rooms simultaneously.

The remainder of the equipment necessary to begin both installations was purchased. The working timeframe to complete the project was the month of August, with a little time to spare before

the start of the Fall 2006 semester. We wanted to allow at least a week for debugging and training as well. As had been done with all of our smart classroom installations on campus, an outside contractor was hired to install all the cabling, as well as install the LCD projectors and screens. All the electronics would be housed in a Mediatech[4] MT-400 smart lectern. These were the standard lecterns used for other smart classrooms on campus and were well suited for the special purpose we had in mind. The other equipment that needed to be installed aside from the PC and projectors, was a Sympodium[5] touch screen monitor made by Smart Technologies, a combination DVD/VCR player, an audio amplifier and speakers. The reason for installing the additional equipment was to provide as much capability in this space as possible. All the equipment was secured to the lectern with cable locks to prevent possible theft. Additionally, locks were installed in the lectern that limited the access to the equipment and cables. The installation was trouble free, since it was based on previous similar installations, and debugging was minimal. The time period set for debugging was used instead to provide longer training for the faculty who would be using the room in the fall. With the installation phase completed, a plan was developed to provide support for anyone initially using this classroom. For at least the first few sessions, a technician would be available in the room just in case something didn't work. Thankfully, this level of support quickly became unnecessary.

Over the course of the semester, both rooms were monitored closely. Faculty members were frequently contacted to make sure that everything was working. Although there were a few minor glitches over the course of the semester, they were easily and quickly resolved. The art history faculty became very fond of these two classrooms. In effect, this project proved to be a catalyst for changing over from 35mm slides to digital images on the campus. This proved fortuitous as there were several ongoing departmental projects involving digitizing images; it seemed appropriate to consider the needs of storing and retrieving these images for use in the classroom.

Using funding from a campus based grant, a collaborative project with several departments was undertaken to create an image repository server for use by the faculty. The idea was to create a server on which faculty could store digital images and access them easily through the Web. In order to make this affordable, an open source package was selected to perform the function of image storage, access and management. Called the Madison Digital Image Database (MDID) [6], the package has all the capabilities required of an online image database and multimedia instructional system. The software was developed at James Madison University to meet the needs of art history faculty. In order to deploy this software, a Dell PowerEdge 2950 server running Windows Server 2003 was purchased. The server has one terabyte of hard disk storage, which is more than sufficient to handle our present needs.

This endeavor is in the very early stages of deployment and a lot of work still remains to be done. Not only will images have to be scanned and loaded onto the server, but they will have to be cataloged in order to provide easy access to the thousands of images that will be housed on the server. One of the several departments that are participating in this project is the library, which will facilitate the cataloging of the images.

Final Thoughts and the Future

These are truly exciting times at the College. With the large-scale deployment of smart classrooms throughout the campus, faculty will have the ability to access the campus' digital image collection in any smart classroom. Additionally, the two dedicated digital image classrooms

provide unique capabilities for both faculty and students. We look forward to stretching the envelope even further as our faculty become more adapt at using all of the capabilities of these unique spaces and systems.

Notes

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Collaborative Tools for Enhancing Learning in the Online Environment

Rebecca Lawson
Professor, Media, Arts, & Information Technology Department
Lansing Community College
PO Box 40010
Lansing, MI 48901-7210
517 483-1552
lawsonr@lcc.edu

Abstract

The proposed presentation will explore the effective use of Web-based communication tools to foster collaboration in online learning environments. Online students benefit from interaction with other learners just as students do in traditional classrooms. Therefore, it is imperative for online instructors to construct activities that support collaboration in the online classroom. Crafting activities and assignments using those tools is less difficult and more fun than either instructor or student may realize. Outcomes of this paper include a discussion of the need for a variety of communication tools in the online learning environment, the selection of Web-based communication tools for collaborative learning, and specific successful examples of appropriate use of these tools.

The Need for Communication Tools in the Online Environment

As we look at how the educational structure of our society has evolved over the last twenty-five years, we see that technology has made an enormous impact. The way students learn and interact has radically changed. The schools of the 1980s, and earlier, were formed from the neighborhoods so students felt a sense of community within the classroom as they learned. Today, Web-based communication tools help us foster a sense of community and collaboration within our online learning environment.

Students in online learning environments come from diverse backgrounds and may be located on opposite sides of the Earth. Yet they interact with each other and learn from each other in many of the same ways as students do in the more traditional environment of neighborhood schools. Students exchange ideas and build upon each other's knowledge with students they have never seen. But a sense of obligation is there because the students learn together. In the online learning environment, the world becomes smaller and the learning becomes greater through the use of synchronous and asynchronous communication tools.

Why We Should Build Community

Distance education is becoming a more prevalent option for the students of today. There are several important benefits for the online learning environment. Still challenges exist. It is easy for individual learners to slip into isolation in an online environment or to become distracted from their studies. Instructors must present an open active learning environment and develop learning activities that draw out the individual student and bring them into the community of learning.

Admittedly, participation and collaboration can be a bit more difficult to elicit in the online learning environment. But we can not leave each student to survey the course materials and to form their own conclusions. Students need the fresh perspectives introduced by other learners. The collaborative learning process greatly enhances the depth of learning and the retention of knowledge for many learners. Relationships formed among students helps to engage the students. Online learning environments offer great opportunity to build relationships.

The online learning environment can be difficult to navigate for both faculty and students under the best of circumstances. Balancing personality traits, differing work ethics, and time management skills becomes an exercise in patience and fortitude as we try to find the balance between space and time that separates learners from each other and learners from their instructors. Forming relationships with the students and engaging the students can be accomplished by modifying techniques that are employed in traditional classroom settings.

Characteristics and Challenge of Today's Students

Today's students come to our online classroom with a real level of comfort using all kinds of technology. Consider that the average college student has always had a computer and a digital alarm clock. The average college student has always been able to make copies of their favorite TV shows with a VCR.

It is likely that the average student has used his cell phone and his MP3 player on his way to class. It is likely that he has checked his e-mail, instant messaged one or more of his friends, and read or written in a blog. It is little wonder that students consider technology as a logical part of the learning environment. The use of Web-based communication tools has become expected.

Today's online students face many challenges. Often students enroll in online classes for questionable reasons. Many students have a busy life with too many commitments and not enough time to meet all of their obligations. Some students view online classes as a short-cut to learning and remedy for their shortage of time.

Other challenges include a mismatch between the required reading and comprehension skills of the course materials and the skills processed by the student. In addition, some students lack the ability to problem-solve or manage their time.

Selecting Web-based Communication Tools

We can help students overcome some of the challenges of the online learning environment by including the appropriate use of communication tools as part of the course design. The communication tools that we use to build community, develop collaboration, and enhance learning can be put into two basic categories: asynchronous and synchronous.

Asynchronous communication is electronic communication in which the participants do not need to be online at the same time. Asynchronous tools include course management software (CMS), e-mail, and discussion boards. For many curriculums, blogs are becoming an important and commonly used tool. Because all of these tools are asynchronous, they help to bridge some of the time-related challenges of the online learning environments.

Synchronous communication is electronic communication in which the participants are online at the same time. Users log on and chat but only if it is convenient for both parties. Examples include chat, instant messaging (IM), and Web conferencing. Synchronous tools transcend space and geography but not time. These tools must be used by two or more people online at the same time. In many ways, synchronous tools can provide a greater potential for learning because student's questions receive an immediate response.

Using Asynchronous Tools

Course Management Software (CMS) generally functions as an online classroom by providing a container for our lectures and assessments. CMS provides a set of tools allowing us to track who is accessing the course, the areas they are accessing, when they access them, and for how long. This type of date is helpful when diagnosing learning difficulties or resolving miscommunications.

Another asynchronous communication tool is e-mail. E-mail remains the most popular form of online communication since the development of the Internet. It provides a stable backbone for communications in an online learning environment.

When e-mail is sent to an individual, it can become a personal contact point between faculty and the student. At the same time, this personalization can become a tremendous time-eater for the faculty unless well-managed. Very few of us are able to provide a unique, customized educational experience for each of our students. However, if used judiciously, personalized e-mail can help to promote student success. It is especially helpful for those students who need a bit of extra clarification.

E-mail can be used more efficiently as a listserv or mailing list that reaches every student enrolled in the course. Mailing lists can be used to provide additional online instruction or clarifications to the materials found in the course management software. Every student becomes privy to discourse of question and response due to the very nature of a mailing list.

E-mail does have some drawbacks. Sometimes e-mail responses from readers are very slow to arrive. Students when and if, they open read or respond to course e-mail. E-mail can be lost and has the potential for the spreading viruses.

Discussion boards provide an opportunity to develop writing skills and build knowledge by providing a constructivist environment. They can be used to draw out deep thinking about complex ideas. For example, you can structure collaborative activities so that new roles and tasks are assigned to students with each lesson. One student will give introductory information about a given topic. Then two other students will add to the discussion thread with each student taking a different perspective on the topic. Then another student will complete the thread by summarizing and assimilating all points expressed. It is important to have the students switch roles over the semester to make sure all students have equal opportunities to participate and learn communication skills in addition to the topic content.

Other ways discussion boards can be used is as a FAQ platform providing answers to commonly asked questions. They can also serve as informal student lounges where students interact with others in peer tutoring sessions.

Discussion board drawbacks include the learning curve associated with the development of well-ordered threads and quality responses among threads. Instruction should be given about how we want students to write their responses so that what we receive from them is readable, make sense, and is appropriate for the lesson. Rubrics are a great way to help students understand the level of quality expectations for their posts.

You may want to provide to one discussion thread already developed as a sample to model for students what is expected. This thread could be available from the beginning of the semester. It could provide important facts on student support services such as where to find financial aid, registration, advising, or the library. Make a thread for each service and state where the office is located, hours of operation, summary of services provided, or other information students should know. This helps students to see where they can find these valuable services and models how a discussion board can be organized.

Blogs are a newer use of technology that allows students to develop their own personal "voice" and sense of ownership of their writing. Similar to a discussion board, a blog allows student to publish their thoughts and ideas in the form of journal that is visible on the World Wide Web.

Because a blog can be created in a way that makes it available for anyone to see, not just the instructor, students tend to focus more carefully not only on their own thoughts as they write. In addition, they begin to focus more on what others write in response as comments. This helps student construct knowledge from statements and ideas.

There are several ways to ensure the successful use of blogs in your course. It is important that students see blogging assignments as serious assignments that align closely with course content. Provide guidelines and suggestions for students to help them organize their blogs into a logical structure and to use dates, lesson numbers, or teams as tags.

Emphasize the difference between formal and informal writing styles so that students create blogs of the appropriate quality. Assign quality points as part of the total assignment score.

Model how to provide feedback to others and insist that all comments add value to the original blog post. Make students aware of the audience; insist on civility and cultural sensitivity. Make students aware of long-term visibility and caution them against sharing personal information.

Using Synchronous Tools

Our students come to our classrooms with lots of experience and a highly developed level of comfort with instant messaging or IM. Educators need to capitalize on this skill and use it to enhance learning opportunities for online students. Instant messaging is a technology that allows for instant communications. Because of the ease of use, IM may surpass e-mail as the primary online communication tool.

IM can be used in several educational settings. You can hold virtual office hours, deliver mini-lectures, and provide library consultations. IM is also very handy for groups as they work on team projects. This can help relive the stress of trying to get all group members in the same location at in the same time.

There are so many IM clients that are available. Some clients are proprietary and only allow communication with other people using the same client. For that reason, it may be helpful to have a unifying utility installed on your computer. These types of utility program work with all of the clients so that you don't have to log into each IM client separately. However, IM clients are improving all the time and now many IM clients permit you to send and receive messages with other IM clients.

Another synchronous tool, chat, helps to dispel that feeling of isolation because it is likely that the students already know how to use this tool. Most Course Management Software packages include a chat client. It is primarily text-based but most chat clients incorporate several other features such as file sharing, integration of Web links, images, sound and video.

Chat can be used for lectures, virtual tours, make-up lectures, review sessions, guest speakers, advising, or library consultations. Typically, chat clients have an archive feature. The archive feature is extremely valuable in the online learning environment because it provides the ability to review the transcripts as often as the student would like. In addition, students who could not participate in the chat can review the archives.

Typically, archives are printable. This feature can be used for on an online review session. Key questions can be posed by the professor and the students provide answers. The professor makes any corrections needed. Then once the review session is completed, it is archived. The archive can be printed out and used as a portable study guide.

Although it is not used as frequently, Web conferencing adds a fresh dimension to the online learning environment. Once a Web conference is scheduled, you can either have students navigate to a specific URL for the conference site or invite people to join your Web conference by sending an e-mail that contains a link to the conference site. It combines audio and video elements closely simulating a face-to-face classroom experience. Most Web conferencing clients integrate other synchronous tools such as text-based chat area and a whiteboard as part of the package. Web conferences can be recorded and archived for later use.

Web conferencing can be used for workshops, guest lecturers, remote experts, and remote demonstrations. One of the most engaging ways to use Web conferencing is by conducting a workshop within your course. Start by assigning a group of students to become a panel of "experts" on a given topic. Next, create a Web conference where the audience (actually the rest of the class) can ask the panel questions about that topic. Record this session and make it available via a Web site or your CMS for replay at a later time. This technique can be used project presentations in online courses as well.

Web conferencing drawbacks include the need for equipment such as conferencing software, a Web cam, a microphone, and speakers. Some Web conferencing software permits the use of the telephone in place of speakers and a microphone. However, one of the most important criteria for successful Web conferencing is the need to adequate bandwidth. Coordinating voice and data takes large amounts of bandwidth. You must be sure all of your students have access to high-speed connections before using Web conferencing as part of the online learning environment.

Summary

Web-based communication tools can be used to enhance learning in online environments. Through the appropriate use of these tools, you can foster collaboration, promote the retention of knowledge, and diminish attrition in the online learning environment.

Today's students have broad experience with Web-based communication tools. Students appreciate and have some level of expectation that the use of tools such as these will be part of the class communication process. Adding one or more Web-based communication tools to your course will help to engage students and diminish the sense of isolation experienced by some online students.

The Frustrations, Pitfalls and Rewards of Implementing a Campus Card System

Stephen McTigue
Network and Systems Specialist
Roanoke College
Information Technology Department
221College Lane
Salem, VA 24153
(540) 375-2259
mctigue@roanoke.edu

Introduction

In the summer and fall of 2006, Roanoke College implemented the OneCard system from Blackboard which has allowed students to use their college ID card as a debit card on campus; a meal plan card; library card; bookstore/financial aid card; and to allow access to the dorms and fitness center utilizing an imbedded radio frequency chip. Future plans include the use of the card with area merchants through Blackboard One (fall 2007) and to allow access to remote events on campus using wireless handheld readers. We did not implement a "turnkey" solution since we already had several system components in place, including door access, ID Works, and Blackboard Learning and Content Systems; therefore, we experienced unique issues when bringing the systems into a single solution.

Process:

The initial meetings with the sales reps from Blackboard began in the fall of 2005. The plan was to have the OneCard system running for the fall semester of 2006. (We renamed the program to be known as the Maroon Card since the Roanoke colors/mascot is the Maroons.) After the initial sale was completed, we began the technical process in January 2006 with an onsite visit from the Blackboard project manager. She verified that our facilities, network and current administrative system (Datatel) met requirements for the new transaction system. This initial site survey also included a detailed meeting with department heads that would be involved, including dining services, business office, campus safety, bookstore, information technology, student affairs and the library.

Issues:

During the following months, as we moved through this process, we experienced many issues. Some of these were due to the fact that we were not implementing the turnkey solution that Blackboard offered. Some issues arose due to Blackboard and 3rd party vendor's lack of knowledge with customizing the product for our environment.

1. Integration with MBS (Missouri Book System):

MBS claimed from early in the project that they were certified to integrate with a Blackboard Transaction system that was Windows based. However, late in the project (July 2006) and af-

ter many hours of frustration and escalation of the issue through several levels at Blackboard and MBS, it was determined that MBS was not certified for Windows and they in fact had to modify the programming "on the fly" in order to make the systems work properly. We were later told that we were the first "live" site to use MBS with the Windows version of Blackboard Transaction system. This integration finally occurred 8 months after we were told that the systems would work seamlessly and in fact was not implemented in time for student check-in.

2. Majority of Blackboard Transaction customers are UNIX based:

Blackboard is currently moving all users to Windows systems, so we were ahead of the curve but therefore we also experienced many issues not faced by Blackboard up to that point in time. Most of their customers are currently using the transaction system product in a UNIX environment, therefore their product and customer support was greatly lacking when we were going "live".

3. Single sign-on:

We wanted to have single sign-on capabilities through our portal so that students could authenticate to the Community System/Transaction System at the same time as they logged onto the portal. However, according to Blackboard this requires a single server, which sounds nice but it is a more expensive way to go from a cost standpoint. This is because Blackboard recommends that the Community System be on a separate system from the Learning and Community systems. However, this would require us to maintain multiple databases. Therefore, we requested that these systems all reside on the same server to allow for better integration. Since, Blackboard does not support this configuration we had to pay more for this sort of setup. In the end it has worked well with some issues arising when upgrades need to be done to the Learning and Content Systems. For instance, our settings for credit card transactions and merchant numbers get erased and need to be reloaded when upgrades are implemented.

Note: For clarification, the Community System allows students and parents alike to add money to a student's card. The Transaction System allows for the student to make purchases on campus. We use the complete suite of Blackboard products; however, the Community System resides on the same server as the Learning and Content Systems while the Transaction System is on a separate server.

4. Integrating systems:

We already had a door access systems and use Datatel, so we needed to have certain customizations completed in order to allow for integration with Blackboard. For instance, we purchased a software integration agent from Blackboard called Building Blocks. These items would pull data on a set schedule from Datatel and populate the Transaction System, ID Works and Best door access systems. However, it became apparent that the integration did not work as seamless as it was advertised. For instance, we already had ID Works set up how we wanted it to process and print cards. This caused issues when the Building Block agent would run because it attempted to overwrite our changes. Secondly, the integration with Best was not part of Blackboard suite as we had been told initially, so we had to contact Stan-

ley/Best on our own and get last minute support. Due to the late date (July 2006), Stanley/Best could not offer support until sometime in late September. This was not acceptable, so they did offer some minimal support to get me going with their integration product but I was left to make it work. Not being a fulltime SQL Server administrator made this even more challenging. I spent many hours of testing, troubleshooting and building automation of the Stanley/Best product to work with ID Works.

Finally to utilize wireless capabilities, we also purchased Sequoia handheld devices from Blackboard. However, due to some additional setup/programming issues, these devices did not work until at least 4 weeks into the semester. The fix was quick but getting Blackboard or Sequoia to take ownership of the problem took several weeks.

5. Training:

We had a training session for all the cashiers, department supervisors, and the "core" team that implemented the system in late May, but in hindsight this was too early for some and too late for others. We should have conducted the training in two sessions. The first should have been held early in the process for those that needed to have a deeper understanding of the project and the second session much later for the cashiers and supervisors. We should have conducted the final training after all the kinks had been worked out and maybe only a week before the official rollout. Due to the timing of the training we found ourselves, retraining the cashiers and administrators when the system went live. By having a single session we found that the training was also not geared towards the proper audience at times, so some department supervisors became lost in the information. Others, like the cashiers did not need to know all the intricate details of reporting.

6. Public Relations and Promoting:

We planned a public relations campaign but due to several delays in the rollout, it may not have been "talked up" enough. Also, at least one department (dining services) took the opportunity of this new service as a time to change prices on their meal plans. This led to some hard feelings among students and even staff who perceived this new system as the reason for the price increase and not seeing the value of the new Maroon Card.

Lessons Learned:

From our implementation we learned the following:

1. You can never start the planning process too soon. Plan for delays. Plan for the worst but expect the best.

2. If your staffing abilities and budget allow for it, try to conduct as much of the setup of the system "in house", especially when setting up the profit centers, reports and other business rules. We find now that we must wait for Blackboard support on many items that we may otherwise be able to fix ourselves.

3. Have a good public relations campaign that is well in advance of the project implementation. This will help build excitement and anticipation. Overall there has been a very positive response to the new card system by the entire campus community.

4. Offer separate training sessions: One early in the implementation process for those that will be the "core" team and first line of support for the system. Follow this with a much later and more basic overview, cash register and report training just before the rollout of the system. This second session would be for the department supervisors, cashiers and other personnel involved with reporting, bookkeeping, etc.

5. Do not allow departments to change pricing at the same time as the implementation of this new program unless it is well publicized and in advance.

6. Do not involve too many extraneous people. As our project progressed it became apparent that many of these departments did not need to be involved on a regular basis and in fact many were more overwhelmed with the process than anything else. The main areas that needed constant communication were information technology and the business office. Without these two departments, none of the other areas would be able to use the system. This is because you can't use the transaction system without money and accounts and nothing can communicate without information technology.

Positive Results and Future:

This project had many pitfalls that with better information and planning may have been avoided. However, overall the implementation has been very positive on campus, among the students and staff. We are planning to promote the use of the wireless Sequoia scanners more this year by the student activities area and dining services. Future use of these devices could be for the bookstore to have a remote location as well during student check-in. We are now ready to move onto the next phase of the program by working with Blackboard in offering off campus vendors the ability to accept the Maroon Card. Some vendors such as CVS already have national accounts with Blackboard but other local vendors may not be familiar with the product.

Conclusion

In conclusion, Roanoke College has had a successful but at times frustrating implementation of the Blackboard OneCard product. However, with dedicated staff we have been able to work through many of the issues and even offer other schools advice as they look to move to a similar implementation. Reports from Blackboard show the value of the card system because it can reduce merchant credit card fees and capture more revenue from the students, especially if off-campus revenue can be captured through Blackboard One, but implementation must be thought-out if it is to be successful.

Allegany Wireless Network Supports Full Motion Video

John R. Moore
Associate Dean of Computing and Communications
Allegany College of Maryland
12401 Willowbrook Road
Cumberland MD 21502
301-784-5312
jrmoore@allegany.edu
http//:allegany.edu

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 approximately 500 employees and thereby strengthened education for its 3,200 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 T1 line more suitable for business applications. A full T1 line linked the Cumberland system to the outside world, which in turn was linked to its two Pennsylvania campuses with a half T1 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 Stratex Networks 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 T1 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 T1 over phone lines, the college now receives the Internet via a full T1 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 T1 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. This site went on line with a wireless connection in fall of 2001. The Faculty and students at that Baltimore Street location are now fully integrated into the college communications network using a wireless connection that includes voice over IP technology.

In the fall of 2004 as the use of the network continued to grow the college started planning for the need to again increase bandwidth. Internet usage had continued to grow and problems occurred with access to some of the more advanced software at the Somerset Campus. We decided to upgrade our video system to include full motion and continuous presence so we started planning for the upgrade of our wireless WAN. This new upgrade will provide increased bandwidth in the main core of the wireless network to support 100 megabits of IP bandwidth and it also offers T1's to carry voice traffic to our Gateway Center. The new link to each Pennsylvania campus has been upgraded to support 50 megabits of IP bandwidth to provide for full motion video and voice over IP. The upgrade includes new radios to provide the increased bandwidth and new network switches to allocate the bandwidth to the required locations. This presentation is a follow-up to a session from 2003 and will focus on the video upgrade project and the network upgrade project that took place during the fall of 2006.

Harnessing Untapped Resources to Help Provide FREE IT Support The Office Based Consultant Program

Bill Pelfrey
EDGE Program/Help Desk Specialist
Information Systems & Services
(859) 985-3352
bill_pelfrey@berea.edu

Judy Gergen
Technical Services Coordinator
Information Systems & Services
Berea College
CPO 2208, Berea, KY 40404
(859) 985-3307
judy_gergen@berea.edu

A Brief History of Berea

Founded in 1855 as the first interracial and co-educational college in the South, Berea College promotes understanding and kinship among all people, service to communities in Appalachia and beyond, and sustainable living practices which set an example of new ways to conserve our limited natural resources.

As Berea continues to build upon a distinctive history of 150 years of learning, labor and service, and find new ways to apply our mission (the Great Commitments) to contemporary times, we hold to our founding motto "God has made of one blood all peoples of the earth." (Berea, History: The Berea Story)

At Berea, promising students with limited economic means receive the opportunity for a world-class education.

The support of generous donors provides each of our 1,500 students with a full-tuition scholarship, which can mean the difference between a life of unmet potential and a future full of possibilities. Friends of the College give our students the chance for a stellar liberal arts education—an opportunity they could not otherwise afford.

In addition to full-tuition scholarships, students gain real-life work experience while earning modest wages through the College's required work program. From Berea College Crafts to Information Systems & Services, students learn, work, and serve. (Berea, Friends and Donors Home Page)

Rationale

No matter how large or small the IT department is at any school, there is never a lack of work to be done. With the growth of new technology and the exponential rate of its adoption into our society, and especially into education, the need to support this technology has grown not only in

depth, but also in urgency. For today's Faculty and Staff computer use isn't an option, but a necessity, a necessity that for many was not even fathomable during their own undergraduate years. Of course with expanding the use of technology comes the need for expanding support services as well, but can we afford to expand our staffing as the same rate as this growth? In general most IT departments have expanded their staffing at a much faster rate than other areas on the same campuses, but how long can this trend continue? Not only has the use of technology expanded, but also the expanse of different types of technology has broadened the range of support needs, which stretches the limits of what can be accomplished by each individual even further. With these realizations it is understandable that many college and university IT departments do not have the best reputations. Most technology requires not only the research and development to stay up to date, but also a great deal of work to provide that those systems remain stable and reliable. What good is a new technology if you can't count on its availability or if you don't have the opportunity to learn how to use it effectively?

Out of these needs at Berea College, grew a unique program that has both expanded support services, and brought about a closer relationship to those we serve, the Office Based Consultant program.

About the Program

In order to provide additional technology support to the College, the Office-Based Consultant program was started in July 2000. In many ways this program developed through a natural progression, in most office settings there is that one person who, through experience, training, or personality becomes known as the one to go to for help. While these are not generally recognized as such, in many ways they are the "front-line" Help Desk support. With little or no recognition and support from the IT department, these individuals fill in the gaps of our official support structures. They have a stronger connection with those that they support, more direct understanding of specific departmental software and technology needs, and a real ownership of the issues that arise. It was in recognition of these that Sandy Bolster, then Coordinator of Instructional Technology, birthed the concept of the Office Based Consultant.
As an introduction in a software manual the following scenario is given:

> "Your secret is safe with us. We know you want to be the formatting expert in the office. Everyone is always asking your officemate how to take a troubled document and line up bullet points, renumber lists, and make the text wrap around the picture just right. She seems to be the only person who can get the column widths spaced to print perfectly on the handouts page. It may take her half the day to do it, but that doesn't matter, everyone loves her because she is a problem solver." (Archilla)

Every office seems to have that one person; the guru everyone knows can answer their questions so they don't have to call the Help Desk, and the amount of support they provide is immeasurable. While these people generally receive no extra pay, have little, if any, formal training in IT support, and are adding these duties completely outside of their job description, many offices would feel crippled without them. Their reputation often exceeds that of the official IT support staff, and they are familiar with the "real work" that goes on in the office.

It was in recognizing that Berea College has many of these employees who are skilled technology users and who assist others on an informal basis, that this network of resource people was created. Office-Based Consultants provide the first contact for employees in an office, on a floor, or possibly within in an entire building. Departments/divisions determine how the office-based consultant functions within their area.

The OBCs work closely with IS&S staff to extend support across campus into individual divisions/departments on a daily basis, and offer input into planning for technology needs. The support and assistance from Office-Based Consultants results in a decrease of basic inquiries to the Help Desk, allowing the Help Desk staff to focus on more advanced issues. The Consultants are able to pass along exact information about problems and training needs to the Help Desk. If the Consultant cannot provide assistance, or is not available, the Help Desk remains available to help with questions.

The Office-Based Consultants meet each week for some of the following reasons:

- Introduction of new software packages, versions and equipment
- Training on new software, hardware, the network, and trouble shooting
- Instruction for new upgrades and patches
- Discussion of questions or computer problems raised by colleagues
- Advance notice and preparation for upcoming changes for the College

Potential Benefits of Program

Office Base Consultants are now part of the IS&S team at Berea College. They add value to our campus by contributing in the implementation of new software (whether campus wide, for individual departments or software installation on individual workstations). This past year they have been planning and training for the campus-wide upgrade to the new Microsoft Office 2007 System (Word, Excel, PowerPoint and Outlook) This upgrade is a major change for the campus. To facilitate this change, the OBCs are being trained first, before the software is released to the rest of campus. They will then go back to their departments, and having had the option to upgrade their own machines to the new version, they will have had time to familiarize themselves with it before their departments make this change or sign up for training. Not all individuals choose to come to training but have come to rely on their OBC and will work through it on their own time with daily problems that surface.

At Berea part of the curriculum includes a labor program where students are an integral part of the employee groups in every department on campus. Every student works at least a 10-hour per week labor assignment, and this requires him or her to have access to certain data within their labor department. The supervising staff can give access to jobs by placing them in shared folders that are secure and backed up daily on our network servers. The data is available to them through the folders within the department where they work. In many cases it is the OBC that manages the work flow and training for these students, as well as staff, by showing them how to efficiently use the shared folders. This training is much easier when done one on one. The OBC in the department usually knows the data and flow of data better than the Help Desk.
Another area that the OBCs are able to help with is in the daily usage of Microsoft Office Outlook. They answer questions regarding departmental distribution lists, calendar sharing, creating appointments, etc. The local departmental OBC knows of and can respond to the personal needs of an individual in using each of these features better than even the Help Desk in some instances.

OBCs also assist with general maintenance on local equipment, (computers, printers, fax, and scanners), evaluation of hardware and software problems prior to involving the Help Desk, running spy ware or virus scans, checking for cable disconnects, printer/copier jams, toner/paper refills on public and departmental equipment.

OBCs also provide support by doing one-on-one training within their departments on topics such as creating PDFs, adding or deleting printers, use of BANNER (Berea's campus administrative software) and NOLIJ (Berea's document imaging system, where volumes of historical information in hard copies are being scanned into electronic format.).

Many of Berea's faculty and staff work from portable computers that are often maintained (cleaning and general care) by the OBC in their department. Often times the portable computer users are presenting and will need classroom media systems set up in advance. Once again the OBC will make sure the room is ready, the software needed for this presentation is in place and will coordinate the set up of the presentation for the department presenters.

Each department and person is also responsible for backups of their own hardware to campus server space. Training OBCs to promote this in their own department has saved a lot of frustration. When end-users experience hard drive failures or other problems the OBC will be able to assist in retrieving their files from the server.

Wireless access to Berea's campus network varies on campus and is available only in certain areas. However, the hardware does comes installed on all new equipment. Therefore the OBC once again is up on the latest so he/she can communicate this info as needed to the department and provide support with how to connect.

Training

While much of the description of the OBC program so far has focused on the benefits to the IT department, the success of the program depends also on the benefits to the individual OBCs and their departments as well. Additional Training, prioritized support, and recognition of service are integral parts of making this program a success.

Since the OBCs are not directly employed by IS&S compensation through pay and benefits is mainly out of our control. For this reason it is essential that the additional support and recognition given is provided in such a way that the participants see the benefits in the program. It is very helpful if departments can recognize the additional support they are receiving and can incorporate these things into job descriptions, and/or recognize the contributions the program makes when considering salary.

Training seems to be the biggest draw to this program. Many who find themselves in this position informally recognize that they are not necessarily more qualified to answer their coworker's questions, and they would like to be better prepared when asked. At the core of the OBC program is training. All OBCs are trained in standard campus software, and are provided with additional manuals and support materials as they are available.

Beyond training in the basic software, it is helpful to have some insight into the operating systems that keep our computers running. While most general computer users focus on applica-

tions, the OBCs are trained on features of the Operating systems so they can also assist with troubleshooting. While this knowledge may seem basic to a technician, it is invaluable and provides not only a reduction in Help Desk requests, but also a knowledgeable assistant in the office that is able to assist with troubleshooting over the phone or by email. With this basic knowledge and a little guidance, a great number of Help Desk requests are quickly resolved and removed from the technician's workload.

One easy way to recognize and measure the progress of the OBCs is through certifications and proficiencies. Whether it is through official certifications like MOS/MOUS or through home-grown proficiency measurements, providing some type of certification and recognition of the level of expertise that has been achieved shows both strength in the individual and the program. Berea certified many OBCs through exercises written in house to demonstrate their knowledge of the software, as well as provided access to MOS/MOUS testing as an industry standard measurement.

Round Tables

One aspect of the weekly OBC meetings that has grown into a wonderful help is the roundtable discussions. Sometimes planned, but often spontaneous (usurping other plans at times) these discussions provide open dialogue on current projects, new technologies, interesting or difficult problems that have arisen. Roundtable discussions happen frequently in our weekly meetings. It's at these times that this program really shines.

It is rare that a problem comes up to which at least one of the OBCs does not have some insight, and a solution is found. Many times these solutions draw on features that are unknown to even IS&S staff! Of course many times there are multiple solutions to a problem, which also allows for some discussion of best practices and the strengths and weaknesses of each solution.

While these discussions are frequent to the weekly OBC meetings, this cooperative effort is not limited to those times. Through an OBC mailing list in the email system, questions are often spread through the group. Questions or concerns are addressed in this manner, resolving problems between meetings, as well as at times providing ideas for discussion or training for the next meeting.

Software Deployment

As we all know, each time a software company provides a new version, it can be a disruption. A lot of work is required to train on the new version, and there are many questions as everyone finds and familiarizes themselves with the new features.

The OBC program has provided a great transition for such times. The most major upgrades in the past have shown the benefits of this program. Upgrades to the Operating system, or to the Microsoft Office System seem to be the ones that effect most people on campus. For each of the upgrades to Windows XP, Office 2000, 2003, and now 2007 the OBCs have taken the leap to the new version ahead of the rest of campus (with the exception of IS&S of course). They have helped in evaluating training and resource materials. They point out areas that they think will be difficult changes and need specific attention. The OBCs field many of the questions as the software is rolled out to the rest of campus.

Glitches, Patches and Errors

The entire Berea Campus benefits from the overall Office Based Consultants Program. One example is a battery recall from Dell last year. The OBCs were trained on how to look up the batteries' codes on the replacement list and mark off names with a date and time stamp showing each person's computer that was cleared or that needed to be replaced. This saved IS&S many hours that would have been a technician's time.

The Day Light Savings Time Patch was another example of the Office Base Consultant Program helping Berea's IS&S technicians to plan. They made sure that the patch was installed and followed up to make sure it worked. Other examples might include planned rollouts of new spam control and virus protection systems, converged messaging (Callpilot), Voice over IP, Video Streaming, and Wireless network access. OBCs are the first wave of customers that evaluate the full impact of these new technologies on their particular operations. Network operations view the OBCs as an integral part of the deployment cycle as they roll out new infrastructure that impacts their clients. This ensures the capabilities of our new technologies are fully applied in a way that meets customer needs. The OBCs help create the bridge from installation to effective application of the technologies. A specific example of this is getting the word out on the features of Berea's new spam control system that allows faculty and staff to customize how spam is managed in their individual email boxes. If the OBCs are used effectively in the deployment cycle, it is possible to leverage new capabilities rather than attempt to use new systems with outdated understanding of how they work. This approach creates a venue for network operations management of voice, data and server technologies. This improves the connection with customers and maximizes the impact of their work.

The OBCs often times provide feedback, giving us information early on that informs the IT department. One issue that escaped our attention was on an order of new laptops for our student laptop program. The laptops were ordered, received and distributed to students, but when students started to use them in the Foreign Language Lab area there were NO internal microphones on that model. Dell, the manufacturer, had just stopped including them but had not notified their customers, nor had we realized the importance of this feature. This was a problem for both the Music Department and Foreign Languages who had already begun to rely on this feature. Through feedback from the OBCs we were made aware of the situation, and we were able to secure some external microphones for those departments, as well as make the needed adjustments on future orders.

The OBCs are usually among the first that are asked to proofread new documentation prior to its publishing and distribution on campus. An example of this was implementation of a new backup system. The OBCs were involved in helping to point out changes that made it easier to use, such as making fewer buttons to click. They also pointed out mistakes or confusing wording in the published instructions prior to their release to the entire campus. They also have been instrumental in helping to restructure the folders on Berea's file-sharing servers making them simpler to follow and understand, and also customizing them to meet the needs of their departments.

Each year as we plan to do our Berea College Campus Inventory on hardware, including computers, printers, fax machines, scanners and other peripherals, OBCs get involved. The IT department provides a list of the equipment in their departments. OBCs can then take the list and

compare the current equipment to the list and write in anything that is not correct then give it back to IT for reconciliation. The same holds true for replenishment of older/obsolete equipment. Each department has to make decisions on replacing or upgrading equipment. While the responsibility to request new equipment generally falls to the Department head, the OBC usually has a better understanding of the technology itself, and can be an invaluable resource to them. In addition, the OBCs usually know the equipment needs better than the IT department and can give recommendations on problematic equipment and often the age of the equipment. This is a very large job for the department head and the IT department so each contribution from the OBC is greatly appreciated. As personal liaisons they help bind together the relationships between the department and IT personnel.

Feedback

The collaboration between IS&S and the OBCs is instrumental in assisting to train the staff and students within their departments. They are also a great resource to IS&S in the feedback they provide to us. One example of this is using shared folders on a server. Due to some security issues it became necessary to restructure the folder hierarchy of the main campus file-sharing servers. The scope of use from department to department could be very different, and any restructuring needed to take into account the various uses and needs in each department. Through the OBCs a good cross section of campus and the various needs was provided, and a much stronger solution could be obtained. This has proven true with other situations as well, such as the selection of a new email system a few years ago.

The OBC can give feedback from within the department regarding many of their needs and also makes it is much easier for IS&S to communicate to the department through one person instead of several. In a department of 45 individual employees, it is preferred to have one person that really knows the business and staff working with the IS&S department.

The feedback provided to IS&S as well as the discussions that come from these times do provide a much closer relationship between IS&S Staff and the OBCs. Their understanding and involvement in new initiatives has provided a strength and confidence in these decisions that is immeasurable. Having more ownership in the decisions, and buy-in to changes that are made make difficult transitions and upgrades much easier on everyone.

Technology Liaisons

A more recent change to the OBC program was the creation of a sub-group called the Technology Liaisons. The time commitment required to attend weekly meetings and participate in this program can sometimes be an added stress to an already full schedule. The success of this type of program really falls on the commitment of the individuals involved. A sub-group of the OBCs was formed in 2005 allowing for those that wished to continue to work in keeping the lines of communication open, but could not continue to commit to the weekly meetings to continue with the training and more day-to-day work involved with the program. Technology Liaisons continue to serve as the primary contact for their department, and work closely with IS&S to address needs they have, but do not attend the weekly meetings.

While this option is not the ideal situation, and much of the feedback, training and relationships that have created such a success are lost, it is easier on those that just can't get the out of office

time. This has also benefited the group as a whole as the remaining OBCs who are able to attend have less repetition in the meetings and more continuity of training.

Is it really free?

To be completely honest, this program has extended the reach of the IS&S department beyond what staffing budgets allow. The only real expense has been time, but it is important not to take the OBCs for granted. Spending a little on them can go a long way. Berea College has provided third party software manuals for core software packages to each OBC, and have given appreciation gifts (USB flash drives) to active participants to help them in their work. They are encouraged to add OBC job responsibilities to their job descriptions so that aspect can be considered when salaries are evaluated. So no, it's not completely free, but an amazing opportunity that should not be overlooked.

Outside the business realm

While this may not be a main business goal of a program of this type, it is important to also recognize the heart of this group. Not only has this random gathering of colleagues grown as a team but also a community. Over the past few years members of this group have went through very trying times in their personal lives, death of close family members, battles with illnesses, etc., and the support and friendship that has developed between them is amazing. This in itself was never planned as a part of this program but is a great testimony to the strength that can be accomplished when we stand together.

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Computer and Information Technology Students and Organizational Leadership and Supervision Students Learn How to "Play Well" in Interdisciplinary Project Management Course

Julie A. Phillips
Associate Professor OLS
(812) 348-7207
phillip4@purdue.edu

Dewey A. Swanson
Associate Professor CIT
Purdue University College of Technology
4601 Central Avenue
Columbus, IN 47203
(812) 348-7238
dswanson@purdue.edu

Universities graduate thousands of students every semester. These students then go out in the "real" world and pursue careers in their major field of study. While at work, many will be assigned to cross-functional projects, each employee bringing to the team their particular area of expertise. For some, this is the first time they have truly worked on a project. Don't misunderstand. Students have worked on a myriad of team projects through their academic career. However, very few truly know how to manage a project. Most are assigned a project, put into a homogeneous team (all from the same major), given the assignment, and told, "Go". Little, if no, instruction is given on project management, team development, team leadership, team management, etc. Also, most lack the ability to work in heterogeneous teams (different disciplines) because upper-level core-curriculum courses are usually not open to other majors.

At Purdue University's College of Technology, the Columbus, IN campus, the senior level Computer and Information Technology (CIT)/CIT 480 and Organizational Leadership and Supervision (OLS)/OLS 450 Project Management courses combine both these populations of students. The professors from these two disciplines team teach this class.

Approximately three years ago both the CIT and OLS curriculums were updated and a project management class was added. Both disciplines taught the basic theories and fundamentals of project management, utilized Microsoft Project as the coursework tool, and assigned a team project focused around the discipline. CIT students worked on a computer related project and OLS worked on a leadership project. As one would suspect, only CIT students were allowed to enroll in their CIT project management course and only OLS students were allowed to enroll in their OLS project management course. The two professors who taught in these disciplines met and discussed that team teaching these classes would greatly benefit the students by placing them in a cross functional team which is more applicable to real life.

The spring semester of 2005 was the first time that this co-listed project management class was offered. The course material was divided between the two professors, with the CIT professor focusing more on teaching Microsoft Project as the tool to be used for the project and the OLS professor teaching the theory and fundamentals of project management and team development.

The Director of the Business department at our local campus was made aware of this course and asked if the senior level Business students (Bus) could enroll. We definitely said yes, since this would make the project teams more diverse.

Since the course focused on not only learning the material but applying the material through an actual project, we hit the ground running by assigning the project teams during week one of the class. We divided the OLS, CIT, and Bus students into equal teams. As suspected, the students weren't thrilled with being separated and taken out of their comfort zone. Once the teams were assigned we had them meet, during class, and exchange basic information: name, major, work experience, email, phone numbers, schedules, etc. We also had them share some generic information: favorite M&M, what music you would take along with you if you were stranded on an island, something interesting about you that most people don't know, etc. The latter information was used to promote team building.

During week two of the class, the teams met and determined the following: project, project manager, assistant project manager, and other roles and responsibilities of the team members. This was then documented and handed into the instructors.

As the semester progressed the nuts and bolts of project management were taught. We covered the following topics:

- The Triple Constraint
- Project Management Knowledge Areas
- Project Phases and Project Life Cycle

Each of the above topics was detailed through lectures, practical application of using Microsoft Project, and team activities. Every time that we did a breakout activity with a team, we utilized the original project team that was assigned during week one. We wanted to allow these diverse groups of people ample time to get to know each other, through actual work/team activities.

The class utilized quizzes, exams, Microsoft Project labs, and team activities. These were used to reinforce the above topics. The Microsoft Project labs and the team activities were "trial runs" for using the tools and techniques for the main team project. Because of this, completion of the exercise earned total points possible. The professors provided valuable feedback on the labs and team activities, so the teams knew how to utilize the tools and techniques for the actual team project.

The team project was broken into 4-phases with a deliverable at the end of each phase. A sample phase is as follows:

Phase 1 – Management Review (M-Review) by Project Sponsors

- Design a Project Book Cover
- Charter
- Stakeholder Analysis
- Preliminary Work Breakdown Structure, 2-levels, tabular form (no Gantt Chart)
- Scope Statement
- Team Contract

The phases were submitted by the project manager of each team. The professors, during the project phases, became the Sponsors of the project (in project management terms this is the person who is responsible for the funding, direction, and support of the project). When the phases were submitted, the review by the Sponsors, was considered an M-Review. An M-Review is a management review between the project manager and the Sponsor. During this M-Review the Sponsor could make changes, ask for clarification, or kill the project. We as Sponsors did make a significant change to each project after phase two. One project's budget was cut in half, one was given additional funding, one's due date for completion was moved up 1 month, and one team had a student drop the course during the semester, who took all the documentation with him. Because of this, we as Sponsors did not have to create a dilemma; this team experience a "real" dilemma. We purposefully created this drama to simulate the "real-world". A project doesn't run smoothly from start to finish, things happen, and when things happen, the team needs to learn how to pull together and create a new plan.

Once each project phase was graded (by the professors), we them became the Sponsors and reviewed comments/corrections with the project manager. The project manager's job was to then call a meeting with the project team, present the findings, and make corrections to the project that were suggested by the Sponsors. We as Sponsors kept copies of the corrections that we suggested and looked for evidence of these corrections when subsequent phases were submitted for an M-Review.

As stated above in Phase 1 the teams had to create a Team Contract. The purpose of this was to get the teams focused not just on the deliverables, but how to effectively work as a team. And, that working effectively as a team doesn't just happen, it has to be created and managed. This contract consisted of the following:

- Code of Conduct
- Participation
- Communication
- Problem Solving
- Meeting Guidelines

The teams had to fill in under each category how they specifically would work as a team. An example under Meeting Guidelines might read, "Meet weekly during class, Judy will take the notes and post them within 24 hours". Each member of the team signed the contract. We as professors knew that the teams would copy what was in the textbook, but change the names, dates, and times to reflect their team. Because of this, we "messed" with the teams during one in class assignment, which forced them to revisit their team contract and make corrections, based on how they were really performing as a team. The lecture material reinforced this concept and really got the teams thinking about how important it is to work effectively as a team. We also used the team contract when team members complained about another team member. We told them to approach the team member and use the team contract as a tool.

The final deliverable for the team project was a detailed report and presentation. The detailed report consisted of the following:

- Cover page (Team Logo, Project Name, Team Members, Date)
- Table of Contents
- Executive Summary

- Charter
- Scope Statement
- Stakeholder Analysis
- Team Contract
- Project Cost Estimate Worksheet for Personnel
- Materials Cost Budget
- Quality Assurance Statement
- Stakeholder Communication Analysis
- Risk Assessment/Management Plan
- Procurement Analysis
- Expanded Work Breakdown Structure
- Expanded Gantt Chart
- Lessons Learned

The presentation consisted of an executive summary, scope statement, lessons learned, and Q&A. Each member had to dress professionally and present a portion of the project. The presentations were 25 minutes in length.

We have completed teaching five sections of this class. Based on input from the students and professors we have made changes to the course. Some of those changes are listed below.

- Students pick their own projects
- In-class time to work with teams
- In-class time to use Microsoft Project
- Individual assignments using Microsoft Project
- Keep cross functional teams
- Assign teams early in the semester
- Do team building exercises throughout the semester

The future for this class it to continue to have a diverse group of people and to open this class to other majors as requested. Project management is a valuable skill that students will utilize in the work place. However, just learning the "pieces part" of project management and Microsoft Project will not make a project successful. It is the people side of project management that makes a project succeed or fail. At Purdue University College of Technology we simulated this real-world work experience in our project management course. We hope to continue to offer this class and make refinements as we proceed into the future.

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A Place for Music Technology at a Liberal Arts Institution

Scott L. Phillips
Assistant Professor of Music
Transylvania University
300 North Broadway
Lexington, KY 40515
(859) 233-8254
sphillips@transy.edu

Five years ago I took my first college teaching job as an Assistant Professor of Music at Transylvania University in Lexington, Kentucky. I admit that when I first applied for the job, I had never heard of Transylvania University, which, I soon learned, was a "liberal arts college". I attended all of my post-secondary schooling at large universities (Brigham Young University, University of Central Florida, and the University of Iowa), each with student populations over 30,000. I had not previously been exposed to a university setting with only 1,100 students and 70 faculty members. Moreover, while I was aware of the concept of a liberal arts education, I was not sure how this translated into the vision of a small private college, or how it would impact me as a professor at that institution. The purpose of this paper is to discuss the development of the study of music technology at Transylvania University within the context of the University's Liberal Arts vision and goals. It is my desire that my experiences might be helpful to those at the ASCUE conference and others who may read these proceedings who find themselves in an educational setting where the study of technology may be considered by some to be contrary to broader educational goals.

What is a Liberal Arts College?

According to the *Encyclopedia Britannica Concise* (Eleventh Ed., 2007), a liberal arts college is, "a college or university curriculum aimed at imparting general knowledge and developing general intellectual capacities, in contrast to a professional, vocational, or technical curriculum." Additionally, liberal arts colleges often place a major emphasis on teaching quality and life-long learning, and boast smaller enrollments, class sizes, and student to teacher ratios. Most classes are taught by full-time faculty members, many of whom have terminal degrees in their fields. Liberal arts colleges are generally private institutions which may or may not receive support through a religious affiliation.

Transylvania University aligns itself well with these definitions. Transylvania is a private college with a historical relationship to the Disciples of Christ, Christian Church. The student population of just over 1,100 and the school boasts small class sizes, and a 13:1 student to faculty ratio. Over 97% of faculty hold the Ph.D. or other terminal degree in their field. As evidence of a strong commitment to excellence in teaching, in the past six years, the annual award for best university teacher at any Kentucky school has gone to a Transylvania professor five times. Additionally, Transylvania's stated goals align with the ideals of "imparting general knowledge and developing general intellectual capacities". They are as follows:

- To develop students' intellectual and creative abilities.
- To stimulate the search for knowledge.
- To promote open and fair-minded examination and discussion of values in all forms of endeavor.

- To encourage inquiry and conversation across the traditional academic disciplines.
- To stimulate in students an understanding of themselves and their relation to others in a diverse, ever-changing world.
- To promote opportunity for students to develop as independent thinkers and leaders.
- To foster a campus community characterized by compassion, respect, ethical concern, and social responsibility.
- To establish a foundation for graduate and professional study, and a variety of satisfying careers.

What is Music Technology?

By definition, technology is the "practical application of knowledge especially in a particular area" (Merriam-Webster Online, 2007). In the case of music, technology refers to the tools that are used as one participates in all aspects of music, such as its creation, performance, production, and consumption. Currently, the term music technology often denotes electronic hardware and computer software, but technology has always been a part of music making. During the early 1700's, for example, some in the musical world were concerned about a new instrument that represented "technological developments" they feared would negatively impact music making. Instrumentalists refused to play it, and composers refused to compose for it. Johann Sebastian Bach predicted its eventual demise, stating that the "notes were too soft to allow a full dynamic range." The instrument was the piano. Today no one questions the use of the piano in music making, or the appropriateness of its study at the university, but current technological developments and their study are questioned. Futurist Alan Kay underscored this dichotomy when he observed, "Technology is 'technology' only for people who are born before it was invented."

The Case for the *Study* of Music Technology

For many in the liberal arts community, it is felt that the study of music technology primarily consists of "skills training" that requires little or no creativity, new thought or deep intellectual exploration. This is the same kind of criticism that is often made of computer science programs. Many feel that this kind of training is best achieved at community colleges and technical or professional schools and has no place in the liberal arts college.

While vocational institutions that conduct this kind of skills training do exist for music technology fields such as recording and producing, the actual *study* of music technology goes far beyond simply acquiring the skills involved to operate hardware and manipulate software. Certainly it is important to learn these skills, but students of music technology must also understand its history and development. They must grapple with important philosophical and ethical issues. Music technology students also need to be good musicians, with an understanding of music as an art form and its history and development. They need to learn musical sensitivity and sophistication that is informed by and improved by their understanding of current technology. Beyond the field of music, students who wish to be involved in one of the many aspects of music technology as a career need to be readers, writers and thinkers. They need to be able to work well with people and be strong communicators. For this kind of education in music technology, a liberal arts college can be an ideal setting.

How We Do it at Transylvania

Transylvania University is one of a small handful of Liberal Arts Colleges to offer music technology as a course of study. Courses in music technology began being offered in the spring of 2004 with "Introduction to Music Technology". This course was offered during Transylvania's "May Term" as a special topics course, but was quickly filled and additional students wondered when the course would be offered again. By the Winter Term of 2005, the course was officially added to the schedule and has been offered nearly every term since. A second course, "Audio Recording Techniques," was created and offered in Fall Term 2005, allowing students an additional level of music technology exploration and experience. In both of these courses, I worked to ensure that the students explored the history and philosophy of music technology as they developed technical skills.

As the music faculty members considered what Transylvania could offer to students interested in pursuing graduate work or a career in a music technology, we developed and proposed a music technology major. The major incorporates the two aforementioned courses in music technology, but also includes courses in music history and theory, four semesters of applied study on an instrument, participation in musical ensembles, study in music composition, and courses in computer science. In addition to these core courses, students culminate their study with a semester-long internship and a final music technology project. The requirements of the major include diverse offerings which go far beyond the limited confines of simple skills training. Additionally, Transylvania students benefit from the broad general education requirements for graduation that make up the University's curriculum.

The music technology major was accepted by the university faculty in the Winter Term of 2006. During the first year, several students have declared music technology as their major. Additionally, plans are underway for the construction of a fine arts technology lab (see Figure 1). In this facility, students will have access to the latest developments in music and art technology.

Conclusion

There is an increasing demand in the academic and professional music world for liberally educated individuals who are not only fine musicians, but who are also trained in computer science and music technology. By offering a music technology major at a liberal arts institution, we hope to provide a learning environment that stimulates creativity, encourages the search for knowledge and inquiry, establishes a foundation for further study, and prepares students for a satisfying and exciting future.

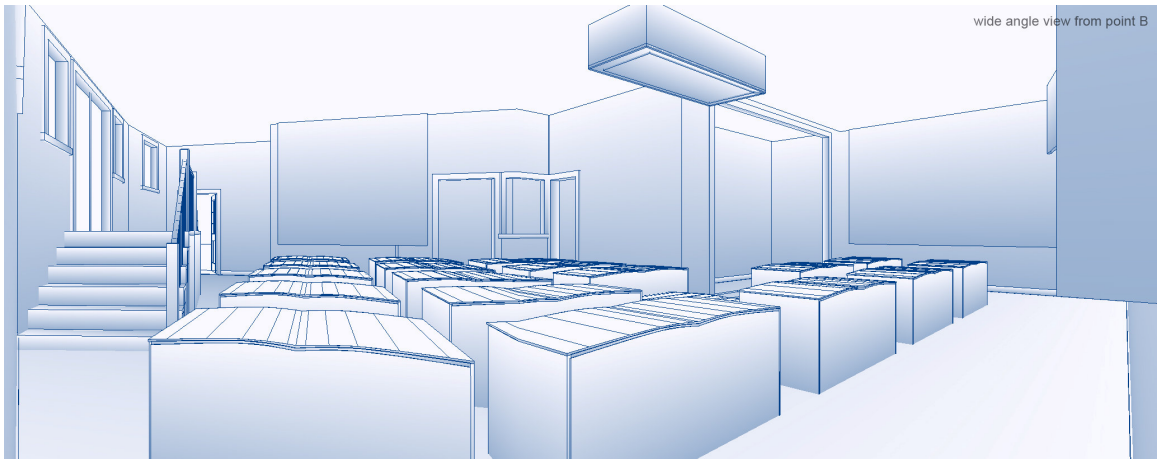


Figure 1: Future Fine Arts Technology Lab

Recruiting Women into IT

Cheryl Reindl-Johnson
Sinclair Community College
444 W. Third Street
Dayton, OH 45402
937-512-3892
cheryl.reindl-johnson@sinclair.edu

Abstract

There is a global decline in the number of women earning degrees in Information Technology (IT) and taking IT jobs. There has been a general decline in computer science enrollment over the past five years, with some estimates as high as 60%. Additionally, the percentage of women pursuing bachelor's degrees in computer science has declined from a 37% high in 1985 to 17% in 2003.

Enrollment in associate degree computer science programs in Ohio shows an encouraging 57% increase between 1999 and 2005. The bad news is that although females represent a consistent 64% of all associate degrees awarded in Ohio, the percentage of women who earned degrees in computer-related programs actually fell from 47% to 31%.

A statewide initiative was undertaken in 2006; ten colleges around the state planned a pilot event to help reverse the trend. Find out about our successful event, our plans for an even better event for 2007, and share information and ideas from your own experience.

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

Our first Totally Online B.S. Program

Gary S. Rogers
Alicia David
Steve Greene
Macon State College
100 College Station Drive
Macon, GA 31206
478-471-2700
grogers@mail.maconstate.edu

Macon State College has proposed a new totally-online Bachelor degree program in Information Assurance. This will be our first totally-online Bachelor's degree program. We propose to present this new degree, why we are establishing this, what markets conditions favor this program, etc.

This is in response to the nationwide drop in IT enrollment.

Background

It is clear that there is a perception among many young people that technology is not a reliable field to enter in terms of landing suitable employment. How do we know this? Decline in IT programs nationwide are in a period of decline. And, this problem is apparently quite real. CS, SE, and IS enrollments are down drastically, and some educational institutions have talked about either closing IT down or merging it into some other academic discipline.

The reasons for this are many, but prevailing in studies on this issue is the psychological impact from the IT (e.g. dot com") bubble bursting in 2001.

Specifically, we at Macon State College have suffered a 14% decline in IT enrollment since 2001. In order to address this decline, the Division of Information Technology is pursuing several efforts as follows:

1. The College has recruited a hard-charging and dynamic Chair who has a superb record in recruiting students in this field as well as solid and highly-respected managerial accomplishments.

2. Efforts have been underway to seek ABET accreditation. ABET accreditation is assurance that a college or university program meets the quality standards established by the profession for which it prepares its students. For example, an accredited engineering program must meet the quality standards set by the engineering profession. An accredited computer science program must meet the quality standards set by the computing profession.

3. Internal retention efforts are underway, namely we are attempting to educate our current student base that there are indeed employment opportunities in the information technology arena nearby, contrary to what they may believe. It should be noted that the off shoring efforts being seen in many locations are not reflected by the local employers).

4. Curriculum review is undergoing to assure our curriculum and its individual emphases and even courses are relevant to our local employer base. This employer base primarily consists

of information technology positions at Robins Air Force Base, the third largest USAF base, educational institutions nearby (the local k-12cschool systems), IKON, GEICO as well as others, including smaller mom-and-pop operations.

5. Accelerating out efforts in placing interns out into the local community. We have discovered that many of these interns end up being hire, full-time, at their intern locations once they have graduated with their degree.

6. Cementing more effective partnerships with local businesses including the possible resurrection of a business liaison council.

7. Introduction of an entirely new online Bachelor of Science in Information Assurance degree.

It is this latter item, e.g. "reason", this brief is directed.

The Process

The Division of Information Technology at Macon State College conducted informal interviews with community leaders such as local government and business leaders. This process was initiated in order to ascertain whether there are areas of interest that out current Bachelor of Science in Information Technology degree does not adequately address. Again, this approach was pursued so as to hopefully find a way to increase enrollment. The result of these interviews was that the area of Security/Information Assurance is not adequately represented in our current academic offerings.

This offering should be highly desirable in light of the many businesses needing secure systems as well as enhanced security concerns at Robins Air Force Base. Robins Air Force Base is the home of Warner Robins Air Logistics Center, the 78th Air Base Wing, and more than 60 other units that make up a vital part of the Air Force war fighting team. It is the largest industrial complex in Georgia, employing a work force of over 25,584 civilian, contractor, and military members. Robins Air Force Base has an annual net payroll of $1,239 million, annual expenditures of $265 million, and a retiree payroll of $491 million. Using a standard Air Force formula places the annual value of indirect jobs created at $836 million for a total economic impact of $2.8 billion in FY05.

In the past, the Middle Georgia RDC utilized a region specific model that considered variables unique to each installation, including among others:

1. The base's mission,
2. The diversity of the economy in the surrounding communities,
3. and the size of the local population.

Averaging the 2004 RDC furnished factor of 2.364 with previous year's analysis places the value of indirect jobs created at $2.2 billion in
FY05. This leads to an estimated total economic impact of $4.2 billion in FY05, as shown below.

Net Payroll
$1,238.5 million

Retiree Payroll
$490.9 million

Annual base expenditures in Ga
$265.6 million
Annual value of indirect jobs created
$2,162.6 million

Total Economic Impact in Ga
$4,157.6 million

In addition to the increased emphasis on Security/Information Assurance at Robins Air Force Base, we also get many of requests for a fully online program. These requests come from local business leaders and our current student base. As one evidence of the pent-up demand for online course offerings, the Division has had several instances within the past two years where a class will not have sufficient enrollment and so we are forced to not "make" it, e.g. not offer it. However, as a test case, some time ago we began offering to offer that course online. In every case studied, the course enrollment soared almost overnight. As only one example, we offered a Linux Systems Administration course a year ago and only four students initially enrolled. After an email to all IT students indicating it would be shifted to a totally online class, enrollment increased in three days form four to fourteen.

We have already obtained permission form the Vice President of Academic Affairs to offer this program. Next, the new program must be approved by the entire Academic Council. This decision is imminent. Finally, it must be approved by the Board of Regents of the University System of Georgia. Where are we at this point in time? We are in the final stages of crafting the program. The projected program is shown below (subject to change). It should be noted that students must first take out "standard" junior-level classes before they are eligible to enroll in the courses listed below:

ITEC 4205 Legal Issues in Information Technology (3)

> Old catalog description: This course provides the opportunity for IT majors to learn about the legal, regulatory, and ethical issues involved in the field of information technology. The legal concepts and laws that govern computers and technology will be studied. Topics include ethics, security, privacy, current legal issues. *PREREQ:* At least a C in ITEC 2215
>
> 1. Introduction to Cyberethics: Concepts, Perspectives, and Methodological Frameworks.
> 2. Ethical Concepts and Ethical Theory: Establishing and Justifying A Moral System.
> 3. Critical Thinking Skills and Logical Arguments: Tools For Evaluating Cyberethics Issues.
> 4. Professional Ethics, Codes of Conduct, and Moral Responsibility.

5. Privacy and Cyberspace.
6. Security in Cyberspace.
7. Cybercrime and Cyberrelated Crimes.
8. Intellectual Property Disputes in Cyberspace.
9. Regulating Commerce and Speech in Cyberspace.
10. Social Inclusion, the Digital Divide, and the Transformation of Work: The Impact for Class, Race and Gender.
11. Community and Identity in Cyberspace: Ethical Aspects of Virtual-Reality and Artificial-Intelligence Technologies.
12. Pervasive Computing and Converging Technologies: Ethical Aspects of Ambient Intelligence, Bioinformatics, and Nanocomputing.

ITEC 4321 Computer Forensics

This course offers a disciplined approach to implementing a comprehensive accident-response plan with a focus on being able to detect intruders, discover what damage they have caused, and discover their identities.
This course offers a disciplined approach to implementing a comprehensive accident-response plan with a focus on being able to detect intruders, discover what damage they have caused, and discover their identities. Students will learn about digital evidence and computer crime in the fields of law enforcement, forensic science, and computer security. This course explains how computers and networks function, how they can be involved in crimes, and how they can be used as a source of evidence. Students will learn about relevant legal issues and will be introduced to deductive criminal profiling, a systematic approach to focusing an investigation and understanding criminal motivations.

ITEC 4285 Web Server Administration

This course covers installation, configuration, and administration of Web servers and services; focus on Windows-based network operating systems running Internet Information Services (IIS) and Apache Web Services; setting up, securing, and managing services including hypertext transfer protocol (HTTP), file transfer protocol (FTP), and simple mail transport protocol (SMTP); extensive hands-on work in a network laboratory.

ITEC 429B5 Network Security

Book: *Counter Hack Reloaded: A Step-by-Step Guide to Computer Attacks and Effective Defenses,* 2/E

Explores the products, people, and processes that implement the Network Security Monitoring (NSM) model. By focusing on case studies and the application of open source tools, the student will gain hands-on knowledge of how to better defend networks and how to mitigate damage from security incidents.

- The NSM operational framework and deployment considerations.
- How to use a variety of open-source tools—including Sguil, Argus, and Ethereal—to mine network traffic for full content, session, statistical, and alert data.

- Best practices for conducting emergency NSM in an incident response scenario, evaluating monitoring vendors, and deploying an NSM architecture.
- Developing and applying knowledge of weapons, tactics, telecommunications, system administration, scripting, and programming for NSM.
- The best tools for generating arbitrary packets, exploiting flaws, manipulating traffic, and conducting reconnaissance.

ITEC 42XX Database Security and Disaster Recovery

Possible books: *Implementing Database Security and Auditing: Includes Examples for Oracle, SQL Server, DB2 UDB, Sybase* and (*Disaster Recovery Planning: Strategies for Protecting Critical Information Assets* or *Disaster Recovery: Principles and Practices*)*:*

The student will learn many methods and techniques that will be helpful in securing, monitoring and auditing database environments. It covers diverse topics that include all aspects of database security and auditing - including network security for databases, authentication and authorization issues, links and replication, database Trojans, etc. The student will also learn of vulnerabilities and attacks that exist within various database environments or that have been used to attack databases (and that have since been fixed).

The student will also learn about an extensive introduction to disaster recovery focusing on planning the team, planning for the disaster and practicing the plan to make sure that, if ever needed, *it will work.*

Chapter 1: Introduction to Disaster Recovery
Chapter 2: Preparing to Develop the Disaster Recovery Plan
Chapter 3: Assessing Impact and Risks in the Enterprise
Chapter 4: Prioritizing Systems and Functions for Recovery
Chapter 5: Identifying Data Storage and Recovery Sites
Chapter 6: Developing Plans and Procedures, and Relationships
Chapter 7: Developing Procedures for Special Circumstances
Chapter 8: Testing the Disaster Recovery Plan
Chapter 9: Continued Assessment of Needs, Threats, and Solutions
Appendix A: Disaster Recovery Plan
Appendix B: Checklist Sample Testing Documents

Take either

ITEC 42XX Software Security

Possible books: *Software Security: Building Security In* or *19 Deadly Sins of Software Security*.
Prerequisite: ITEC 3310. Covers:

Eliminate these security flaws from computer code:

- Buffer overruns
- Format string problems
- Integer overflows
- SQL injection
- Command injection
- Failure to handle errors
- Cross-site scripting
- Failure to protect network traffic

- Use of magic URLs and hidden forms
- Improper use of SSL
- Use of weak password-based systems
- Failure to store and protect data securely
- Information leakage
- Trusting network address resolution
- Improper file access
- Race conditions
- Unauthenticated key exchange
- Failure to use cryptographically strong random numbers
- Poor usability

Or

ITEC Wireless Network Security

Possible book: *Security In Wireless LANS And MANS* or *CWNA Certified Wireless Network Administrator Official Study Guide (Exam PW0-100), Third Edition*

Key foundation topics and technology frameworks for designing and maintaining secure, reliable operations. Covers basic concepts to designing principles to deployment, and coverage of wireless security testing techniques and intrusion prevention techniques. Identify various vulnerabilities in the physical layer, the MAC layer, the IP layer, the transport layer, and the application layer, and discuss ways to strengthen security mechanisms and services in all these layers. The topics covered include intrusion detection, secure PHY/MAC/routing protocols, attacks and prevention, immunization, key management, secure group communications/ multicast, secure location services, monitoring and surveillance, anonymity, privacy, trust establishment/management, redundancy and security, and dependable wireless networking.

Conclusion

Our preliminary data shows that this new program should bring new students into our Division of Information Technology. This has obvious benefits from increased opportunities for faculty to teach varied classes, students becoming more knowledgeable in a skill area desirable to out local employment market, and, finally, employers being in the unique position of obtaining qualified students in this highly-desirable knowledge area.

Why Teach What Students Can Learn Themselves?

Sunil Gopalchandra Samanta
Computer Information Technology
Franklin Pierce College
20 College Road
Rindge, NH 03461
603-899-4253
samantas@fpc.edu

Abstract

One of the major challenges information technology teachers in the US face is motivating students to learn what teachers want to teach. Often teachers fail in doing so. This leads teachers to learn and apply better teaching techniques. Students keep getting doses of better teaching techniques akin to overfeeding, which become counterproductive. This may also have contributed to the decline in student-enrollment in the information technology major.

Students inherently may not be unmotivated. This can be confirmed by another surprising trend. Most young people are found to be using technology to a much greater extent. They take to the Internet, chat, instant messaging cell phones, video games etc. like a duckling takes to water. If they can learn all that on their own why can't they educate themselves? The purpose of this paper is to explore how teachers can avoid teaching and yet educate the next generation by letting them do so.

Keywords: Pedagogy, Pedagogical, Learning, Teaching, Teaching Approaches, Student, Teacher, Higher Education, Undergraduate, Training, Student Led Teaching

Background

Lecturing may be one of the most popular methods of teaching. However, research (Meyers and Jones, 1993) on the lecturing method indicates a limitation of lecturing. I too found that lecturing causes disinterest among the students. This makes educating them more difficult. To involve students to a greater degree and hence to retain their interest and ultimately increase in their learning I wondered why teach what students can learn themselves? I experimented with student-led learning.

Spring 2006

I used to feel frustrated when my students would not be able to fully learn what I taught them. This led me to change my focus to student-led learning in spring 2006. Instead of me using the instructor's computer and doing a lecture and demo, I availed the help of a student who would demo on the instructor's computer and I would lecturing him or her on how to do it. I was amazed to notice that this approach significantly improved the learning of students. According to my guesstimate, more than 90% of the students would learn more than 90% of the contents of the course. Earlier about 60% of the students would learn about 80% of the contents of the course.

Fall 2006

I became bolder and attempted to further increase student involvement. In fall 2006, I formed groups of two students in each of my classes for: microcomputer applications (using Microsoft: Word, Excel, Access, and PowerPoint), electronic spreadsheets (using Microsoft Excel), and database applications (using Microsoft Access). I asked the groups to make presentation of chapters in the book. I also assured them that they need not feel insecure because I will always be available in case of need. The chapters include hands-on practice on microcomputer applications. Most of the instructions in the book were click this or click that, and type this or type that.

It very went well with my microcomputer applications class. It did not go well with my classes on electronic spreadsheets, and database applications. All the students in my microcomputer class were new to me and I was new to them. For them it was not a change in pedagogy. It was the pedagogy. That was not the case with my electronic spreadsheets and database applications classes. Many of the students had known me teaching them by lecturing so they noticed the change in pedagogy distinctly. This also caused a little bit of unease among them. My assurance that I will always be available in case of need eased their tension. I did not have to help them much in the actual practice. The students in all the classes finished learning much better than if I had taught them. They also did it much faster. At the end of the semester I found added confidence among the students.

Spring 2007

In spring 2007, I taught similarly in five classes. These classes are microcomputer applications (21 students), a freshman level course; object-oriented programming (9 students), a sophomore level course; systems analysis and design (11 students), a senior level course, and two classes of principles of financial management (29 and 30 students), a sophomore level course, where I also used Microsoft Excel for teaching financial analysis.

In the microcomputer applications class the groups were expected to carry out hands-on practice using textbook projects. In the object-oriented programming class students were required to use the source codes in each chapter made available by the publisher. They were required to explain the source codes and modify programs as per my instructions. In systems analysis and design and principles of financial management classes the students were required to use modified PowerPoint slides provided by publishers of the books. They were asked to limit the number of PowerPoint slides to 10 to 15 as opposed to the publisher's 30 to 50. This was to allow more time for the class discussion. Additionally systems analysis and design class students were required to learn and use MS Visio and MS Project by themselves.

My involvement was minimal in the microcomputer class. This was followed by the systems analysis and design class wherein I provided lot of input from real world examples. Since most students lacked much work experience, this was expected. In the object-oriented programming class my involvement was higher. I had to explain basic concepts and repeat them often to students. In principles of financial management classes the results were mixed. One of the classes was housed in computer lab. Students had access to a computer in front of them and this provided ample opportunity for students to get distracted by engaging themselves in doing chat, IM, e-mail, web surfing etc. I had to supplement up to half the course in some of the classes. Since this was a required course some of the students did not display the required level of enthusiasm

to learn it. These students would make substandard presentations often reflecting bare minimal preparation. Their response to my motivation to prepare better was not satisfactory.

Survey

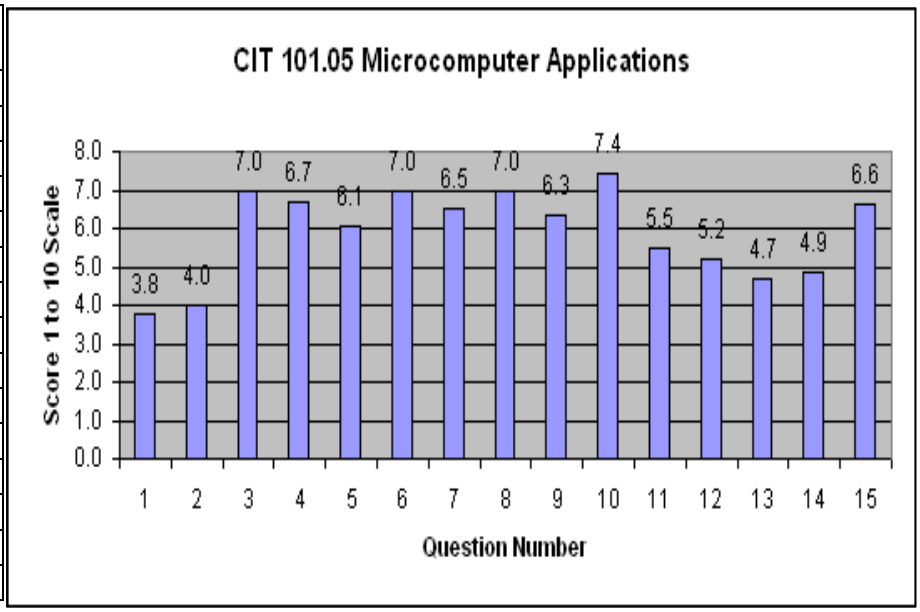
At the end of the semester I carried out a survey in all classes to learn how students viewed at this pedagogy. I asked following questions:

1. How **difficult** did you find it for you or your group **to prepare** for your presentation? (Very Easy = 1, Average = 5, Very Difficult = 10)
2. How **difficult** did you find it for you or your group **to do your presentation**?
3. (Very Easy = 1, Average = 5, Very Difficult = 10)
4. **How well** did **you or your group** make **preparation** for their presentation?
5. (Not Effective = 1, Average = 5, Very Effective = 10)
6. **How well** did **other students or groups** make their **presentation**?
7. (Not Effective = 1, Average = 5, Very Effective = 10)
8. **How good** did you find the **question/answer session** that followed the presentation?
9. (Not Effective = 1, Average = 5, Very Effective = 10)
10. Did you find **yourself more involved** in the learning?
11. (Not Involved = 1, Somewhat = 5, Very Involved = 10)
12. Did you find other **students** in your class were **more involved** in the learning?
13. (Not Involved = 1, Somewhat = 5, Very Involved = 10)
14. **How good** did you find such **verbal interaction** by the **instructor**?
15. (Not Effective = 1, Average = 5, Very Effective = 10)
16. **How good** did you find such **supplementary notes** provided by the **instructor**?
17. (Not Effective = 1, Average = 5, Very Effective = 10)
18. **How much** did you learn in this course from the **textbook**?
19. (Not Much = 1, Somewhat = 5, Very Much = 10)
20. **Whom** would you **credit** for your **learning** in this course from the **textbook**?
21. (Instructor = 1, Both Instructor & Students = 5, Students = 10)
22. **How much** did you learn in this course that was from the **real world situations** outside of the textbook?
23. (Not Much = 1, Somewhat = 5, Very Much = 10)
24. **Whom** would you credit for your learning from the **real world situations** outside of the textbook?
25. (Instructor = 1, Both Instructor & Students = 5, Students = 10)
26. **How much** did you improve your **presentation skills**?
27. (Not Much = 1, Somewhat = 5, Very Much = 10)
28. How much **do you appreciate** overall **this approach** where students or their groups are required to make preparation and presentation of the textbook chapters?
29. (Not Much = 1, Somewhat = 5, Very Much = 10)

Data gathered are presented along with chart class-wise in Table 1 through 5 as follows:

Table 1

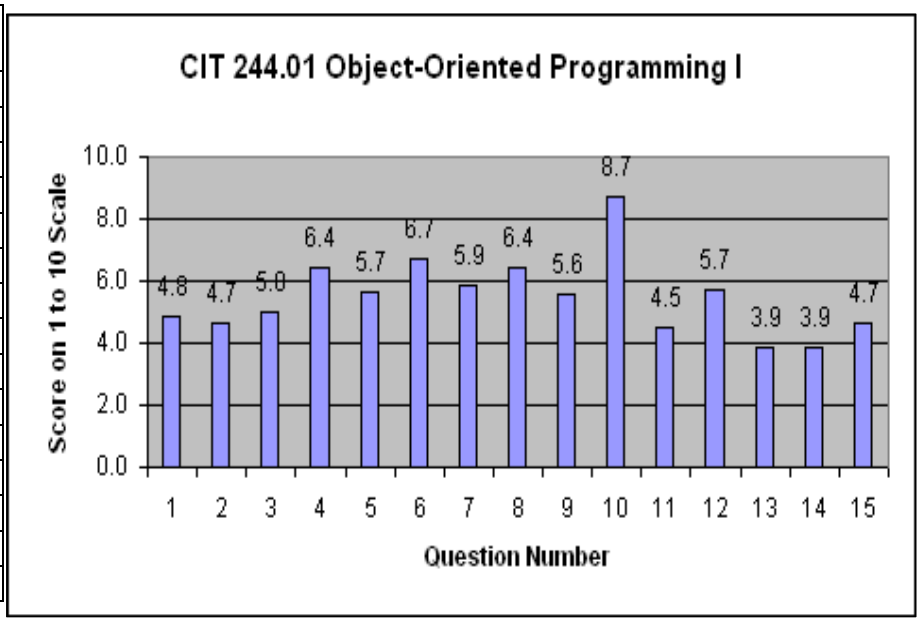
Q	A	S
1	3.8	1.8
2	4.0	2.3
3	7.0	1.9
4	6.7	1.4
5	6.1	2.2
6	7.0	1.7
7	6.5	1.6
8	7.0	1.7
9	6.3	2.6
10	7.4	2.3
11	5.5	2.0
12	5.2	2.6
13	4.7	1.9
14	4.9	2.5
15	6.6	2.2



Valid response was received from 14 students out of 21 students i.e. 67%

Table 2

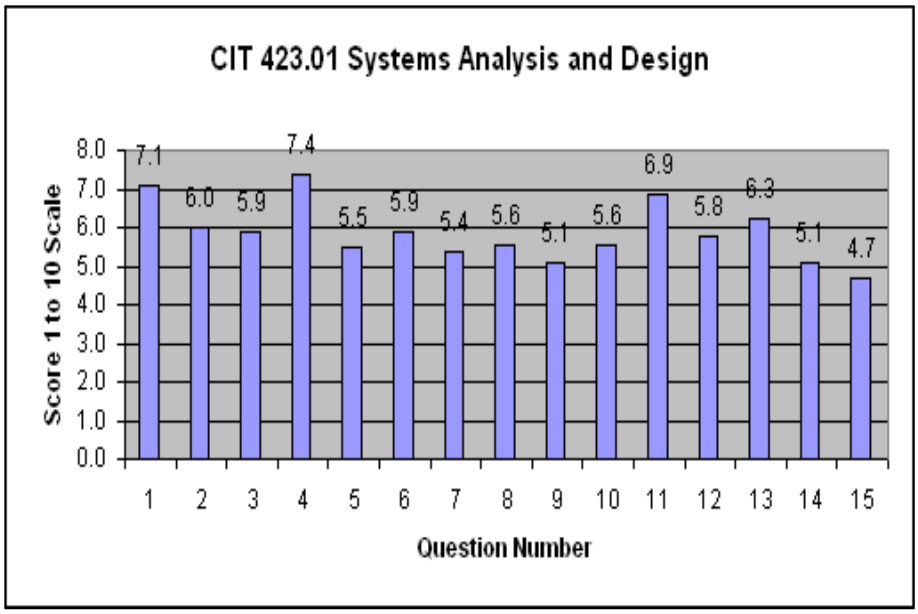
Q	A	S
1	4.8	3.1
2	4.7	2.9
3	5.0	2.3
4	6.4	1.9
5	5.7	1.4
6	6.7	2.0
7	5.9	1.7
8	6.4	2.0
9	5.6	2.5
10	8.7	1.1
11	4.5	3.0
12	5.7	1.7
13	3.9	2.9
14	3.9	1.7
15	4.7	2.4



Valid response was received from 7 students out of 9 students i.e. 78%

Table 3

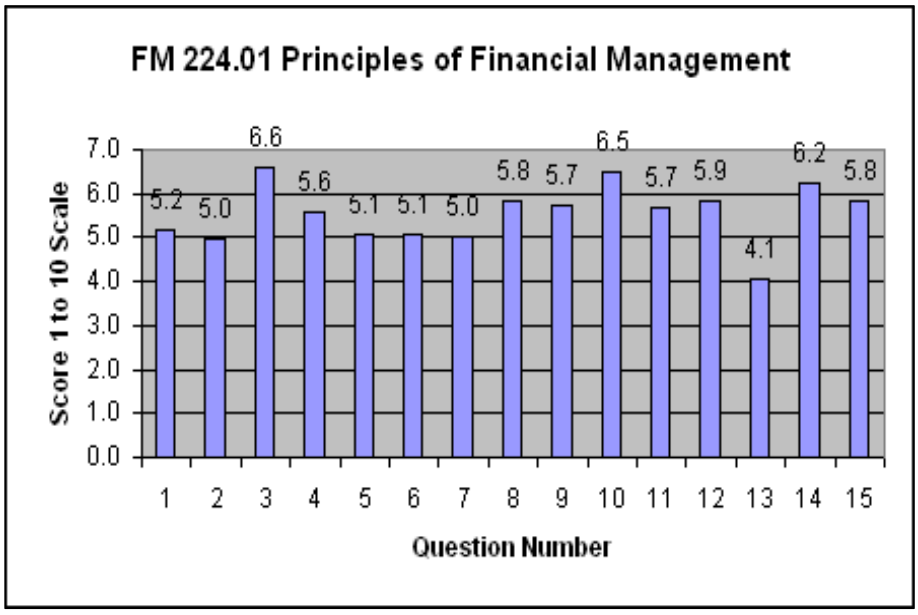
Q	A	S
1	7.1	1.7
2	6.0	2.5
3	5.9	1.6
4	7.4	2.3
5	5.5	0.9
6	5.9	2.5
7	5.4	2.2
8	5.6	2.2
9	5.1	3.4
10	5.6	2.4
11	6.9	2.3
12	5.8	2.3
13	6.3	2.9
14	5.1	2.9
15	4.7	3.1



Valid response was received from 9 students out of 11 students i.e. 82%

Table 4

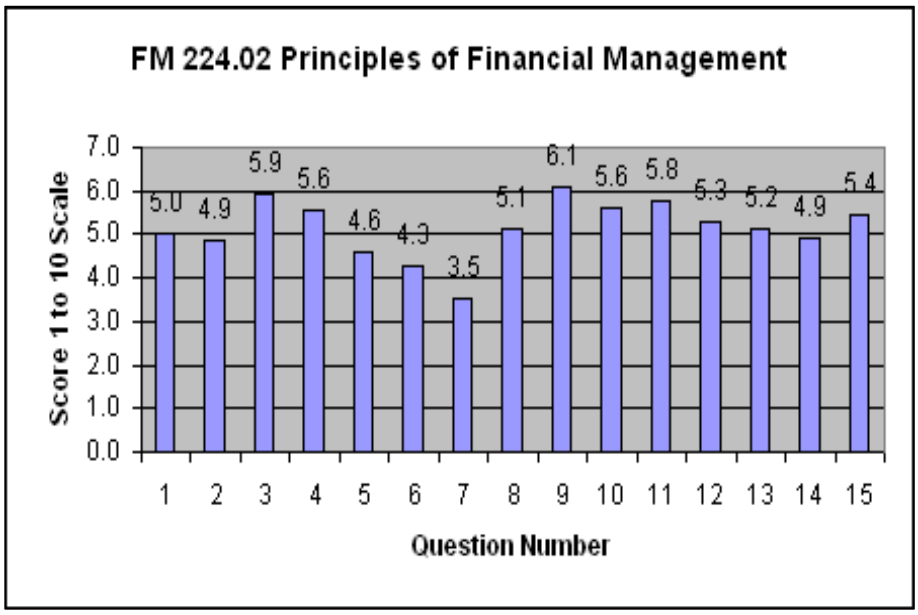
Q	A	S
1	5.2	1.6
2	5.0	1.1
3	6.6	1.2
4	5.6	1.5
5	5.1	1.9
6	5.1	2.1
7	5.0	1.9
8	5.8	2.0
9	5.7	2.2
10	6.5	2.4
11	5.7	1.8
12	5.9	2.3
13	4.1	2.0
14	6.2	2.0
15	5.8	2.7



Valid response was received from 21 students out of 29 students i.e. 72%

Table 5

Q	A	S
1	5.0	1.7
2	4.9	1.7
3	5.9	1.7
4	5.6	2.0
5	4.6	2.3
6	4.3	2.3
7	3.5	2.0
8	5.1	2.7
9	6.1	2.5
10	5.6	2.7
11	5.8	2.2
12	5.3	2.4
13	5.2	2.3
14	4.9	2.0
15	5.4	3.1



Valid response was received from 21 students out of 30 students i.e. 70%

To get comparative idea the data gathered in all the classes are presented in Table 6 as follows:

Table 6

CIT 101.5 Microcomputer Applications			**CIT 244.01 Object-Oriented Programming I**		**CIT 423.01 System Analysis & Design**		**FM 224.01 Principles Financial Management**		**FM 224.02 Principles Financial Management**	
Q	**A**	**S**	**A**	**S**	**A**	**S**	**A**	**S**	**A**	**S**
1	**3.8**	1.8	4.8	**3.1**	**7.1**	1.7	5.2	1.6	5.0	1.7
2	**4.0**	2.3	4.7	**2.9**	**6.0**	2.5	5.0	1.1	4.9	1.7
3	**7.0**	1.9	**5.0**	**2.3**	5.9	1.6	**6.6**	1.2	**5.9**	1.7
4	**6.7**	1.4	6.4	1.9	**7.4**	**2.3**	**5.6**	1.5	**5.6**	2.0
5	**6.1**	2.2	5.7	1.4	5.5	0.9	5.1	1.9	**4.6**	**2.3**
6	**7.0**	1.7	**6.7**	2.0	**5.9**	**2.5**	**5.1**	2.1	**4.3**	2.3
7	**6.5**	1.6	**5.9**	1.7	**5.4**	**2.2**	**5.0**	1.9	**3.5**	2.0
8	**7.0**	1.7	6.4	2.0	5.6	2.2	5.8	2.0	**5.1**	**2.7**
9	6.3	2.6	5.6	2.5	5.1	**3.4**	**5.7**	2.2	**6.1**	2.5
10	**7.4**	2.3	**8.7**	**1.1**	5.6	2.4	**6.5**	2.4	**5.6**	**2.7**
11	5.5	2.0	**4.5**	**3.0**	**6.9**	2.3	5.7	**1.8**	5.8	2.2
12	5.2	2.6	5.7	1.7	**5.8**	2.3	**5.9**	2.3	5.3	2.4
13	4.7	1.9	**3.9**	**2.9**	**6.3**	**2.9**	**4.1**	2.0	**5.2**	2.3
14	4.9	2.5	**3.9**	**1.7**	5.1	**2.9**	**6.2**	2.0	4.9	2.0
15	**6.6**	**2.2**	**4.7**	2.4	**4.7**	**3.1**	5.8	2.7	5.4	**3.1**

It was noted that:

1. Preparation for or making presentations was found to be the least difficult for the Microcomputer Applications class whereas the Systems Analysis and Design class found it most difficult. This may be because the Microcomputer Applications textbook has clear-cut instructions that are easy to follow even for freshman students whereas the Systems Analysis and Design textbook probably was the most challenging textbook representing real-life Systems Analysis and Design practices that are more difficult to follow for even senior students who were without practical work experience in the field of Systems Analysis and Design.

   The standard deviation in Object-Oriented Programming I class was highest. Some of the students had good programming logic and found it easy to prepare whereas some of the students struggled to grasp programming concepts and logic.
2. As to the effectiveness of the presentations, the Microcomputer Applications class found it most effective. Principles of Financial Management Section 2 found it least effective. It is interesting to note that students in the Object-Oriented Programming I class and the Systems Analysis and Design class found that other students or groups in the class had made a more effective presentation compared to their own presentation. It should be noted that the standard deviation in the Systems Analysis and Design class was the highest implying some students made more effective presentations whereas some were not very effective. That indeed was the case according to me.
3. The Microcomputer Applications class found that the question/answer session following the presentation was more effective whereas the Principles of Financial Management Section 2 class found it least effective. It also had the highest standard deviation implying more variation in response of students.
4. Students in the Microcomputer Applications class found themselves to be the most involved of all the classes and the Principles of Financial Management Section 2 the least involved. The difference in involvement by self verses other students was significant in the Principles of Financial Management Section 2 class. This was the class that was held in a computer lab classroom and the students suffered more distractions. The classes of Microcomputer Applications, and Object-Oriented Programming I were also held in computer labs but students had lot of class-work to do before they could be tempted by distractions.
5. The Microcomputer Applications class found verbal interaction by the instructor to be most effective. The Principles of Financial Management Section 2 class found it to be the least effective. It also had highest standard deviation.
6. One consolatory aspect of the Principles of Financial Management Section 2 class was that it found supplementary notes provided by instructor to be among the most effective.
7. The Object-Oriented Programming I class followed by the Microcomputer Applications class found that they learned the most from the textbook. The Object-Oriented Programming I class had the least standard deviation.
8. The Object-Oriented Programming I class credited the instructor most for their learning. The Systems Analysis and Design class credited the students. This was by design. While it makes me happy to learn that students of my Object-Oriented Programming I class gave me more credit for their learning, what I wanted was that the students would learn themselves and give more credit to them. The standard deviation was highest in the Object-Oriented Programming I class, though. This implies that there were some students who gave more credit to themselves. I wish the proportion of such students to increase.

9. The students of the Systems Analysis and Design class and the Principles of Financial Management Section 1 class found that they learned the most about the real world situations outside of the textbook. They gave more credit to students and instructor respectively. The Object-Oriented Programming I class gave the most credit to the instructor among all the classes. It also had a high standard deviation.
10. the students of Principles of Financial Management Section 1 class found that they improved their presentation skills the most. It is not surprising that a technical class like Object-Oriented Programming I found that it did not improve their presentation skills very much. Their focus was on improving the technical knowledge which would help in controlling programming codes and whoever did that successfully was valued more than those with more theatrical presentation skills. The standard deviation was the lowest implying higher degree of agreement among the students.
11. The Microcomputer Applications class appreciated this approach the most. The classes of Object-Oriented Programming I and Systems Analysis and Design found it to be the least appropriate. The degree of difficulty of the class may have something to do with this conclusion.

Two Yes/No type of questions were excluded from the analysis due to seeming confusion among the students in grasping their meaning. They are: Did the **instructor supplement** student learning in class by **verbal interaction**? Did the instructor supplement student learning out of class by providing **additional notes**?

The feedback received to one open-ended question (Would you like to make **suggestions** to change the approach adopted in this class so as to make the student learning more effective?) may be summarized as follows:

1) The Microcomputer Applications class provided one feedback comment: The class is good set up the way it is.
2) The Object-Oriented Programming I class provided two feedback comments summarized as:
   a) *(provide)* More student-led working with other students (debugging)
3) The Systems Analysis and Design class provided two feedback comments summarized as:
   a) Do main project in parts along with chapters from beginning of the semester.
4) The Principles of Financial Management Section 1 class provided twelve feedback comments that may be summarized as:
   a) Positive or corroborative feedback included:
      i) …this was a very good approach to make verbal presentations a real part of class learning… every person in business needs communication skills; this class helped… with this. I think that this approach needs no change.
      ii) …this approach was a lot more effective than just being lectured to by the instructor… Q&A after the PowerPoint (presentation) was effective & helped us to learn by ourselves with the instructor's help.
   b) Negative or critical feedback included:
      i) This class was very boring. It was hard to get motivated… It would be a much more effective class if we didn't rely so heavily on the textbook and student presentations and instead focused on real life situations.
      ii) …the self-learning approach is a good idea however it is tough for a required class because a majority of the students are not interested… instructor should do chapter presentations
      iii) Have more in-class group work.

iv) … Instructor should do the presentations but continue to ask questions during class.
v) … introduce an online discussion component in the course
vi) The students are not knowledgeable enough to teach material because they haven't learned it yet. The questions *(by the instructor)* are hard to answer if the group doesn't know.

5) The Principles of Financial Management Section 2 class provided eight feedback comments that may be summarized as:
   a) Positive or corroborative feedback included:
      i) I like being able to use the computers during class to do a good job of teaching. Don't change anything.
   b) Negative or critical feedback included:
      i) Students do not make good presentations or make poor presentations. The course should go at a slower pace and should cover less material *(chapters)* but go in more depth.
      ii) The approach is inappropriate and unacceptable. Instructor should screen students and only if they are found to be good should he approve them to make presentations.
      iii) This approach might be fine in a grad school but not in undergraduate school *(such as ours).*
      iv) Students are disinterested and ill-prepared and make shabby presentations.
      v) The instructor should do more lecturing and teach half or the whole class.
      vi) The students would have performed better in exams if the instructor did more teaching.
      vii) The class should not have been held in a computer lab where there are too many distractions.

Conclusion

The student-led learning approach is a good approach for classes like Microcomputer Applications. It may work with qualifications in classes like Object-Oriented Programming or Systems Analysis and Design. It may also work with some qualifications in classes like Principles of Financial Management if the students are committed and work hard to prepare for and take interest in making a good presentation and avail the instructor's help if lacking in preparation or presentation skills.

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Technology and General Education: Collaboration for Curriculum Building and Student Learning Part II

Matt Smith
Chair, Department of English and Foreign Languages
University of Saint Francis
2701 Spring Street
Fort Wayne, IN 46808
260-434-7720
msmith@sf.edu

Abstract

As a follow-up to last year's presentation discussing general education, because of a series of events, the University of Saint Francis had to totally revise its procedure to align our general education technology outcomes with our newly revised general education curriculum beginning fall 2007. Rather than use an outside vendor, the university developed its own testing protocol and system to determine students' competencies in a number of technology applications. This presentation discusses how the university will be able to assess students' ability to meet the outcomes of our curriculum by utilizing assessment tools designed for general education assessment. This presentation will also describe the process that faculty and technology specialists engaged to develop this component of the general education curriculum. The presenter will illustrate a model for collaborative technology curriculum building and participants will be able to contextualize this process for their institutions through the interactive presentation.

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

Using the open source Portable Miranda instant messaging client to support student-teacher chat sessions from any computer on the Internet

Robin Snyder
Savannah State University
126 Jordan, P. O. Box 20359
Savannah, GA 31404
(912) 356-2716
snyderr@savstate.edu
http://www.RobinSnyder.com

Abstract

Portable software can be installed and run from portable media such as USB flash drives - usually without prior installation or support from the local computer staff. This paper (and talk) will discuss (and present) how the free and open source Portable Miranda instant messenger client is being used to allow students (e.g., with a free Yahoo email account) to initiate a chat session with the teacher from any computer on the Internet. Miranda currently supports Yahoo Messenger, Windows Messenger, Jabber, IRC, ICQ, and AIM protocols - all at the same time. Installation, configuration, support, audit logs, add-ons, etc., will be covered.

Introduction

IM (Instant messaging) is a real-time on-line communication method that originated as text-based messages but has since expanded to include audio, video, and file transfers. IM tends to be much more real-time than email and has its roots in online chat systems. To use IM, one needs an IM account on an IM server. One then needs an IM client into which to input messages and see response messages. There are many IM protocols. Here are just a few of the popular IM protocols.

- MSN Messenger
- Windows Live Messenger
- AOL (AOL Instant Messenger)
- Jabber (open source)
- Yahoo! Messenger
- ICQ (I Seek You)
- IRC (Internet Relay Chat)

Each IM system has advantages and disadvantages. Some IM clients, such as the open source Miranda system, discussed here, allow simultaneous access to multiple IM servers running different IM protocols.

This paper (and talk) will discuss (and present) how the free and open source Portable Miranda instant messenger client is being used to allow students (e.g., with a free Yahoo email account) to initiate a chat session with the teacher from any computer on the Internet. Miranda currently

supports Yahoo Messenger, Windows Messenger, Jabber, IRC, ICQ, and AIM protocols - all at the same time.

Portable Applications

A portable application is a software application that can be moved from computer to computer via a storage device such as a USB drive. Such software does not leave a "footprint" on the computer being used. This can be important when using software on, for example, computer lab computers in a University setting. An extensive list of portable applications is available at http://en.wikipedia.org/wiki/list_of_portable_software. The author uses the following portable applications on a regular basis.

- Portable Apps menu and backup system.
- OpenOffice (apps similar to Word, Excel, PowerPoint, Access, etc.)
- Firefox Portable web browser (with many extensions)
- Miranda Portable instant messaging (with many extensions)
- Thunderbird Portable email client (with many extensions)
- Audacity Portable for audio recording/processing
- Portable Python for simple programming for data communications and security courses.

The Portable Apps web site is at http://www.portableapps.com. Many portable applications are available for download.

The principle behind a portable application is that everything the application needs is stored in one directory structure. In the case of Windows systems, it means that the Windows Registry is not used. A standardized directory structure allows the portable menu and backup system to "understand" any added portable application.

The directory structure of the portable application system is as follows. Assume that **`E:`** is the root of the USB flash drive.

- **`E:\autorun.inf`** contains the commands to automatically start the Portable Menu system - on permission of the user (depending on the autorun settings of the computer).
- **`E:\StartPortableApps.exe`** is the executable to start the portable application menu and backup system. This system provides convenient access to all installed portable applications.
- **`E:\PortableApps`** contains the portable application directories. A few of these appear next.
- **`E:\PortableApps\FirefoxPortable`** contains the Firefox portable system.
- **`E:\PortableApps\OpenOfficePortable`** contains the OpenOffice portable system.
- **`E:\PortableApps\MirandaPortable`** contains the Miranda portable system.
- **`E:\PortableApps\PortableSnyder`** contains the author's portable software. A few of these appear next.
- **`E:\PortableApps\PortableSnyder\SecureS.exe`** is the author's software for the security and data communications course. A Python IDE is included.
- **`E:\PortableApps\PortableSnyder\JavaS.exe`** is the author's software for the Java programming course. A simple Java IDE is included.

The portable applications menu system, when run, looks for a subdirectory called **PortableApps**. Any subdirectory in the **PortableApps** subdirectory, such as **PortableSnyder**, is searched for executable files, such as **SecureS.exe** and **JavaS.exe**. The title and icon, if any, is extracted from each executable and displayed in the menu system.

The **autorun.inf** file allows the autorun feature of the computer to automatically start the portable applications menu system. This file might appear as follows.

```
[Autorun]
useautoplay=1
Open=PortableApps\PortableAppsMenu\PortableAppsMenu.exe
Action=Start PortableApps
Icon=PortableApps\PortableAppsMenu\PortableAppsMenu.exe
Label=PortableApps
```

Needless to say, both the **autorun.inf** file and individual portable applications can be customized for use in a specific environment. A self-extracting zipped executable can be used to allow students to download and install a customized version of any portable application. Check the license agreement to see if this is permitted. For example, you might be required to have the students download the "standard" software and then download and extract the "customized" changes to the "standard" portable software.

Besides the directory structure, the following are commonly used for packaging portable applications.

The UPX (Ultimate Packer for Executables) is an open source system for packing an executable file so that it requires less space. It is unpacked as needed during runtime. This makes executables take less space which is important for storing applications on USB flash drives. The UPX web site is at http://upx.sourceforge.net/.

The NSIS (Nullsoft Scriptable Install System) is on open source system for creating and deploying Windows installers. For portable applications, the full functionality and complexity of NSIS is not needed since the Windows Registry is not used. The NSIS web site is at http://sourceforge.net/projects/nsis/.

Together, UPX and NSIS make it easy for a user to download, install, and run portable applications.

Student software

The author has also made much of his software for student use in the author's classes available as portable applications. Here is a short history of the ways in which the author has made software available to students in the past.

Computer hard drive: The software can be put on the computer hard drive. The problem is getting it installed on the hard drive.

Network drives: The software can be put on a network drive to which the student has access. The problem is that this method requires that the student be connected to the network with the correct access rights. This can be tricky to implement and maintain.

Software download: The software can be put on a web server to be downloaded and installed. The author packed the software into a self-extracting executable that used a fixed path on the hard drive. The student then had to find the software the first time. When run, the software would create shortcuts on the desktop for the user.

Terminal services: The software can be put on a network drive that is mapped such that when the student logs in to terminal services using remote desktop, the software is available.

Portable application: The portable application is made available as a self-extracting download that the student extracts to their portable directory - usually on a USB flash drive. The portable menu system then recognizes it.

The portable application method requires the least effort by the author and the least computer support by the local IT staff. To date, this method has worked very well.

Moving portable applications and data is easy. For example, Miranda Portable can be moved from computer to computer without having to install Miranda on each computer. It also means that one can move and have access to the history of messages that are stored on the storage device. Otherwise, that history would be spread over many different computers.

Important: One important note is that students must be taught to not remove their USB flash drive from the computer without closing all open portable applications and then using the "**Safely Remove Hardware**" icon in the tray of the computer. If this feature is disabled, the student can close all open applications and then wait a few seconds to make sure that all changes have been flushed to the USB flash drive. Otherwise, a corrupted database (or other file) might result. In the case of Miranda, there is a program that can be used to attempt to recover a corrupted database.

Important: Another important note is that students should safeguard their USB flash drive so that it is not lost or damaged. USB drives do go bad. A backup is very important. The portable menu system has a backup feature that should be used. The students must be taught to use this system.

If one is using portable applications, changing operating systems is as simple as moving the USB flash drive on which the portable directories reside to the new computer. If one is using the portable applications on the hard drive of a computer, the upgrade consists of copying the portable application directory to the new computer.

Installation and configuration

Although Microsoft has stopped support for Windows systems such as Windows 98 (and earlier), some students may still be using such older systems. This is not a good idea as security vulnerabilities for such systems are well known. But, if such systems are used, Miranda will still work

on them but one must use the ANSI versions (i.e., 8-bit character support) and not the UniCode versions (i.e., 16-bit character support).

Installation of Miranda is easy - just extract to the portable applications directory. However, if students save the installation program to their USB flash drive, they will often confuse the installation program with the "**MirandaPortable**" folder that contains the program to start Miranda. Some students will "**install**" Miranda over and over and not understand why it is not "**working**".

Here are some suggestions for configuration. Most of the configuration problems arise when the student does not read the displayed message.

- An initial profile must be created such as "`default`".
- When asked, select "**Cancel**" for any IM account that is not being used, such as AIM, ICQ, etc. These account configuration requests can be later turned off.
- When asked, select "**Cancel**" if there are no other contact lists to be imported.

Once started, the Miranda system starts by appearing in the tray (lower right corner of the desktop on most systems) as a little man. Right click on it and select "**Hide/Show**" to see the contacts tree.

The Miranda system must be configured before it can be used. Select "**Miranda**" (the leftmost icon in the main menu bar) and select "**Options**". There are many options that can be configured. Only a few are covered here.

Plugins: Under "**Plugins**", any plugin that is not needed can be unchecked. For example, unchecking the `aim.dll` plugin will avoid the AIM error message when Miranda is started.

Network: Under "**Network**", login account information can be set for the desired IM systems. Since Yahoo Messenger is "**free**" (i.e., one must tolerate advertisements and marketing monitoring of one's account), the author requires students to get a Yahoo email and messenger account. Since Microsoft Messenger will not allow sending messages to users who are not online, but Yahoo does allow sending messages to users who are not online, the author prefers the Yahoo Messenger system for student use. Under "**Network**", select "**YAHOO**" to set the login options for Yahoo Messenger. One must have a Yahoo Messenger account before this option can be used. The "**ID:**" field is the Yahoo account name without the "`@yahoo.com`" suffix. If Yahoo messages on port `5050` will be blocked by a firewall, the "**Port:**" should be set to port `80`, the standard web port that is not blocked. Other options can be set as desired. It is usually a good idea to check "**Auto-Login to Yahoo**".

For MSN messenger, one should check "**Use HTTP gateway mode**".

One way to go online is to select "**Status**", "**Online**". Miranda then attempts to connect to all IM systems that have been enabled.

Once connected, one can add contacts. To do this, select "**Miranda**", "**Find/Add Contacts**". Select the "**Search:**" system, such as "**YAHOO**" (you must be online to do this), provide an "**ID**" (without the "`@yahoo.com`" suffix), and select "**Search**". When contacts are found, select the

desired contact and select "**Add to list**". Many students will think that finding them automatically adds the contact and will have to redo this step. The chat room tree can be configured as desired.

Customization

Almost any feature of Miranda can be customized - fonts, colors, etc. If not, an plugin probably exists to do what is desired. If not, one can create their onw plugin.

One advantage of open source software is that a usually has some way that a programmer can access the system to extend it to do things the system was not originally intended to do. In the case of the Miranda instant messaging system, there are examples on the web of how to create Delphi Pascal (and other) program code to interface to the Miranda software system. Obviously many people have created add-ins for the system so one just needs to dig into the details of how to do it.

Chat sessions

A common problem is that, when accepting a connection, one needs to make that contact permanent. To do this, right-click on the contact in the menu tree and select the appropriate option. Otherwise, the contact will not appear the next time that Miranda is started.

To initiate a chat session, one double-clicks on the desired contact in the contact tree. The chat dialog window opens, and the conversation can start. Or, one can accept an incoming chat request such that the chat dialog window opens.

For group work, the author requires students to contact their group members via IM. The Miranda software system does not currently support groups of members in the same chat room. The IRC system does support group chat. The author required the students to got ICQ accounts and then do a group chat in IRC. However, the University firewall blocked such access and even when permission was granted and the firewall port(s) opened, the access was still blocked. The issue was never resolved. The open source Jabber IM server system might solve the problem.

The author has modified the author's submission system to accept images in GIF or JPEG format along with written text. The free, but not open source software, IrfanView is covered to allow the students to easily grab, crop, save, and submit an image that contains the required content. The required content is such that the author can determine that the students have actually done what they were supposed to do. For example, a requirement might be to use Miranda IM to initiate a conversation with me. The image would require the contact tree window and the message dialog window that shows the conversation. The written requirement might be to discuss how IM can be used in business marketing to enhance communication. The author's submission system makes it easy to collect the submissions, grade them according to a published scoring rubric, and provide feedback to the students via the online submission database. For security, the entire student web system is accessed via a secure web system with login authentication.

Add-ins

There are many add-ins that can be used to extend the functionality of the Miranda instant messaging system. There are hundreds of add-ins for Miranda. The following add-ins for Miranda were found to be useful to extend the functionality of Miranda.

History logs: Miranda maintains history logs of conversations in the database. Some plugins provide convenient access to such history logs. The **`msg_export.dll`** plug-in is used.

Tabbed chat windows: The **`tabsrmm.dll`** provides tabbed chat windows. Otherwise, chat sessions with, say, **`20`** students would result in **`20`** separate windows on the screen. The tabbed chat windows provides one window with tabbed access to the desired chat session.

Smiley's: The **`smileyaddw.dll`** provides (Unicode) smiley support. Is same cases, the user must do some "extra" work. For example, the smiley's for Yahoo are copyrighted by Yahoo. To use them in Miranda, one can install Yahoo Messenger which installs the smiley's. Then, one can copy the Yahoo smiley's to a directory where Miranda can use them. The same method would be used for any copyrighted but otherwise reusable content that is already on one's computer. As a bonus, the Miranda add-ins allow one convenient graphical access to special Yahoo smiley's that are only available in Yahoo Messenger via their text abbreviations.

Animated smiley's: The **`ieview.dll`** plugin provides animation for smiley's in the message windows.

Screenshots: The **`sendss.dll`** plugin is used to allow students to send screenshots to the teacher. This can help in diagnosing problems. However, there are sometimes firewall issues that keep this plugin feature from working properly. The same issues were detected with general file transfers.

Notifications: The **`messagenotify.dll`** and **`notifyanything.dll`** plugins are used to provide an easier way to determine that a student has sent a message. The author uses four big monitors connected to one computer and, with so much screen space, it is easy to miss a message window.

Voice recognition

In the introduction, it was stated that one "needs an IM client into which to input messages...". Technologies such as voice recognition can be used to make it easier to input messages. The author has been experimenting with the ScanSoft Dragon Naturally Speaking 8 Preferred voice recognition software. Note that this software has since been taken over by Nuance, at http://www.nuance.com.

Once set up and trained for one's voice, the software works pretty well. A good microphone is important. The author uses the USB Samson C02U Recording/Podcasting Pak. One problem with voice recognition software is that it does not always correctly recognize the words you are thinking when you are speaking. There are ways to train the system to make it better at recognition, but this requires investing time in learning the intricacies of the voice recognition system.

Observations

During the Spring semester of 2007, the author has required all students to install and use Miranda IM. Some students have done this. Others avoid it unless forced to use IM. Those students who use IM on a regular basis often ask questions when they get stuck. In many cases, students identify problems with the author's web system such that the author gets feedback in a timely fashion. Future plans include working out issues with screen shot sharing for problem diagnosis and with group chat so that the entire class can be online in the same chat room.

Summary

This paper has discussed aspects of using the open source Portable Miranda instant messaging client to support student-teacher chat sessions from any computer on the Internet. This has allowed the author to provide convenient student access to the author, for class purposes, for many more hours than is provided by conventional office hours. The main problems encountered with using IM were firewall beyond the author's control that blocked the needed ports to use IM. The Yahoo IM system was usable without changing the firewall, but the group chat feature is not available in the Miranda IM system.

References

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Using the open source TrueCrypt software system to provide on-the-fly encryption of storage media

Robin Snyder
Savannah State University
126 Jordan, P. O. Box 20359
Savannah, GA 31404
(912) 356-2716
snyderr@savstate.edu
http://www.RobinSnyder.com

Abstract

The need to encrypt information on hard drives, flash drives, laptops, etc., is becoming increasingly important for both personal and institutional use. After covering some basic security and encryption concepts, this paper (and talk) will discuss (and present) how the free and open source TrueCrypt software system can be used to provide encryption of information on either an entire drive partition or of a file that mounts as a virtual disk. TrueCrypt includes many advanced features such as plausible deniability, ways for the local computer staff to support users (who have lost their password access), easy installation, extensive documentation, etc. An add-on method that the author developed to make an encrypted drive useless without a corresponding USB drive key (and password) will be included.

Introduction

It now happens often that some person or organization has lost information by the physical loss of an unencrypted storage device. Losing encrypted data on a storage drive is often not a problem. But losing information on a storage drive is definitely a problem. And that difference illustrates the difference between data and information.

The author defines data as "stuff". Anything can be data, but in the computer field data is usually represented as bits. Information, on the other hand, can be defined as data that is more valuable when interpreted with the proper insight, as a message sent by a sender to an intended receiver, etc. Thus data loss itself is not a problem. Data in the form of bits is an intangible entity that may take a tangible form. To see this, imagine a CD with 650MB of data bits. The bits could be arranged as information (e.g., Microsoft XP Pro, though some might argue about whether it is just data). Or, the bits could be in a form that is not recognized as anything useful (again, some people might view Microsoft XP Pro as such, but for the sake of argument, this line of thought will not be followed very far). An encrypted drive whose encryption cannot be broken is just data. However, with the proper insight (i.e., the decryption keys), the data can become valuable information. Thus, while information loss for which there is no backup can be catastrophic, data loss by itself is not a problem. But, data loss that can be interpreted as information might be catastrophic to the person or organization whose information has been compromised.

In previous decades, a floppy disk might hold a megabyte or so of data. In the mid-1990'- the Zip disk moved portable storage to 100MB and beyond. Today, USB thumb drives are typically in the 1GB and beyond range. This leaves substantial room for a lot of valuable information. Lost

or stolen laptops, portable hard drives (100GB and up), flash memory drives (1GB and up), etc., provide additional avenues for information compromise. And humans are usually the weak link in the security chain. It should go without saying, but it will be said anyway, that information is today often more valuable than the computers and/or storage devices on which the information resides.

The key to information security, and security in general, is to make data appear as information to those to whom access is allowed and to make that same physical data appear as meaningless bits to others who might happen to get access to those bits (e.g., by stealing the storage device).

The obvious solution is to encrypt the data on the storage device. Most solutions to this problem are OTFE (On The Fly Encryption) that makes the encrypted drive appear as just another drive. Such access requires administrator privileges for installation but normal privileges for use. All standard tools, such as **`chkdsk`** (for Windows) can be used on such encrypted drives.

This paper discusses how the free and open source TrueCrypt software system can be used to provide encryption of information on either an entire drive partition or of a file that mounts as a virtual disk. Much of the material in this paper is from the author's previous work in this area [1].

USB devices

USB memory devices range from flash memory, in the 1 GB range (i.e., 100MB to 10GB) while USB hard drive devices are in the 100GB range (i.e., 100MB to 1TB). Some, such as the Seagate 100GB 2.5 inch USB hard drive (8MB cache) are very compact and convenient, with no power brick, just a split USB cable to get the required power from the USB ports (about $145 in Summer 2006). Other low-cost USB hard drives are larger capacity and larger size. 1GB USB memory devices are in the $20 range (Summer 2006, Verbatim 1GB).

Many USB storage devices include encryption and decryption software. Most require administrator rights to run on a system. This might not be available (e.g., in student labs, Internet cafe's, etc.).

Lexar includes JumpDrive Secure.

JumpDrive Secure is a software application that comes pre-loaded on the JumpDrive Secure allowing you to password protect files that are stored on the JumpDrive itself. It enables you to divide your JumpDrive into two different areas, or zones. The public zone has no password protection and is accessible by anyone using your JumpDrive. The private zone is password-protected so no one can open, copy or write files to it without entering the correct password. We go one step further than just password protecting your data, we also encrypt your data with 256-AES encryption.
http://www.buy.com/prod/Lexar_1GB_JumpDrive_Secure_USB_Flash_Drive/q/loc/101/10381529.html [as of Fri, Jun 09, 2006]

Here are some comments.

The secure partition feature is a nice feature, however it installs software on the computer to access the secure partition. If you put it on someone else's computer, you will see the software

running in the task manager and it will stay there even when you are done..not cool. http://www.buy.com/prod/Lexar_1GB_JumpDrive_Secure_USB_Flash_Drive/q/loc/101/10381529.html [as of Fri, Jun 09, 2006]

I get an error saying I must be an adminstrator to run the software whenever I plug it in. It has an auto-start program that wants to run every time you plug in the device. Included security and partitioning software uses over 4MB of the drive. I am using a company provided laptop, and have verified that I am logged in as a local administrator on the device, but perhaps I am not THE administrator. This seems to be an unneccessary feature of the device. After the error, I can access the non-encryted drive, but have no access to the encrypted drive. I http://www.buy.com/prod/Lexar_1GB_JumpDrive_Secure_USB_Flash_Drive/q/loc/101/10381529.html [as of Fri, Jun 09, 2006]

The problem seems to be that many are proprietary to company that produces the devices. Until a standard emerges, there will be quite a variety of such software systems. The author has reviewed a number of these and each seems to have many complaints from users. In general, many users avoid the supplied software and opt for some more general software solution.

NTFS

The Microsoft NTFS file system offers an EFS (Encrypting File System). The author's experience has been that this is somewhat difficult to make work the way one wants it to work. The concept is simple enough. Just format a partition with NTFS file system and select the desired options.

However, moving a portable device from one location to another is, in general, not possible. Because the ID is based on the SID and not the login name, that SID may vary from machine to machine and system to system. And, a certificate in the root Windows directory is needed in addition to a password. In addition, portability is not easy. And anyone who has access to the machine can easily determine that there is an encrypted drive and may want to find out what is on it. There is no easy way to plausibly deny that there is encrypted information on the drive.

PGP Disk

One popular drive encryption system has been PGPdisk. At one time, this was open source, and included with PHPfreeware, version 6.0.2.i. But, as of version 6.5, it is no longer included as it has since become commercial, available at http://www.pgp.com/ [as of Fri, Jun 09, 2006]. It is now called "**PGP Whole Disk Encryption**". As such, the older open source version, though still available for noncommercial use, will gradually become out-of-date (i.e., through information entropy increase).

TrueCrypt

A seemingly very well-engineered and free Open Source drive encryption solution that the author has successfully used is TrueCrpyt, at http://www.truecrypt.org/ [as of Fri, Jun 09, 2006]. The author's view is that confidence in the security of any encryption software should only be placed in open source software where the source code is available for everyone to inspect and study. Otherwise there is no easy way to be certain that there are no back doors or other hidden

features in the software. In addition, the nature of open source software means that, if the source in kept, in principle the binary software could be re-created and/or modified, if needed. This would not be the case for proprietary software.

From the TrueCrypt web site, here are some of the main features of TrueCrypt.

- Creates a virtual encrypted disk within a file and mounts it as a real disk.

- Encrypts an entire hard disk partition or a device, such as USB flash drive.

- Encryption is automatic, real-time (on-the-fly) and transparent.

- Provides two levels of plausible deniability, in case an adversary forces you to reveal the password:

- 1) Hidden volume (steganography -- more information may be found here).
- 2) No TrueCrypt volume can be identified (volumes cannot be distinguished from random data).

- Encryption algorithms: AES-256, Blowfish (448-bit key), CAST5, Serpent, Triple DES, and Twofish. Mode of operation: LRW (CBC supported as legacy).

- Conceived in 2003.

The web site, documentation, and performance of TrueCrypt is very good. There are very useful insights into security problems that can arise because of the way hardware and/or software works. For example encrypted data left in RAM, left in Windows paging files, available because of USB wear-leveling strategies, data left after drive fragmentation, etc. Each is beyond the scope of what the TrueCrypt software can control, but the information is useful for general security purposes.

As for wear-leveling, USB flash drive uses flash memory. It can only be written a certain number of times until it "wears out". The hardware in a USB flash drive moves the written sectors around so that the same sector is not written too many times. As the sectors "wear out", they are marked as not usable. For security, someone with low-level access to TrueCrypt's sectors (from the USB point of view) could get information that might compromise TrueCrypt's security.

Besides the plausible deniability features (i.e., hidden volumes, etc.), there are keyfiles. A key file can be (the first few thousand bytes of) any file that does not change. This is designed to hinder most keyloggers. There is automatic unmounting after a specified timeout, and locking the terminal or screen saver activation. There are command line options (discussed below) to automate the mounting and unmounting. And, the mouse movement can be used as part of the random number generation. A Linux version is available and work is underway on a Mac OS version.

A particularly useful feature, depending on need, is plausible deniability. Throughout the design, TrueCrypt has been engineered to make it difficult for an attacker to access. There is the pass-

word, which can be up to 64 characters. Multiple keyfiles can be used to make it difficult for keyloggers. The file format appears entirely random. There are no markers, file directories, etc., that can be inferred from the encrypted file. The entire space for the file is filled with random data. There is no discernible file format. Nowhere is the encryption method stored. The software tries each of the allowable methods to see if any will work.

From a network administrative point of view, the password and keyfile(s) are used to find and decrypt the header file created when the volume was first created. This header file can be exported and saved in a secure place (e.g., by the IT support service). Changing the password and/or keyfile(s) by the user changes the access to the location of and decryption of the header file which decrypts the rest of the volume. Thus, it is possible to change the password and/or keyfiles for an encrypted volume without losing the original data, without going through a complete decrypt-with-old and encrypt-with-new process, and without the time requirements of an in-place changeover. If the user loses/forgets their password and/or keyfile(s), the administrator can recover the original header and decrypt the volume, setting it to the original header, password, and keyfile(s).

The primary disadvantage of TrueCrypt appears to be that administrator rights are needed for installation. Thus, the "**Traveler mode**" (e.g., for cafe use, school use, etc.) will not work if TrueCrypt is not already installed on the computer to be used. It should work in a student lab, however, if the IT staff has installed TrueCrypt on the lab computers. Traveler mode stores some configuration information in an XML file, but TrueCrypt does not use the Windows Registry.

Plausible deniability

Plausible deniability means being able to say "I didn't know that" and not be able to be proven wrong. One might want "plausible deniability" so that one cannot be held accountable. For example:

- The government says: You have secret information on that drive.
- You want to say: No I don't.
- Government has to now "prove it".
- How will the government "prove it"?

The government now needs to find the "secret information" on the drive. Computer forensics looks at what is on the drive. The FBI can read a hard drive after many formats. But, if it was encrypted, it may not be possible.

The government wants you to provide the password. So, you have to provide the password, or you may be found guilty, or in "contempt of court". Once the password is provided, there is nothing on the drive that is found to be "illegal". With TrueCrypt, they can't determine if there is a hidden drive within the drive. TrueCrypt plausible deniability makes it practically impossible to determine if there is a "hidden" drive in an encrypted drive.

Using TrueCrypt

Here are a few details on using TrueCrypt. For more information, see the TrueCrypt web site or do a Google search as there are a number of step-by-step tutorials with screen shots available.

Although the GUI (Graphical User Interface) can be used to mount and unmount volumes, this can also be done from the command line or from a batch file. Note that the initial creation of the volumes should be done from the GUI. Do not lose the password and/or keyfile(s) as there is no way to recover them. Recovery can also be done by backing up the header file information to a secure place.

By placing an **autorun.inf** file in the root of the drive, with autoplay enabled, TrueCrypt can be set to automatically run when the storage device is plugged into the USB port. Usually, part of the drive is saved for the TrueCrypt files (a few megabytes). Here is an example **autorun.inf**.

```
[autorun]
label=Seagate USB Drive
icon=truecrypt.exe
```

Traveler mode

The TrueCrypt software has a traveler mode that includes an **autorun.inf** that makes mounting USB drives easier. For example, the following **autorun.inf** file might be created.

```
[autorun]
open=TrueCrypt\TrueCrypt.exe /q /a /e /m rm /v "\mydisk.tc"
shell=mount
action=Mount                    TrueCrypt                    Volume
shell\open\command=TrueCrypt\TrueCrypt.exe /e /m rm /v "\mydisk.tc"
shell\open=TrueCrypt Start
shell\mount\command=TrueCrypt\TrueCrypt.exe  /q  /a  /e  /m  rm  /v
"\mydisk.tc"
shell\mount=TrueCrypt Mount
shell\dismount\command=TrueCrypt\TrueCrypt.exe /q /d
shell\dismount=TrueCrypt Dismount All
```

Note again that administrator priveledges are needed to install TrueCrypt, though administrator priveledges are not needed to then run TrueCrypt. This is, in part, to allow for drive mounting as an encrypting file system. An encrypting file system then provides all of the features that any file system would have such as running ScanDisk, running the defragmentation program, sharing as a network drive, etc.

Here is a series of batch commands to mount file **H:\vol1.tc** as a volume using drive letter **Z:**. The password is ***password*** and the keyfile (more than one can be used) is ***keyfile***.

```
truecrypt.exe /v H:\vol1.tc /l Z /p password /k keyfile /m rm /q
/s
```

Here is a series of batch commands to dismount a volume.

```
truecrypt.exe /q /d Z
```

These commands can be put into batch files **`mount.bat`** and **`umount.bat`** to mount and unmount volumes. The author started using this method but soon decided to encapsulate the needed functionality in an executable program named **`rmsinit.exe`**.

One issue when using the command line is that the command line arguments contain the password. The command line is available in the current running services list via the Windows API. That could be a security problem. It seems that this information is available when TrueCrypt is first started but not when it is called once started. Thus, it seems better to first start TrueCrypt (i.e., automatically) then make the calls to TrueCrypt to automate from the command line. Note that this information is available via explicit programming but not necessarily from commonly used software such as the Windows "**Task Manager**".

Summary

This paper has discussed how the free and open source TrueCrypt software system can be used to provide encryption of information on either an entire drive partition or of a file that mounts as a virtual disk.

References

[1] Snyder, R. (2006). Some security alternatives for encrypting information on storage devices 2006 Information Security Curriculum Development conference (September 22-23, 2006), Kennesaw, GA.

Strategic Planning for a New Building Created a New Learning Environment

Richard N. Stewart
Associate Professor, Communications and Parish Administration
The Lutheran Theological Seminary at Philadelphia
Director of Distance Education – Eastern Cluster of Lutheran Seminaries
Philadelphia, PA 19119
215-248-6378
rstewart@ltsp.edu

John Kahler
Director of Communications
The Lutheran Theological Seminary at Philadelphia
Philadelphia, PA 19119
215-248-6397
jkahler@ltsp.edu

Abstract

A reflective presentation of a small school's advance to a new learning environment. This school of 500 students has taken a strategic grant and turned it into a strategic plan for educational enhancement for a school that had never had an official classroom building. The plan included the planning, construction, equipping, and implementing the technological infrastructure of a new classroom building. The plan also included the building of awareness and opportunities for experimentation, in the classroom presentations of the faculty prior to the building coming on line. Once the building was on line, the challenge was to facilitate a reasonably smooth transition from 7 classrooms scattered in 4 buildings, into teaching in a fully accessible learning environment, with 9 classrooms, 7 seminar rooms and a 300 seat auditorium that can be subdivided into three classrooms or opened up into a banquet room for 200. The presentation is a logical follow-up on the 2003 ASCUE presentation by Prof. Richard Stewart of "On-Time Grants for On-Time Technology in the Classroom".

Background

The Lutheran Theological Seminary at Philadelphia is one of eight seminaries of the Evangelical Lutheran Church in American whose mission is to teach and prepare professional and lay leaders for the church. The church has divided these eight seminaries into three clusters: The Western Mission Cluster [Pacific Lutheran Theological Seminary - Berkeley, and Luther Seminary - St. Paul]; Covenant Cluster [Wartburg Lutheran Seminary - Dubuque, Lutheran School of Theology at Chicago, Trinity Lutheran Seminary – Columbus]; and the Eastern Cluster of Lutheran Seminaries [Lutheran Theological Southern Seminary – Columbia, SC, Lutheran Theological Seminary at Gettysburg, and The Lutheran Theological Seminary at Philadelphia].

In 1994, Prof. Stewart presented a paper at ASCUE, which highlighted the historical process by which The Lutheran Theological Seminary at Philadelphia [LTSP] became computerized, "Computerizing on a Shoe String: With Lots of Prayer." The fact that the Business Office was

the last office computerized was the central point of the presentation. With intense discussion computerization started with the administrative offices that needed database support.

In 2003, "On-Time Grants for On-Time Technology in the Classroom" highlighted the receipt and use of four grants to facilitate the use of technology on the seminary campus. The first grant in 1999 was a planning grant from the Lilly Endowment for "Informational Technology for Theological Teaching Project." The planning grant produced a proposal that garnered a $300,000 implementation grant from Lilly Endowment in 2000. The grant facilitated the introduction of Blackboard as LTSP's course management platform, the addition of two staff members in educational technology and help desk positions, and the training of faculty to use the new elements of technology that were placed in a faculty development laboratory. With the availability of staff assistance and faculty development grants, there was one hundred percent participation by faculty in the use of technology in enhanced classrooms by the end of the three year grant.

The Luce Foundation in 2001 funded the research and the planning to implement a cluster project to have "One Library in Three Locations." The online catalogue listing the holdings of all three institutions and sharing of resources has fostered some savings in the library expenses and targeted the acquisitions and reduced the duplication. In 2002, the fourth grant came from the Teagle Foundation to explore the "Modeling a Seminary System in Multiple Locations." Administrative functions were shared among the three seminaries located in Columbia, Gettysburg, and Philadelphia. The Dean of the Doctor of Ministry Program, the Director of Diaconal Ministry, the Director of the Lutheran Theological Center in Atlanta, Director of Distance Education, a Joint Appointment in Homiletics and Old Testament, and the Director of Continuing Education and Lay Theological Education were all positions that were supportive of programs of the Evangelical Lutheran Church in America or were shared among at least two of the institutions.

New Building

Since 1995 the seminary administration spoke of the need for a classroom building. In 1998 a committee explored the possibility of reallocating the space that had been vacated in the original 1888 building that had been used as a dormitory. As a part of the Lilly Endowment planning grant, several staff members attended the University of Wisconsin Distance Education conference, and Prof. Stewart attended an auxiliary continuing education event sponsored by the U. Wisc. Engineering School on Classroom Design. A core learning from the event was to bring the technical engineers into the process at the beginning of the first designs of the architect. The Implementation grant included funds to support the initial contracting of a consulting educational technology design firm to assist in the design of the new classroom building.

In its first 135 plus years as a school, LTSP had never had a specific building for classrooms. Space has been carved out of the chapel, the administration building, the basements of dormitories, and the library. Yet at the start of the design development stage for this new building, grants already garnered had given the campus a technologically rich educational environment. The budget of $15,000 covered the initial expenses of a technology consultant to work with the architect and the project manager. The first goal set by the LTSP Committee for Electronic Educational Development was that the campus technology planning team was to not have one change order related to technology. The second goal was to have a building that was flexible and capable of growing into a technologically rich yet unknown future.

Design

Faculty were surveyed about their expectations for a new classroom building, and observed in their current teaching and learning settings. Having just expended three years in working with all of the faculty in the use of technology in pedagogical presentation, they were quite articulate in their expectations of what was now necessary for their classroom use. The survey produced the following results:

Elements Necessary for a Smart Classroom

Podium: A Central Teaching Spot – This may or may not have an equipment rack included. This could easily be configured as a teaching table.
Equipment Rack: This equipment would house additional electronic equipment: ie. VCR, DVD, CD, Cassette Recorder, Computer, electronic Control equipment
White Board: Teaching Tool minimum 4' in small rooms and 6' in large spaces, these may be wall mounted and contain clips for holding flip charts.
LCD Projectors: Visual Display presenters for computer and video imput, permanent ceiling mounts in large spaces and large classrooms, portable units available for Conference rooms and offices. Minimum 2500 Lumens.
Plasma Panels: Flat computer/video monitors with a minimum of 42 inches in width. Should be capable of displaying HDTV.
Electric Screens: Wall or ceiling mounted screens for viewing projected images. Not needed in rooms with Plasma Panels.
Touch Screen Controllers: Electronic controllers to permit one person use of all the electronics in a room from a single place. These are essentially small dedicated computers.
Document Camera: Teaching tool which facilitates visual display of papers, overheads, hard items of a small nature. Can be used with writing tools.
VCR Playback: S-VHS playback for video presentation
DVD/CD Playback: DVD video and audio and CD audio playback equipment.
Audio recording: Cassette recording equipment for recording of lectures for easy distribution to students.
Program Audio: Microphone [wireless] for projecting teaching voice and other electronic audio input. Front mounted speakers included.
Audio Enhancement: Ceiling mounted speakers for enhancing audio input for large classrooms and meeting spaces. Tied to this equipment would be equipment for ADA speech enhancement. [Personal PA]
Dedicated Computer: A computer installed in each teaching location
Laptop Interface: Electronic connection for laptop use with installed equipment in a teaching location.
Variable Lighting: Dimmable lighting
Screens/Blinds: Window treatments to assist in limiting light infiltration in a teaching environment.
Power ports: Electric outlets for both presenters and students in every room.
Data ports: LAN Local Area Network connections for each teaching space for both presenter and for students. May be used for wireless access ports.
CATV ports: Access to Campus Cable system for each room.

These kinds of expectations could not have been formulated without the educational advantage that was offered by the Lilly Endowment grant. The faculty, even those who considered themselves to not be media sensitive, had developed a threshold of knowledge that had significantly grown. With this information in the hands of both the architect and the technology consultant, the placement of doors and windows, room pillars, noise generating building infrastructure became a part of the discussion of design elements for a building that was more than just a large box divided into smaller boxes. Wiring closets and wiring races/runs were designed into the initial blueprints, rather than being added after the fact and being carved from previously allocated space.

An important consideration in the planning phase was the recognition that the economics of the seminary would not allow for the level of staffing that could be necessary to operate a state of the technology art building days, nights and weekends unless the basic functions were easy to operate and the technology could be used with basic training. The ability to monitor and manage the technology plant had to be as automated as possible and as accessible to support staff as possible, a concept that was relatively new, yet quickly developing.

The institution wanted to maintain some of the technological capability that it had already acquired, such as video conferencing. Administrative requests, financial constraints, technology team dreams, and best practices identified by the team from other institutions and presentation experience were incorporated into the design elements offered by the technology consultant who offered the following **Scope of Work**:

Room Darkening for Audio-visual: Concerns were expressed about afternoon sun; blackout shades were deemed undesirable.

Teleconferencing: Capability will be provided on the Third Floor in five different locations: (2) medium classrooms; (1) in the Heineken Room; (1) Board Room; (1) Auditorium Reception Hall.

Teleconferencing Equipment: Only the medium classroom has fixed equipment. The remaining spaces will be wired so cameras can be plugged in. The Cameras will be pulled from a pool of equipment.

Seminar Rooms: Seminar Rooms will have electronic screens. Other equipment (notably portable projectors) will be pulled from a pool.

Teaching Labs: Will have fixed projectors and electronic screens.

Technology Costs: Most of the Technology cost is centered in the Third floor spaces. The Control Room alone constitutes approx. $250,000 of the budget.

LTSP Power Access Concern: Faculty has a concern regarding access to power for laptop plug-ins. This has been a problem when the rooms are set up for seminar format, with 35+ students wishing to plug in laptop computers. Power needs to be provided in a grid configuration where 75% of the students are within a few feet of a receptacle in the Teaching labs and medium classrooms.

Instructional Needs: Each classroom needs a table with podium set up for electronic control.

Technology Table: A rolling technology table with mounted podium will be provided in each classroom. The faculty is concerned that the technology and furniture work together.

Laptop Campus: LTSP may become a laptop campus—though this decision had not yet been made. This would eliminate the need for a computer in each classroom.

Pulpits: A rolling pulpit must be provided in each medium-sized classroom with a wireless mike and remote Power point capability.

Carpeting: Carpet wear is a concern with flexible-seating rooms. The budget assumes vinyl composition tile (VCT) in the teaching labs.

Lighting Type: The faculty representatives noted that LTSP classrooms presently tend to be on the dark side. The new lighting would consist of 4x8 fluorescent fixtures with eggcrate lenses. Special at-

tention would be paid to zoning of the lights to provide partial fixture blackout in each room. Fluorescent dimming in the classrooms was currently not anticipated.

Lighting Dimming: Fluorescent dimming will be provided in some limited areas. Incandescent lighting will provided in the control room. Consistent ambient lighting will be the primary goal of the designers.

Computer Lab: Graduate students want a computer and printer available to them in one room for occasional use. This could be accomplished through a minimal size printing kiosk with network hookup.

Wireless Network within classrooms. LTSP may want to shift to a wireless system for classroom access, similar to one installed at St. Mary's College in Frederick, MD.

Fixed Computers vs. Wireless laptops: The present Technology budget includes an allowance of $2000 per classroom for a fixed computer, and (17) fixed computers in the lab. Wireless hardware is not currently in the budget, but the amount budgeted for fixed equipment could be substituted for wireless hardware.

Reception Hall: The reception hall has 14-15' high ceilings, and can be subdivided into three (3) classrooms each capable of accommodating 64 students. The Hall will contain movable whiteboards in each of the three spaces. The middle classroom will have a fixed projector and screen, but no podium. One end classroom will have a roll-down screen on the end wall. Two portable podiums will be provided for this space.

Clocks: The faculty requested that clocks be installed in the rear of each teaching room.

Raised Platforms: Two raised platforms for use in classrooms will be provided and moved from classroom to classroom as needed by individual instructors. Raised platform segments will be required for use in the Reception Hall for large events.

Reception Hall mechanical shades. These are an option. Architects will examine the need.

PBX jacks: The current proposal includes a quantity of 150 PBX jacks.

Library Cataloguing: It was suggested that a consultant may be necessary to review the library cataloguing system and propose upgrades/alternatives to accommodate the archives and new spaces.

Mailroom/Breezeway: The layout of the mailroom and breezeway spaces will be discussed at a separate meeting involving staff. Security regarding all of the new spaces may require a separate meeting

Wireless

With the Lilly Endowment grant, one of the cutting edge elements the implementation was using wireless technology to reach periphery campus buildings, most on the far corners of the campus, without the laying of cables. The wireless umbrella over the fourteen acre campus created an environment of high expectations from the students and the faculty who lived on the campus. Though a newer dormitory had wiring into the apartments, access points were requested for lounges and other living and recreational areas. Faculty housing and border apartments were connected to the network via distributed access points.

The questions about the need for connectivity in the new building were a construction issue as well. Office space and classrooms were wired for connectivity, but to maintain classroom flexibility, power was supplied to the desktop with each classroom offering wireless access for student use. Construction barriers were considered in the design of the wired and wireless networking of the building.

Laptop Campus

We struggle almost each month in our meetings about the wisdom of requiring laptop computers for our students. We have researched the implications for accessibility of technology in diverse

populations. We have almost come to the conclusion that our part-time minority students may be more computer savvy than some of our more youthful day time students. Yet we worry about the implications of a firm final decision for our part-time students and the occasional auditing student.

Construction Issues

Moving from concept to reality, especially with technology, requires a mix of flexibility, being informed about the latest and next generation products coming or expected to come to market, a certain amount of crystal ball gazing, and a constant review of the objectives the technology would be expected to meet and aligning the technology being incorporated into the facility to meet those objectives. During all phases of planning and construction, technology staff remained on top of advances in the industry, and were prepared to press and challenge the consultants to be sure that appropriate advances were incorporated into the design. Network-based controls and technology were beginning to become available from vendors, and the consultants were challenged to change their designs, and move beyond their comfort zone, to adopt state of the art technology that was increasingly becoming network-based. While this required a change in the way components would function, this also made the ultimate design more flexible and less expensive.

One challenge that was not directly related to technology but which would have effected the teaching/learning experience was a consequence of retaining part of the old while building a state of the art building. The architect creatively designed a building incorporating the façade of the old dormitory that provided a "face" for a modern building. The problem with this design was ceiling height in the classrooms. Dormitory rooms have much lower ceilings than those required for classrooms expected to seat 60 or more students and equipped with appropriate projection systems that would be visible to all in the room. This required some extensive and expensive revisions, but was essential to make the rooms comfortable and functional.

The decision to remove teaching/learning technology from the guaranteed maximum price (GMP) of the project was made for several reasons. Financing the building required a cost cap for the GMP that would have left too little for funding the technology, and LTSP realized that without the full complement of technology the usability of the teaching and learning spaces would suffer. This did benefit LTSP in that this also removed a significant amount ($750,000) that would be subject to the contractor's overhead markup, and would also allow us to finance technology over a term more appropriate for expendable equipment than for a building. Working with the consultants, this also allowed us to be in complete control of the selection of vendor. The disadvantage was that technology installation wasn't directly tied to the construction schedule, and by the time funding was in place and contracts signed the construction was much further along, presenting challenges to the technology vendor. Indeed, while the building opened before the beginning of fall semester in September 2005, the technology contractor has had to work around a busy building and is just now completing the project.

While the project overall went smoothly, a significant omission had the technology team scrambling. Somewhere in the development of the project and the GMP, the network infrastructure had been missed. While the technology consultant had incorporated the network into its drawings and specifications, and provided details for costing and installation, the network was not included in the contractor's final documents. After some discussion and wondering how anyone

miss the inclusion of a network infrastructure in the construction documents for a state of the art building, LTSP worked with already on site subcontractors to remedy this oversight, and the contractor agreed to handle daily management of this work.

With the target date of July 31, 2005 set for the general contractor to turn over the building at a stage of substantial completion, thus giving the seminary enough time to shake down the building, move in the furniture and get everything in place for fall semester, construction was begun and continued through almost two years. The AV contract was let in May of 2005, a mere four months before the beginning of classes, and faculty and students were expecting those state of the art classrooms to be available from day one. The technology team had agreed to do the day to day oversight of work by the technology contractor, and would call on the consultant only when needed. This allowed the process to continue at a pace that resulted in functional spaces from day one, and completion and implementation of some of the "bells and whistles" that were in the design as time allowed and users were ready to use some of the advanced elements.

Training Issues

As previously noted, the technology was designed to meet the needs and desires determined by the pre-design survey of faculty and other users, with an emphasis on ease of use while requiring minimal day to day support staff and holding down costs. Several assumptions that were built into the design assisted in the training and successful use of the technology:
As part of the regular replacement cycle, all faculty members were being supplied with laptop computers as their primary personal computer, and they would use these in the classroom for Web access, presentation and other uses. Many were already using their computers this way, even without properly equipped classrooms.

The Blackboard course management system would be used by most if not all courses to some extent, and all faculty would be trained in the use of Blackboard.

The technology in all equipped classrooms would be consistent from room to room, with special use equipment in rooms equipped for video and audio conferencing added to the same standard configuration. Thus, an instructor could walk into any equipped classroom and be instantly familiar with the equipment and operation interface for that room's equipment.

We learned from the surveys and observation that the teaching environment preferred by seminary faculty was more flexible and less structured than traditional higher education classrooms with a desk for the teacher up front. Some would use a tabletop podium and stand during lectures, others would rearrange the space and sit at a table either facing or joining the students. Many were using their laptop computers, some to the extent where it was the only tool they used for their notes, presentations and support. In the only room equipped with a formal podium, the Wiedemann videoconferencing room, faculty would often pull up a table and chair facing the class, much like they did in the other classrooms.

Given these assumptions, several elements were incorporated into user design:

Since faculty were using laptop computers as part of their set of teaching tools, they were essentially carrying a control panel with them at all times. Classroom control would therefore be Web based, with a few touch panels available for outside users or when a laptop was not available.

This saved us several thousand dollars on each classroom. The biggest problem we have had with this decision is that the interface launches a new browser window, and faculty need to have any pop-up blockers turned off to access the classroom technology.

Installed equipment would be mounted in accessible racks near the front of each room, but away from "prime" space. There would be no fixed electronic podium, desk, instructor's station or other location that would be a part of the classroom furniture, allowing any classroom to be reconfigured as needed to support the teaching style of the instructor and instructional design of the class. This also saved a substantial amount of money by eliminating custom furniture and installation that, in the experience of one of the authors at least, often proved to be inflexible, frustrating and, sometimes, was in the end abandoned.

Like the physical equipment in the rooms, the Web and portable control panel interfaces were designed to be the same for each classroom, and also designed to be task oriented (want to play a DVD? Press the DVD button. Want to use your laptop? Plug into the Laptop input in the floor and press the Laptop button, etc.) with controls designed to be simple, clear and uncluttered. Higher level tech controls are accessible through a tech interface. The machines and interface would look the same and work the same for each classroom A server based, networked management system is in its final installation stages, and will allow tech support to monitor and control each component in each room, virtually anywhere the Internet is accessible.

We used Blackboard to manage access to the interface and controls for each classroom. By placing the control interface for each classroom into the individual course area in Blackboard, faculty would only need to log into their course (which many of them were already doing anyway) and then click the classroom control link to access the correct classroom control panel. No separate logins, no having to remember which room your teaching in - this is already placed in each Blackboard course site and and ready to use.

To keep the cost for replacement components to a minimum, we assign a 15-pin male-male cable to each instructor, which they are encouraged to keep with their laptop and bring to class whenever they, or their students, are using projection as part of a class. This has been successful in keeping replacement cost from lost or stolen pieces to a minimum, and insures that there will always be the proper cable in the room, as long as the instructor keeps the cable with their laptop when not in use. It's a simple solution that works well.

Training for users is a combination of small group orientation and individual training. All faculty members planning to use technology are invited to orientation sessions at the beginning of the semester, and have been joined by each new group of students in our Th.D. program, many of whom will be acting as teaching assistants and teaching classes during their time at LTSP. A more extensive session touching on both pedagogy and practical use of the technology is presented to each incoming Th.D. cohort, and also offered to incoming faculty, including part time and adjunct. Individual users, including students, are taught the basics by the help desk support technician when needed.

Successes and Concerns

Faculty and students have embraced the use of technology, facilitated by the state of the art design of the technology in The Brossman Center, and regularly, where appropriate, incorporate it

into their teaching and learning. The objective of a simple to use design, friendly to users and requiring a minimum amount of day to day assistance from support staff has proven to be successful. Visiting and adjunct faculty, including those from other institutions known for being "high tech," quickly learn how to use the technology and easily incorporate it into their teaching and learning. This allows technology staff to attend to other needs where their skills are better utilized.

As faculty and students have "lived into" the new space and technology, they dream of new ways to use technology, and over the next year we will introduce some of the "hidden" components, such as course recording equipment, that will expand the tools available. This was intentional, in part to allow bugs to be worked out, and in part to keep the support staff from being too overloaded. There may still be a significant challenge if faculty embrace additional capabilities before staff is able to meet demand for training and support for what will be higher level technologies and applications.

While a number of students have voiced "concern" over the cost of education in an extravagant new building, these same voices have no memory of what the teaching spaces were before the rather radical and significant changes that took place in a relatively short period of time, ten years. The changes that have been implemented will need some updating, but there will not be wholesale changes for the future. And if there are changes for the future, those of us who had a hand in designing our present day teaching environment hope that we have planned for easier changes and have put in place a robust infrastructure that will allow substantive changes, sometimes without the knowledge of the end users.

SinclairOnline: A Scalable Model for Implementing Quality Online Programs

Nancy Thibeault
Director, Distance Learning & Instructional Support
Sinclair Community College
444 West Third Street
Dayton, OH 45402
937-512-2926
nancy.thibeault@sinclair.edu

Abstract

While enrollments at Sinclair Community College have remained flat for the past several years, enrollments in online programs have grown at a rapid pace. In fact, the College has not been able to meet the demand for online courses. As a result, online learning was identified as a growth strategy by the President and Board of Trustees, and the Distance Learning Division was charged by the Provost to begin delivery of five fully online programs effective fall 2007. A scalable model that encompasses course development, faculty support, course scheduling, staffing, quality assurance, and student support was developed. The model and implementation plan will be presented. The challenges encountered and strategies for overcoming the challenges will be discussed.

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

Perception is everything - It's MY website, I can do what I want!

Anne Vaassen
Webmaster
Loras College
Marketing / Web Development
1450 Alta Vista
Dubuque, IA 52001
563-557-4092
avaassen@loras.edu

Background:

Loras College is a four-year, Catholic, liberal arts, technology rich laptop campus located in Dubuque, Iowa, granting undergraduate and graduate degrees. Iowa's oldest college, Loras is at home on 60 acres atop the highest bluff of historic Dubuque, overlooking the Mississippi River at the junction of the states of Iowa, Illinois, and Wisconsin. . With over 1,700 students and more than 250 faculty and staff, Loras strives to develop active learners, reflective thinkers, ethical decision makers and responsible contributors in their diverse professional, social, and religious roles.

Abstract:

More than ever, every person, place, department, program, idea wants their own web page; some want to maintain their own – some want complete hands-off. Is brand really that important; it's MY page? The reputation of a professor, program, department and institution is based on branding. Perception is everything. Why/how is it more than just a logo? This session will explain how Loras College is addressing web branding and site saturation challenges. The session will entertain an open discussion on "Expectations and perceptions related to individual, departmental and program web sites."

What is a brand? "In its most advanced form it is the core of your strategy, your DNA. It embodies your image, determines your marketing from concept to execution..."
-http://www.davidrohlander.com

A brand is more than facts or a logo; it's how we talk, express and share common goals and expectations. It's what people feel about us once we're in their lives: it's perception. It's all about creating an image in the eye and mind of your prospects. Academics, campus life, co-curricular activities, history – individually these do not make a brand; a brand is emotional. It reflects a personality, your core values, and the things you believe in – who you are. The ultimate goal is when reality and perception are the same. The challenge comes in when reality and perception are very different.

A successful branding program should be multidimensional emphasizing the total customer experience. It needs to articulate to your prospects that you are the best choice for them fulfilling all their expectations; the total student experience. It's not just academics or student life, it is all encompassing.

GET INVOLVED

Branding - It's not just for Marketing and Public Relations
(entire campus needs to be involved)

Loras College Brand Review Approach:
Listen, listen, and listen
Need to evaluate our brand

Globally: A collaborative campus approach not just administratively

- Appreciative Inquire
- Market Research [Perception Research]
- Change is Challenging
- Revamp Marketing Strategies [and tools needed to support strategies]
- New Tagline
- Fresh Look
- Usage Standards (logos, tagline, fonts, graphics, colors, etc.)
- Communicate and Collaborate – LISTEN

Web: A collaborative campus choice not an IT or Marketing directive

- Revisit Redesign [smaller –phase changes vs complete redesign]
- Form Web Committee for global web policy and long term goals
- Incorporate Global Marketing Changes/Recommendations on Web
- Evaluate / Update Policies
- Select Few Faculty and Use As Examples
- Develop Program sites [replace departmental sites with divisional sites]
- Catalog content AUGH-*that's a topic all by itself* ☺
- Communicate and Collaborate - LISTEN

It's my web page. I want a web page. I want a brown background, with gold and green copy on a three column page with frames, java script (something cool I found on the internet) and a page counter at the bottom. I want to add a few pictures of my dog and my trip to the mountains (pulled directly from my 4mp camera). I retyped the 4 year plan for pre-dental students because I really don't like how the catalog worded it, so add this also. Oh yea, and I don't want my phone number on the site; only my email address.

Why? Why not? Understanding the why(s) and the why not(s) are critical. Communication and collaboration with faculty and staff will make a huge difference.

Share Page Examples:

- Easy ways to incorporate the brand into your site
- Good and not so good site examples
- Before and After

URL with PowerPoint and examples available at presentation.

Discussion:

Expectations and perceptions related to individual, departmental and program web sites.

- Is it necessary to extend the college brand on individual faculty or staff pages?
- How do teens react to branding? What are their expectations and perceptions?
- How do faculty/staff react to branding? What are their expectations and perceptions?

References:

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