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DISTANCE LEARNING

... For Educators, Trainers, and Leaders

In this issue the spotlight is on

Western Governors University

ARTICLES

- Education Without Boundaries: The Western Governors University Story
- Distance Education: Synchronous Communication and its Assessing Benefits
- Implementing an Open Source Conferencing System for Distance Education
- Delivering Blended Learning Into Europe's Largest Organization
- Effective, Scalable, Verifiable: The Power and Application of Blended Learning in Field Security Operations of the Defense Information Services Agency
- Accountability and Productivity Through SCORM 2004 in the Defense Manpower Data Center RAPIDS Certification Program
- Individual Devices Enabling Access: Creating Intelligent Tutoring Technology Solutions Through Gifted Student Training and Mentoring
- Internet-Based Videoconferencing for Teaching and Learning: A Cinderella Story
- The Arkansas Virtual High School
- Case Studies

COLUMNS

- Ends and Means
- New Media, New Learning
- And Finally ...

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Featured Articles

1 ***SPOTLIGHT PROGRAM***
Education Without Boundaries: The Western Governors University Story
Daniel Eastmond

15 **Distance Education: Synchronous Communication and its Assessing Benefits**
Vartouhi Asherian

20 **Implementing an Open Source Conferencing System for Distance Education**
Philip J. Lunsford II

28 **Delivering Blended Learning Into Europe's Largest Organization**
Brian O'Malley and Séamus Coogan

33 **Effective, Scalable, Verifiable: The Power and Application of Blended Learning in Field Security Operations of the Defense Information Services Agency**
A. Cathleen Greiner, Nicole Beaulieu, and Kaaran Webb

41 **Accountability and Productivity Through SCORM 2004 in the Defense Manpower Data Center RAPIDS Certification Program**
Michael Byars

47 **Individual Devices Enabling Access: Creating Intelligent Tutoring Technology Solutions Through Gifted Student Training and Mentoring**
Daryl Diamond and Tony Dutra

61 **Internet-Based Videoconferencing for Teaching and Learning: A Cinderella Story**
Robyn Smyth and Jan Zanetis

71 **The Arkansas Virtual High School**
Valeree R Falduto and Richard Ihde

Case Studies

Duquesne University School of Nursing 81

East Carolina University 84

Northwestern University School of Communication 87

University of Tennessee College of Veterinarian Medicine 90

UCLA Anderson School of Management 92

Villanova University 94

Columns

Ends and Means
Where Are We Going ... and Why? 97
—by Ryan Watkins

New Media, New Learning
Breaking Down Walls (and Building New Ones) 101
—by Craig Ullman

And Finally ...
Podcasting ... or "Seeds Floated Down From the Sky" 104
—by Michael Simonson

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Distance Learning, an official publication of the United States Distance Learning Association (USDLA), is sponsored by the USDLA, by the Fischler School of Education and Human Services at Nova Southeastern University, and by Information Age Publishing. Distance Learning is published four times a year for leaders, practitioners, and decision makers in the fields of distance learning, e-learning, telecommunications, and related areas. It is a professional magazine with information for those who provide instruction to all types of learners, of all ages, using telecommunications technologies of all types. Articles are written by practitioners for practitioners with the intent of providing usable information and ideas for readers. Articles are accepted from authors with interesting and important information about the effective practice of distance teaching and learning.

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Distance Learning is for leaders, practitioners, and decision makers in the fields of distance learning, e-learning, telecommunications, and related areas. It is a professional journal with applicable information for those involved in providing instruction of all kinds to learners of all ages using telecommunications technologies. Articles are written by practitioners for practitioners with the intent of providing usable information and ideas. Articles are accepted from authors with interesting and important information about the effective practice of distance teaching and learning. No page costs are charged authors, nor are stipends paid. Two copies of the issue with the author's article will be provided. Reprints will also be available.

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IN UPCOMING ISSUES

Spotlight Article: Instructional Design for Online Learning at Capella University	*Nan Thornton*
The Next Generation of Planetary Universities: A Two-Part Bird's-Eye Review: Part One: Future Global Curriculum Models; Part Two: Future Operational and Structural Models	*Irving H. Buchen*
Review of Current Issues in Quality E-Learning Environments	*Abed H. Almala*
Pitfalls, Perils, and Profound Pleasures of Live E-Learning	*Janice Wilson Butler and Michael Sullivan*
Conversation With a True Maverick: Michael F. Beaudoin	*María Raquel García Castillo and Arnold (Noteh) Glogauer*
If ITDE is Romeo, Who is Juliet? An Interview With Jeroen van Merrienboer	*Elias Garcell and Diane Hobson*

SPOTLIGHT PROGRAM

Education Without Boundaries

The Western Governors University Story

Daniel Eastmond

Introduction

The Western Governors University (WGU) graduation held on Saturday, February 10, 2007 in Salt Lake City, Utah, was truly inspiring. At this celebration, the university awarded 495 degrees, with over 57 diplomas handed to graduates who converged on the city from more than 20 states. WGU faculty members also gathered from across the United States and arrayed in their academic robes, were meeting with their distance students for the first time in person. However, their voices were familiar to them, having spoken by phone and e-mail to each student several times monthly over the years.

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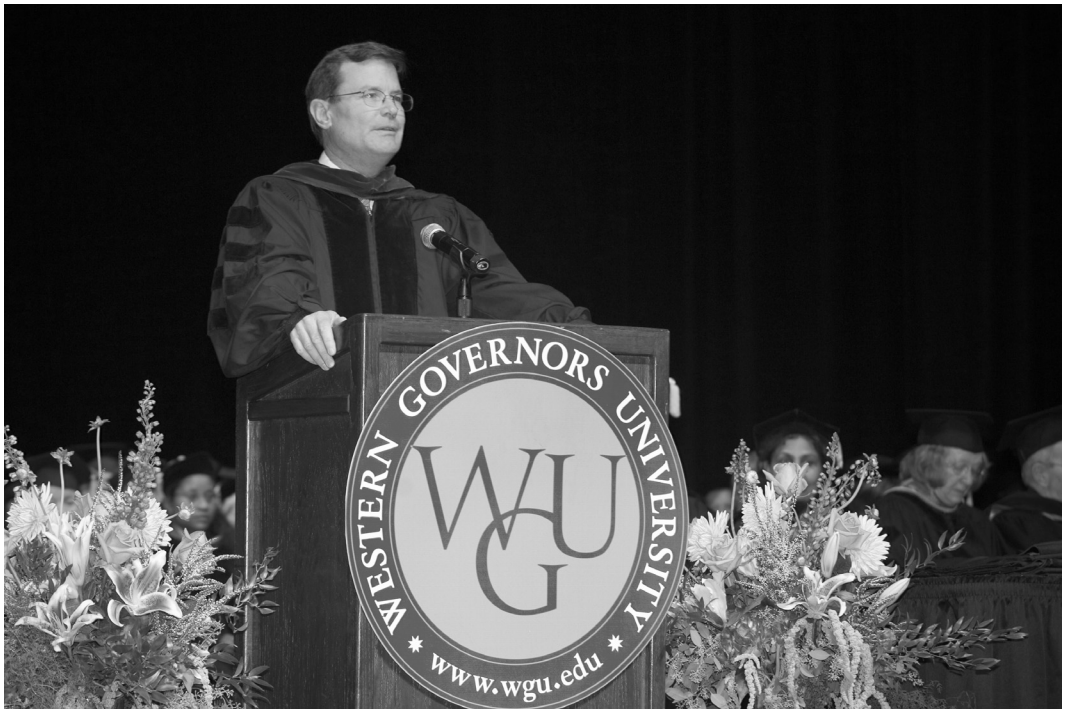
President Robert Mendenhall greeted the assembly of family, friends, and WGU staff in Abravanel Hall, a large auditorium and home of the Utah Symphony (WGU having outgrown previous venues). Mendenhall explained that those graduating during this most recent 6 months represented about a third of graduates from the rapidly expanding university. He reflected on WGU's remarkable growth—from roughly 600 students in eight degree programs with 33 graduates at regional accreditation in 2003—to more than 7,500 students, more than 40 degree programs, and 1,581 graduates today.

Commencement speaker Bess Stephens, vice president of corporate philanthropy and education at Hewlett Packard and a WGU board member, exemplifies the struggles of an African American leader to advance her education and career. She boasts advanced degrees in chemistry and education, rising to her position as global director of HP's Foundation. Stephens spoke on lifelong learning. Applauding WGU, she remarked, "Students can work school into the flexibility of their schedules. They aren't limited by time and place but



WGU President, Robert Mendenhall, addresses the February Commencement audience.

their own willingness to commit and meet the requirements" (McFarland, 2007).

For me, the highlight was graduate speeches, particularly that of Joel Ellington. His father, a dirt-poor farmer in the Ozarks in Oklahoma, had no more than a third grade education. Joel, the sixth of 10 children, was one of the few to finish high school. A watershed experience happened in his senior year, when a high school counselor asked Joel whether his future plans included college. That possibility had never entered his mind. When he learned that it was doable, Joel improved his grades to enter and graduate with two associate's degrees from a junior college in Idaho where he also met his wife. He entered the workforce, began raising a family of his own, and the years went by. In 2000, Joel enrolled at Missouri Western, earning a bachelor's degree in education and was able to begin teaching, a lifelong dream.

Joel entered WGU a couple of years ago, meeting major requirements, taking learning resources and passing assessments to almost complete his degree. One hurdle, the capstone project, remained, and Joel's situation had become particularly acute just then—as he had just rejoined the military full-time. Joel's mentor, Jennifer Smolka, called him, saying, "Joel, I know you; you can do this!" During an early morning run while struggling up a particularly challenging hill, Joel planned to stop at a speed limit sign ahead, only to discover upon arrival another short 80-yard stretch to the summit. With Smolka's words ringing in his mind, rather than walking, Joel picked it up and ran to the summit. From there he could see the whole valley and snowy tops of surrounding mountains. Similarly, girded with her faith

and confidence in him, Joel found the power within to press on to the academic summit, completing the capstone requirement of his master's degree. He soon received another call on a field phone from his mentor exclaiming, "Joel, you've done it!"

Here on the stage of this large auditorium far from Missouri, Joel Ellington shared his tale of how WGU kept its promise to him and made his dreams come true—a dream nurtured by his father, though his parents never had the means or circumstances to gain such education themselves. He declared, "Without the help of my mentor, it never would have happened.… [She] called and stayed with me."

In September 2006, experts from higher education institutions, foundations, and accrediting bodies completed their investigations and deliberations about the future of American higher education, culminating in the Spellings Report (U.S. Department of Education, 2006). They concluded that higher education needs to become more accessible, affordable, outcomes-oriented, innovative, and accountable. WGU's President, Robert Mendenhall (2007), a member of that commission stated, "Ideally, distance learning will help to move all of higher education to better measures of learning—what students know and can do—rather than focusing on measuring time" (p. 13). WGU sets a course to accomplish these objectives as a unique competency-based institution of higher education, firmly committed to providing quality educational opportunities that fit the needs of underserved Americans as well as the competitive workplace of the twenty-first century.

Mission and Promise

Western Governors University's mission remains as originally conceived in 1996: "to improve quality and expand access to postsecondary educational opportunities by providing a means for individuals to learn independent of time or place and to earn competency-based degrees and other credentials that are credible to both institutions and employers." Likewise, the university's leadership formulated this "Promise" which it freely shares with students, setting an employee service standard: "We help our students achieve their dreams for a degree and career success by providing a personal, flexible, and affordable education based on real world competencies." The university strives to build a culture quite contrary to that of traditional campuses—one that focuses on students first, is data driven to measure and improve performance, is innovative and nimble, is high quality with high performance expectations, and is responsive and supportive.

Several aspects of the university make it an especially attractive value proposition for students. WGU is affordable—its tuition ($2,790 per 6-month term) is far lower than most private institutions, and scholarships, financial aid, and tuition reimbursement programs are in place for a majority of students. WGU is flexible—as an online institution, students have tremendous independence and convenience to choose the time and place of their studies. Because WGU is competency-based, it is relevant to the career choices and workplace opportunities of its students, and the constant communication, support, and assistance of a mentor/progress manager make its education personal. WGU is credible—demonstrated through state approvals, accreditation, governors' endorsement, corporate partners, and support from state and national government agencies (e.g., U.S. Department of Education, Congress, Veteran's Administration, and Department of Defense). Finally, the university becomes a good choice for students who wish to accelerate their education—based on the extent of their prior competencies and their determination, commitment, and dedication to exert the effort to move faster through their programs.

The Founding of a New Institution

WGU was conceived at a Western Governors Association meeting in Park City in 1995 (C. Johnstone, 2006). With the growing numbers of citizens in the West, the governors determined not to build new "brick and mortar" institutions, but rather to harness the new technology of the World Wide Web in providing quality distance education to underserved populations, especially those living in rural areas. They determined that this education needed to be geared to the workplace needs of employers. A year later, the governors drew up a charter with 10 sponsoring states, and in fall 1996 began seeking regional accreditation for WGU. With governors Mike Leavitt (Utah) and Roy Romer (Colorado) leading the initiative, the fledgling institution eventually received start-up monies of $100,000 from each of 19 western states (the only direct state funding it would receive). Founding governor Roy Romer spoke of the vision he had for the institution:

> We wanted a university that was available through modern communications, and we wanted it based on performance. And, that was the essence of the experiment.… We wanted to be sure that we created a system in which you didn't get credit for a degree based just upon hours of exposure but based upon proven competence that you demonstrated. (Witkowsky, p. 1)

By 1998, the governors had worked with various corporate sponsors and higher education institutions to open the doors of the new private, nonprofit university. WGU initially did not offer its own degree programs—rather, it was a portal for students to choose distance courses and programs from dozens of participating postsecondary institutions and educational enterprises. After much hype about how the institution would remake the face of higher education and be swamped with enrollments, the initial results were disappointing. Very few students appeared at this nonaccredited upstart institution, as many students determined it was advantageous to go directly to colleges and universities in their locales that were launching their own distance education programs via the Internet. Institutions within states, likewise, banded together to form collaborative distance course and program sharing consortia as a counter response to the WGU initiative in an era ripe with innovation and the prosperous economy of the dot.com boom (Duin, Baer, & Starke-Meyerring, 2001).

Accreditation and Growth

WGU realized that its credibility and survival depended upon becoming an autonomous institution fulfilling an important alternative higher education niche by offering its own degree programs and achieving its own accreditation. The university began the accreditation process in 1996, but was instantly seen as an anomaly, since its footprint covered states accredited by several regions—a new situation for regional accrediting agencies that were geographically bound. To address accreditation needs of this new online competency-based university, the regional associations founded a special task force, the InterRegional Accrediting Committee (IRAC). It had representatives from the Northwest, North Central, Western Senior, and Western Junior regional accrediting commissions. C. Johnstone (2006) outlines the issues and events of the 6-year scrutiny of WGU by IRAC in its rigorous review process, progressing from *eligibility* (1998), to *candidacy* (2000), to *initial accreditation* (2003). Because of the need for more immediate credibility, the university sought national accreditation in 2001 and was awarded it a year later by the Distance Education and Training Council (DETC), a process that was "much shorter … but its standards were equally high and its evalu-

ation every bit as probing and thorough" (p. 5). With initial regional accreditation in 2003, WGU received an unprecedented accreditation by four commissions simultaneously for a 2-year period, with responsibility shifting after that to the Northwest Association.

Some key milestones in its brief history follow. The university began offering degrees in 1999. In 2002, WGU became nationally accredited by the DETC, which was followed by regional accreditation in 2003. The U.S. Department of Education awarded the university a $10 million Star Schools grant in 2001 to develop teacher education programs in shortage areas, and in 2003 helped launch the university's teachers college. The university began to flourish. Financial support shifted from corporate, foundation, and government assistance to the nonprofit, private university being funded almost entirely through tuition revenues. In 2006, the university launched its College of Health Professions.

Also in 2006, WGU's Teachers College completed a multiyear review to achieve accreditation by the National Council for Accreditation of Teacher Education (NCATE). NCATE stated, "In 2001, NCATE modified its standards in part to anticipate the accreditation of non-traditional providers, and WGU is the first to engage the opportunity" (Castaldi, 2006, p. 1). WGU President Mendenhall stated, "WGU is rapidly becoming one of the largest teacher education programs in the country, and we have teacher education graduates seeking licensure in all 50 states." Further, "Today, WGU graduates can apply directly to more than 40 states for teacher certification, and WGU students are eligible for reciprocity in most of the remaining states" (p. 1). The university has stated that what its teachers college "offers is no different from what teacher education programs at traditional institutions aim to provide: a solid foundation for beginning teachers to enter the classroom" (Honawar, 2006, p. 1).

WGU Model and Features

The learning experience at WGU is entirely at a distance wherever a student can access the telephone and Internet within the United States. Students start every month of the year, taking a short introductory course, "Education Without Boundaries (EWB)" before moving ahead on an individualized program of study. EWB prepares students for WGU's model of education and develops their skills to use various tools, such as participating in learning communities or conducting searches for full-text articles at WGU's virtual library. Students are expected to spend between 15 to 20 hours a week on their studies—and can move forward more quickly if they already possess many competencies of their degree program and are willing to devote more time and energy.

Competency-based education (CBE) rests on the premise that candidates should demonstrate their knowledge, skills, and abilities at the level of objective standards to receive the credentials, diplomas, or the licensure of a graduate. CBE particularly appeals to adult learners who already possess capabilities developed through prior work, education, or community experience—and to employers who want evidence that their workers possess the required abilities to perform in the workplace upon graduation.

A promise of CBE is that students won't have to retake courses in subjects in which they are proficient, thus accelerating the time to degree completion (while reducing expenses). WGU allows applicants to transfer in higher education credits at the lower division level where there is a match with required competencies. Certifications they possess, likewise, if part of the degree (such as in information technology) waive requirements. However, WGU affirms most prior learning by determining students' prior capabilities through preassessment, and then enables them to move rapidly to final, high-stakes assessments in their areas of competence.

From its inception, the university has been committed to using the latest technology to deliver quality distance education. Students entering WGU are expected to be adept at using telecommunications technologies, and WGU strives to incorporate technology into its competencies, assessment procedures, and learning resources to meet tweny-first century workplace demands. Not only are almost all of the university's services delivered at a distance through technology, but there is a continual commitment to keep pace with the best appropriate instructional technology available.

WGU's degrees are practical, career-oriented diplomas. The university seeks to produce graduates who meet the needs of employers for today's competitive global economy; it constantly reviews degrees to ensure that competencies fit current workplace demands. The university received special funding to create programs in areas of teacher shortage—science and math education, elementary teaching, English language learning, and social science. Business, information technology, and health professions programs similarly seek to match graduates with the needs of these sectors of the economy.

WGU's programs are tailored to address individual needs, suited to students' abilities, schedules, and interests while maintaining academic rigor. WGU assigns a mentor to advise and support students throughout their degree program. A first task is developing an academic action plan (AAP) that schedules out the sequence and dates of assessments with associated learning resources for competency development. This online AAP dynamically allows students to enroll in learning resources, schedule assessments, and continually see their own progress. Mentors maintain constant communication with each student—by telephone and e-mail at a minimum of every 2 weeks, revising the AAP for every 6-month term. Of WGU's roughly 350 employees, over 150 of them are mentors—the majority working throughout the country from home offices.

Student Enrollments and Demographics

WGU President Mendenhall reported on the "skyrocketing" enrollment the university achieved after its 2003 accreditation, which increased more than tenfold from all states by 2006. "And enrollment is projected to double to 10,000 within the next 2 to 4 years, increasing to 15,000 by 2013" (Witkowsky, 2006, para. 23). With its expansion, WGU's enrollments roughly follow national demographics with its students coming from the most populous states: California, Texas, Florida, Georgia and Illinois, while Utah and Nevada still have large numbers based on founding connections of government partners.

The university accepts most adult students, particularly focusing on working adults who have competencies derived from life experiences of the workplace, prior education, and through community service. Not of surprise, the average student age is 37 years old. WGU particularly targets underserved students and prides itself that approximately 83% of its student body come from one or more of these categories: minorities, rural, low income, and first-generation college students. More precisely, 41% of students have household incomes of less than $35,000 a year; 31.5 percent of students live in a rural community; 42% of students did not have either parent attend college; and 22% of students belong to an ethnic or racial minority group.

Government, Foundation, and Corporate Support

In its early years before regional accreditation, WGU was sustained through major corporate and foundation donations as well as government grants. The university's nearly 25 member National Advisory

Board (NAB), is comprised of corporations and foundations that contribute money and advice to WGU. NAB members (including AT&T, BearingPoint, Consonus, Convergys, Dell Computer, Farmers Insurance, Bill & Melinda Gates Foundation, Google, Hewlett-Packard, Hospital Corporation of America, J. Willard and Alice S. Marriott Foundation, Microsoft, Oracle, Qwest, Sallie Mae Fund, Simmons Media Group, Alfred P. Sloan Foundation, Sun Microsystems, SunGard Higher Education, Thomson Corporation, Wasatch Property Management, and Zions Bank) each made substantial initial contributions and have given yearly dues, also. Wasatch Property Management, upon joining the NAB, donated premium office space in a high rise with an extended, low-cost lease arrangement. The Bill and Melinda Gates foundation, another NAB member, matched a "T-Plus" grant from the State of Utah to prepare school administrators in the use of technology. The Federal Government contributed financial support through FIPSE grants and wrote the university into legislation to offer federal financial aid (FFA) to its distance students at a time when many institutions were hamstrung when using primarily distance delivery.

Perhaps the most significant of the early grants received by WGU came from the U.S. Department of Education. Besides USDOE's award of a $10 million Star Schools grant to build out the curricular programs of WGU's Teachers College for high needs teaching areas identified in the "No Child Left Behind" legislation, the USDOE offered an important scholarship grant. WGU applied for and was awarded a $3.7 million "Transition to Teaching" grant that enabled highly qualified paraprofessionals in the university's partnering school districts (Clark County, Nevada, Region IV of Houston, Texas, and later El

A national online institution, WGU's administrative offices are in Salt Lake City, Utah.

Paso, Texas) to receive half-tuition scholarships to gain teacher licensure through WGU's new programs. These important curricular and enrollment supports enabled WGU to successfully mount its highly successful teachers college.

Since regional accreditation allowed WGU's enrollments to burgeon, reliance on outside support has tapered off so that now more than 90% of operating expenses come directly from tuition revenues. It is worth noting that WGU has worked hard to maintain its FFA awarding status, to make its programs reimbursable to the employees of several companies (especially those on the NAB), and to become a player in Veterans Administration and Department of Defense (DOD) reimbursed postsecondary institutions. WGU also is able to award "Troops to Teachers" scholarships because of DOD and USDOE support. WGU estimates that 65 percent of its students are on FFA, and with another 18% receiving at least some assistance from their employer or the military.

Support in recent years has included: Hospital Corporation of America's sizable contribution to the design and launch of WGU's College of Health Professions; the Sorenson Legacy Foundation's donation of $150,000 toward the new College; the Tenet Healthcare Foundation's donation of $100,000 toward the new College; a major donation of 60 laptop computers from the HP Company Foundation (bringing total support to roughly $750,000); Sun Microsystems's $500,000 in-kind contribution of IT equipment and services; and the sizeable donation of equipment, servers, and space in Salt Lake City from Consonus as WGU moved its IT operations from Sunnyvale, California. Also notable among the current grants was the award of $400,000 from the Lumina Foundation for the university to conduct research to improve its outreach to underserved populations—a major strength and vital part of its mission. Another was the Department of Labor's award of a $3 million grant in February 2007 to award scholarships to rural teachers. This grant will also allow the university to conduct a study with the American Association of Colleges of Teacher Education (AACTE) to develop and disseminate a new model for addressing rural teacher workforce development. Obviously, many contributors throughout the years have made significant donations to WGU's success.

Governance, Program Development, and Council Models

Guiding the overall course of the university is the board of trustees, comprised of governors, educators, and industry leaders. Currently, the former governor of Wyoming, Jim Geringer—a moving force behind the founding of WGU—chairs; current governors Jon Huntsman, Jr. (Utah), and Janet Napolitano (Arizona) also serve. The university continues to garner support (though no monies) from governors of its founding states, and it often holds its meetings in conjunction with the Western Governors Association.

The university's day-to-day operations rely on the decisions and initiatives of its senior leadership team. Very early on, WGU adopted an internal governance structure that is more akin to that of a corporate enterprise than most of higher education. It features: an executive management structure; promotion based on competency; the valuing of all employees equally; a single university structure; the solicitation and valuing of input from all employees, students, and other stakeholders; and academic program councils as major force behind curricular oversight.

WGU develops programs internally by both relying upon the expertise of senior qualified experts in each program area and relying on external standards. Nationally renowned academicians and corporate experts serve on program councils that oversee the development and maintenance of each program's curriculum. How-

ever, in several programs, such as teacher education, state and national standards, as well as those from accrediting bodies, dictate program content and candidate qualifications.

Program councils have oversight responsibility for the quality, currency, and effectiveness of the programs within their charge. They consist of six to nine subject matter experts drawn from other academic institutions, private enterprise, school districts, and state or national government agencies, and are the university's most senior faculty members. There is a council for each major curricular area—liberal arts, business, information technology, education, and health professions. They meet in person at WGU offices several times a year to monitor program effectiveness, evaluate learning resources, and provide advice on program planning issues. Speaking of the academic integrity created by councils in formulating competencies, former Provost Chip Johnstone wrote:

> The coherence of the degree is ensured by … the comprehensive nature of degree competencies. These are not the result of a single faculty member's point of view, nor are they derived from course equivalencies. They are designed as complete structures—the body of knowledge, skills, and abilities that a broad cross-section of experts judge necessary for a student at a given degree level to possess. (D. Johnstone, 2005, p. 28)

In addition to approving all new degree structures and competencies, Councils conduct formal reviews of program effectiveness at least every two years, and more frequently for newly launched programs. During program reviews they make sure that competencies still align with current academic and professional standards. They review assessment performance to be sure they effectively measure the competencies and learning resources to be sure that they properly align.

Marketing and Student Services

Appealing to the right audience who will especially benefit from WGU's distance programs is the crux of marketing and recruitment efforts. As a nonprofit institution, the university does not have a large budget to spend on mass marketing. Word of mouth helps, but lead generation from interested applicants through Internet brokers—as well as through partnering organizations or grants—is WGU's preferred source of applicants. It especially seeks working adult students from underrepresented populations—rurally located, first generation college, lower income, and ethnic minority students whose work experience has outpaced their credentials.

The university employs a cadre of enrollment counselors to respond by e-mail and telephone to those who express interest in attending the university. Counselors in some ways parallel the mentoring process that goes on once the student matriculates. Each prospect works with an enrollment counselor who specializes in the degree field that he or she has chosen; the counselor assists the prospective student through the entire admissions process (e.g., financial aid, application, admissions testing, and scheduling to attend the introductory course, "Education Without Boundaries").

Given its missions of "expanding access," WGU is more open-enrolled than its traditional counterparts; however, student selection is still important to winnow out those who will likely succeed at its model of distance education. WGU requires all applicants to complete an admissions test that measures academic competency, and considers each applicant's situation, technology skills, and commitment toward their educational goals before allowing entry. Of course, a high school diploma or equivalent (and TOEFEL scores for nonnative English speakers) are required for entry into baccalaureate programs. A bachelor's degree from an accredited institution is the mini-

mal requirement for entrance into the university's graduate programs.

WGU accepts lower-division undergraduate credits in transfer, waiving those relevant competencies. However, in upper-division or graduate work, transcripts will not suffice; the student must demonstrate those competencies through assessment (which should be expedited if there is successful prior college work in that area).

WGU's own transcript is somewhat unique but readily accepted at other institutions. All competency assessments are taken as "pass/fail" with a "pass" meaning that "*the student has demonstrated competency at a grade equivalent of B or better.*" Transcripts also list the competencies by "courses of study" (assessments) with the number of competency units (credit equivalents) each one represents.

WGU has an office devoted to retention and student success. These employees contact "at-risk" students to see how the university can assist them to make it through each term. They may assist with minor purchases (e.g., textbooks) if that becomes a major obstacle. These counselors coordinate with various university offices to address any problems these students face. The liaison works with any student complaints in a like manner, also making arrangements for students with disabilities. The Student Success office organizes incentives for student achievement of milestones and administers scholarships for students in underrepresented populations to attend and succeed at WGU.

As its graduates multiply, WGU is committed to their ongoing success. Rather than ask for contributions back to the university, WGU affords them continued mentoring, peer-networking through a special portal, and career services. The university measures its own success by the success of its graduates—such things as their performance relative to others on standard tests and certification exams; their placement, promotion, and pay; employer evaluations; the relevance of the degree to their career; and their recommendation to others to attend WGU.

Assessment

Students demonstrate competency through assessments. WGU uses various measures in combination, relying on external graders to determine competency. For each domain (typically four to eight in each degree program) WGU has established multiple measures to ascertain competency. These typically include objective and essay exams in proctored testing centers, and performance tasks done online to apply skills and knowledge to realistic work requirements and portfolio development—turned in electronically for grading. For initial licensure, students in the Teachers College are also "observed," during their student teaching experiences using a grading rubric administered by a qualified clinical supervisor and arranged for and trained in the student's school district, wherever located across the nation. Degrees culminate in a capstone project that synthesizes the knowledge from several domains into a culminating product, usually written and presented online via Web and phone conference to graders.

Students occasionally must travel to proctored sites (such as test centers) that WGU arranges near their homes—the only site-based requirement for most programs. Also, WGU arranges for independent grading of its essays, performance tasks, portfolios, and capstones. (Online testing software automatically grades objective tests). The assessment department contracts with roughly 150 qualified graders, training them and continually monitoring their performance and interrater reliability. Graders also give important feedback on student work, especially if it must be reworked if "not passed."

In addition to its program councils, the university established an assessment council, comprised of experts who oversee and advise on measuring the competencies in

each program area. In cases where programs use industry-recognized assessments in their programs, such as Praxis, SHRM, CMBA, or IT certifications (e.g., MCSE, iNet+, Security+, MySQL, etc.), the university compares its students' average scores with the industry average to achieve a standard of excellence above the mean. WGU builds most of its assessments in-house, through rigorous psychometric practices approved by the assessment council. In other cases, like its business and IT programs, WGU uses industry certifications as a component of the degree requirements. This practice assures that graduates from its programs have demonstrated competence within their fields as defined by the industry itself.

Learning Resources

While enrolled at the university, students use a variety of learning resources (LRs) to brush up on existing competencies and develop new ones. From its inception, the university determined not to duplicate the online offerings of other institutions of higher education but instead to bring in suitable, aligned courses as needed to assist students. Since no students come fully competent, they spend the bulk of their time at the institution becoming proficient through interaction with a variety of LRs. These include textbooks, Web sites, Web-streamed e-learning, learning community discussions with peers and mentor experts, CDs and videos, virtual library resources, and online courses taken from other institutions. WGU makes sure that its LRs are available at any time or place, modular, low cost (since funding comes from student tuition revenues), open or available frequently, self-paced (especially for acceleration), interactive, and feedback-providing (Eastmond, 2006). Each course at WGU has an associated "course of study" (an annotated syllabus) that directs student learning.

WGU arranges for all of its LRs from third-party providers, through contract. These include online courses from accredited institutions of higher education, such as University of North Texas, Rio Salado College, and Chadron State College and nonaccredited enterprises, such as Abromitis Online Learning and Wasatch E-learning. Increasingly, however, the university arranges access to independent learning resources—e-learning, videos, simulations, and websites—through commercial providers such as NetG, SkillSoft, Teachscape, and MindEdge. All of these LRs are integrated into WGU's catalog to automate the enrollment process and assure that students get immediate access to most LRs online. The university also has contracted for tutoring services in math, writing, and other content areas where students may struggle (Eastmond, 2006).

Students learn to use WGU's virtual library, arranged by contract with the University of New Mexico, in their first introductory course at the university, "Education Without Boundaries." Then they use various library services such as database searches for full-text articles, reference desk, e-reserves, and interlibrary loan throughout their study at the university. WGU's librarian supplies most of these services directly while interfacing with the full services of the University of New Mexico library.

WGU has moved from operating a virtual bookstore through a third-party vendor toward getting more precise textbook content electronically. The university is working with several major publishers for specific chapters and sections of its adopted textbooks to be made directly available online for students—with e-reading capability to search, bookmark, highlight, and make individual notes in those copies. This e-content is integrated with other types of LRs within WGU's "courses of study" so students can seamlessly move from one LR to another.

WGU Goals and Future Directions

The university's provost and vice president of academic affairs, Craig Swenson, reflected recently about WGU's role in American Higher Education:

> I believe that WGU is the most innovative higher education institution in the United States, with a single-minded focus on improving the cost and quality of higher education.… Many people say that higher education is all about teaching, but it is really about learning—helping students become learners, gain competencies, and measuring and credentialing those competencies. That is what WGU does and it is why this institution is so important as a model to our higher education system. (Osmond, 2006, p. 2)

WGU considers itself successful through achievement of its purpose and mission. That is to develop and promote *competency-based* education; provide effective, *high quality* education programs; create a more efficient, *lower-cost* model for higher education; expand *access* to underserved populations; develop programs to anticipate and *meet significant needs* (public and private); and *use technology* to deliver more effective, efficient, and quality education.

Success really depends on the accomplishments of the university's students and graduates. That means maintaining and constantly improving WGU's retention rate, academic progress rate, graduation rate, and student satisfaction. These metrics are constantly monitored and have become performance objectives tied to compensation for everyone in the university. That success is captured in these recent vignettes:

- Penny Allison, a parent and teacher, reported: "I am able to work when it is convenient for me … Sometimes that is 2 a.m., because I work three jobs and have a family" (Osmond, 2006, p. 2).
- During Hurricane Katrina, an online group of student friends, one in Utah and another in Michigan, were able to give moral support and even recreate some of Sara Miller's work. The student was living in Mississippi when her home (including textbooks, papers, and computer) was destroyed (Osmond, 2006, p. 2).
- Angie Lambert, a 2006 graduate, stated "I loved the WGU program—It didn't waste any of my time like other college classes have" (Witkowsky, 2006, para. 47). It saved her from a several-hour commute to the nearest university campus, and her degree landed her a new job, teaching fourth grade.

Western Governors University's challenges include reaching out to adult and underrepresented populations who will benefit most from these credentials, and gaining recognition of the validity of this alternative education model. Having the endorsement of national, regional, and association accrediting bodies has substantiated the model within the higher education community. The university holds the promise of extending affordable, quality higher education to deserving adults in a manner convenient to their life situation, enabling them to realize their educational dreams and progress within the workplace or pursue further educational goals.

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WESTERN GOVERNORS UNIVERSITY

2003 = 33 GRADUATES

2007 = 1581 GRADUATES

Distance Education

Synchronous Communication and its Assessing Benefits

Vartouhi Asherian

Distance leaning is the process by which students learn course material from a location that is remote or away from the instructor. The technology for delivering distance education evolved over time. As changes in technology took place, the way distance learning is conceptualized has also changed. The literature identifies four stages in the evolution of distance education that are linked to technologies as methods of delivering instruction (Lauzon & Moore, 1989; Moore & Kearsley, 1996). They include the delivery of course material using: correspondence/independent study (first generation), radio/audio study (second generation), broadcast television, videotape, with interaction by telephone, or both delivery and interaction by telephone, satellite, cable or ISDN lines (third generation), and computer networks and computer-based multimedia workstations (fourth generation).

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The four stages reflect not only changes in technologies but correspond to differences in the way instructors and learners approach distance education. The first stage interaction is a multistep process that takes a long time to occur and the learner is essentially engaging in self-study. In this stage, the instructor is an absent figure who creates the learning materials and the learner is fairly passive. The second and third stage makes the instructor more personal and the level of control exerted by the learner increases. Depending on the venue, the learner can make menu choices (Pavlik, 1998, as cited in McMillan, 2006). In the final step, technology provides some unique opportunities to enhance the entire process in a way that distinguishes this approach from all previous instructional technologies (Maddux, Johnson, & Willis, 1987). The fourth generation delivery system is referred to by many names such as "Web-based" or "online" education, and for some it has become simply "distance education." This form of instructional delivery facilitates not only the potential of providing instruction using different modalities, but also providing the potential for truly

interactive communication; specifically, communication between instructor and learner can be facilitated to include real time feedback, collaboration between learners, and rapid access to information. The learner has the ability to exert more control over the learning process and work with the instructor to cocreate the learning experience.

Using McMillan's model of user-to-document interactivity the evolution in distance education changed in two significant ways. The level of learner-perceived control increased and the learner became more of a contributor in the learning process (McMillan, 2006, p. 213). Again, using McMillan's model, the first stage in the evolution of distance education was the providing of a packaged content in which communication essentially was unidirectional, from the instructor to the learner. In the second and third stage, content became more on-demand as learners could exert more control over when, where, and what content to focus on. Finally, the fourth stage allows the instructor and learner to cocreate the content and learning experience. It is this unique combination of elements that makes the fourth stage of distance education truly interactive.

Even though advances in technology have enhanced interaction, the positive effects of technology are still debatable. As researchers explore this ever-changing topic, there is a need to clarify the effectiveness and appropriateness of techniques. The importance of doing this is not only to facilitate research in distance education but, as technological advances take place, the use of these technologies to facilitate distance education will increase and penetrate schools. One line of debate focuses upon the impact of instructional media. Clark (1983) has noted that instructional media are just vehicles used to deliver instruction and do not affect the learning process. However, Cobb (1997) argues that different media have an impact on learning but do not produce different learning outcomes. Jonassen, Campbell, and Davidson (1994) propose that media and technologies are not just methods of content delivery, but also part of context. The issue of context adds to the complexity of the debate by including such topics as learner characteristics, instructional design, learning environment, learning context, and the social context factors in delivery systems.

Today there are many different technological tools available to teach online. Despite the various technologies, there are clearly many shared benefits of online learning using computer-mediated communication (CMC). These include: convenience; elimination of space, time and geographical constraints; increased peer interaction; deeper critical reflection; and the ability to utilize effectively internet resources. These benefits were identified and documented by several researchers suggesting that they are truly benefits of online education (Berge, 1995; Harasim, 1987; Hiltz 1994; McCreary & Van Duren, 1987). In addition to the documented advantages of technology, student expectation and demand for online classes is growing. According to the report *Entering the Mainstream: The Quality and Extent of Online Education in the United States, 2003-2004* (Allen & Seaman, 2004), the number of online students was expected to reach 2.6 million by fall of 2004. The demand for distance education places a need for improving online delivery to meet the diverse needs of these students and to meet student expectations for this educational venue.

Unfortunately, progress in taking full advantage of online instructional delivery is obstructed by misconceptions instructors have concerning this mode of instruction. One misconception concerning online teaching is that it is not possible to establish the same level of effective communication as experienced in face-to-face interaction. Feenburg (1989) states that

Western cultures need face-to-face interaction to assure that learning takes place. Instructors' comfort with classroom instruction rely upon the various channels of feedback provided by this method and equate that feedback as evidence that learning has taken place.

Another misconception is that one can easily create a successful online course by placing traditional classroom tools and materials online. The assumption is that all teaching modalities are functionally equivalent. This view provides little recognition of either the unique opportunities or the unique challenges that are provided by different learning venues. According to Wiesenberg (1999) what is needed is not a simple retooling of the old "how to" of instruction but a whole new approach to teaching online. Hopefully, these misconceptions and others can be overcome by taking a new approach to online instruction.

A new approach would have to focus upon the communication of online course material to facilitate student understanding. There are two types of communication in an online course environment: asynchronous and synchronous. Asynchronous communication is one-way communication that often takes place through e-mail and discussion boards. Synchronous communication takes place in real time by use of various technologies. Often, it includes lecture followed by discussion. Each approach has its advantages and can be differently applied to achieve a variety of desired outcomes.

Asynchronous communication can facilitate a contemplative discussion and detailed exchange of ideas among students. According to Garrison (1997), the reflective nature of asynchronous communication is different and has more depth than synchronous communication. Learners in an asynchronous environment can reflect on statements made by the instructor and fellow students. They can take the time to research and craft their responses and by so doing engage deeper into the conversation. In comparison, Garrison argues that synchronous communication is a less structured form of communication.

However, the study of some disciplines benefit from real-time communication. An example of this is the study of foreign language. Students need to practice a spoken language in real time and so will most likely learn the subject matter more proficiently through some form of synchronous communication. In fact, Murphy and Coffin (2003) researched the implications of language instruction using a computer-based synchronous communication method. They reported a tendency of students to use the discussion tool even though the oral tool was available. Unfortunately, this behavior ostensibly defeats the purpose of using a technology that applies a multiple-modality learning environment. However, they attributed this behavior to technical difficulties reported by students in using the microphone and the oral tools in general. This study is interesting in that it explored a new and different use of technology. In the past, the use of synchronous communication was focused on MOO, MSN, and audio/video conferencing. These tools were not integrated directly into the course. Cox, Carr, and Hall (2004) state that "online chats, or any other form of CMC, should be integrated into the course design otherwise students will not see a need to participate" (p. 191). The integration of synchronous communication was essential in the case reported by Murphy and Coffin. Nevertheless, the use of multiple modes of synchronous communication for language instruction remains an exciting yet inadequately tested possibility.

Despite advances in technology and depth of communication, or degree of interaction, Jonassen et al. (1994) argue that context plays a significant role in the process of effective instruction. To engage the students, the instructor needs to carefully design questions to facilitate thinking

and discussion. Advanced learning occurs when the learner develops schemas from well-developed constructs that are interconnected. To do this, the instructor must guide the development of the learner's thought process. Essentially, the basics of sound pedagogy are still paramount. The method of instruction is not a substitute for sound teaching techniques and instructor preparedness.

Shotsberger (2000, p. 54) explores the concept of context and takes this issue to the next step by exploring the social context of communication. He finds that social and human encounters are missing from asynchronous communication. This mode of communication is missing a variety of cues that are found in face-to-face communication. Communications in this environment are somewhat disjointed and lack a certain flow. He states that "a group of teachers chatting together can accomplish in one hour what it takes a week to accomplish in a week to accomplish using an asynchronous discussion board." There is great value to the synchronous environment in that it reduces the time it takes for small groups of people to reach a shared understanding. It is within energetic give and take that shared meaning is developed and participants can engage in synergy among themselves.

Finding the right educational tools to achieve a specific learning outcome and using those tools properly can result in greater student success. This statement is all the more true for a distance education environment in which instructors and learners are physically separated from each other. In any case, learning objectives should dictate the proper instructional methodology and not the availability of a specific technology. It is therefore predictable that one form of instruction or communication over another best meets the learning goals of the class. The key then is for research to uncover systematically the instances in which one form of communication is more effective than the other. Research needs to distinguish between student participation and comprehension while using synchronous versus asynchronous tools. Specifically, it is hypothesized that asynchronous communication is most useful for topics and issues that require the student to engage in deep contemplative and reflective thought. The student can use this approach to craft well thought out and researched responses. This may prove more useful for classes in which students are required to delve in more depth on a narrow topic. Synchronous communication is most useful when there is a short timeline, a need for consensus, or for coordinating events or an extensive group project. Specifically, the use of synchronous tools will be associated with positive learner perception if a course requires frequent feedback or creating shared decisions with the instructor or others in the class.

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"SYNCHRONOUS COMMUNICATION IS MOST USEFUL WHEN THERE IS A SHORT TIME, A NEED FOR CONSENSUS, OR FOR COORDINATING EVENTS OR AN EXTENSIVE GROUP PROJECT."

Implementing an Open Source Conferencing System for Distance Education

Philip J. Lunsford II

As distance education becomes more popular, the need in educational institutions for inexpensive long-distance voice and teleconferencing services grows. Students need to communicate with each other and with instructors. Additionally, the availability of broadband connections to the Internet for students is increasing and the cost is decreasing. This article reviews a case study of implementing an open source system of an Internet protocol-based private branch exchange (PBX) along with software-based phones that allow students and instructors to communicate via voice or both voice and video. Since the system is based on open-source software, all of the software is free and the hardware requirements are minimal. The Asterisk-based phone system TrixBox was implemented on a VMWare virtual machine as the PBX and the software-based phones X-Lite, Ekiga, and Idefisk were used by the instructors and students. A review of open-source licensing, along with the rationale for choosing the particular software distributions, is given. Additionally the topology of the implementation is reviewed along with the configuration challenges found. Finally, a review of security and policy considerations is given.

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Introduction

Organizations all over the world are expanding their Internet presence. Whether educational institutions seeking to broaden their reach and increase revenue by offering online courses, companies trying to offer telecommuting capability, or organizations seeking

to provide online access to the handicapped, online collaboration and conferencing is becoming popular across all industry sectors.

Community colleges, notoriously on shoestring budgets, have begun offering online classes for general education and preparatory courses. In order to complete the online coursework, a collaboration tool is needed. E-mail is not real time and does not offer the consistent interactive "feel" online students need, but can be provided with such tools as conference calls, video and text chat. Schools constantly deal with a segment of their students that does not perform well. These students fall behind and their grades seldom recover. Rural school districts could use distance learning tools to help mediocre students shore up course work after school without the students needing to be on campus. Another educational segment, the growing homeschooling community, continues to struggle with the question of socialization. Pundits such as Mike Jerry, expert author at Ezine, teacher organizations, and civic groups and even the popular TV psychologist Dr. Phil, feel that homeschooled children's isolation causes disconnect later in life (Delp, 2006; Jerry, n.d.). The usual and optimal solution is to schedule play times and field trips with other home school groups, but at home there is still a disconnect. Homeschool groups need a solution for families and children to keep in step with each other and provide needed socialization. The handicapped community has always struggled with accessibility to work, school and other social settings. Providing this equal access is often costly, time consuming, and complicated. These organizations require a cost effective and quick solution in a setting where the handicapped need access to various people on a consistent basis and always feel connected to their office or classroom. Finally, universities all over the world are expanding their online course offerings and yet the available tools lag behind. According to an MSNBC report, 3.2 million students took online courses in the fall of 2005. That accounts for one in six higher education students (Pope, 2006). These institutions seldom initially consider the inherent challenges and the tools these students and instructors need. Consequently, the credibility of these universities can be on the line. Although the solution can be complex given the exact needs, the vastly expanding Internet is a mature infrastructure. Solutions that utilize the Web for voice and video calls are becoming more popular. Since the Internet itself does not care if information is data, voice, or video, it does not enforce a limit on the number calls, unlike circuit switched technology. The only limitation is either a service provider enforcement of total bandwidth usage or the limitation of a private network's technology. Although some rural areas do not have broadband, the outlook on its expansion is good since, as of 2003, it was available to 80% to 90% of Americans, according to Mehlman (2003). Mehlman also cites the Jupiter Research estimate that 56% of households will be using broadband by 2007.

Most universities and colleges have broadband Internet access, so the challenge is at the private home where the monthly price of broadband continues to thwart low-income earners. Although the problem is clearly at the residential end because of location or cost, the good news is the advent of not only expanding DSL and cable networks, but also technology such as broadband data modems and WiMax, which are putting downward pressure on monthly service costs. Data modems simply use the digital 3G technology of cell phones but offer broadband services usually by the use of either a PCMCIA card for laptops or PCI card for regular PCs. This is an attractive and comparable ($60 per month) solution in many rural areas that have cellular coverage but no DSL or cable. WiMax is the new standard IEEE-801.16 that extends broadband

services via radio signal to businesses and residences up to 30 miles in non-line of sight scenarios. This comparable service ($50 to $100 per month) is now in residential trials and is expected to instantly expand deployed broadband services to rural areas by 30 miles (Kay, 2003). Of course, satellite broadband access is available to businesses and residences as part of satellite TV service at comparable prices.

Because of budgetary constraints and the expense of paid conferencing solutions, open-source products are an excellent option. A vital aspect of open-source is the extensive network of online forums and communities made up of software developers, integrators, and network administrators. Note that not all open source products have extensive communities, but many do. The open source software removes the cost barrier to market entry so that educational organizations can avoid having to put a "down payment" on a solution without a clear outcome.

Many equate free software to open source. Although an open source package may be free, all free software is not open source. Such is the case of VMWare Server which is a free software package that emulates individual computers within a physical computer. This software is free but is not open source; therefore, users are not able to modify and repackage the code, creating a new emulator. Open source means users have access to the software source code, and it is usually issued under a license called the GNU General Public License (GPL) (Su, 2006). With the GPL license, anyone can use or modify the program. The caveat is that if any software is sold that is based on the original software, then the newly-derived software must be released under the GPL license, thus making the modified source code available to anyone free of charge. What normally does not come with free open source software is support in the form of a helpdesk or automatic updates. However, there are many online forums in the open source community where users can ask questions and often the documentation for application is extensive and available online. The business model for companies dealing with open source software is based on selling services such as integration, training, support, and updates.

H.323 AND SIP

Internet communication has eclipsed circuit-based systems in which channels, usually of 64kbps, were assigned to subscribers. ISDN combined two of those channels for a total of 128kbps, not enough bandwidth for an IP Web-based video conference. When choosing a multimedia solution, we had to decide if we preferred or required a specific protocol. The two choices for protocols that coordinate the creation of a phone or videoconference call are the older H.323 and the newer SIP. The H.323 protocol was originally designed for video conference setup using switched circuit connections. It has been updated to include packet switched IP networks. SIP is simpler and truly a multimedia protocol because it is agnostic of the underlying transport protocol (Stegh, 2006). So, a SIP server could set up a text chat or whiteboard call session between two SIP clients without the server caring about the protocol. H.323 must support and negotiate the protocol before clients are allowed to collaborate. Although the industry has continued deployments of H.323 systems, service providers often deploy SIP capability in tandem for eventual cut-over. This is because SIP is gaining ground due to its relative simplicity and by becoming the 3GPP approved standard (Stegh, 2006). Although there are H.323 open source tools, the server and client side of most new collaboration software uses SIP as its session protocol.

Case Study

After several weeks of study which consisted of learning about Linux, the latest trends in voice over IP, operating system compatibility, and the available open source products, we selected Trixbox 1.2 as the server for the East Carolina University lab trials. We considered other software, such as Webhuddle, which runs on a Web server, and Netmeeting, with the Linux server acting as ILS (Internet Locator Server). Ekiga was not considered as a server solution, as it does not offer call control and registration. It is certainly usable as a client in our solution and has been tested as such. One caveat is the Windows open source distribution of Ekiga that we tested was unstable and crashed the client computer in our tests. Webhuddle, on the other hand, is very stable and offers all the control, whiteboarding, chat, and desktop control. It also does not require a software download, but the client side must download and start Java to run the Webhuddle applet. Although it is a relatively "light" applet, it does require an initialization time, up to 1 minute, depending on the client computer's processor. Webhuddle has less community forum support and the installation was complex and confusing. We chose to install it on Windows running within VMWare. This worked, but the lack of call control and administrative capability caused us to abandon WebHuddle. In trying to find a peer-to-peer solution that would not require a server, we configured Netmeeting on a Windows machine side and Ekiga on a Linux client and realized the two were not compatible. We were left with Trixbox 1.2 and Asterisk system available at www.trixbox.org. This installation went smoothly. With complete real-time control of the audio and video codecs, conference room monitoring, and the capability to define hundreds of user extensions, we selected Trixbox as our final solution. Trixbox is an audio and video conferencing system based on Asterisk, which is a free Public Branch Exchange (PBX). Trixbox is produced by Digium, which originally designed Asterisk. Digium has made available a full Linux distribution of Trixbox as an ISO image at www.trixbox.org. An ISO image allows an installation CD to be created that includes a complete installation. Trixbox is composed of several software packages that have been integrated, including a webmin interface for web browser based administration. There are several other components which make up this system. Asterisk is at the system's core and provides the capability to handle SIP VoIP calls. In its basic form, Asterisk can be fully customized using the configuration files in the directory /etc/asterisk. This system will handle inbound our outbound calls and know how to route them, which codec to use, and if video is supported. It includes hundreds of customization options. Included in Trixbox is SugarCRM which is an integrated contact and calendaring tool that users can log into, define contacts, schedule meetings and call into a meeting directly from a browser. Also included is the A2Billing management interface used for optional billing management. Most educational institutions do not need this feature. The Flash Operator Panel is a real-time call operator control panel which displays in the administrator's browser each configured extension and if it is presently on the phone. Web Meet Me Conference is the administrator's global view of the conferencing status for the entire system. It allows for a real-time status of all conference rooms and parties. FreePBX is a browser administration front end for Asterisk. It provides the administrator the ability to define and configure the system from a web browser. The CDR reporting tool is another administration tool for call tracking and monitoring. FreePBX also includes Config Edit designed to provide browser editing of Asterisk flat configuration files. We have found this version of Config Edit causes problems and has actually deleted all contents of the vital sip.conf file, requiring a

complete system reinstall. Thanks to VWware which saves snapshots of the virtual machine, a system restore was trivial and it was back up and operational within minutes. Finally, this distribution comes with the CentOS operating system which is a very stable early Enterprise linux distribution. This version does not require an operating license and does not come with a support license.

The ECU pilot implementation found that available free SIP softphone clients are not yet feature rich, but some basic audio and video SIP phones are quite mature. Those with many features are not yet stable, such as Ekiga for windows which supports file transfer and whiteboard features. In our tests, the Ekiga client crashed the Windows XP host laptop several times. We ended up using the free softphones X-lite and Idefisk (www.soft20.com and www .tucows.com).

Our final solution included the use of the virtual machine emulator package VMware; thus, we were limited to the list of supported Linux distributions for VMWare Server. We settled on Ubuntu 6.06 because of the extensive free support. The individual in charge of this prototype installation did not have extensive Linux administrator experience. Firstly, we needed to understand the ISO installation process and the administrator's duties such as enabling root access and changing the root password. VMware's Ubuntu installation is not trivial, but once installed it is quite stable and easily operated, especially from the Ubuntu desktop. The VMware virtual machine is easily created and defaults to a 3 GB virtual hard disk. This virtual appliance shares the host system's RAM, so the amount of physical memory on the host machine is critical. The ECU pilot server runs on 2 GB of

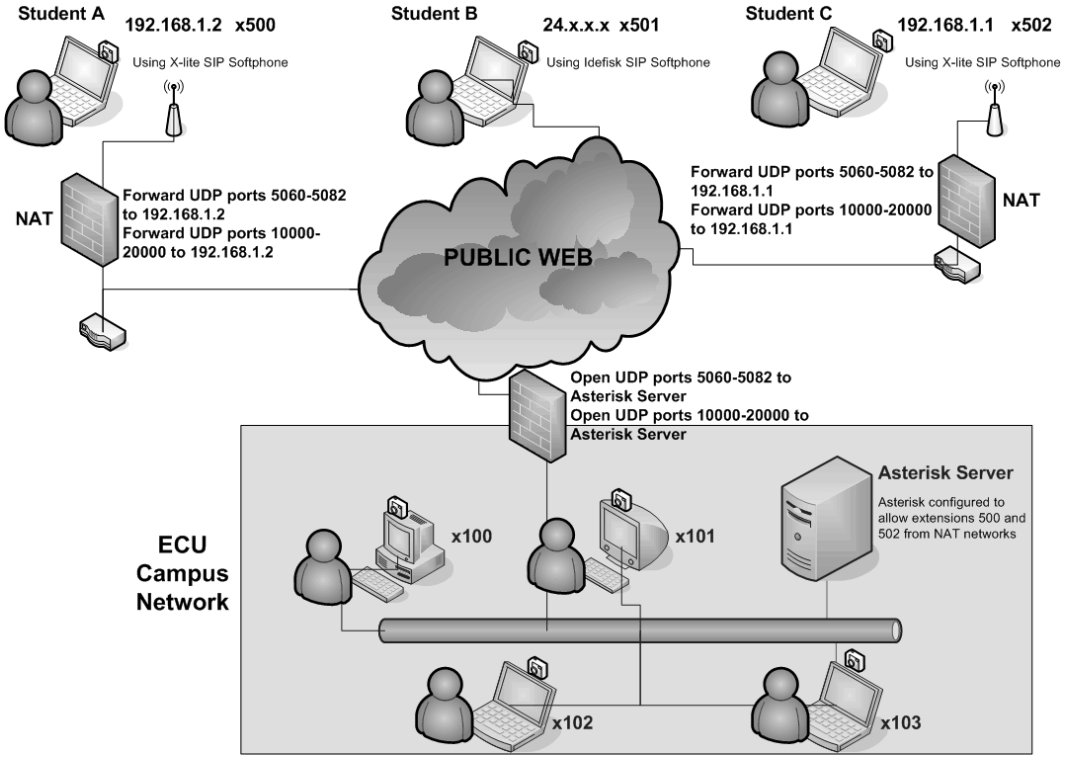

Figure 1. Topology of the Trixbox system implementation.

RAM, of which it has dedicated 128MB to the Trixbox virtual machine. It should be noted that VMware provides a solution that is easier to manage and configure, but is not required. The Trixbox server could be set up on a machine running native Ubuntu and would require less RAM.

Upon installation of the Trixbox system, the dynamic DHCP IP address gave us full connectivity to the network. Upon bootup we had a console printout which showed us the http path to use for Web access. After exploring this system via the browser, we got a feel for the administrator's access and changed the system login password. Unfortunately, the connectivity to the Trixbox machine was lost without warning. After much investigation, we saw the CentOS distribution of the ifcfg-eth0 comes with DHCP turned on, but something in the machine makes it renegotiate the IP address periodically. Therefore, if we changed the IP address to static or even rebooted the machine, it renegotiated a DHCP address and all connectivity was lost, although data is not affected. Though the cause of the forced DHCP request was never diagnosed, the workaround was to change the TrixBox /etc/sysconfig/network-scripts/ifcfg-eth0 to PROTO=none and define a static IP address.

At the core of this system is Asterisk, which has two main concepts: extensions, and routes. These concepts make up the dial plan. The dial plan idea is that every call in or out of the system must be handled and routed to a client device, whether a SIP desk phone, SIP softphone, pager, cell phone, or public switched telephone network (PSTN) (i.e., legacy phone). In our installation, we did not integrate our Asterisk installation with the PSTN network. An extension is comprised of a number (e.g. 100) and a secret (e.g. 12345) for authentication and registration. There are inbound and outbound routes. There can be many of these and many combinations of them based on the different types of client devices and routing. In our simple case, we have only SIP and IAX2 as possible clients. No PSTN connectivity is required, since the ECU implementation includes the need for audio and video. If desired, a PSTN to SIP VoIP call architecture is achievable by simply purchasing a low cost monthly service from a VoIP gateway service provider. This provider assigns a traditional 10-digit telephone number to the Asterisk server's IP address and does the translation upon receiving a PSTN call. The central Asterisk IVR attendant module, unless otherwise configured, will answer the call translated from PSTN to VoIP from the gateway and the PSTN client will hear a number of options and the chance to connect to an extension via the key pad.

Our implementation's Trixbox server sits on the same LAN as its physical host Ubuntu machine. It resides behind a firewall but not behind a NAT device (more about understanding NAT can be found at http://www.pcsupportadvisor.com). With the advent of home routers and wireless access points, the problem of NAT comes in at the client side. When a SIP softphone tries to register with the server, the signaling packets are from the private side of the network, most likely from a 192.168.1.X address. The router replaces the source address by its own external address and the Asterisk server sees the external address of the client as the SIP client, which is incorrect. Asterisk must be told to ignore this address, register the client and continue the SIP call setup until the call is active.

Because firewalls and routers close TCP and UDP ports as part of their design in order to work effectively, we had to reconfigure the firewalls in front of the Trixbox server to open UDP port ranges 5060 to 5082 and 10000 to 20000. The lower range is used for signaling and the higher range for voice call content, otherwise called the bearer traffic. The alternative to opening a range of ports at each end of the connection is to use a Virtual Private Network

(more about VPN can be found at http://compnetworking.about.com/od/vpn). One advantage of a VPN is that of secure communication. The complication is that each user must install and configure the client, which can become complex and difficult to support. Portability is also an issue, since the VPN package and SIP phone must be installed on every end device. So, if a user moves to another computer, the setup and configuration must be duplicated for both the VPN and the phone. As part of our solution, we have downloaded the free SIP phone Idefisk. This perfect solution for non-computer savvy students is an executable softphone copied to a USB drive along with its customized configuration file for that particular user. The user only needs to plug in the USB flash drive, click on the Idefisk icon and the client registers automatically with the Asterisk, authenticating with the preconfigured extension.

In the Asterisk deployment, the solution designer must budget for the likely used bandwidth versus the available bandwidth. The ECU network has abundant bandwidth, so we have chosen the high-quality G.711 audio codec, which reproduces noncompressed voice content, therefore excellent quality. After installation and the short ramp-up to understanding the system's architecture and basic concepts, we were able to demonstrate several scenarios. First, we remotely configured two extensions via the Web server's Web tool, one for a student and one for an instructor. Then, we defined a conference room to start at 6:30 PM, a student password, and an administrator password. The student called into the conference room defined extension (900) using the X-lite softphone from his home network behind a NAT router, and was prompted for a password. The system recognized the student login and played a .wav file as background music while waiting for the instructor. The instructor called into the same extension from the ECU network on X-lite, but logged in with the call administrator password, instantly recognized as such. The .wav file stopped playing and instantly both parties were allowed to talk. In the second scenario, one student using X-lite on a data modem from an Internet café directly called the other student's extension. This student invoked the Idefisk softphone from a wireless home network with NAT. By plugging the preloaded USB key with the Idefisk executable and configuration files into a simple laptop never before used for conferencing, the student was able to just click on the .exe, start the program and make and receive calls after a quick moment of authentication with the Trixbox server at the ECU campus.

Final Considerations and Conclusion

As in any new system rollout, due diligence must be made to protect areas which only administrators should access. Trixbox has already done this by password-protecting the administration area. The Asterisk CentOS server itself should also be password-protected in the traditional Linux sense. A user policy should also be disseminated so the system is not abused. Our installation accomplished this through locally developed tutorial Web pages which also covered all aspects of SIP client configuration and troubleshooting from the students' perspective. Each instructor can be given a range of extensions and passwords that can then be assigned to students. Those extensions can be recycled at the end of the course. This policy also prevents any personal abuse of the system once a course is finished. The instructor community should be trained first on the limited administration and day-to-day best practices. The Asterisk server and its network should be protected from known and potential exploits. We only found one published Asterisk vulnerability, where the server SCCP "Skinny" port 2000/tcp allows an attacker to execute code on that port as

root without authentication. Our fix was to disable the Skinny module initialization at Asterisk boot time. The CentOS firewall should not be disabled as it does not hinder server operation. Because of the firewall and NAT challenges and the Linux knowledge ramp-up, anyone considering the implementation and rollout of TrixBox should certainly have at least some basic Linux administrator and network security skills.

Although a few careful post-installation modifications are required, Trixbox 1.2 proves to be a free, quick, efficient, and customizable conferencing solution. However, the lack of stable and feature rich SIP video softphones somewhat dilutes the power of this solution. We are confident more free and open source clients will become available.

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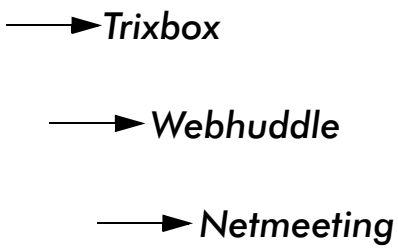

Delivering Blended Learning into Europe's Largest Organization

How the ADL Initiative Has Helped Tackle Healthcare Associated Infections in the NHS

Brian O'Malley and Séamus Coogan

Introduction

According to figures released by the British National Audit Office for 2004, one in nine patients in the United Kingdom will acquire an infection during their healthcare treatment, directly resulting in 5,000 deaths, contributing to a further 15,000 mortalities, and resulting in over 100,000 healthcare associated infections (HCAI). These infections clearly have a major impact on the availability of beds and the length of waiting lists, because infected patients have to spend, on average, an extra 11 days in hospital. Furthermore, infected patients cost

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around three times more to treat than uninfected patients, costing an estimated £1 billion (approximately $2 billion) to the health service every year. With improved hand hygiene and environmental cleanliness, it has been estimated that around 15-30% of HCAIs could be avoided.

In October 2005, the *National Infection Control Training Program* was launched to address staff training across the service in an effort to reduce the number of HCAIs. Since then, the Core Learning Unit of the National Health Service (NHS) has been responsible for the rollout of the program, targeting all NHS employees.

The program aims to support busy hospital staff by providing both e-learning materials that learners can access independently and face-to-face materials that can be cascaded throughout the organization by a broad range of trainers. It was developed on behalf of the service by an expert reference group from the service and education supported by Infection Control Experts at the Richard Wells Research Centre (at Thames Valley University in London) in conjunction with technology-enabled education company Intuition. From the outset, the project team adopted a standards-based approach to e-learning content development, with SCORM 1.2 conformance being written into the project specification. This case study demonstrates how a SCORM approach has aided both the development and delivery of the program at a number of key points in the project cycle, ultimately ensuring that Infection Control Training is available to the widest possible audience, without barriers.

The Challenge

The health service in the United Kingdom is a geographically dispersed and decentralized organization with executive powers residing in various regional authorities. It is the largest employer in Europe, with 1.3 million staff. The NHS has recently restructured from 28 to 10 Strategic Health Authorities (SHAs), each with responsibility for coordinating the strategies of the healthcare trusts within their regions. The different trust types are: Acute Trusts (hospitals), Ambulance Trusts, Care Trusts, Mental Health Trusts, and Primary Care Trusts.

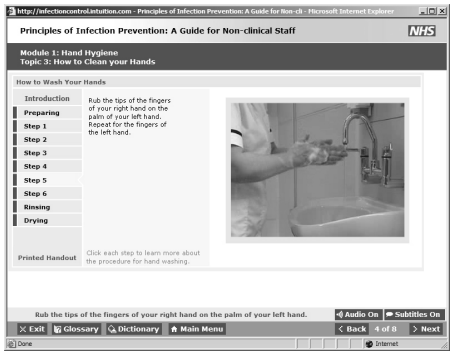
Making the content available to all NHS employees in these different trust types was a daunting challenge for the program from the outset. Adding to the challenge is the range and diversity of the employee roles within the service—ranging from clinical staff who are IT literate and have access to IT resources but are typically time-poor, to nonclinical staff who traditionally have not been afforded learning opportunities and will often encounter barriers in terms of both skills and access to IT equipment.

Solution

High quality evidence-based learning resources were developed with the aim of providing a centrally-validated suite of courseware delivering underpinning knowledge in the principles of infection control and prevention. These resources are distributed freely across the NHS as a toolset available to both Infection Control teams and standard Training Units. The materials are designed to be relevant to all levels of staff within the NHS, from cleaners, porters, technicians, and receptionists, to nurses, doctors, managers, and chief executives. Two versions of the program have been developed (an e-learning version and an instructor-led version), and each of these has been further split to suit both clinical and nonclinical staff.

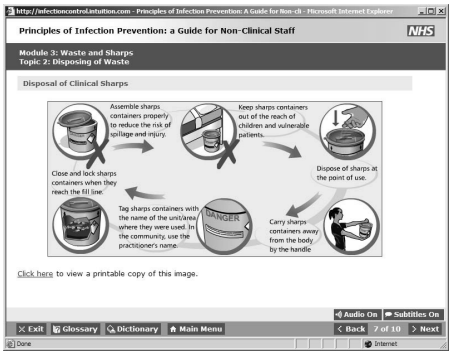
Technical Delivery

Initial plans for technical delivery centered on an NHS-wide Learning Management System which was, at that time, in the process of procurement. The project team was able to confirm that the future platform would support SCORM 1.2 content, which gave confidence to proceed



Handwashing video

Screen shot from animated photo montage



Graphic showing disposal of clinical sharps

Instructor-led materials

Figure 1. National Infection Control Training Program screen shots

with content development with minimal interoperability or compatibility concerns. However, due to organization change, the LMS procurement was cancelled, and by the time the Infection Control courses were ready for release, the plans for a centralized delivery system had been withdrawn. At this early stage, the SCORM conformant approach began to pay off; since the content had been developed using a standards-based approach, it was possible at short notice to swap in Intuition's own LMS as a Web-hosted service.

Intuition has been a SCORM adopter since 2002 and has benefited significantly over the years from implementing a common technical delivery standard across all projects. In some cases, the main benefits have been realized through reuse of its own SCORM 1.2 platform, in others through the efficient development of content for delivery on client platforms that utilize the same standard. For the NHS project, this meant that the project team could continue to concentrate on the quality, usability, and interactivity of the content rather than be sidetracked into technical development challenges. With just a small amount of rebranding and customization, Intuition's LMS became the delivery mechanism for the Infection Control Training Program.

Auditable Tracking of Learner Progress

The training program meets the recent requirements announced by the British

Government's Health Act 2006, which includes a Code of Practice for the Prevention and Control of Healthcare Associated Infection. The Code of Practice requires every NHS body to ensure that mechanisms are in place to provide prevention and control of infection in induction programs for new staff and ongoing training programs for all existing staff. The code provides a legal basis for infection control practice accountability and, as part of this, stipulates that there must be a record of Infection Control training for each staff member. SCORM-based training records are available to infection control teams and training administrators through the reporting functionality of the learning management system. This provides auditable evidence of uptake for individual Trusts. The Code of Practice, which came into effect on October 1, 2006, is already a key area for self assessments submitted by all providers of healthcare to the industry regulator, the Healthcare Commission.

Although the infection control training is available in both e-learning and instructor-led formats, the e-learning has proven more popular for a number of reasons, summarized as follows:

- Staff can access individual modules in their own time and from any place. Users can even progress toward certification in 5-10 minute study sessions, with automatic tracking of their progress as they use the system
- The e-learning results in less "down time" while whole sections of staff undertake training to the same timetable
- All training records are available in a centralized national system—the qualification can therefore move with staff as they move between NHS organizations
- Content modules can be mixed and matched according to local need, since the content has been developed using a Reusable Learning Object (RLO) model (again based on the SCORM standard)

Flexible Access—Through National or Local Entry Points

Compounding the challenge of rolling out the content to such a huge dispersed audience was the additional technical challenge resulting from a number of the service's SHAs/Trusts that had already invested in their own Learning Management Systems. When consulted, these SHAs/Trusts expressed a strong preference to continue to use their own systems rather than having to adopt a new national system to deliver e-learning content. Again, SCORM conformance delivered a solution to this challenge since all of the LMSs in use were SCORM 1.2-based and therefore were compatible with the existing content. Furthermore, to meet national and local requirements concurrently, a standards-based login was developed to offer learners the ability to launch and track their learning either from the national system (hosted by Intuition at www.infectioncontrol.nhs.uk), or from whichever learning management system is in use at their local Trust/SHA. Tracking of learner progress occurs concurrently on the national and whichever local system is in use, thereby meeting the requirements for both local and national uptake data. This maximizes the investment made by Trusts/SHAs in their own delivery platforms and enables them to leverage work put into those systems.

Greater Flexibility Through Mobile Learning

In September 2006, the Core Learning Unit and Intuition piloted a solution with South East Devon Primary Care Trust to tackle the problems of accessibility to IT hardware and poor computer literacy through the use of tablet PCs. The program is available on A4-sized tablet PCs running offline, meaning that it is truly accessible at any place and at any time. Tablet PCs help the program reach the widest possible audience and offer a state-of-the-art e-learning experience that is cost effective,

NHS staff accessing the program on an off-line tablet PC.

easy to use, and highly intuitive. The digitized pen removes the need for any pre-existing keyboard skills and offers a fun, user-friendly platform from which to learn. The ADL initiative has again facilitated this delivery option since Intuition was quickly able to produce an offline player utilizing the SCORM 1.2 standards.

Paul Norrish, project manager, education, training and development at South East Devon PCT, commented that "The tablets PCs have been received remarkably well by our staff, who find them extremely simple to use. The portable nature of the device also means that they have much more flexibility to complete their training, and this is a hugely important factor for support staff who may not necessarily have a permanent day-to-day presence on site."

The project team is also investigating the use of the content on Blackberry devices, potentially allowing more experienced clinicians to opt-out of annual training if they take a short refresher and can prove their continued mastery of the topics. A SCORM player has been developed for the Blackberry to facilitate this, which synchronises tracking results with the national system via Blackberry services.

Conclusion

The National Infection Control Training Program continues to grow at a rapid rate within the NHS—there are now almost 20,000 users registered on the system. The project team recognises that this successful rollout has been facilitated greatly through the use of the SCORM 1.2 standard. International interest in the training programme is also strong, with a Chinese Mandarin version already in production with the backing of the Chinese Ministry of Health, a Scandinavian version in the pipeline, and pilots are beginning in areas of Australia.

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Effective, Scalable, Verifiable

The Power and Application of Blended Learning in Field Security Operations of the Defense Information Services Agency

A. Cathleen Greiner, Nicole Beaulieu, and Kaaran Webb

Introduction

For the past 10 years, online educational offerings have been increasing at an exponential rate (Allen & Seaman, 2006). More recently, there has been a convergence of instructor-led training (ILT) with online learning, the appropriate iteration of the evolution of technology, asynchronous teaching and distance/digital learning. As a result, blended learning is assuming an increasingly prominent role in developing and dispersing content, whether in a traditional context, corporate/global setting, or anytime/anywhere situation. The larger environment builds on the increasingly ubiquitous nature of learning and is the

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impetus behind such change. Chief among the efforts stimulating the change in online learning is the Advanced Distributed Learning (ADL) Initiative, launched nearly 10 years ago by the Department of Defense (DoD) in order to "establish a common technical framework for computer and Web-based learning that fosters the creation of reusable learning content as 'learning objects'" (Wisher, 2006, para. 6). "ADL is an enabling technology in the DoD Training Transformation program" (Wisher, 2006, para. 6) and forms the background for the reasons behind creating curricula designed to implement the training policy and advanced application of learning across a massive landscape.

Moving from the macro framework to the more immediate project details involves an understanding of how such learning is comprised and addressed pragmatically (i.e., making it work). This objective is a tall order: the NetOps content delivers a transformational concept to thousands of DoD personnel, comprised of multiple subentities and agencies, in addition to the widely extended DISA audience. It is for this reason especially that the use of a "blended learning" approach is essential (i.e., effecting change on a historic level across a highly complex and disseminated employee workforce). A working definition posits the notion that "blended learning systems combine face-to-face learning systems and distributed learning systems. It also emphasizes the central role of computer-based technologies in blended learning" (Graham, 2006, p. 5). Content that is taken by students—or employee participants in this case—via computers or the Web is hardly new, as creative adaptations and applications are being employed every day and the expansion in this area is growing at an exponential rate. This case study provides a direct application of blended learning in an extensive, distributed environment, employing best practices of instructional design and subject matter expertise for a governmental agency that requires worldwide access to content.

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The content is multilayered, modularized (allowing for either sequential or nonsequential instruction) and includes both mastery of information and the capacity to demonstrate knowledge of the essential organizing concept. Transformation denotes innovation, total change, and reinvigoration. The purpose of the curriculum is to provide high-level input with attention to history, context, function, and policy over three courses, each building on the other and based on successful completion. The case study here emphasizes the design, development, and distribution of the courses through a successful blended and distance learning process delivered through a learning management system, while meeting disparate federal requirements for education, workforce professionalization, and appropriate access (accommodations to allow full participation by all personnel).

Process

The overarching question addressed was how can a large, governmental agency embed and implement a transformational framework with a large population and across a highly dispersed operation? A new organizational framework was required, one that was strategic and provided a critical infrastructure. NetOps is a "big picture" term that is intended to denote integration of enterprise management, network defense, and content management on a globally integrated scale. It involves a comprehensive strategy whereby Booz Allen Hamilton partners with the Defense Information Services Agency (DISA) to implement a full-scale training effort within the scope of the Information Assurance Technology Analysis Center (IATAC) contract. Booz Allen initiated and continues to develop both ILT courses and a computer-based training (CBT) courseware, resulting in a blended training solution. The project—based on extraordinary collaboration between DISA and Booz Allen team members—literally began as a blank page, with no baseline of knowledge of the concept and has moved to full development in a short span of time.

NetOps is a transformational concept and methodology for operating and defending the Global Information Grid (GIG) that requires unprecedented cooperation among the services, agencies, and personnel. Systemwide collaboration is another way to think of the connection represented by jointness, which refers to a seamless interweaving of interoperable systems, assured security, global information, and high-quality. To successfully train in this environment requires collaboration, communication, and "buy in" across the enterprise.

DISA is a Combat Support Agency (CSA) responsible for planning, engineering, acquiring, fielding, and supporting global netcentric solutions to serve the needs of the senior government leaders, such as the president and the secretary of defense, as well as other DoD components, under all conditions of peace and war. Through the FSO, information assurance training ensures the availability, integrity, identification, authentication, confidentiality, and acceptance of information and information systems within DoD information systems and computer networks.

This is the core of implementing the transformation systemwide. The result is that a very large organization can effectively provide global netcentric solutions for a dispersed population of combat and support personnel. The designated core missions of DISA are communications, joint command and control, defensive information operations, combat support computing, and joint interoperability support.

The challenge, therefore, is to turn a large and complex organization with approximately 7,000 employees in a new direction and to embrace a new functional philosophy. Similar to an ocean liner changing course, it takes a strong and persistent effort to effect the transformation, the expected outcome of the immense training program. The solution is to provide expertise and a consistent message through delivery of the content via multimedia technology and digital distribution, ensuring employee knowledge and awareness. With such a complex organization, the transformational concept is an extraordinary goal; for that reason, even though the training content may be nonsequential, to disseminate and embed this concept throughout the culture, the first course, NetOps: An Overview, is required of all employees.

To that end, DISA has engaged Booz Allen's instructional design professionals in developing a highly focused, systematic approach based on extensive expertise with training and education, human information processing, communications technologies, and instructional system design (ISD). Using an industry standard instructional and courseware development

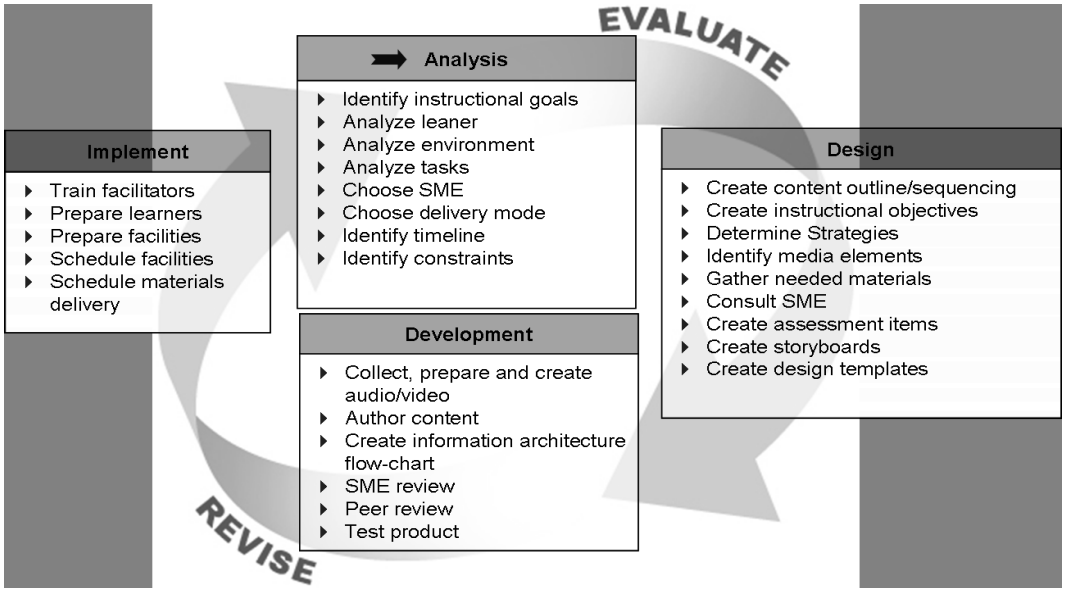

Figure 1. Booz Allen's development process.

process, ADDIE (Analysis, Design, Development, Implementation, and Evaluation), the Booz Allen team was able to combine advanced technologies with sound learning and educational principles to establish a learning structure that best meets the training requirements of NetOps organizations worldwide. A detailed explanation of each step in the Booz Allen development process is depicted in Figure 1.

This process, along with Booz Allen's expansive involvement and Subject Matter Expertise (SME) in the arenas of NetOps implementation and support, has allowed the development of a tailorable and scalable continuum of NetOps training. As a result, the content and instructional flexibility of the curriculum fits the experience, maturity, and ability of the DoD audience, including DoD warfighting, intelligence and business domains, Combatant Commands (COCOMs), Services, and Agencies, and Coalition or multinational organizations.

The protocol from the beginning was based on partnering with the client team, creating a type of "no walls" experience, whereby both groups leverage intellectual capital and areas of strength to aggressively accomplish an exceptional task. When designing the learning offering, the team considered the learning tasks, learner preferences, content hierarchy and organization, media selection, and usability. In order to apply best practices and reach the large and extensive client base involved, designers employed blended and Web-based learning, self-paced simulation, Sharable Content Object Reference Model (SCORM) conformance, Section 508 compliance, and other open standard formats. This partnering requirement, especially, is crucial to the agency in meeting requirements, timelines and achieving training metrics and interoperability with all training systems. On a related note, due to the "depth of bench" capacity and capability in both design and technology, the training is scalable and can reach the large "n" or number of training subjects required for the project.

SCORM is a common technical framework for Web-based learning content; most importantly, it provides the specifications to create sharable, reusable content.

SCORM is needed to standardize how to create reusable content and how to launch and track directed learning experiences, most often from a learning management system. The power of SCORM standards is in the reusability, accessibility, and interoperability of content across many learning contexts and systems. The NetOps: An Overview CBT implements SCORM version 1.2 guidelines, including metadata for content objects and the ability to navigate between and among the topic-level sharable content objects (SCOs). In addition, the course has built-in SCORM-conformant values to track student participation from beginning through completion. The use of SCORM is critical to this effort due to the required flexibility of the content as well as the need to provide this content to several DoD agencies for training, policy decisions, and Continuity of Operations (CONOPS) development and review.

With special attention to the Section 508 requirement, it is important to specifically note this ensures equal access through the appropriate use of information technology. The U.S. Department of Education is a thought leader in the realm of Section 508 compliancy. The NetOps: An Overview course has been approved by the Department of Education's Assistive Technology Program as a product that ensures minimum accessibility for individuals with disabilities. The department has established Requirements for Accessible Electronic and Information Technology (E&IT) Design in order to support its obligations, under Sections 504 and 508 of the Rehabilitation Act of 1973, 29 U.S.C. 794 and 794d. This specifically proscribes the obligation and process to acquire accessible electronic and information technology and applies to this project in terms of evaluating and deploying hardware and software.

Process and Outcomes

Mendenhall (2007) points out that distance or online learning is becoming ubiquitous and that learning objectives and goals are accomplished with the same expectations and achievements for both instructor-based and online learning. In this case, the learning goals of the training are specifically linked to the transformational concepts; success is measured in terms of how transformational principles impact everyone within the agency (attitude, function, and capability) and everything, including support for military personnel and adaptation to a variety of situations. The courses expand employees' knowledge on how to react in each high-level and strategic situation:

- **Operational Accountability:** NetOps illustrates that what one person does affects many, and the training emphasizes preparation for any situation that arises and the interoperability to provide the right information to the right person, just in time.
- **Innovative, Integrated Solutions Supporting the Warfighter:** That all actions are coordinated to ultimately support the Warfighter and NetOps is the framing concept for this core mission and value.
- **Operational and Strategic Agility:** With early and integrated knowledge of the commander's intent, military personnel can increase their rapid response capability.

Booz Allen has developed three courses that comprise the NetOps curriculum: NetOps: An Overview; NetOps: Applied to GIG Operations; and NetOps: Policy Guidance and the DoD Enterprise. These courses take a blended learning approach, complete with comprehensive materials needed to support course delivery, including animated slides for visual representation of the concepts, and instructor guides that incorporate a script for the instructor, amplifying notes at appropriate locations in the instruction, discussion points, and references. In addition, each student

receives a student guide, which provides a thumbnail of all slides to follow along with the instructor, ample space for note taking, footnote references, an acronym list, and several reference documents including salient policy and relevant framing directives.

The cornerstone of the NetOps courses is the inclusion of scenario-based learning events that connect students to a real-world NetOps experience. The scenario—which is entirely unique and embedded in all three courses—is completed at the beginning of the course and becomes the framework for concepts subsequently taught. In addition to this scenario, the courses are designed to maintain student engagement with tabletop activities and collaborative discussions. Student comprehension and learning objective mastery is assured throughout the courses through thorough module reviews and confirmed via a final cumulative assessment. A course evaluation encourages students to provide feedback for subsequent course improvements. As a result, there is a culture of evidence and a built-in performance improvement process, both goals of the training project and consistent with the transformational tenets.

To better meet the needs of DISA's distributed staff, Booz Allen team members developed a strategy to add the online format and combine it with instructor-led sessions, resulting in both asynchronous and synchronous environments with the same course material reaching more people. Facilitators for the computer or online-based courses, Booz Allen's SME instructors, are fully aware of the practices and protocols regarding facilitating learning in a blended-learning environment. Learning outcomes are the same as those for the site-based, instructor-led delivery; however, new learning modules were developed for the courses to reflect the updated modality and format (e.g., learning activities). For example, as Figure 2 illustrates that students agree and strongly agree that instruction and content for these courses are very important and have a direct impact on the learners positive experience.

Over 2,500 students across the DoD have received the NetOps curriculum using both computer-based and mobile training teams—a blended learning pro-

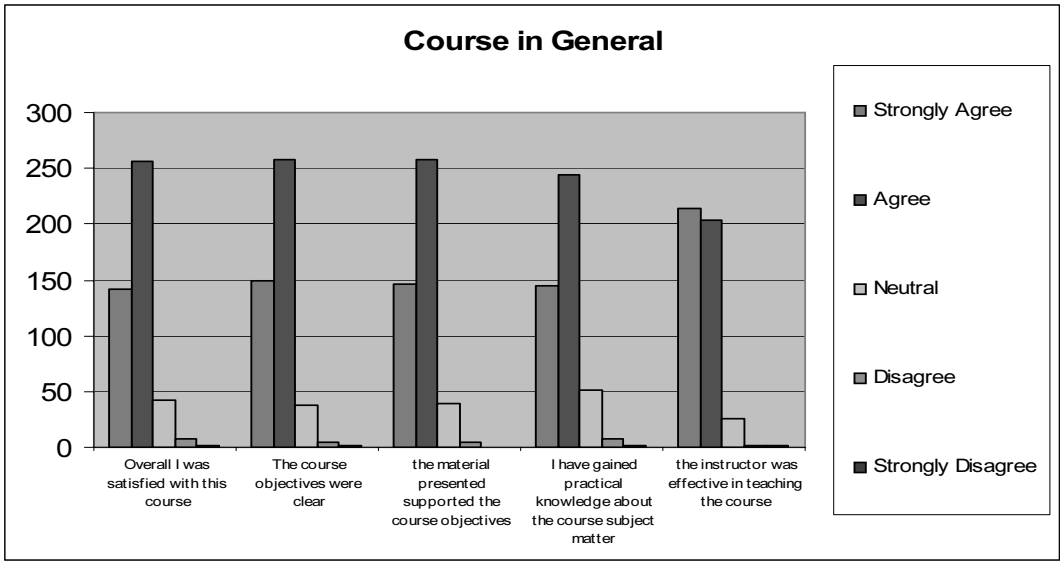

Figure 2. Student evaluation feedback, NetOps: Applied to GIG operations.

cess—hosting classes at each COCOM and various DISA external agencies. The NetOps: An Overview course has been fully converted into a computer-based course that is interactive and incorporates audio, flash animations, progress checks, and a comprehensive assessment to provide students with an introduction to GIG essential elements, functions, roles, responsibilities, and benefits. The course is hosted on DISA's internal Web site. This blended program has become a de facto additional geographic location that can be deployed regardless of place and time, thereby ensuring maximum access and participation by all DISA employees.

Students for NetOps range from manager and planner, such as senior level military personnel, to in-training apprentices and civilian contractors. The courses ranges from two to four hours and students can participate in the blended learning environment by taking the courses and modules from the instructor and online. An example of demographic information by position is noted in Figure 3.

LESSONS LEARNED

The major lesson of the case is that an extraordinary challenge to implement a required transformational process can be accomplished using the power of blended learning. Takeaways in applying advanced distributed learning and blended learning to effect entity transformation include the following:

1. From the beginning, work with clients to develop content that will be taught both online and onsite
2. Use the "pilot" process both internally and externally at each stage—then, incorporate those lessons into the next iteration
3. Pay attention to student/participants, both in the pilot stage and through ongoing evaluations
4. Listen to instructors to quickly incorporate changes, to update and add relevant content and employ new tactics (for scenarios) and strategies (for online learning)
5. Provide leadership and expertise—walk the walk and talk the talk—con-

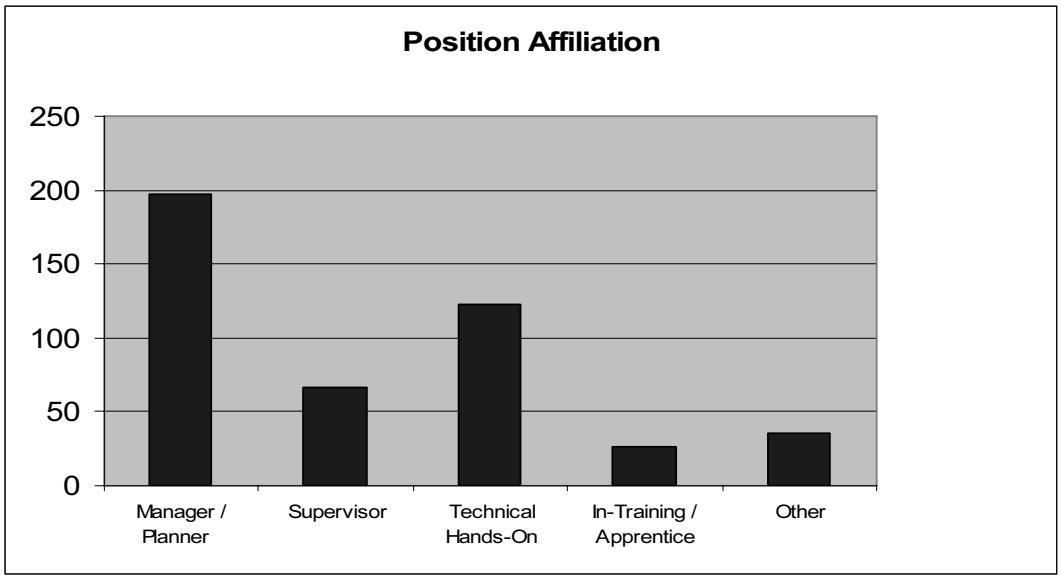

Figure 3. Demographics information by position, NetOps: Applied to GIG operations

sistently throughout the entire process, from developing content to implementing excellence in instructional design

Conclusion

Booz Allen Hamilton has developed a three-course curriculum for DISA that is in place and currently being delivered via blended learning. This blended learning process will eventually impact an extraordinary number of military personnel, nearly 7,000. Using blended learning methods, including instructor-led and asynchronous online learning, is the primary way to achieve success in accomplishing this goal. DISA and Booz Allen will continue to partner effectively together to introduce innovation and flexibility, while being responsive to meeting ongoing challenges and determining next steps. The content and its deployment will, therefore, remain scalable, SCORM conformant, and agile in providing blending learning content, instructional design and technological modalities.

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"The major lesson of the case is that an extraordinary challenge to implement a required transformational process can be accomplished using the power of blended learning."

Accountability and Productivity Through SCORM 2004 in the Defense Manpower Data Center RAPIDS Certification Program

Michael Byars and Daniel Bliton

Introduction

Innovative Learning System Features a First-of-its-Kind, SCORM-Conformant Infrastructure

A groundbreaking distance learning program created by Booz Allen Hamilton, in partnership with the Defense Manpower Data Center (DMDC), uses a standards-based approach to certify learners in secure environments around the world, enhancing the effectiveness of training, reducing costs, and holding application users to strict performance standards. DMDC earned the 2006 United States Distance Learning Association 21st Century Best Practices in Distance Learning award for the use of a Sharable Content Object Reference Model (SCORM) 2004-conformant approach to learning. Its innovative practices are a model for orga-

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nizations in the use of the SCORM standard.

Background

As part of the Office of the Under Secretary of Defense for Personnel and Readiness, the DMDC supports the information management needs of and develops software applications for the DoD and its service members. DMDC also provides training for users of its applications. The SCORM standard establishes a common structure for courses housed on the government learning management system (LMS) so their content can be more easily organized, tracked, and reused for other training. SCORM-conformant courseware also reduces the cost of course maintenance.

Booz Allen's largest curriculum effort with DMDC—and the first set of courses to be delivered by the Enterprise Training Program's LMS—is the Real-time Automated Personnel Identification System (RAPIDS) user certification program. Department of Defense personnel use RAPIDS to issue military identification credentials. DMDC, as the manager of the DoD's human resource information, administers the RAPIDS program for the Department of Defense (DoD). RAPIDS personnel act as critical gatekeepers to the nation's defense information and facilities by controlling the issuance of Common Access Cards (CACs) and other identification media. CACs are military identification credentials encrypted with biometric information and used throughout the world to: access networks and secure information systems; enter DoD facilities, such as base commissaries; and to draw on government benefits, such as medical care.

With the Enterprise Training Program, DMDC established accountability and a standard of knowledge through its certification of CAC issuance personnel. DMDC also improved learning productivity by reducing the time needed to master learning content.

SCORM 2004 System Establishes a Standard of Knowledge for Users

Through the use of performance-based assessments and the advanced sequencing capability available through the use of SCORM 2004-conformant courseware delivered through a certified SCORM 2004 LMS, DMDC has, for the first time anywhere, established a true standard of knowledge by which to certify users of its applications. The evaluation model used in the RAPIDS courseware, for example, includes both pretest and posttest assessments that require the learner to demonstrate mastery of the subject matter before graduation.

Performance-Based Assessment Enables Comprehensive Certification of Learners

The certification program exams contain a mix of "traditional" questions, such as multiple-choice, matching, and true-false questions (that test knowledge-based learning objectives) and application simulations (that test performance-based learning objectives). The performance-based assessments are application "simulations." These simulations are a major component of the pretest exam, the content delivery lessons, and the posttest exam. Course developers produce performance-based simulations using Adobe Captivate, a tool that models a series of actions that the user would have to complete in the actual application. The simulations are employed in the effective Guide-Me, Let-Me-Try, and Test-Me approach. The use of simulations is a particularly effective method of training personnel in an environment that closely emulates their actual work conditions.

Certification exam performance-based questions ask learners to demonstrate their performance of application procedures in a simulated environment. Each step in a

procedure is graded, and learners must demonstrate mastery of learning objectives before they can complete the posttest and become certified. Learners can complete the exam component of any learning objective in either the pretest or the posttest. The exam questions are randomly drawn from a pool with posttest remediation links that access appropriate content lessons.

SCORM 2004 Sequencing Delivers Customized Courses for Every Learner

Through the use of the pretest exam and SCORM 2004 sequencing capabilities, learners can demonstrate their existing knowledge of the system and opt out of any training they do not need. The result is improved learner motivation and reduced time to mastery of new content.

Once a learning objective exam component is marked as "passed" in the pretest, a review of the associated content is no longer required, and the exam component is marked as "passed" in the posttest also. Learners then complete a personally customized course covering only the learning objectives on which they have not demonstrated mastery.

This technique limits exposure to material known to learners and focuses them on new content, helping to maintain their motivation. This "prescriptive learning" approach also allows experienced system users to "test out" of sections of the training and therefore reduce the total training intervention time. Prescriptive learning is a key feature of the RAPIDS training program because the program is a longstanding program with many experienced users and because issuance personnel must be recertified via the training every year.

Before the RAPIDS program was introduced, instructors traveled throughout the world to deliver that training. High turnover and troop deployments to remote sites made it difficult and expensive to ensure training was consistent and timely, and that each user had the skills he or she needed. This instructor-led training program lasted as long as 3 days. The complete Web-based training event now has a "seat time" of 10 to 12 hours, but through the use of sequencing that allows for presentation of only the content lessons on which learners are unable to demonstrate mastery, the average time to certification has been reduced to 5 or 6 hours. The result is a dramatic reduction in the time needed to train users, as well as improved RAPIDS customer service due to the resulting reduction in training "down-time" at a card issuance site.

SCORM Repurposing and Reuse Produce Learning Program Savings and Speed Deployment for New Versions of Courseware

The RAPIDS system, and most DMDC applications, are constantly being improved and updated, and require that learners complete recertification testing every year. The course content and the exam questions are maintained to keep pace with the changing application and procedures.

Although the course content and structure are based on the sequencing of the learning objectives, the learning objectives can be grouped to vary the length of the lessons presented to the learners. Course lessons and course navigation is specified in a SCORM 2004 course "manifest." Within the Extensible Markup Language (XML)-based manifest file, lessons can be rearranged, added, or deleted in a matter of minutes with no change to the course pages themselves, enabling easy updates to the curriculum when performance needs change.

Using SCORM standards and repurposing lessons allows DMDC to update and maintain course content in a fraction of the

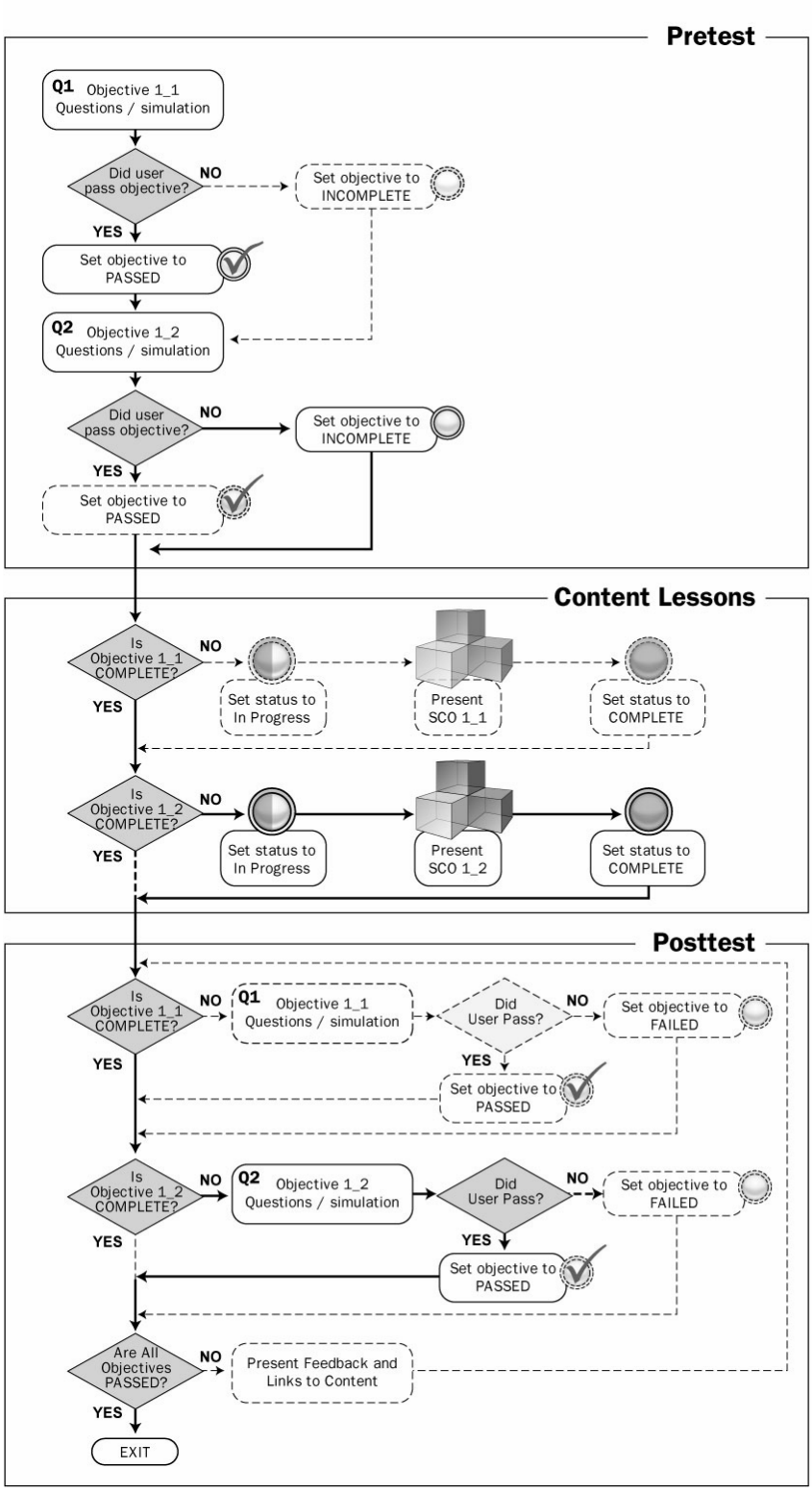
Pretest
Q1 Objective 1_1 Questions / simulation
Did user pass objective?
NO
Set objective to INCOMPLETE
YES
Set objective to PASSED
Q2 Objective 1_2 Questions / simulation
Did user pass objective?
NO
Set objective to INCOMPLETE
YES
Set objective to PASSED
Content Lessons
Is Objective 1_1 COMPLETE?
NO
Set status to In Progress
Present SCO 1_1
Set status to COMPLETE
YES
Is Objective 1_2 COMPLETE?
NO
Set status to In Progress
Present SCO 1_2
Set status to COMPLETE
YES
Posttest
Is Objective 1_1 COMPLETE?
NO
Q1 Objective 1_1 Questions / simulation
Did User Pass?
NO
Set objective to FAILED
YES
Set objective to PASSED
YES
Is Objective 1_2 COMPLETE?
NO
Q2 Objective 1_2 Questions / simulation
Did User Pass?
NO
Set objective to FAILED
YES
Set objective to PASSED
YES
Are All Objectives PASSED?
NO
Present Feedback and Links to Content
YES
EXIT

Figure 1.

Figure 2.

time needed for an initial course development. For example, using SCORM and repurposing lessons also allowed DMDC recently to update 80% of the RAPIDS course content in about half the time needed for the initial course development. And, since the use of SCORM makes it easy to move from one LMS to another, the DMDC has also been able to port courses to other government agencies, such as the Department of the Interior, saving resources for the government as a whole.

SCORM 2004-Conformant Infrastructure Serves as the Technical Backbone for the Training Program

Booz Allen provided a total training solution to the Enterprise Training Program, integrating help desk support, implementing an LMS integrated with the DoD's personnel database to meet each student's training needs, and designing and developing Web-based certification courses for users of DMDC applications. The technical backbone for the DMDC Enterprise Training Program is the government off-the-shelf LMS, AtlasPro. Integrating the AtlasPro LMS with the DoD's personnel database allows DMDC staff, contractors, and customers to be automatically enrolled in curricula that match their learning needs.

The result is the Department of Defense's first-ever large-scale Web-based course implementation that conforms to SCORM 2004 course development requirements, uses a SCORM 2004-certified LMS (i.e., AtlasPro), and is Public Key Infrastructure (PKI)-enabled and authenticates learners with their CACs. Booz Allen ensured additional security by making the AtlasPro LMS PKI-enabled. Courses cannot

be accessed and personnel cannot be certified without inserting an ID card in a workstation reader and entering a corresponding personal identification number (PIN). This CAC login process ensures that the Certification Program participants are authenticated as users and that the person who completes the certification exam is the person who is certified.

Conclusion

The DMDC Enterprise Training program establishes DMDC as an innovative leader in the implementation of standards-based training in the Department of Defense, and has enabled the organization to help ensure the integrity of the DoD ID Card Issuance program through the certification of learners in a cost-effective and flexible manner. The system is available worldwide at any time of the day or night and helps eliminate fraudulent training certification. The CAC login process ensures that the Certification Program participants are authenticated as users and that the person who completes the certification exam is the person who is certified. In addition, RAPIDS Web-based training delivery virtually eliminates the need for classroom training. The overall impact is that in less than 2 years, DMDC has, for the first time, certified over 7,000 RAPIDS users in 1,400 sites around the world.

Participants in the RAPIDS Certification Program are enthusiastic in their support for the training and its usefulness in helping them do their job. Here are some quotes from learners:

> This was an excellent tool for VOs [Verifying Official] to provide better customer service and to know our roles and responsibilities. Thank you for the enhancements to the DEERS-RAPIDS systems. I am proud to have participated in this valuable training.

> The certification program was really tough but we're glad something like this was made available to us.

The DMDC Enterprise Training Program serves as an example of the power of the SCORM standard to improve learner performance, reduce training program costs, and speed time to market for learning products.

"DMDC earned the United States Distance Learning Association award for the use of Sharable Content Object Reference Model (SCORM) 2004-conformant approach to learning."

Individual Devices Enabling Access

Creating Intelligent Tutoring Technology Solutions Through Gifted Student Training and Mentoring

Daryl Diamond and Tony Dutra

Mentorship for Gifted and Talented Students

One of the most valuable experiences a gifted and talented student can have is exposure to a mentor who is willing to share personal values, a particular interest, time, talents, and skills. When the experience is properly structured, and the mentor is a good match for the student, the relationship can provide both mentor and student with encouragement, inspiration, new insights, and other personal rewards. The idea of mentoring is as old as mankind. The term mentor does not imply an internship, an apprenticeship, or a casual hit-or-miss relationship in which the student simply spends time in the presence of an adult

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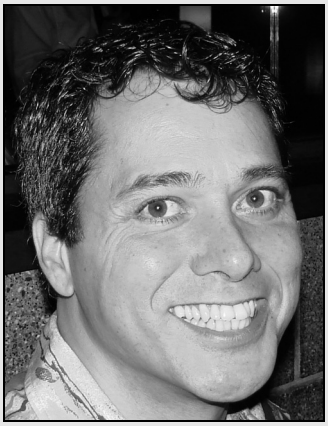

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and information is transmitted. A mentorship is rather a dynamic, shared relationship in which values, attitudes, passions, and traditions are passed from one person to another and internalized. Its purpose is to transform lives.

Research and case studies focusing on mentors and mentorship often address the effects of the mentor in terms of career advancement. The research emphasis on professional advancement and success takes priority over clarifying the basic characteristics of the relationship and its importance to gifted students (Kaufmann, Harrel, Milam, Woolverton, & Miller, 1986). Having a role model, support, and encouragement are often the most frequently-found benefits. Gifted students benefit from mentors who set an example, offer intellectual stimulation, communicate excitement and joy in the learning process, and who understand them and their needs.

Traditionally, mentorship programs provide motivated gifted and talented students with an opportunity to apply inductive thinking and problem-solving skills to advanced content that is often associated with real-life situations. Mentorship activities allow gifted students the ability to investigate the complexities and interrelationships among disciplines that can only be discovered with assistance from highly knowledgeable experts. As gifted students develop their interests and talents in a chosen area of study, it is often necessary to structure learning experiences with out-of-school mentors. A true mentor relationship does not formally end. In many instances, both parties are energized by the process and continue to learn from one another, growing personally and academically. Mentor and "mentee" identify with each other, each having made an indelible imprint on the life of the other.

This case study offers a new approach by developing a mentoring program in which gifted and talented students learn to perform newly acquired educational technology skills. These new skills were taught by school district personnel from the Education Technology Services (ETS) Department, while each participating student received continuing technology support from an instructional mentor at their New River Middle School site. This unique extracurricular opportunity offered intellectual challenges to participating gifted students. This structured study, mutually agreed upon by gifted student and supervising teacher, allowed participating gifted students to individually investigate an area of high interest and to advance their knowledge in this area of interest.

Broward County Public Schools currently serve students who are gifted through the Department of Advanced Academic Programs. The mission of the Department of Advanced Academic Programs is to research, develop, coordinate, and support quality enrichment and acceleration programs and services for academically talented students, to provide leadership and support in their identification and scholastic preparation, and to offer professional development opportunities and support for educators and parents of the academically talented. Through the collaborative efforts of ETS, New River MS, and the Department of Advanced Academic Programs, this proposal offers an expansion of program options available to gifted students. This program proposal helps to facilitate their reaching the following goals:

- increasing the number of students ready for success in advanced academic coursework
- increasing the number of challenging programs for academically talented students
- supporting the schools in building capacity to offer quality advanced academic programs

One goal of this study was to improve the academic performance of Broward

County Public Schools' gifted students through active participation in an innovative redesign of the social studies and science eighth grade curriculum. The program hopes to introduce new perspectives, information, skills, and talents to the instruction of gifted, exceptional student education (ESE) and English language learners (ELL) students. This study anticipated the development of the following additional abilities that participating students are expected to acquire at the end of the program:

- increased technology literacy skills, including an appreciation for, and a hands-on knowledge of assistive technologies;
- an appreciation of computer-based instruction that brings together the best technology with the best instructional practices;
- the development of skills that can assist in the successful transition to post-secondary educational institutions and to the workplace;
- to become self-motivated and self-directed; and
- to build meaningful peer relationships and work cooperatively in group activities.

Gifted students participating in this study conducted the business of creating the digital data used by converting written text from eighth grade science and social studies textbooks to video files using both Kurzweil (2000) and Camtasia software applications. After capturing the digital text on to CDs, gifted students then edited text and zones as needed (they listened to text and corrected any word pronunciation errors captured by the text to speech software). Once the CDs had been corrected, gifted students then imported the video content onto the Archos 504, and in turn trained and mentored the participating ESE, ELL and general education students on how to use, care for, and utilize the data stored on the handheld devices. The gifted students' role in this study began in November 2006 and will continue throughout the remainder of the 2006-2007 school year.

ESE/ELL Student Participation

The 2004 reauthorization of the Individuals with Disabilities Education Act (Public Law 108-466) requires the use of assistive technology (AT) services to be considered for every child when developing their individualized education program (Day & Huefner, 2003). Students with emotional/behavioral disorders display:

- a lack of ability to learn that is not due to intellectual, sensory, or heath concerns;
- an inability to maintain appropriate relationships with peers and teachers;
- actions inappropriate under normal situations;
- feelings of depression or unhappiness; and
- physical fears connected to school or personal issues (Edyburn, 2000).

Students with learning disabilities have normal IQs, but have one or more disorders in the psychological processes of using or comprehending language, spoken or written, that manifest in processing deficits with listening, thinking, speaking, reading, writing, spelling or their ability to perform mathematical calculations (Edyburn, 2000). These subgroups account for 71% of the student population receiving special education services (Eggen & Kauchak, 1994). Many of these students are also identified as ELL. As many as 8 of 10 students with learning disabilities cannot read and comprehend grade-level material (Hasselbring & Bausch, 2006). Additionally, both ESE and ELL students demonstrate similar weaknesses in reading comprehension and reading fluency and benefit from similar teaching strategies (Bryant, Linan-Thompson, Ugel, Hamff, & Hougen, 2001).

In fact, 12% of students labeled as ELL could be placed into ESE services (Minow, 2001). Today's general education classroom has both ESE and ELL students included in the learning environment, which has teachers instructing many different reading abilities at one time. Using educational technology is one way to address the different reading levels within one classroom environment.

Bimodal presentation of content involves visual and auditory channels receiving sensory inputs from the environment simultaneously. Case studies of students with below average reading skills have reported that using bimodal presentation of student texts has increased reading comprehension and fluency (Elkind, 1998; Hecker, Burns, Elkind, Elkind, & Katz, 2002; Montali & Lewandowski, 1996). These same case studies report that students indicated less fatigue when reading and demonstrated increases in completion of assignments. Additionally, studies conducted with learning-disabled students which provided assessment tests in reading math questions orally, documented an increase in student's scores (Fuchs, Fuchs, Eaton, Hamlett, & Karns, 2002; Tindal, Heath, Hollenbeck, Almond, & Harniss, 1998).

Bimodal presentation is built from Vygotsky's theory of the zone of proximal development, Baddeley's theory of working memory, Mayer's principles of multimedia learning, and Mayer's cognitive theory of multimedia learning. The zone of proximal development is the phase in the students' learning where they would benefit from assistance, whereas without this help, they would be incapable of doing the requested work (Vygotsky, 1978). The theory directly relates to this case study, as both the ESE and ELL students have an inability to independently comprehend the grade level curriculum without the use of assistive technology. The assistive technology provides the assistance to the ESE and ELL students at their zone of proximal development. In this regard, assistive technology takes on the role of the intelligent tutor.

The working memory of the ESE and ELL students also need to be examined, as it to can affect comprehension of the text. The reading abilities of disabled students have a general working memory deficit related to the language and the numerical domain (de Jong, 1998). Disabled students have a general failure for the simultaneous processing and storage of verbal information (phonological loop). Additionally, ESE students who were administered the Working Memory Test Battery for Children showed that in the area of language, the students' mean standard scores for both the central executive and phonological loop was 83, with a score of 100 as the norm (Pickering & Gathercole, 2004). In the area of language, it is important to note that in both studies the students with special needs performed poorly on the phonological loop portion of working memory that could be addressed through bimodal text presentation. Bimodal educational delivery (see Figure 1) includes both Mayer's principles of multimedia learning and Mayer's cognitive theory of multimedia learning.

Application in this Case Study

This case study extended the traditional notion of mentoring (adult to student). The study included gifted and talented students utilizing their newly acquired technology skills learned in their adult-student mentor relationships, by incorporating them into new mentoring relationships (student to student) with exceptional students with learning disabilities (ESE) and English language learners (ELL). This study trained each gifted student as an action researcher, by giving them the skills to become the technology and curriculum mentor to three participating students who have been classified as either ESE or ELL. Each gifted student received intensive

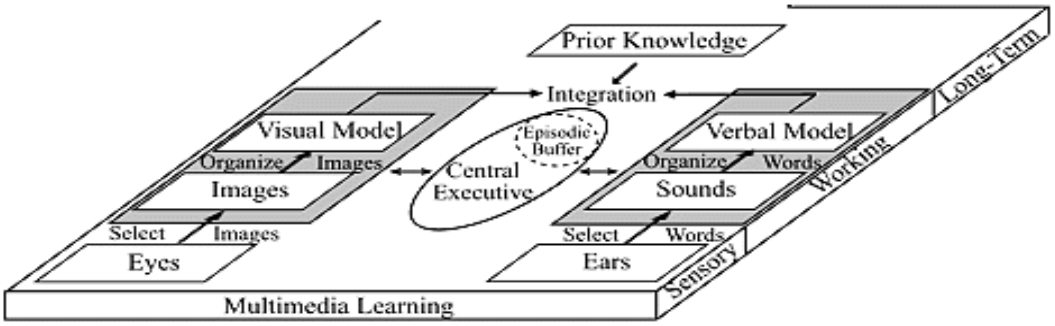

Figure 1. A visual representation of Baddeley's Working Memory (2000), Mayer's Principles of Multimedia Learning (2005) and Mayer's Cognitive Theory of Multimedia Learning (2005).

technology training from ETS technology personnel, and was subsequently supported by on-site school personnel on the techniques used to capture, transfer, and store the eighth grade social studies and science curriculum on to the Archos 504 digital video recorder (DVR). On-site school personnel also assisted the gifted students to develop the essential peer mentorship skills needed to successfully interact with their ESE and ELL mentees. As such, gifted students became part of the research and development team to determine and examine the effects on student achievement as a result of using the Archos model 504 as a handheld assistive technology tool to digitally deliver the eighth grade social studies and science textbooks and workbooks in a bimodal presentation.

Gifted students were trained how to convert written content into video content that can orally read and highlight the written word for the ESE and ELL student. They learned how to use Camtasia, a software application video screen capturing tool, in conjunction with Kurzweil 3000, a text to speech reading software that created the videos used in this study. They then learned how to import the content into the Archos 504 handheld at various reading rates. They were trained how to determine the appropriate reading rate that would be most beneficial for use by their selected mentees. The school district's Peer Counseling course objectives and strategies were used in training gifted students on mentoring techniques.

Research and Suggested Activities Based on the Research

Reading Rates and Text to Speech Readers

This case study examined the effects of using the Archos model 504 handheld as an intelligent mobile assistive technology tutoring tool delivering eighth grade Social Studies and Science content by using videos that orally read and visually highlight the written word to the student. Participating gifted students from New River MS were trained to use Camtasia, a video screen capturing tool, used simultaneously with Kurzweil 3000 text to speech reading software to create videos that were imported into the Archos 504. Gifted students were trained by the technology staff at Education Technology Services (ETS) of Broward County Public Schools, and further supported by individual curriculum/technology personnel at New River Middle School. Gifted students were mentored through the entire process of digitizing the content and importing the content onto the handheld devices, in addition to learning the appropriate strategies and techniques to be successful peer mentors to ESE and ELL students.

Assistive Technology helps ESE and ELL students develop independent knowledge skills by allowing them to interact within the curriculum (Rapp, 2005). Through the use of bimodal (seeing and hearing) instruction, it is expected that the ESE and ELL students will increase their reading comprehension and fluency, increase their completion of assignments, and have less fatigue when reading. Student perspectives measuring the success of this project proposal were captured through ongoing student reflections housed on a Web log (blog) created specifically for this project. Ongoing peer-to-peer mentorship can be delivered and its quality can be measured by using a teacher-created and -monitored blog. As such, this project proposal reflects curriculum design modifications and instructional strategies that demonstrate authentic tasks, student reflection, and student products.

Research conducted by the gifted student participants in this study found that the average reading rate of an eighth grade student is 200 words per minute (wpm); however, readers adjust their reading rate depending on the content of the reading activity (Mather & Goldstein, 2001). A 3-year longitudinal study of learning disabled middle school students revealed a fluency pretest score range of 4 to 100 words per minute (Mercer, Campbell, Miller, Mercer, & Lane, 2000). A slow conversational oral reading style is 120-160 wpm (Beattie & Rose, 1986). Based on these studies, gifted student participants were trained to create text to speech videos at a rate of 125 wpm.

Gifted student participants also identified that text to speech readers do not have the same qualities of voices for all the software available, but generally the male voices were found to have better quality (Stevens, Lees, Vonwiller, & Burnham, 2005). Regardless of what software one uses as a text to speech reader, the listener is faced with a synthetic voice that does not replicate the tonality of a natural voice and a properly chosen voice could influence the learning of the listener (Lee, Nass, & Brave, 2000). For this reason, gifted students were exposed to a variety of synthetic voices and trained to use the Kurzweil text to speech reader as the software application offering the highest quality male and female voices.

Mayer's Eight Principles of Multimedia Learning

Creating digital content to be uploaded onto handheld digital video recorders aligns with Mayer's (2005) eight principles of multimedia learning:

- multimedia principle: deeper learning occurs when pictures are presented with words than with words alone;
- contiguity principle: deeper learning occurs when pictures and words are shown at the same time;
- coherence principle: deeper learning occurs when unnecessary words, sounds, and pictures are left out of the presentation;
- modality principle: deeper learning occurs when words are read orally instead of being shown on the screen;
- redundancy principle: deeper learning occurs with animation and narration being presented on the screen at the same time;
- personalization principle: deeper learning occurs when words are presented in an informal style;
- interactivity principle: deeper learning occurs when the learner has the ability to control the pace of the presentation; and
- signaling principle: deeper learning occurs when important facts are signaled to the learner.

Gifted students were exposed to these principles as part of the mentoring process with their ETS trainers and the support personnel at the school site. As part of their

reflection activities, gifted student mentors monitored the academic success of their three ESE/ELL student mentees and added or adjusted video content stored on the Archos 504 handheld according to the needs of their mentees. Gifted students were trained how to use Unitedstreaming, the districtwide video content provider licensed by the school district. Students searched, found, downloaded, and finally uploaded streaming content to the Archos 504 that aligned with the diagnosed individual needs of their mentees. In addition, gifted students were trained on using video editing tools. PC users were trained to use Movie Maker. Mac users were trained to use either iMovie or Final Cut Pro. With these additional technological skills, participating gifted students were able to learn how to individualize instruction by accessing and creating content that they felt were beneficial to their individual ESE/ELL student mentees. In this aspect, gifted students became action researchers, by first identifying individual student needs and then by determining content and strategies that could be used to address those needs. By monitoring their mentees' success, students gathered data that was useful in determining whether or not their instructional strategies resulted in increased student achievement.

The Technology Acceptance Model

The Technology Acceptance Model (TAM) was constructed to rate users' intentions of using the information technology available, and postulates students' intention of using the assistive technologies (Davis, Bagozzi, & Warshaw, 1989). The TAM claims that the user's perceived usefulness and ease of use as measured by questionnaires, directly relates to use of the technology being introduced (Davis et al., 1989). Bandura's (1993) theory of self-efficacy which states that students perform at their perceived abilities is reflected in the TAM's measure of perceived ease of use and usefulness. Past research has shown that 35% of purchased assistive technology devices are not used by the learner (Dawe, 2006). During one-to-one interviews with teachers, parents, and students using assistive technology, the following was noted as key points about their assistive technology experiences: portability of the assistive technology, social appropriateness of the assistive technology, and the ability of the technology to grow with the learner. The following diagram details these aspects.

Relating the diagram to this case study, the external variables are the videos in the handheld devices, box U represents the ESE and ELL students' perceptions of success with using the AT, box E represents the ESE and ELL students' perceptions that AT will have ease of use, box A represents the ESE and ELL students' overall attitude towards AT, and box BI represents the ESE and ELL students' intentions to use the AT. By incorporating peer-to-peer mentorship between gifted students and ESE/ELL students in this project proposal, it is anticipated that U, E, A, and BI can be raised to a

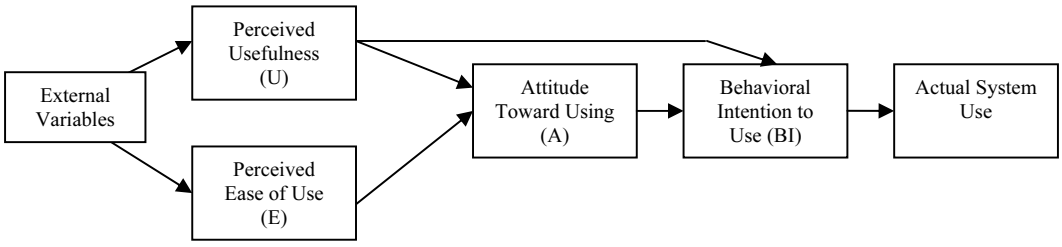

Figure 2. Technology Acceptance Model (Lee, Nass, & Brave, 1989).

high level such that there is actual system usage of the handheld device, thereby enabling greater student achievement through such use.

Measurable Objectives

Some measurable objectives of this case study were a direct result of the significant gaps in the research literature regarding assistive technology use. Research studies that used the Kurzweil 3000 were limited to a desktop computer. There are no known studies of a text to speech reader capturing videos that are then made portable for the learner in a handheld device (Elkind, 1998; Hecker et al., 2002). This case study sought to collect data on student success using Kurzweil software in this fashion.

Furthermore, previous studies have allowed users to select their reading rate but did not definitively report what listening rate is best for the ESE or ELL population, as their individual reading rates vary (Elkind, 1998, Hecker et al., 2002, Beattie & Rose, 1986, Mercer et al., 2000). This case study sought to determine the best listening rate for ESE and ELL students. Additionally, male voices have been found to have a better quality in text to speech software (Stevens et al., 2005). However, since there are continually new advances made in technology, this needs to be evaluated. This case study sought to determine which gender voice had the best success rate. Mayer (2005) has conducted numerous case studies involving the multimedia principle. An objective of this study was to determine whether this project reproduces his findings. Finally, the TAM has been applied to studies involving e-mail and desktop applications such as Word Perfect, Lotus 123, and Chart Master (Adams et al., 1995, Davis, 1989, Davis et al., 1989). However, it has not been used for handhelds with eighth grade middle school students using a text to speech reader as an assistive technology tool. By using peer-to-peer mentorship as an integral part of this case study, the collaboration team seeks to determine whether or not such relationships can increase the perceived usefulness, perceived ease of use, attitudes towards using, and the behavioral intentions to use assistive technology such that there is an increase in actual system use.

To address the gaps and variables identified in the research, the following question was posed: What are the benefits that can be derived from using a bimodal text presentation enabled by the use of handheld assistive technology devices to the ELL, ESE, gifted and general education students?

Quantitative:

- How do pre/post informal (ORT Fluency and SRI) test scores of fluency and reading comprehension and formal test scores of the Benchmark Assessment Tests (BAT) compare for ELL, ESE, and general education students before and after usage of handheld assistive technology?
- How does completion of assignments and fatigue of reading for ELL, ESE, and general education students compare before and after using handheld assistive technology?

Qualitative:

- How do the general education, ESE, and ELL students feel about their interaction with the multimedia principles of contiguity, redundancy, interactivity, and signaling that is embedded in the use of handheld assistive technology?
- How do the general education, ESE, and ELL students feel about their interaction with the synthetic male and female voices in the text to speech reader?
- How do the general education, ESE and ELL students feel about the reading rate provided in the videos of the handheld assistive technology?

- What impact is identified by the general education, ESE, and ELL students as a direct result of the peer-to-peer mentorship given to them by the gifted students in this case study?
- What impact to their academic growth is identified by the participating gifted students as a direct result of their mentor relationships with district technology staff and school-based support staff?
- What impact to their academic and social growth is identified by the participating students as a direct result of the peer-to-peer mentorship provided in this case study?

Evaluation

The quantitative data collected from this case study were obtained from the district's Benchmark Achievement Tests (BAT) because these mini-assessments are excellent predictors for student success on the statewide assessment test (FCAT). Quantitative and qualitative data were also collected informally, based on classroom assignments, homework, and daily student engagement in classroom activities. Student and parent surveys were given to assess: the frequency of handheld use by students, the enjoyment of using the handheld, the significance of using the handheld as it relates to student efficacy and increased student achievement, and the study's effect on the gifted student participants as it relates to intellectual, social, and educational gains derived from both sides of the mentorship process (being both a mentor to peers, and a mentee with district instructional and technology staff).

Prior to using the Archos 504 digital video recorders, students were administered a fluency test, a reading comprehension test, and a BAT to determine a baseline of their reading skills. After one semester of using the AT, the students will then receive the same battery of tests to offer a comparison between their pre/post test scores. A modified version of the TAM

Table 1. Staff Organizational Plan

Program Personnel	Administrative Responsibilities
Project Manager: Technology and Instruction, ETS	Oversee the design, develop, and implementation of the case study. Place and monitor the study on Microsoft Office Project as an official district-wide IT project.
Manager, Conferencing Services, ETS	Ensure that adequate training is delivered to the gifted mentors on the use of the Archos 504 and the iMovie, Final Cut Pro, and MovieMaker video editing tools.
Instructional Leader, New River Middle School	Oversees: • The training of gifted mentors • The creation of video content done by gifted students through the use of the Camtasia and Kurzweil software • The creation, maintainence, and monitoring of the project's blog • The collection of initial and ongoing data on ESE, ELL and general education students throughout the school year • The gifted mentors' understanding of the data collected and how to use that data to redesign instructional delivery to ESE and ELL students. • The ongoing reflection of gifted mentors enabling them to redesign curriculum as appropriate • The ongoing dynamics of the peer-to-peer mentorship, ensuring that developing relationships are positive using Peer Counseling techniques
Department of Advanced Academic Programs	Assistance in the analysis of data collected

Table 2. Collaborative Effort

Department	Activities	Timelines
Education Technology Services (ETS)	Conferencing Services at ETS will train gifted students on the use of the following: • the Archos 504 handheld • the Unitedstreaming video content server • Final Cut Pro and iMovie for Mac users to edit video content • MovieMaker for PC users to edit video content	January 2007- October 2007
New River Middle School	• Selection of participating ESE, ELL, and gifted students • Ongoing training, mentorship, and support given to gifted mentors • Creation of a blog where students, teachers, and parent reflections and comments about the project can be collected and updated • Deliver training and ongoing mentorship and support to gifted students on the use of Kurzweil and Camtasia software • Collect student data to baseline the project proposal • Collect ongoing student data to be used to determine project effectiveness (both formatively and summatively) • Analyze the data with the gifted students as part of their action research experience • Offer a letter of support from the principal for this project proposal	September 2007-May 2008
Department of Advanced Academic Programs	• Offer departmental support to instructional staff at New River MS • Offer research expertise to help analyze data	January 2007-May 2008

questionnaire was be constructed and modified to fit the parameters of this study. The questionnaire was administered to the ESE and ELL students, their parents, and their teachers prior to and after the completion of the project. Data analysis on the responses to the questionnaire pre- and post-project will offer information on students' perceived usefulness and ease of use regarding the handheld devices to determine whether this technology increases student self-efficacy.

Additionally, prior to receipt of the handheld, each student was administered a survey utilizing a rating scale to determine their perception of themselves in regard to certain criteria relating to their ability to complete school assignments and their fatigue level while reading. Within the same survey, the students rated their satisfaction with the male/female voices and the reading rate of the bimodal videos. In addition, because Mayer's multimedia principles of contiguity, redundancy, interactivity, and the signaling principles are embedded in the use of the assistive technology, a rating scale was constructed to measure the students' perceptions of these principles post-use of the AT.

A separate survey was constructed and administered to the participating gifted students to determine the benefits derived from the mentorship between gifted students and the participating ESE, ELL, and general education students. This survey sought to determine the types of relationships that were forged and how peer mentorship enhanced or detracted from social skills and learning gains. Through collaboration with the Department of Advanced

Academic Programs and our district's Research and Evaluation Department, valid surveys and rating scales will be constructed, and data analysis will be conducted to determine if there were any correlations between the use of the Archos 504 handheld devices and participating student achievement.

A Web log (blog) was created for students, teachers, and parents to communicate their thoughts and opinions on the use of handheld devices as assistive technology intelligent tutoring devices, and to monitor their impact on student learning and achievement. Included on this blog site were discussions on mentorship from both the perspective of the gifted student, and the ESE and ELL students. Blogging used as an instructional strategy usually encourages students to blog as well. Blogging welcomes parents into the classroom by facilitating active at-home participation in the child's educational experiences at school. Blogging provides time for students to develop information and communication technology (ICT) skills that are necessary for twenty-first century schooling and workforce.

The case study is presently in progress with an anticipated end date of May 2008. At that time, additional data will be analyzed to determine the answers to the questions posed.

Support for Strategic Imperatives

This case study addresses the State's reading initiative of Just Read, Florida! By giving ESE and ELL students the bimodal ability to see and hear text, this study hopes to inspire the love of reading in struggling students. This aligns with the statewide goal that all Florida students are able to read at or above grade level by the year 2012. By using assistive technology and mentorship relationships in this study, we hope to demonstrate reading gains for all participating students.

Using blogs to express and communicate students' thoughts regarding this project proposal enabled participation in the project's processes and offers a platform for publishing and copublishing content, not merely finding and accessing it. Research indicates that teachers whose students blog within the context of lessons, improved writing and dramatically improved attitudes toward learning, classrooms, and schools.

The project proposal also incorporated one of the Florida State Board of Education (SBE) Strategic Imperatives. This is strategic imperative #3, to improve student rates of learning, thereby allowing for every student to be proficient on grade level in reading, writing, and mathematics. This case study focused on the reading content area by using the assistive technology handheld devices, and the writing content area by using blogs.

Dissemination Plan for Economy of Scale

Several methods/strategies were used to disseminate and market information about the case study to other educators and appropriate population. They include:

- A recording to be created by the instructional leader and ETS staff using Tandberg videoconferencing equipment capabilities to deliver an explanation of the study's design, objectives, processes, as well as demonstrating all technology tools used in the project.
- This recording was burned as DVDs for distribution to other interested schools throughout the district.
- This recording was be uploaded to the district's Unitedstreaming video content server for access by any Broward County Public School personnel using their login and password information.
- A demonstration of the handheld assistive device and the projected educational gains from the project will be

delivered by the collaborative group (New River MS, ESE Department, Department of Advanced Academic Program, ETS) to school board members at a school board retreat at the end of the study.

- This project proposal is scalable within both the initial test site (New River MS) and to other schools throughout the district. Scheduled professional development and student training can be delivered through both the ESE Department and ETS using districtwide videoconferencing and collaborative services.

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Internet-Based Videoconferencing for Teaching and Learning

A Cinderella Story

Robyn Smyth and Jan Zanetis

Introduction

As a rich media technology, videoconferencing has moved forward significantly in recent years. The development of videoconferencing to utilize the Internet rather than telephone lines makes it possible to send and receive video and audio (Nokia, 2005a, pp. 5-8; Tandberg, 2006b; Videoconferencing Insight Newsletter, 2006b) nearing broadcast quality. Henceforth in this article, the current form of the technology will be referred to as Internet-based videoconferencing. This capability is the key factor enabling most previous criticisms of the medium to be challenged because the transmission speeds (number of kilobytes per second or kps) are vastly increased, thereby increasing picture and audio quality. While the capabilities of videoconferencing have been steadily increasing since

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the 1980s, the capacity of the technology to deliver high-quality video and audio has improved dramatically in the last few years.

What does this mean for teaching and learning? The enhanced technical capability has a number of positive implications for using Internet-based videoconferencing for teaching and learning:

- First, the richness of the media can now be accessed and utilized for a broader range of teaching and learning activities (Smyth, 2005).
- Second, the cost of using the technology is now minimal. It costs around $2.75 per hour to link from a university in Australia to the United States or the United Kingdom accessing the Internet at 768kps or better, whereas it previously cost on the order of $2,500 per hour using three telephone lines to achieve half that speed.
- Third, Internet-based videoconferencing enables dual-stream video and multicasting without loss of bandwidth, providing that all sites have high-speed capability.
- Fourth, the technical capability to link from Internet-based videoconferencing to mobile phones will enable videoconferencing anywhere, any time, around the globe.

These issues will be explored as the limitations of videoconferencing are challenged. We will examine video-conferencing from three perspectives: videoconferencing of the past, what it now is, and what its future might look like. We will specifically address the factors of cost effectiveness, connectivity, scalability, and inclusivity.

Overcoming the Past

Previous generations of videoconferencing that relied on using multiple lines of costly telephone connections were characterised as one-to-many presentation media useful for lectures and accessing remote experts. Student control was minimal, as in any large lecture, and the media was not considered to be particularly student friendly (Laurillard, 2002). In short, it was useful for didactic teaching and not much else; that is, the top left hand cell in Figure 1: *Current and potential examples of practice*. The inherent richness of the media was constrained by the cost and limited ability for effective interaction, and so its usefulness was often restricted (Fryer, 2005).

Defining the Present

Videoconferencing in education is no longer a novel idea. A recent Wainhouse Research report estimated that an overall average of 25% of U.S. primary and secondary schools have videoconferencing units installed, many of which have made the transition to Internet-based protocols (Greenberg, 2006). Educators are finding that Internet-based videoconferencing is easy to use, rapid, and approximates broadcast quality video and audio quality. Using a controller not much different from a television remote, any user can connect to anywhere in the world with two or three button pushes via a videoconferencing site, videophone, mobile phone, or personal computer (Bland, 2005; Fryer, 2005).

The current generation of videoconferencing technology relies on the Internet but can connect via ISDN lines if required. Transmission speeds of 768kps and greater are the norm. This alone is the source of the high definition video images, the insignificant audio lag, the ability to use dual streaming video and the potential for simultaneous multicasting (Tandberg, 2006b, 2006c).

Internet-based videoconferencing technology overcomes previous problems of cost, poor technical quality, and unreliability (Kirkpatrick, 2002). At the University of New England, we adopted the Internet technology in 2003 because it allows videoconferencing to support four key aspects of

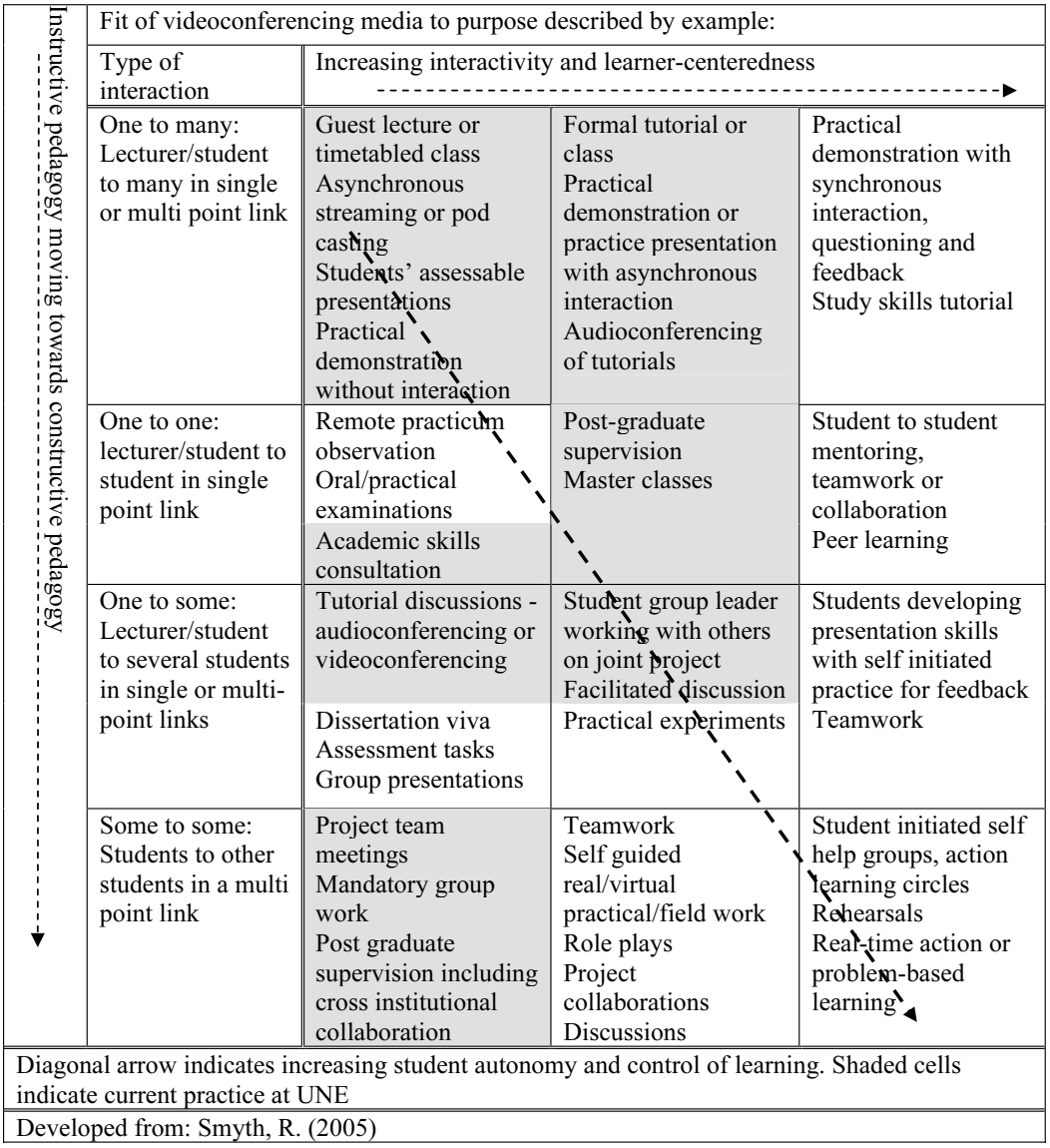

Figure 1. Current and potential examples of practice.

communication which were previously limited:

- synchronous communication not affected by obvious audio delay
- use of face-to-face interactive teaching and learning experiences at a distance
- student control of learning, engagement in active learning
- reliable teacher-to-student and student-to-student audio-visual communication.

Now, the range of teaching and learning interactions utilizing Internet-based video-conferencing are being expanded to include more learner-centred modes. As Figure 1 shows, the traditional lecture format (teacher to many students), which was

the most cost effective use in the past, can be replaced by a range of small group activities (teacher to a few students) and student-initiated interaction (student to student) in undergraduate and postgraduate contexts.

The inherent richness of Internet-based videoconferencing enables it to support visual aspects of teaching and learning not well supported in the print and audio media of previous generations of distance education (Taylor, 2001) or using other online technologies. While the reliability and high video and audio quality enables real-time support for students learning in a wide range of video and audio conferencing activities (Macadam, 2005; Smyth, Stein, & Shanahan, 2005), the capacity of the technology allows it to interface with other online media such as podcasting and presentation tools through dual video transmission and streaming. In addition, current Internet-based videoconferencing equipment has the capacity for high definition video transmissions, Web-based streaming and simultaneous multisite audio and video conferences.

In 2005, two studies (Macadam, 2005; Smyth, Stein, & Shanahan, 2005) confirmed that staff and students who are involved in successful videoconferences praise the technology, while those who experience technical difficulties are frustrated by it even if they were willing to acknowledge its potential. As more institutions update their equipment to Internet-based videoconferencing, this remaining frustration should disappear. It exists because a "latency" mode in most equipment means that Internet-based videoconferencing can appear to be of poor quality when connected to sites using older equipment only capable of low transmission speeds. This latency reduces the whole conference to the transmission speed of the lowest connected site.

Cinderella Emerging: Future Potential of Videoconferencing for Teaching and Learning

Elements of a rich media delivery have huge potential to enhance student learning, particularly for distance students as recent literature (Dennis & Kinney, 1997; Gilman & Turner, 2001; Kock, 2002) concerning information communication technologies shows. These benefits are emerging in the use of Internet-based videoconferencing (Bland, 2005; Fryer, 2005). The visual richness of Internet-based videoconferencing permits access to the multiple cues of natural language and its synchronicity makes it suitable for activities such as role plays, interactive group work, simulation games, and practical demonstrations as well as more traditional activities such as guest lectures and tutorials (Benbunan-Fich & Stelzer, 2002; Blake & Taji, 1997; Gilman & Turner, 2001). The immediacy, flexibility, and visual richness of Internet-based videoconferencing as well as its increasing reliability (Scanlon, 2002; Scanlon, 2003a; Scanlon, 2006) enhance possibilities for learner-centeredness and interactive learning.

These improvements in videoconferencing technology enable "virtual" interactions that more closely approximate regular face-to-face communication by supporting participants' access to synchronous verbal and nonverbal communication through the ability to see and hear multiple visual and aural cues in natural language communicated in real time, body language and intonation of speech, and immediate feedback, which increases the personalizing of learning.

The means by which academic and teaching staff utilize videoconferencing and integrate the technology appropriately into the curriculum design will define the opportunities available for students to engage effectively in learning via this improved medium. In addition, opportunities for student-to-student interaction

also exist (Smyth, 2005) as shown in the central and right-hand columns of Figure 1.

Student-to-student interactions could include student directed group work, peer tutoring and buddy systems (Scanlon, 2002), practice situations such as peer feedback on presentation skills prior to assessment, practicum peer support, and peer mentoring for students developing academic, library skills, and spoken English.

Instructional design incorporating interactive videoconferencing at the primary/secondary level can support construction of learning through problem-based learning, project-based learning, team-based learning, simulations, and use of technology resources. To do this, learning activities must shift from passive to active and from de-contextualized tasks to authentic learning tasks (Heath, Holznagel, deFord, & Dimock, 2002). In a survey of 32 experts in the K-12 videoconferencing field, Hayden (1999) was able to identify several desirable characteristics of videoconferencing that support the constructivist learning environments described above:

- connections—synchronous connections and links to remote people in remote locations;
- questioning—students develop and ask questions to investigate topics, clarify meanings, and receive feedback;
- learning—students use audio and video to listen, tell, observe, present, and interview; and
- interaction—students work in collaborative groups using remote connections, sharing resources and tools, and participating in authentic activities.

In a distance education higher education model, Internet-based videoconferencing could provide for staff and student interaction during nonresidential school or face-to-face learning periods that would enhance learning at little or no additional cost. These applications could perhaps respond to the recent reports regarding attrition (Anderson & McCrea, 2005). Current and potential areas for trials and case studies within the University of New England Access Centres network and with international partners include:

- moot court assessments in law
- virtual rehearsals and specialist tuition in music (Scanlon, 2003b)
- virtual field trips and practical demonstrations
- practice situations such as for presentation skills prior to assessment
- practicum support and remote supervision
- examination preparation tutorials
- tutoring for students developing academic and library skills and spoken English (Smyth, Stein, & Shanahan, 2005, p. 1).

New opportunities exist to reduce staff and student isolation and provide greater opportunities to enhance distance education teaching, supervision, and research. Videoconferencing systems can be regarded as learning tools that supplement other digital learning technologies such as learning management systems like WebCT and object repositories in libraries.

An Example: Internet-Based Videoconferencing Music

The quality of the image and sound using Internet-based videoconferencing has been demonstrated frequently over the last two years at the University of New England (Scanlon, 2003b). Music master classes for students of woodwind and strings have been taught on a weekly basis between UNE and the Sydney Conservatorium of Music, 600 kilometres away and between regional centres 100-200 kilometres apart. In the case of the woodwind students, the teacher in Sydney instructs his students, listens to their playing, comments on their technique, and models

appropriate wind, sound, intonation, and fingering. His ability to discern fine detail is reflected in comments such as "Your face is not red enough! I can hear that you are running out of breath at the third note" (M. Walton, personal communication, 2004).

Most importantly, person-to-person feedback and discussion is possible at minimum cost and inconvenience to many more students than was previously the case. In future, UNE aims to link regional conservatories, music teachers and students together for professional development, expert tuition, and examination.

As a test in 2003 proved (Scanlon, 2003c), transmission rates of 30 million bits a second can be sustained for many hours continuously over the Australian Academic research Network (AARNet) university research network in Australia. Using this amount of the Internet, a virtual orchestral recital was transmitted from the Sydney Conservatorium of Music to the University of New England in Armidale, 600km from Sydney, and the University of Western Australia in Perth, 3,974km away. Transmission rates of this quality will enable instantaneous, seamless interaction between world-class performers, educators, students, and their audiences around Australia and the world.

An Exemplar: Schools and Colleges Working Together

As the "Around the World Videoconference" demonstrated (Scanlon, 2006), videoconferencing links can effectively be used to enhance bulletin board discussion and collaboration sharing of audio and video files and artifacts via WebCT or Blackboard. Similarly, K-12 schools are collaborating with universities in California (Videoconferencing Insight Newsletter, 2006a).

Colleagues in the United States are currently utilizing videoconferencing to successfully link schools with universities and their expertise. For example, the science and the cinema program uses a topical movie such as *Jurassic Park* as stimulus for discussion between school teachers, students, and a relevant academic who explore how close to the reality of scientific work are the ideas portrayed in the movie. Integration of IP videoconferencing for increased learner-to-learner interaction is emerging and its potential for improving outcomes of distance and other learners from kindergarten to higher education can only be surmised, at present (Ozkan, 2005).

Cost Effectiveness

The main efficiencies result from the ability to connect to subject matter experts, colleagues, and students across the globe without time and travel costs.

For many years, academic staff have delivered conference presentations, provided occasional tutorials, lectures, and demonstrations and engaged in professional development via videoconferencing. The potential for these activities has not yet been tapped, but indications are that universities and educators in other sectors are increasingly delivering and engaging in teaching, learning, and professional development via Internet-based videoconferencing (Bossu, 2005; Videoconferencing Insight Newsletter, n.d.). For example:

- attracting international scholars without the need for travel;
- teaching to overseas locations;
- providing additional contact and support for remote students and colleagues;
- accessing and providing training anywhere anytime via synchronous transmission and/or archived asynchronous streaming;
- collaborating in research projects without excessive time and travel costs (Bossu, 2005, p. 1);
- attending meetings, tutorials, and virtual conferences;

- participating in service activities, particularly nonfunded activities; and
- delivering professional development to strategic partners and professional bodies (Bossu, 2005, p. 5).

Apart from the obvious savings from convenience and the cost of time wasted in travel and work productivity, many staff will discover that there are likely to be time savings in direct student assistance through the potential for this medium to contribute to timely interventions that enhance student satisfaction, competence, and confidence. In addition, time accrued through not traveling affords increased productivity. Some faculty are currently using both video and audio conferencing to run regular tutorials with students from their offices or homes.

Connectivity and Scalability

Wireless technology will make it possible to expand videoconferencing beyond the constraints of physical locations, particularly as 3G mobile telephony coverage is rolled out (Bland, 2005; Nokia, 2005b, 2005c; Tandberg, 2006a).

The advent of wireless transmission capability, third generation mobile phone connectivity, and the increasing roll out of bandwidth across the globe will enable Internet-based videoconferencing to reach individual students and staff in home, work, remote, and international locations. Any SIP-enabled or 3G mobile phone can link to existing videoconferencing equipment via the public Internet. Such videoconferencing over the public internet using high bandwidth equipment is of quite high quality, increasing the potential for links between various forms of videoconferencing technology. Similarly, streaming servers that have interoperability with existing videoconferencing equipment will increase the possibility for podcasting of regular lectures, tutorials, and videoconferencing classes and activities. Connectivity via personal computers will also increase with the development of equipment to ensure that firewall security cannot be breached (Tandberg, 2006b).

The telecommunications companies are currently promoting such possibilities (Nokia, 2005b, 2005c; Videoconferencing Insight Newsletter, 2006b). Regular, more widespread audio and videoconferencing between mobile phones and the current videoconferencing system is only limited by the roll out of 3G mobile phone connectivity. The efficacy of these developments was demonstrated by the mobile phone plan which allowed spectators to "watch" test cricket live for 1 month at a cost of AUS$10.00 , in Sydney, January 2006.

Current uses of Internet-based videoconferencing that demonstrate scalability include:

- joint supervision between staff at the University of New England, Australia and overseas classes is currently conducted via NetMeeting and a Tandberg videoconferencing system when external institutions do not have videoconferencing systems;
- audioconferencing of tutorials between university staff located in their offices and multiple students in their homes is a regular occurrence most week nights during term time;
- increasing capacity of voice-over-IP (VoIP) for audioconferencing; and
- supervision of student teachers at remote schools over Internet-based video connections (Fry & Bryant, 2006)

Research and development to trial scalability of Internet-based videoconferencing for supervision using VoIP and web cams where stand-alone systems are unavailable, will further demonstrate this potential.

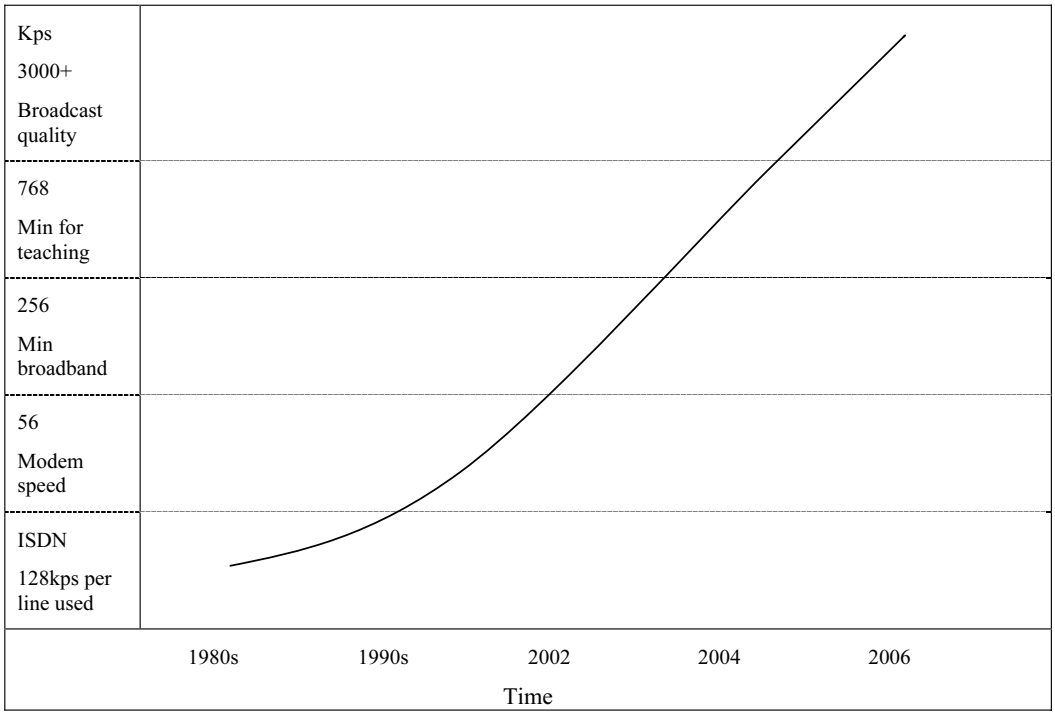

Figure 2. Commonly used transmission speeds in recent years.

INCLUSIVITY

As personal videoconferencing capacity increases via 3G mobile and computer-based systems, inclusivity will increase for:

- Rural or isolated students: Access to long distance/mobile call-plans that cap telephone costs to a few dollars per call make it affordable for students to audio conference if they cannot access videoconferencing or to link into the Internet videoconference via an audio-only connection where video connectivity is not available;
- International students: Where student numbers are too small to support staff traveling to international locations or in times of concern such as the "SARS" influenza epidemic, staff can interact effectively with students on a regular basis at minimal cost;
- Hearing Impaired students: The clarity of Internet-based videoconferencing enables lip reading so hearing impaired students can participate with or without the need for a signing interpreter;
- Vision impaired and physically impaired students: For students who can access a videoconferencing facility or high-end webcam technology, there is no barrier to participation via audio-only mode;
- At-risk students: Videoconferencing can increase personal and academic interactions with at-risk students with the potential to decrease attrition rates (Anderson & McCrea, 2005; Smyth & Gratton, 2001);
- Research Staff: Internet-based videoconferencing provides an opportunity for staff and research students to work collaboratively with colleagues worldwide at little cost (Macadam, 2005); and
- Preservice teachers and their university supervisors (Fry & Bryant, 2006).

Audience accessibility combined with ease-of-use makes Internet-based videoconferencing a useful addition to the distance educator's tool-kit.

Conclusion

Cinderella has emerged from the ashes! She has spent many years as the poor handmaiden earning income from administrative and "one-to-many" applications. Now that she has the Internet prince, she is showing how Internet-based videoconferencing enhances teaching and learning environments while promoting student interactions from kindergarten through higher education.

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The Arkansas Virtual High School

A Learning Environment Approach

Valeree R Falduto and Richard Ihde

Legend has it that Abraham Lincoln walked 20 miles a day to attend school and studied by candlelight in order to obtain an education. That took place nearly 200 years ago. Ironically, even today, children in rural areas still must rely on their own perseverance and resiliency if they desire to achieve a formal education.

Residents of urban areas in the United States have the advantage of educational choices. Students typically live within the proximity of a number of local high schools, private and public, any of which they may attend. Tuition, course offerings, quality of teaching, reputation, convenience, and college preparation programs are among the things students and parents may consider when making a selection. However, things are quite different in rural areas where population density is low, schools are few and far between, and school choice is literally nonexistent. Enabling students to obtain a quality education, one that would prepare them for a competitive society, presents many problematic issues for rural school officials.

Course offerings are slim, as finding enough qualified teachers in a variety of

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subjects is almost impossible. Funding schools in rural communities takes creative thinking and plenty of outside help, as raising property taxes to pay for education, the usual panacea in American cities, is not an option when the population is very small, and many are poor. In the late 1990s, with the expansion of high-speed Internet access, came a potential solution to an educational crisis—the "virtual" school.

E-learning is established and accepted as a legitimate form of education at the postsecondary level. However, in the elementary and secondary school systems, virtual schools are still finding their way, and it is too soon to tell what the ultimate outcome will be. How will this form of education affect the futures of young students? The state of Arkansas is among the first to implement the virtual high school, and will likely be the site of future research. Beginning with only 50 students in the spring of 2000, the Arkansas Virtual High School (AVHS) has grown from an experimental, pilot project into a major institution hosting over 1,700 students in the fall 2006 semester.

Virtual schooling is a trend whose time has come. Increasing demands on rural communities for funding, providing required and desirable elective courses, attracting staff members, and developing an environment conducive to competition, are among the reasons states choose this path. Of course, all states can benefit from the virtual school technology, but especially for states such as Arkansas with a population density of 52, that is, 52 people per square mile. Compare Arkansas to the state of Florida with a population density of 308, or Illinois with a population density of 228, and the benefits are potentially dramatic (Netstate-AR, 2005; Netstate-IL, 2005; Netstate-FL, 2005; SchoolMatters, 2005).

Development of the Arkansas Virtual High School

Distance learning in Arkansas is coordinated by the state Department of Education's Arkansas Distance Learning Development Program. A federal grant under the Voluntary Public School Choice 2000 program to the Arch Ford Educational Service Cooperative provided initial funding for the AVHS pilot initiative. Arch Ford manages the school in cooperation with the Arkansas Distance Learning Center (Assurance Policies, 2006). Tuition is free to Arkansas students.

The purpose of the AVHS, as stated on their Web page (http://avhs.k12.ar.us), is to

> provide an online alternative learning environment for the students of Arkansas' public schools who need assistance in completing coursework that is difficult to receive due to factors such as schedule conflicts, homebound due to extenuating circumstances, and other factors that might impede a student's progress through grades 9-12. (About AVHS, 2006)

The first seven courses were developed in-house during the fall semester of 1999, for their introductory run the following spring. The initial offerings included U.S. history, world history, algebra, calculus, English, biology, and Spanish. A few teachers were hired to conduct these courses based on certification status and completion of at least three distance learning courses. Additionally, teachers were required to attend weekly training sessions throughout the instructional design phase (eSchool News, 1999). By the fall 2006 semester, 33 courses were available, which included the secondary school core curriculum, a number of electives, and several advance placement courses. The AVHS instructional staff had expanded to three full-time teachers and 21 part-time teachers (Watson & Ryan, 2006). Figure 1 shows the enrollment per course category over the years 2004-2006.

The first semester of the AVHS proved to be a learning experience for all involved. A number of adjustments were necessary to continue. One of the primary changes involved the system through which les-

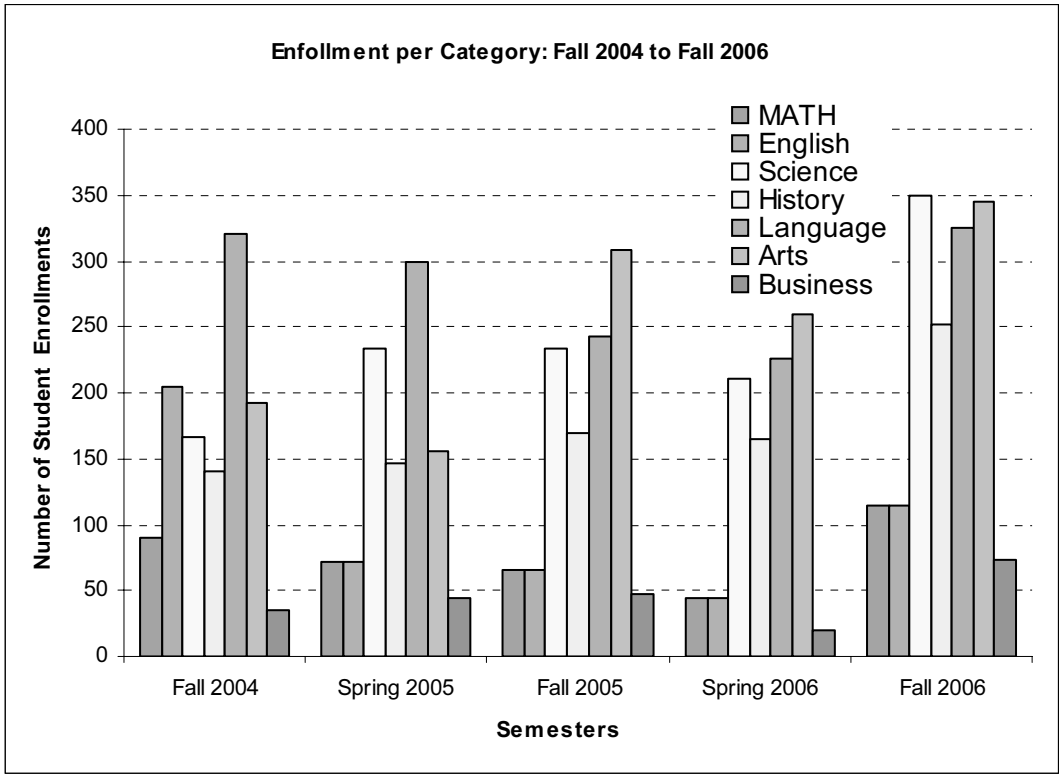

Figure 1. Student enrollment in various categories of courses from fall 2004 to fall 2006.

sons were developed and delivered to students. The school switched platforms from Lotus Notes Learning Space to WebCT, a more user-friendly environment, which remains in place today.

A second major adjustment involved textbooks. Initially, teachers tried designing courses that did not require textbooks. Lectures were posted, electronic links and graphics were provided, and so on, but this method turned out to be ineffective, more so for some courses than others. Teachers found that posting lectures and exercises took too much time, formatting presented technical hassles, often students had problems with the links, and the graphics—well, students soon became familiar with the little red box with the x in it. Ultimately, the product did not return the desired outcomes. However, requiring a course textbook helped to resolve these issues for many courses, and greatly influenced the manner in which instructors and students were spending their time (S. O'Reilly, personal communication, November 19, 2006).

The characteristics of the students attending AVHS have changed, as well. As director Sandy O'Reilly has noted, some students enrolled thinking that online classes would be a lot easier, and they were not prepared for the amount of work demanded (S. O'Reilly, personal communication, November 19, 2006). Thus, for the first two years, the length of the pilot program, only 47% of students completed their courses. However, some school officials attributed the low completion rate to the fact that during the pilot phase, all courses were free. Beginning in the fall of 2002, affiliate schools were charged a fee of $150 per half-credit (one-semester) course,

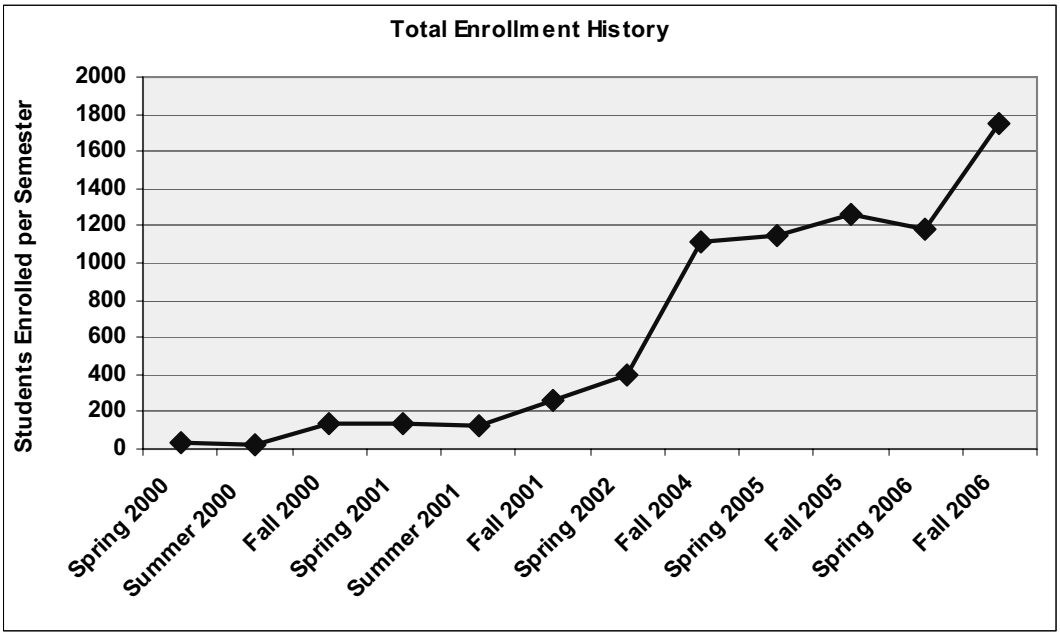

Figure 2. Total enrollment over the history of the AVHS using available data.

per student (Denton, 2002). Schools were then pressured to stay on top of student progress, and it apparently paid off, as enrollment grew to over 30 times its original size in 6 years (Watson & Ryan, 2006) (see Figure 2).

STANDARDS

The questions on the minds of educators regard the long-term effects of a virtual education on high school-age learners. The National Education Association (NEA), recognizing these concerns, and the differences in teaching young students as opposed to college students, recently issued their Guide to Online High School Courses (NEA, 2006), in which they focus on standards for curriculum, instructional design, assessment, management and support systems. They indicate that while some post-secondary school course standards and characteristics may "also apply to online courses in a high school environment, to be effective there, online courses must address the unique social, educational, and emotional needs of the high school student" (par. 4).

Technology may remove the geographical and economic barriers to a high-caliber education, but the challenge faced by virtual schools is ensuring that the quantity and diversity of courses increases, while enhancing the quality of the educational experience (NEA, 2006). Simply put, the concern is to provide the courses students need and want, while maintaining a consistent level of authenticity. Clearly, the methodologies involved in teaching and learning online are different from those practiced in the traditional classroom. Therefore, the NEA Guidelines explore and document a number of these issues, including communication between teacher and student, appropriateness of courses for online delivery, completeness and accuracy of assessment tools, flexibility issues for individual student needs, timeliness of teacher response, and responsibilities of online instructors.

Special attention is given to teacher certification, teacher preparedness, profes-

sional development, and student monitoring. Further, intellectual property rights, notification and approval of parents, equivalency in course credits, course evaluations, and access to the equipment, software, and connections necessary to make the student's experience legitimate and rewarding are part of the published set of guidelines (NEA, 2006).

With these standards at the forefront of the process, developing the virtual school entails the implementation of enabling technologies to support learning anywhere, anytime, and at any pace (to borrow a phrase from the Florida Virtual High School). The speed of the digital environment make some processes especially important: the virtual school must have a system in place to maintain integrated and ever-changing data files, to report student progress, and to provide a variety of well developed learning resources (Salisbury, 1996).

AVHS Standards

The AVHS is clearly intent on complying with the Arkansas Department of Education Rules Governing Distance Learning (2005), in detail. This is apparent on their Web site by the way the viewer is informed. The AVHS uses refreshingly readable fonts; they set off important issues with enough "white space" so that they cannot be missed, and other graphical techniques are employed for emphasis as well. Nothing is hidden, and it would be very difficult for a student, parent, or affiliate school not to understand the straightforward process of course enrollment.

In line with the Rules Governing Distance Learning (2005), the AVHS created their own set of policies to address local issues. For example, students must be enrolled at one of the affiliate schools in the 21 school districts encompassed by the Arch Ford Co-op to be eligible to take AVHS courses. In fact, students must be registered by their school counselor; they are not permitted to register themselves. This procedure guarantees that the school district will accept and issue course credit to the student for AVHS classes. Affiliate schools have the responsibility of providing students a place to work, access to a computer, an adequate Internet connection, and whatever resources are necessary so that they will be able to accomplish course requirements (Assurance Policies, 2006).

Additionally, affiliate schools must provide proper technical assistance and monitor students as they access courses to ensure security and fairness. Each affiliate school must designate a site coordinator for the purposes of disseminating information to students, as well as reporting their progress and any other pertinent issues that may arise. Affiliate schools must agree to accept the grade provided by the AVHS and record the course credits for participating students. These items are presented to affiliate schools in a formal document called the Arkansas Virtual High School Assurance Policies (2006), requiring the signatures of school officials before a student is admitted.

A Cool Way to Learn on the Fly!

This is the AVHS motto. It runs across the top of the Web site like a ticker tape. It may give students the wrong impression, but it is accurate. Hinson and Bordelon (2004) note that preparing an online course involves extensive planning, and details that may be overlooked in the classroom must be explained clearly to the virtual student. Instructors must remember that students cannot raise their hand and ask a question or talk about things after class. Therefore, everything must be accessible online, a task that is not that easy to accomplish. However, the AVHS has managed to provide students with an easy-to-understand opening page and menu links leading to other equally simple structures (see Figure 3).

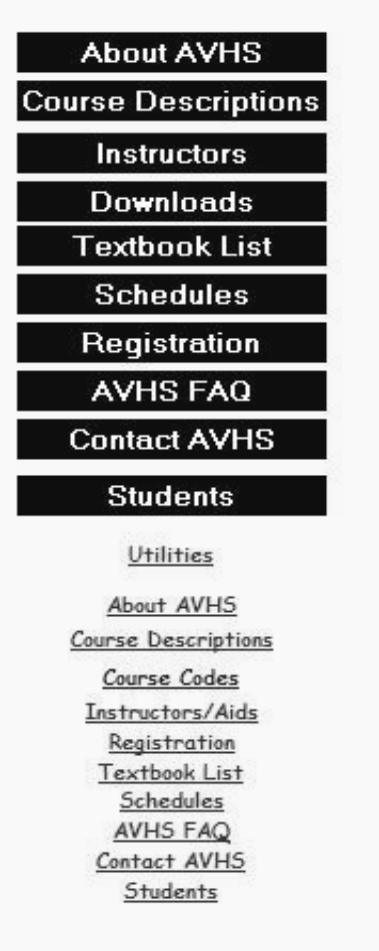

Figure 3. This simple menu appears on each page of the AVHS Web site.

An impressive element of the Web site is the Utilities page, where various program viewers (WORD, PowerPoint, and so on) can be found. Often, online instructors create something for students that, due to computer configurations, they are unable to view. The AVHS shows that they have thought about this issue and provided all the necessary programs in one easy-to-find place (see Figure 4).

The form of the presentation and the nature of instructional materials are of major concern to experienced instructional designers. There is a difference between the digital format and the print material format, although it may seem a subtle point to instructors (Hinson & Bordelon, 2004). Too often, instructors present lectures or assignment material in a linear fashion, as if writing on a chalkboard. However, the digital format is conducive to lists, bullet points, and a style of organization that presents the student with information already in outline form. Course designers must anticipate likely questions and provide students a method to find the answers without wasting time. In other words, to accommodate the virtual student, instructional designers must develop courses that are truly virtual courses, and not merely replicas of the traditional class (Palloff & Pratt, 2003).

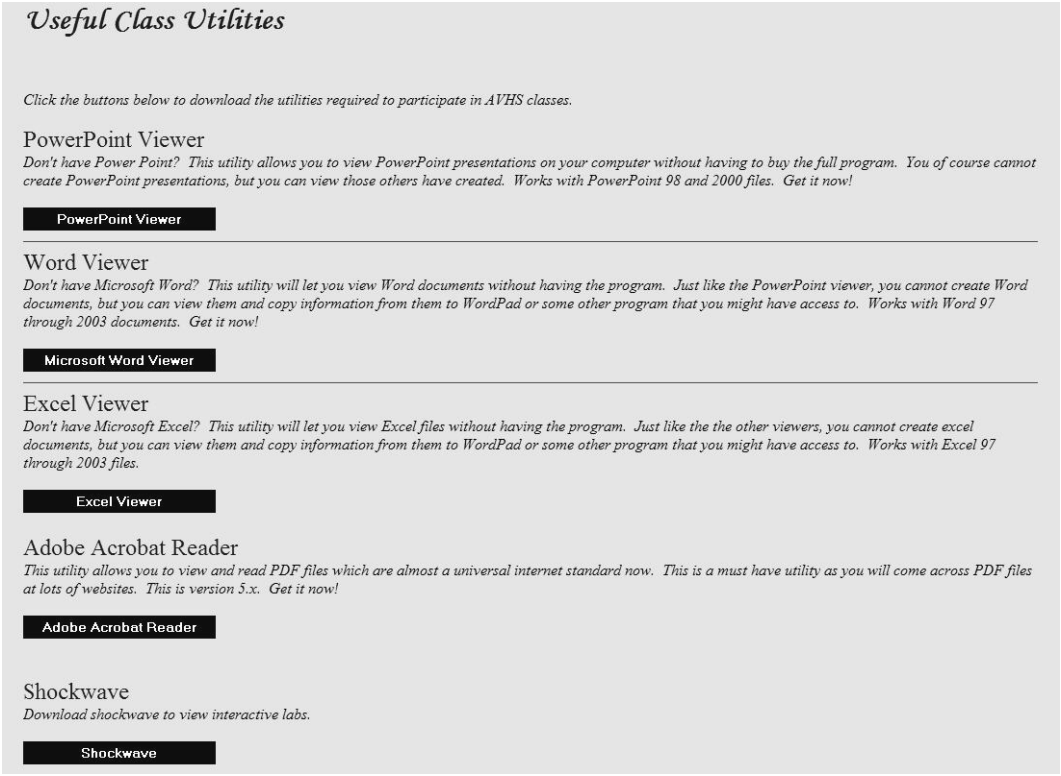

Figure 4. The utilities page provides electronic program viewers.

Moreover, to be able to evaluate the effectiveness of the AVHS, one must be able to put oneself in the student's position, to have access to a real course. Only a portion of each course is available to the public. However, what can be seen is extremely well-organized and includes homework criteria, descriptions and due dates of quizzes and exams, grading calculations, ways to obtain extra help, tips for success, and other details that give students a realistic picture of what a course entails.

An impressive feature of the AVHS Web site is the tutorial explaining in pictures exactly how to get around WebCT. Detailed instructions are provided for all major functions of the WebCT platform. An excerpt is shown in Figure 5.

While distance education has a long track record of success, and research is plentiful, virtual schooling for high school students is a technology in its infancy. Over the coming years, the virtual high school will surely be the topic of dissertations and other research studies, especially if it proves to be successful. Of course, not all students are suited to this style of learning, but there are many advantages over the classroom setting. These include the absence of disciplinary problems, the ability for students to take needed courses unavailable at their local schools, the absence of transportation issues, especially for students who, for a multitude of reasons, are unable to attend the traditional high school. As Steven Wyatt, principal of the Clarksville High School, stated, "We want to continue to expand the use of the virtual high school. We are looking at the possibility of having a teacher available at night so students who work during the

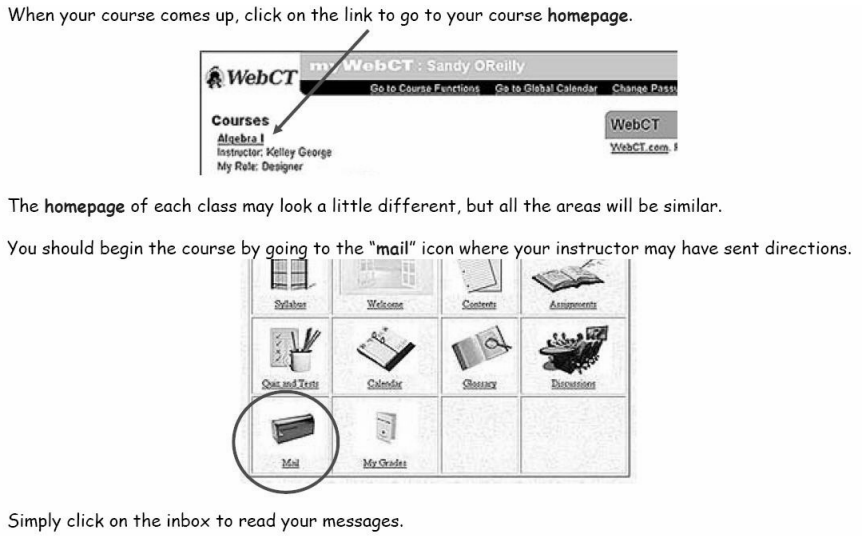

Figure 5. A sample page from Part I of the WebCT tutorial.

day can come in and work on their courses" (personal communication, December 11, 2006).

The AVHS is filling a need. As Steve Thomas, Superintendent of the Wonderview High School, noted, "It's a great opportunity for us to meet standards because of the lack of certified teachers in certain areas. We needed a foreign language teacher and couldn't afford one full time" (personal communication, December 11, 2006). The results for the AVHS students and affiliate schools, to this point, are promising.

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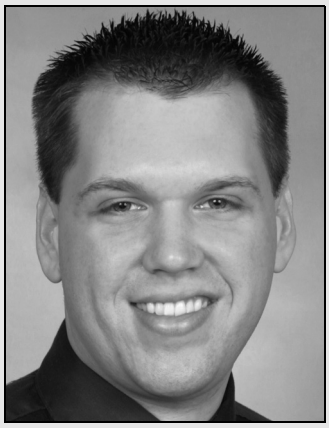
CASE STUDY

Duquesne University School of Nursing

INTRODUCTION

Duquesne University remains at the forefront of nursing education with Mediasite. Duquesne University first opened its doors as the Pittsburgh Catholic College of the Holy Ghost in October 1878 with an enrollment of 40 students and a faculty of seven. Today, Duquesne University is a progressive educational community that has more than tripled from its early 12.5 acres to its present self-enclosed 40-acre campus. Duquesne's tremendous growth includes more than 10,000 students in 10 schools of study, offering baccalaureate, master's, and doctoral degrees as well as professional certificates.



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CHALLENGE

The United States is in the midst of a nursing shortage that is expected to intensify as baby boomers age and the need for healthcare grows. Compounding the problem is that colleges and universities across the country are struggling to expand enrollment levels to meet the rising demand for nursing care. Duquesne University School of Nursing is at the forefront of this challenge, as one of the first institutions in the country to offer online programs in forensic nursing education. In 2003, the forensic program was awarded a 3-year Advanced Education Nursing Grant from the Health Resources and Services Administration of the U.S. Department of Health and Human Services.

According to Joseph Seidel, videographer and computer technology consultant, "A major goal of the funding was to enhance the program through technology in order to better serve online nursing students located throughout the United States and in various other countries around the world."

Duquesne University's School of Nursing sought a solution that would allow it to share critical information related to forensic science in a clear and concise manner. In addition, the School of Nursing wanted to bridge the gap between a regular classroom and an online environment, providing students with the best of both worlds.

Mediasite records and synchronizes audio, video, and visual aids and instantly streams them over the Internet.

Duquesne's online forensic nursing program collaborates with The Wecht Institute of Forensic Science and Law, whose courses are only offered in a regular classroom setting. In order to make the institute's classes available to online students in a user-friendly, rigorous, and cost-effective manner, the university wanted an innovative approach. They hired a videographer and, after researching available new technology, purchased Sonic Foundry's Mediasite Web communications system.

Solution

Prior to purchasing Mediasite, the university employed a short-term solution of videotaping its courses. The content featured nationally known guest lecturers speaking each week and included real-world crime scene investigations. The result was an extensive videotaping process, requiring much equipment, time, and money.

"We wanted our distance learning students to have the same rich experience as being in class and interacting with professors directly," says Seidel. "But, our early approach was exhaustive in terms of the time, effort and expense we incurred. We truly had to manage the entire process—step-by-step—which demanded a great deal of time and money."

In addition, distance learners experienced a lengthy delay in receiving the DVD for a class, making it difficult for them to interact with students on campus via the Blackboard course management system. As Seidel notes, "Mediasite brings the classroom to the student via the Internet and allows them to ask questions of the professor in real-time, not later when they

have a moment to e-mail the professor directly."

With Mediasite, students and faculty who cannot attend lectures have the ability to ask questions of the presenter and hear questions from live audience members through the use of wireless microphones. Another added benefit is that doctoral students can now view presentations from their peers and professors on-demand, in preparation for their own defenses.

Result

"Mediasite has transformed the way course content is delivered to our distance education students," Seidel explains. "The feedback from students has been incredible and the growth of the program is due in large part to the quality of the courses offered online. Mediasite simplifies the post-production time and cost dramatically."

Over the past year, the School of Nursing has expanded its educational opportunities by providing continuing education in the area of Sexual Assault Nurse Examiner (SANE) Training. An initial live SANE training is now offered on a continual basis through Mediasite to reach underserved areas where few nurses are trained in caring for victims of violence.

"We have found an unlimited number of ways to use Mediasite to improve our nursing distance education," says Seidel. "It allows us to branch into other clinical areas, enhancing the capabilities of our doctoral program through live dissertations. With Mediasite, students and faculty who cannot attend now have the ability to ask questions of the presenter."

Mediasite has provided a framework for future advancements in distance education at the Duquesne University School of Nursing. Students, faculty, and staff across the university are now collaborating to provide similar innovative programs in their own departments.

"We look forward to continuing our use of Mediasite as we seek to both educate and inform our students in this demanding field," says Seidel.

Benefits

- Meets the demand for training qualified workers to address the national nursing shortage;
- Simplifies postproduction time and cost dramatically;
- Bridges the gap between the regular classroom and an online learning environment, better serving online students in the United States and beyond;
- Makes classes available to online students in a user-friendly and rigorous manner, encouraging real-time interaction between students, faculty, and guest lecturers; and
- Offers unlimited possibilities for future advancement and growth of clinical programs.

Mediasite has provided a framework for future advancements in distance education at Duquesne University School of Nursing.

CASE STUDY

East Carolina University

Introduction

In 1907, East Carolina University (ECU) was founded to alleviate the desperate shortage of teachers in the eastern part of North Carolina. The College of Education continues to supply the nation with some of its best educators, and now it has been joined by programs of high distinction in health care and fine and performing arts.

From modest beginnings as a teacher training school, the university is now an engine of economic development and a hotbed of discovery. Today, ECU is emerging as a top national research university with an enrollment of more than 23,000. East Carolina is a constituent institution of the University of North Carolina and offers 106 bachelor's degree programs, 71 master's degree programs, 4 specialist degree programs, 1 MD program, and 16 doctoral programs in its professional colleges and schools, the Thomas Harriot College of Arts and Sciences, and the Brody School of Medicine.

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Challenge

ECU recognized the potential of online learning early on and was among the first schools in the nation to develop and offer a degree completely over the Internet. Since then, the university has created more than 50 degree and certificate programs in health, education, technology, and other areas, and a number of new degrees are under development for online delivery.

ECU was the first university in North Carolina to begin teaching distance education programs. At that time, their approach to distance education was limited to chat rooms, the Blackboard course management system, and entirely text-based online course content. ECU sought an online learning platform that would match their cutting-edge reputation, accommodate PowerPoint presentations, and scale to meet growing demand.

Solution

ECU purchased Mediasite in October 2003, hired Global Classroom Video Producer Emily Jones 4 months later, and then, after just 1 week, the department's Mediasite program was in full swing. Jones now uses Mediasite to produce the

school's Global Classroom, capturing 40 Mediasite recordings per week within multiple colleges across the campus. To date, ECU uses 17 recorders and three servers to webcast more than 530 hours of classroom content per semester, which it expects to double to 1,000 hours over the next 6 months.

Jones records presentations from students who arrive in any of three reserved classrooms. Two of the classrooms seat approximately 30 students, while the other seats up to 60. Jones then burns a DVD of the classes so that professors can retain a lecture library to share with students in other classes.

Requests for the three Mediasite rooms come from the College of Technology and Computer Science, the College of Education, the College of Arts and Sciences, the College of Health and Human Performance, and the College of Human Ecology. Degree programs using rooms include: industrial technology, industrial distribution and logistics, engineering, information and computer technology, social studies and science, instructional technology, public health, recreational therapy, environmental studies, anthropology and international studies.

The majority of Mediasite content is captured by faculty for viewing by students. A recent U.S. Department of Agriculture conference was captured for ECU's distance learners. Engineering students undertaking a senior capstone project mediasite their final presentation to their clients at the end of the semester. Students also use Mediasite to capture and review their defense of thesis class on-demand.

"Thanks to Mediasite, thesis defense students can review and improve their presentation style and delivery before they enter a potentially high stress situation," says Jones. "We continue discovering new ways to use the technology for the betterment of both students and faculty."

Result

This next phase of ECU's Mediasite deployment will include the installation of 16 Mediasite recorders in the Allied Health Sciences facility with additional planned purchases campuswide. The new Mediasite units will capture and publish more than 300 lectures for both on-campus and global, live and on-demand viewing over the Web. The distance education program is also incorporating podcasting capabilities with Mediasite and users can attach it to any extension they wish.

ECU has extended its holistic education experience by offering blended learning activities, synchronous online lectures and collaborative content-building sessions using Mediasite. In addition, the university is posting its curriculum online via Sonic Foundry's Mediasite.com—the first searchable Web site focused exclusively on presenting publicly available expert presentations with video, audio, and graphics. Using this unique public outlet, ECU will share the archived course lectures captured on campus with both ECU and other students, professors and the general public.

"The population of distance learners definitely has increased since the program began employing Mediasite," says Jones. "Additionally, this tool is applied across disciplines, allowing ECU's distance education program to deliver a more student-centered educational format to those who must travel, who wish to review course content more than once or individuals with irregular schedules."

Benefits

- Allows university to offer blended learning activities, synchronous online lectures and collaborative content-building sessions;
- Expands structured classroom teaching and independent student learning;

- Accommodates the diverse needs of students who need to travel, who wish to revisit course content, or who are spread across the state; and
- Scalable online learning platform grows to meet increasing demand.

EAST CAROLINA UNIVERSITY "... HAS CREATED MORE THAN 50 DEGREE AND CERTIFICATE PROGRAMS IN HEALTH, EDUCATION, TECHNOLOGY, AND OTHER AREAS, AND A NUMBER OF NEW DEGREES ARE UNDER DEVELOPMENT FOR ONLINE DELIVERY."

CASE STUDY

Northwestern University School of Communication

For 125 years, the Northwestern University School of Communication (formerly the School of Speech) has provided leadership and vision in the art and science of communication. Since beginning as a single elocution course in 1878, the school has grown in scope and size, becoming one of the most respected institutions for the study of human expression and communication. The Northwestern University School of Communication offers a comprehensive program of study in the arts and sciences of communication. Undergraduate, graduate and professional students work with world-class faculty to create new understandings of communication and develop new approaches to improving human performance.

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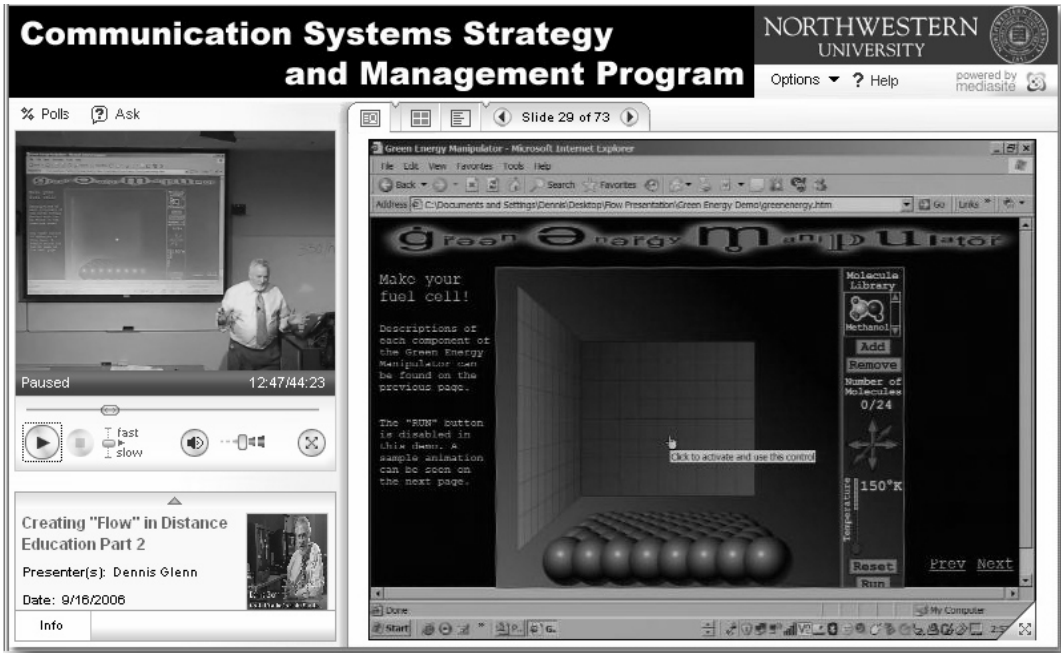
CHALLENGE

The Distributed Learning Center located within the Northwestern University School of Communication has the primary responsibility for helping faculty and students apply new interactive technologies to teaching and learning.

The purpose of the Distributed Learning Center is to research and implement the latest instructional technologies for distributed learning environments, video conferencing, video and voice over internet protocol, and peer-to-peer interactions. The Center provides a place for students in the School of Communication to work with new interactive technologies that provide a joint learning experience for both faculty and students.

"We found that we needed to offer additional resources to continue our top-notch learning environment," says Dennis Glenn, assistant dean for distributed education at Northwestern. "Northwestern attracts the best and the brightest and as such it is our job to deliver the best education possible. We developed the Distributed Learning Center with the latest technology in mind that would allow students on campus or anywhere in the world to attend class."

With one of the nation's leading executive education programs, Northwestern was committed to offering students a solution for distance education that was



Northwestern University delivers a classroom experience through the Mediasite Viewer interface.

dependable and convenient and easy to access. The School of Communication had many potential students who expressed interest in its programs, but because of the time and travel commitment were unable to attend courses on campus. "Northwestern was asked by companies located in the Silicon Valley to offer a distance education solution which would make it possible for their employees to attend our programs and reap the benefits of a Northwestern education," says Glenn.

Solution

The Northwestern University School of Communication looked at several other systems before selecting Mediasite as the solution to launch with its graduate distance learning program.

"We wanted a live streaming solution," says Glenn. "Other companies offered some of the components we wanted, but we continued to search because we simply did not find a solution which met our very high standards. We delayed implementing our distance program until we found a technology that would provide us with a way to deliver distance education that was equal to that of our on-campus experience."

Northwestern made the decision to offer synchronous video conferencing as a way to bring distance students into class with students who attend the on-campus courses. The determining factor was the ability to have students participate in class synchronously. The technology converged and permitted the distant students the ability to attend class with resident students. "The added benefit Mediasite provided to the program was we now could do a live stream and archive simultaneously which was a critical factor in the selection of Mediasite technology," says Glenn. The quality of viewing and archiving the courses was a key determinant for success. Northwestern was committed to embarking on the program only when a viable solution was in place. Glenn wanted to be sure that the chosen technology would be capable of

enhancing the educational value of both local students and distance learners.

In an executive education program, it is understandable that students will occasionally miss classes. Before employing Mediasite, there was nothing Northwestern could do—the students had to go to their professors and fellow students for the material. With Mediasite, students now can go directly to the source. "The local students demanded archived links to the material," says Glenn. "We agreed that all students in the class should have access to the same materials. With Mediasite, we were able to offer both on-campus and distance students the ability to access the same material at their convenience."

"Mediasite has taken the place of note taking and offers students a superior education because they can go straight to my lecture, watch it again and simply print off the accompanying PowerPoint. I do not allow students in my courses to take notes," says Glenn. "If they are taking notes, then they are not listening to what I am saying. Class time should be spent asking questions and interacting between students and the professor."

Result

Northwestern University is constantly evaluating new ways to use Mediasite. On average, the university conducts 120 classroom sessions a year using Mediasite. In addition, final presentations of graduate students are captured which allows them the opportunity to review and better prepare for the graded presentation to the larger class.

Interest in Mediasite is now spreading across campus to other colleges. "When I demonstrated our current capabilities using Mediasite to the Northwestern University Feinberg School of Medicine—Prosthetics and Orthotics Center, they immediately saw the benefits and made the decision to utilize the technology to create a blended learning program," says Glenn.

Benefits

- Allows university to offer programs to students in different geographical locations;
- Promotes classroom discussion with students able to focus on the information being exchanged rather than on note taking; and
- Extends use of technology beyond the confines of one school or department to promote interdepartmental collaboration.

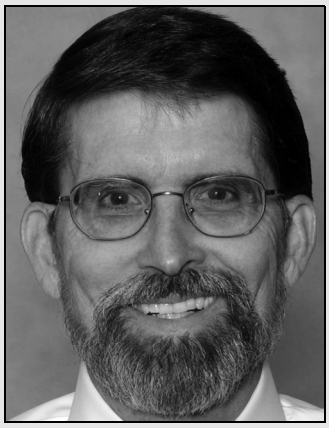
"Northwestern made the decision to offer synchronous video conferencing as a way to bring distance students into class with students who attend the on-campus courses."

CASE STUDY

University of Tennessee College of Veterinary Medicine

Introduction

The University of Tennessee College of Veterinary Medicine (UTCVM), one of only 28 veterinary colleges in the United States, was established in Knoxville in 1974. Since the college first opened, more than 1,600 students have completed their doctor of veterinary medicine degree, and the college's clinical program has treated more than 945,000 patients.



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Challenge

Administrators in the College of Veterinary Medicine sought to maximize the use of technology in their teaching, so the college's Instructional Resources (IR) team set out to take advantage of online technologies. "We have a computer-literate faculty that is willing and anxious to try new technologies," says Michael Sims, professor of veterinary medicine at the University of Tennessee College of Veterinary Medicine and director of Institutional Resources.

Institutional Resources wanted to offer a variety of technology options that faculty and students could choose from to enhance their individual teaching and learning styles, respectively. In the process of helping keep pace with ever-changing technologies, the IR team also worked to steer the college away from technologies that were too complex and thus leading to technological difficulties and discouraged users.

"We have always been interested in engaging students to participate interactively in their own education, in the classroom as well as in study groups," says Sims. "And we wanted to deliver content as near to 'anywhere/anytime' as possible, to minimize the time spent in locating relevant subject matter."

"We have a particular interest in capturing," says Sims. "For our purposes, it is important to get data, sound, and video all on one screen … integrated in a format

that is Web-enabled. We started looking for a system that could do it all."

Solution

The technology resource center on the University of Tennessee's main campus was already using the Mediasite Web communications system. The center leased the technology to the College of Veterinary Medicine for a trial period, which concluded with very positive feedback.

"Interactively engaging students in the classroom is a very important part of teaching, especially when some or all of the attendees are at a distant site," says Sims. "Mediasite has allowed our college to interact with others at remote sites without unnecessary complications to the presenter. Some professors in the college have used Mediasite to record special presentations and seminars. Archived presentations allow 'would be' attendees to participate at a later time. With this technology, we can invite a professor from another university to teach a whole course, part of a course, a lecture, or even participate in a classroom question and answer session. Can you imagine being a student and asking questions to a world-renown expert just because he or she is willing to be a virtual guest in a class focused on his or her area of expertise?" asks Sims.

One innovative application that has emerged at UTCVM is using Virtual Microscopy to share microscope slides. Glass slides are digitized in high resolution, in such a way that a computer replaces the traditional microscope. The digital images are then used in presentations or exams, archived, replicated, transferred over networks, distributed on a CD, integrated into course material on the Web site or via the school's intranet—all to allow ubiquitous access. "I am convinced that digital microscopy has the potential to replace glass slides in some teaching labs," says Sims.

Result

Since using Mediasite and other technologies, UTCVM has recorded content ranging from classroom lectures to conferences, large and small.

The college is now considering using distance education technologies to capture classroom lectures and conferences and will soon use this technology to offer continuing education to graduate veterinarians.

"With video-streaming technologies, students who have moved away from campus can still continue to learn from our experienced faculty," says Sims. "Providing students with the opportunity to learn from professors at other leading veterinary colleges would also be a distinct advantage for our graduates."

In the future, the college looks forward to interacting with other colleges and universities specializing in Veterinary Medicine through Mediasite. "The collaboration of our experienced teaching staff, coupled with that of the other 28 veterinary colleges in North America, would allow for a cross-listing of courses which would present a unique learning experience for veterinary students," says Sims.

Benefits

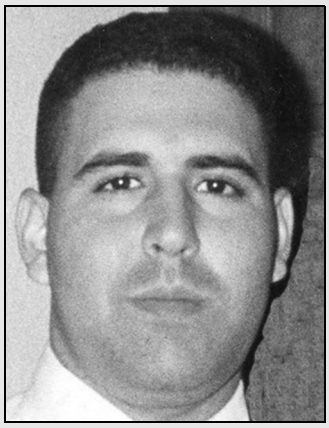
- Engages students to participate interactively in their own education, in the classroom and in study groups;
- Delivers anywhere, anytime content to minimize the time spent in locating relevant subject matter;
- Interactively engages distant education students through archived presentations, guest lecturers and real-time Q&A over the Web; and
- Encourages innovative uses of other technologies such as medical imagery.

CASE STUDY

UCLA Anderson School of Management

Introduction

UCLA Anderson School of Management is a global leader in management education, research and service. The Anderson School is ranked among the top-tier graduate business schools in the world. The Fully Employed MBA (FEMBA) is one of three degree programs in the Anderson School and, most recently, was ranked fourth by *U.S. News and World Report*. Award-winning faculty, renowned for their research and teaching, highly selective admissions, and successful alumni combine to provide an extraordinary learning environment. The FEMBA Program is designed for full-time working managers and meets evenings and Saturdays and requires 84 units for completion during a 3-year period.



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Challenge

Manuel Burgos, senior manager of the FEMBA, was challenged to find a technical solution to enhanced student learning and to provide a higher level of student affairs. Many students found it difficult to travel to UCLA for tutorial sessions and other students wanted to be able to review classroom lectures online. It was almost impossible for FEMBA students to attend special daytime Anderson distinguished speaking lectures and other events of interest to them. Use of the Mediasite Web communications system was the solution.

"When first introduced to the Mediasite system, I could hardly believe what it was capable of producing. I was only aware of products that did just a portion of what Mediasite was capable of doing in such a short amount of time," says Burgos. "For instance, a video camera could capture a lecturer, a Web site link could provide students with class notes; but I did not know it was possible to combine the two into one self-contained unit for use in a large university setting like the UCLA Anderson School of Management."

Another need was for technology to meet the diverse demands of the FEMBA Program's Global Access Program (GAP). This course offering is a unique educational program that matches students in the FEMBA Program with early stage inter-

national technology companies. The goal is to develop a comprehensive business strategy to enable the companies to move to the next stage of their corporate development.

Solution

Initially, UCLA purchased Mediasite to record tutorial sessions, core management courses, GAP presentations, and special speaking events.

"Business runs on information, access, analysis and communication," says Burgos. "At the Fully Employed MBA Program, UCLA Anderson School of Management, we can now pride ourselves on possessing the technology that reaches beyond the books, brick, and mortar. Our physical and electronic environment is designed to facilitate information competency, communication and group work. We are now able to keep our promise to both students and faculty by providing them with the tools they need to deliver data and power to anyone around the world. Mediasite allows us to provide students with information and create a communication infrastructure upon which great ideas and careers are built."

Result

Recognizing that learning technologies must play a major role in future growth and services strategies, the UCLA Anderson School of Management is considering the use of additional Mediasite units in their case classroom and lecture hall.

"It would be ideal for a professor to simply walk into the classroom in which they are teaching and easily activate a recording system to begin recording content for later dissemination or review," explains Burgos.

"The Fully Employed MBA Program at the UCLA Anderson School of Management has enhanced student learning with the use of Mediasite 100%," says Burgos. "Now that we have the product, we are branching off into other uses for the entire school."

Benefits

- Provides e-learning with an online representation of the classroom experience;
- Automates, captures, manages and delivers multimedia presentations;
- Supports in-class learning, as well as Web-based e-learning; and
- Unobtrusively records educators in their natural classroom environment.

"Business runs on information, access, analysis, and communication…. At the Fully Employed MBA Program, UCLA Anderson School of Management, we can now pride ourselves on possessing the technology that reaches beyond the books, bricks, and mortar."

CASE STUDY

Villanova University

INTRODUCTION

Founded in 1842, Villanova University established a first-class reputation for its bachelor's, master's and doctoral programs, and its College of Engineering was recently ranked by *U.S. News & World Report* as one of the top engineering schools in the country. The college provides education in four disciplines: chemical engineering, civil and environmental engineering, mechanical engineering, and electrical and computer engineering.

CHALLENGE

Villanova's College of Engineering determined that remote students should have two options for receiving course content. It invested in both a video teleconferencing facility and Web-based streaming technology, which could capture and stream the audio and video of the professors, but lacked the graphical components.

"We had to manually convert any type of graphic to a video signal, which of course takes time and degrades the quality of what the student sees," says Seán O'Donnell, director of distance education. "I think that really held us up in terms of offering a highly effective distance education program."

Engineering courses, particularly at the graduate level, create unique challenges for institutions interested in offering distance education programs because of all the complex graphics and simulations used by the professors. Technologies that might be effective in capturing and streaming PowerPoint slides for a liberal arts course are ill-suited for the technical disciplines like engineering and healthcare where the content includes highly detailed imagery that is generated from a variety of devices.

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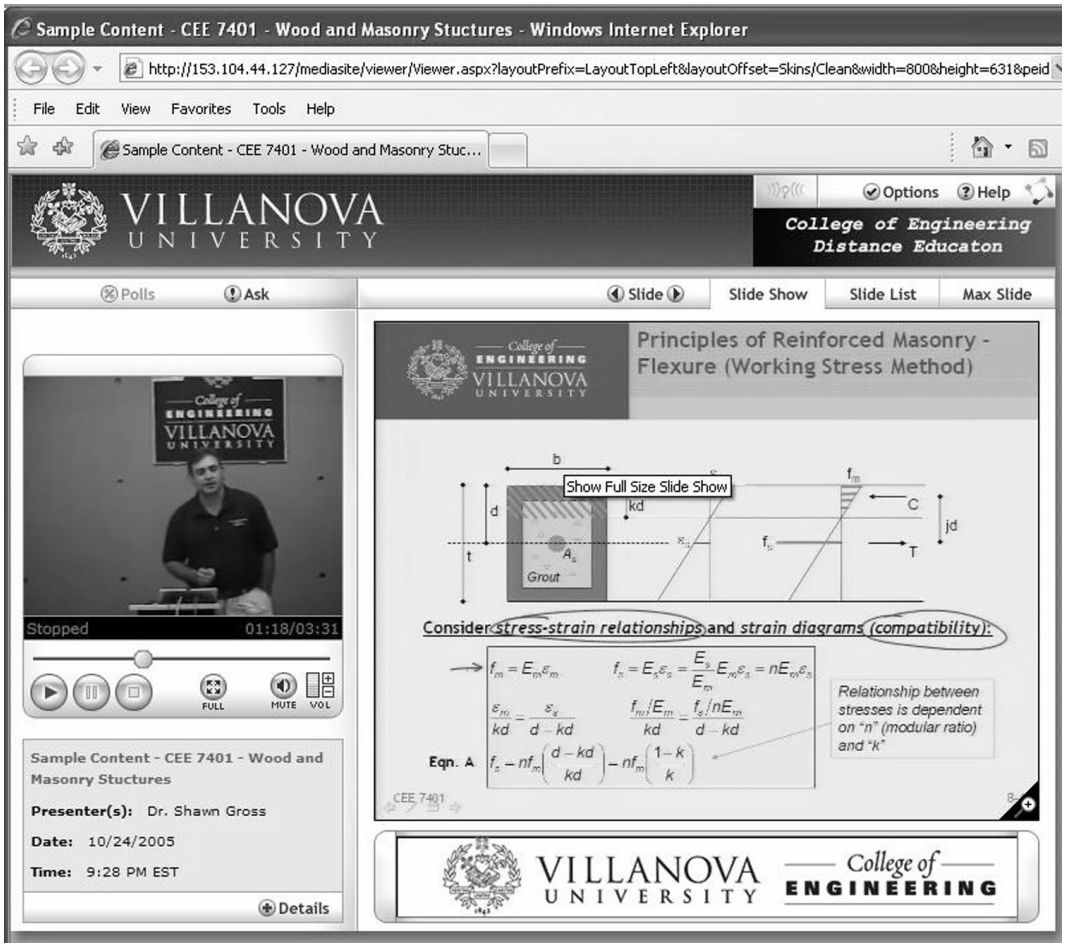
SOLUTION

Villanova University selected Sonic Foundry's Mediasite for its ability to capture multi-source, multiformat visual content from virtually any analog and digital source. Mediasite easily handles complex engineering diagrams, maps, photos, detailed medical imagery, intricate drawings and other applications where visual clarity is critical. All of this is accomplished in real time and is completely transparent to the instructor.

In January 2004, the college began using Mediasite to capture and stream courses for its graduate degree program, two certi-



Villanova University displays high quality complex graphics through the Mediasite Viewer interface.

fication programs, and two noncredit professional development courses. The recorded classes serve as an important adjunct to in-class learning and facilitate effective online learning for students in the distance education section.

"Mediasite has now allowed us to reach students in ways we never imagined before," says O'Donnell. "There are so many solutions in the market that do a piece of what Mediasite offers, but no real solution which combines everything into a single offering, like Mediasite."

Villanova's Mediasite Recorders run simultaneously every night of the week, reflective of the growing demand for distance education from working engineering professionals. Online students have the option of watching the classes streamed live or on-demand. Students without broadband Internet access, or the time to watch live, can download each class and watch offline. Traditional classroom-based students also can access the online lecture archive to review complex concepts or to make up a class.

Result

In the last 2 years, the College of Engineering has served more than 435 students from 20 states and two countries through Mediasite. Enrollments continue to grow

each semester, serving more students than ever before. "Using Mediasite, we increased the number of students in our distance education program, generating over half a million in dollars annually for College programs," says O'Donnell.

"With Mediasite, the in-class and distance education programs mirror each other—the information is exactly the same," says O'Donnell. "In fact, some of our in-class learners are switching to the online section because they've seen that it's the same experience. There's no difference between sitting in class and sitting at their computer, except the distance education program is more convenient as they can watch where and when they want."

To date, more than 50 professors have used the system both in the distance education mode and as an enhancement to their traditional classroom teaching experience. They teach once even though they are reaching multiple audiences, and there are no restrictions on types of materials they use. The system integrates with the university's WebCT course management platform, enabling live chat and the posting of notes and other materials to support the learning process.

"Our professors really love it," says O'Donnell. "To be honest, they were a little disheartened by our earlier distance education efforts because they couldn't use their computer images. With Mediasite, that's no longer an issue. Now they can teach the way they want, using all the complex high-resolution images that are so essential to engineering courses."

O'Donnell believes the distance education program for the College of Engineering is unique because it gives students three options for receiving their education: in person, via the Web (live and on-demand) and through video teleconferencing. Mediasite's role in the program will continue to grow as the demand for both master's and certification programs increases. "It's important for us as an institution to offer an optimal learning experience—regardless of where the student is sitting when that learning occurs," he says. "Mediasite allows us to extend our distance education offering and enhance our in-class learning."

Benefits

- Generates significant revenue from new enrollments each year;
- Provides engineering faculty with high-quality graphic capture capabilities essential for effective teaching;
- Meets growing demand for continuing distance education from working engineers; and
- Offers optimal learning experience regardless of location or geography.

SEAN O'DONNELL SAYS, "TO BE HONEST, THEY WERE A LITTLE DISHEARTENED BY OUR EARLIER DISTANCE EDUCATION EFFORTS.... NOW THEY CAN TEACH THE WAY THEY WANT, USING ALL THE COMPLEX HIGH-RESOLUTION IMAGES THAT ARE SO ESSENTIAL TO ENGINEERING COURSES."

Where Are We Going ... and Why?

Ryan Watkins

For decades, technologies such as satellite communications, personal computers, the Internet, and learning management systems have been primary drivers in the evolution of distance learning. These *electronic* technologies have simultaneously challenged and changed how learning is viewed by students, instructors, managers, CEOs, and others. From where we learn and when we learn, to how we learn and what we learn, these and other technologies continue to challenge our perspectives of learning, frequently turning many of our perceptions upside-down.

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For students and instructors alike, numerous benefits have been the consequence of these technical innovations. The Internet, for instance, offers educational and training opportunities to millions of people who would otherwise be disadvantaged by their geographical location, physical disabilities, and/or competing obligations. Similarly, personal computers provide millions of users with the capacity to create and share information more easily than at any other time in history.

Yet, as I have discussed in previous *Ends and Means* columns, advancements in these technologies have outpaced advancements in *conceptual* technologies (such as theories, procedures, frameworks, and models) for creating effective learning experiences. This lag has left instructors, learners, researchers, instructional designers, and others without clear answers to where they are headed with distance learning and why.

Instead, we seem to be on a never-ending merry-go-round of *electronic* technologies. As soon as we grab one gold ring (e.g., podcasting, compact streaming media,

wikis), a new technology is released and we are once again grabbing for the next technology. Often, we are striving to integrate the newest technologies before we have even discovered the potentials of the earlier technologies. And, more often than not, we are applying new technologies without any theoretical or foundational frameworks for relating technologies to learner performance.

Without strategic objectives to answer the questions about where we are going and why (and lacking *conceptual* technologies to guide our practice) we just keep grabbing for the next gold ring without knowing if it is going to help us achieve our goals. Frequently, we can't even describe how we will measure our success beyond the boundaries of the next fiscal quarter, let alone two, three, five or even ten years down the road. And getting off the merry-go-round to catch your breath is difficult, if not impossible. All of this leaves us with little time, and few opportunities, to reflect on "where we are going, and why?"

Advances in technological hardware and software are not likely to end, nor should they. By no means do I advocate that the marry-go-round should stop. These advances continue to expand our capacity to deliver valuable learning experiences to learners around the world. But we must also find time in our busy schedules to ask basic questions about what results we are trying to accomplish and why those results are of value to our students, organizations, and communities. These answers, after all, should guide our decisions to a much greater degree than the technology tools we may (or may not) use to achieve our objectives.

Take a few minutes now to reflect on where are you and your organization are going with distance learning. Then ask yourself "why?" Can you identify the strategic objectives that distance learning is intended to accomplish for your organization, its clients, and your societal partners? Is distance learning simply an option to cut production and delivery costs, or is distance learning intended to guide colleagues, clients, organizational partners, and others in the accomplishment of useful results? Are advances in distance learning technologies leading your daily decisions, or are the strategic objectives of your organization and its partners you guide?

For most of us, these are challenging questions to answer. Frequently, we are too busy trying to achieve loosely defined goals to question and discover why they are our goals in the first place. The daily tasks associated with designing, publishing, and revising e-learning tutorials, for example, take the place of any time we may have had for adequate pre-design planning, needs assessment, and needs analysis. Strategic plans routinely gather dust on the shelf while our daily to-do list grows in length and complexity.

Yet, these are essential questions for everyone in all organizations to ask and answer. Without clear answers to these, we are left to continually chase the latest in technological advances, not knowing which are going to truly help us achieve valuable results for our internal and external partners. After all, if you don't know where you are going, then any path (or technology) will do.

If you don't have clear answers to the questions of where you are going and why, now is the perfect time to find them. With the answers, you can then ensure that all of your daily decisions are made on the basis of accomplishing long-term goals and objectives, letting strategic ambitions replace new technologies in deciding where to go next and why.

Begin by reviewing the strategic plans of your organization and its partners. Include the long-term goals of your organization along with the strategic goals of clients, clients' clients, the communities you service, suppliers, and others. Building a comprehensive understanding of where

your efforts fit in this mosaic is critical to determining where you are headed, and why.

If you can't find answers in current strategic planning documents, then this is likely an indication that it is time for your organization to undertake practical strategic planning. Every department, division, and person within an organization should be able to look to the strategic plans of their organization to identify their contributions and guide their decisions. From maintenance crews to software engineers, the strategic plan of an organization should provide answers to where they are going and why.

Useful strategic plans develop out of collaborations with internal and external organizational partners. These collaborative efforts help you define the valuable results that your organization, together with its partners, is working to accomplish for clients, clients' clients, and others in society. Consequently, practical strategic planning begins outside of the organization and provides a foundation for answering the question "why?"

Begin strategic planning outside of your organization and then move inward as you look to define the desired results of the individuals, departments, units, and other colleagues that make up your organization. This outside-inside approach ensures that the goals and objectives within the organizations are aligned with the desired results of your external partners. For instance, if your clients' clients are looking to use your products in a safe and effective manner, then any internal training and education for new customer service representatives should include skills related to answering the safety questions of indirect clients. This external alignment then replaces old planning processes where you may have started with off-the-shelf e-learning modules on customer service and then looked for "problems" that these resources could address.

Even when your direct-clients are internal to your organization (for example, new employees or the manufacturing division), your strategic goals and objectives should be informed by the external clients. This ensures that your decisions are aligned with the long-term objectives of all organizational partners rather than those of discrete factions within the organization. Focus first and foremost on the desired results of your external partners (including clients, suppliers, and community members), and you will quickly learn where you are heading and, more importantly, why.

Breaking Down Walls (and Building New Ones)

Craig Ullman

Perhaps no change in federal educational policy has been as extensive as No Child Left Behind (NCLB) or produced as many consequences (unintended and otherwise). No doubt the next president, of whichever party, will have his or her own educational policy with an equally catchy acronym, and "NCLB" will be assigned to the idea closet along with Sputnik and the Skinner box.

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Yet no matter how profound the next change in educational policy, one bit of innovation that NCLB has brought forth, I hope and expect will remain, is the extension of K-12 education beyond on the bounds of the physical school.

Okay, before you wag your finger, education *always* extended beyond the school as students brought home their work or did research at the local library. But NCLB fostered (and foisted) something more: tutoring after school, either in the school itself, or outside the school, at a local community center or a nearby Starbucks. Expanding the notion of school was, I suspect, at most an incidental goal of NCLB, but I think it's the innovation (one would think with a very different execution) that will stick.

What schools can't usually offer students, and what tutoring should, is individual attention. Sustained individual attention is simply not something a typical school is equipped to do. If we think about the world we live in these days being about *mass personalization* (think about Amazon having a tab on the home page entitled "Craig's Amazon.com." Not that it would be the same name for you—unless your name was Craig, too. But it would feature different items.) So I don't think

that going beyond the confines of the school is going to go away.

Beyond NCLB, as more and more educational content moves online, and as students and teachers *expect* to use computers and Internet applications to do their work, the continued virtualization of education is inevitable. As the virtual world becomes even more important in education, the school as a location becomes more abstract, and the walls that separate the school from the larger world begin to crumble.

Between NCLB's emphasis on outside tutoring and moving content experiences to the Internet, we're seeing a lot of wall crumbling, both metaphorical and virtual. Now the question becomes, what will replace these walls?

Follow me on this one: The Orthodox Jews have a procedure called *eruv.* Eruv means "mixing" in Hebrew, and it enables Jews on the holidays and the Sabbath to virtually extend their home, which allows them to perform activities they would otherwise be prohibited from doing outside it: carrying, cooking, and so forth. The boundaries of this unrestricted area are sometimes defined by a fence, but in the United States it's typically done with a piece of string. The area could be of any size—a city block, a neighborhood or, in the case of Jerusalem, a whole city. The eruv extends the boundaries of place, creating, just with string, a virtual home.

Maybe the new walls of where *the process of education* happens will be made of string: we'll encircle an area that will enclose the school, the library, the homes, the neighborhood, maybe even the world.

So maybe we won't actually use string …

… continued from page 104

Podcasting is not a new idea. It has been around at least since the audio tutorial movement and the Sony Walkman. A podcast is really a single concept event that is explained by an audio file, or an audio file supplemented by still pictures or video. The most widespread and current example of a type of a podcast is a song, usually 3 to 5 minutes long available in an electronic file format, such as MP3 or MP4, that also might be available as a music video with singers, dancers, and actors in addition to the song. Luther Vandross' tune "Always and Forever" is a wonderful 4-minute-and-54-second example. The tune is also available as a music video showing Vandross singing the song.

Individual songs work well as podcasts because most modern tunes have the characteristics of an effective single concept event—what many now are calling a podcast, which really is a learning object that is stored in an MPEG format. The characteristics of an *effective* podcast are as follows:

- A podcast is a single idea that can be explained verbally or, if necessary, with audio and appropriate still or motion pictures (not a face talking);
- A podcast is a recorded event that is 3-10 minutes long;
- A podcast is part of a series with each single event related to others;
- A podcast is a learning object available in an electronic format that is easily played, most often as an MP3 file;
- A podcast is stored on a Web site or other Internet location for easy access; and
- A podcast is current and changed or updated frequently.

In spite of what the *Chronicle* says, a recording of a lecture is a poor example of a podcast. Rather, it is best to "chunk" the class into five or six single concept blocks, each as a separate learning object. Effective lecturers do this already; they break up their class session into related topics. These topics can become podcasts when they are recorded electronically in an MPEG file format, especially if they are supplemented with related examples and recorded property without distracting background noises. Podcasts are a reincarnation or reinvention of what the mastery learning movement of the 1960s called single concept files or single concept films. They were effective then, and can be effective today.

And finally, let's call them something other than podcasts. MPEGcast doesn't have the same cachet as podcast, but then Mpegcast doesn't remind everyone of Donald Sutherland pointing his finger at the last normal person, either.

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"… A RECORDING OF A LECTURE IS A POOR EXAMPLE OF A PODCAST."

Podcasting ... or "Seeds Floated Down From the Sky"

Michael Simonson

Bud-like seeds floated down from the sky—from space actually. They were not noticed at first, but soon the seeds grew into pods, plantlike oblong objects that when ripe disgorged a terrible creature, a creature that killed and eliminated humans and replaced them with exact physical replicas that were identical in appearance but lacking in any emotion. Podpeople.

This sentence could be the plot-line to one of the four motion pictures made over the last 50 years based on Jack Finney's 1955 book *The Body Snatchers*. The film most remember was released in 1979, starring Donald Sutherland, who was one of the last on earth to remain free of will and independent of the pod menace.

Another explanation of this sentence might be a teacher's lament about the students in class constantly putting the tiny "buds" in their ears to listen to the tens of thousands of rap tunes on their personal iPod, hidden in a back-pack.

The iPod has become an icon in the first decade of the twenty-first century, and podcasting has become one of the most talked-about applications in distance education. Podcasting and iPods are written about in the popular press, in journals, and even in the prestigious *Chronicle of Higher Education.* The *Chronicle* recently published a long article with the unfortunate title "How to Podcast Campus Lectures."

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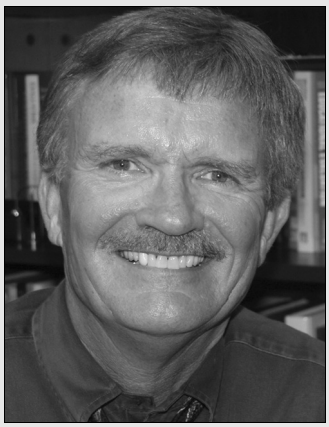

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