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IDENTIFIERS	Technology Role

ABSTRACT

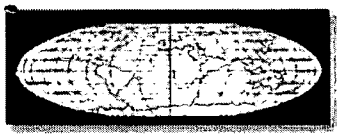
The overarching focus of the International Conference on Technology and Education (ICTE) Tampa 1999 conference was "Preparing for a New Century of Learning: Technology, Education, and the Internet." Twelve themes supported this focus: "Implementation in the Classroom"; "Educational Tools"; "Information Technology and Educational Policy"; "School-Based Technical Support"; "Internet Filters vs. Free Speech"; "Copyright and Trademark Issues"; "Internet and Distance Learning: The Next Five Years"; "Using Technology To Create New Paradigms"; "Assessment"; "Assistive Technologies"; "Challenges of Technology in the Classroom"; and "Creating Digital Assets for Education." Topics of papers in this proceedings include: task based management for technology instruction; interactivity in Web-based instruction; Web pages to enhance student achievement; digital enculturation; K-12 student perceptions of classroom computer use; role of educational technologies; self-pacing technology; teaching technology in the focused calendar; system dynamics and computer modeling; technology in mathematics teacher education; technology rich lessons; technology supports school reform; online textbook publishing; computer conferencing and blended courses; technology in developing countries; Powerpoint presentations; computer graphics and animation; educational technology to increase achievement in a standards based environment; technology to enhance foreign language competency; Internet in the secondary English curriculum; an elementary computer initiative; digital books for mathematics learning; Asynchronous Transfer Mode; online learning for K-8 students; changing universities into virtual universities; Web-based writing, peer review, curriculum development, and dissemination; graduate computer education; Internet MBA; streaming video in instructional Webs; individual access applications; courseware description language; Open and Distance Learning pedagogy; distance education considerations; seamless access for students transitioning from secondary to postsecondary programs; supporting faculty users of online course management systems; Web page annotation; challenges in online program creation; and software delivers math on the Internet. (AEF)

Preparing for a New Century of Learning: Technology, Education, and the Internet

ICTE Tampa 1999: International Conference on Technology and Education Proceedings

(17th, Tampa, Florida, October 10-13, 1999)

International Conference on Technology and Education



ICTE Tampa Conference Program

The overarching focus of ICTE Tampa is ***Preparing for a New Century of Learning: Technology, Education, and the Internet***. The following Program Schedule for ICTE Tampa lists presentations, presenters, and times for the Conference.

Sunday Evening, Monday Program

Tuesday Program

Wednesday Program

For more details about each presentation, see the Program Abstracts under the appropriate theme.

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Sunday Evening, Monday Program

Day / Time	Room	Seq	Session / Title	Presenter(s), Institution	Session Type / Theme
Sunday 1:00 am			On-site registration desk opens	On site registration beginning at 1:00 PM, Tampa Convention Center	Registration
Sunday 6:00 pm	Main Auditorium		ICTE Tampa Opening Session	**Welcome** -- Lynn Peterson Conference Co-Chairs: Owen Gaede Suzanne Martin Laurey Stryker David Walker **Introduction of Special Guests, Announcements** **Video Vignettes of Technology in Schools --** Special Video Presentation provided by the National School Boards Association **Opening Keynote Address** -- Louis H Kompare , Executive Director Center for Effective Government for the State of Tennessee	Conference Opening
Monday 8:00 am	See List by Theme		Theme Round Tables; Meet the Presenters Presentation Briefings: Theme 1: West Side -- Main Auditorium Theme 2: East Side -- Presentation Room 1 Theme 3, 4, 5, 6: Presentation Room 2 Theme 7: Presentation Room 3 Theme 8,9: Presentation Room 4 Theme 10, 11, 12: Presentation Room 5	The Theme Round Table sessions are an opportunity to meet the presenters of papers in the various themes, and to meet others attending who have similar interests. At the Theme Round Table sessions, a few minutes will be used to brief those attending on the presentation order and related details. Round Table Sessions and Presentation Rooms will be hosted by Meeting Room Coordinators. The Meeting Room Cordinators are Graduate Students from Florida State University and the University of South Florida	Theme Round Tables

				(Special Note: Exhibit hours are from 8:30 AM until 4:30 PM on Monday and Tuesday, and from 8:30 AM until 3:00 PM on Wednesday.)	
Monday 8:30 am	Presentation Room 1	A	Using the Internet: Enhancing the Secondary English Curriculum	Ward Brian Zimmerman Enterpriz Consulting; USA	Paper 1
Monday 8:30 am	Presentation Room 1	B	Using Technology to Restructure the Classroom Paradigm	Arthur Shapiro University of South Florida; USA	Paper 1
Monday 8:30 am	Presentation Room 1	C	Distance Learning in Management: The Dislogo Case-Study in Portugal	Luis Valadares Tavares, Manuel Joao Pereira Universidade Catolica Portuguesa; Portugal	Paper 1
Monday 8:30 am	Presentation Room 2	A	Access to Technology at Woodbury University	Robert A. Schultz Woodbury University; USA	Paper 2
Monday 8:30 am	Presentation Room 2	B	A Crossroad to the Current U.S. Undergraduate Computer Science Education (UCSE) - Challenges and Opportunities in the Information Society	Yun Wang Mercy College; USA	Paper 2
Monday 8:30 am	Presentation Room 2	C	A Real-Time Software System for Detecting Plagiarism in Programming Assignments	Dulal Chandra Kar Virginia Polytechnic Institute & State University; USA	Paper 2
Monday 8:30 am	Presentation Room 3	A	Technology Leaders and New Paradigms of Leadership	Patricia A. Bergeron Family Education Company; USA	Paper 3
Monday 8:30 am	Presentation Room 3	B	Institutional Leadership and Technology Trends	Gregg Brownell College of Education and Human Development, Bowling Green University; USA	Paper 3
Monday 8:30 am	Presentation Room 3	C	The Enator@school project - an industrial concept for education	Bengt Bengtsson Skolbas and University of Gothenburg; Sweden	Paper 3
Monday 8:30 am	Presentation Room 4	A	Computer Based Campus Information Services	Thomas W. Hutchison Middle Tennessee State University; USA	Paper 4
Monday 8:30 am	Presentation Room 4	B	The Thin Client/Server Strategy	David Bainum, Susan Van Sickle Washburn University; USA	Paper 4
Monday 8:30 am	Presentation Room 4	C	Re-Engineering a School Network: Implementing Changes that Enhance School-Based Technical Support	Suzanne H. Hoffmann Sanford School; USA	Paper 4
Monday 8:30 am	Presentation Room 5	A	Managing Technology in the Computer Classroom	R. Theresia Litvay-Sardou LaGuardia Community College; USA	Paper 10
Monday 8:30 am	Presentation Room 5	B	Internet Math for the Trades	Quentin T. Wells Salt Lake Community College; USA	Paper 10
Monday 8:30 am	Presentation Room 5	C	Florida's Curriculum Planning Tool	Linda O'Karma, Nancy Romance Region V Area Center for Educational Enhancement; Florida Atlantic University; USA	Paper 10
Monday 8:30 am	Presentation Room 6	A	Supporting Faculty Use of Online Course Management Systems	Gina Roberts University of Tennessee, Knoxville; USA	Paper 7
Monday	Presentation	B	Beacon Learning Center: On-line	Barbara Eubanks	Paper

8:30 am	Room 6		Learning for K-8 Students	Bay District Schools; USA	7
Monday 8:30 am	Presentation Room 6	C	Incorporating Streaming Video Into Instructional Webs	Jerald D. Cole New York Institute of Technology; USA	Paper 7
Monday 8:30 am	Presentation Room 7	A	Thoughts on Technology Training: Creating Collaborative Learning Enviornments	Sara Olin Zimmerman Appalachian State University; USA	Paper 8
Monday 8:30 am	Presentation Room 7	B	Teaching Research Methods via the Internet: Accepting the Challenge and Making it Work	Mary Ann Zager Florida Gulf Coast University; USA	Paper 8
Monday 8:30 am	Presentation Room 7	C	Creating Flexible Networked Classrooms	Brad Barrett Connect Center, Inc; USA	Paper 8
Monday 9:40 am	Exhibit Area		Coffee Break -- Exhibit Area	--	Coffee Break
Monday 9:40 am	Poster Area 1		Partnership in a Hospitality Program: Where Education Meets Industry	Renee Jeffery, Allen Powell Garland County Community College; USA	Poster 1
Monday 9:40 am	Poster Area 2		Preparing Tomorrow's Leaders to Use Techology	Valerie Carroll Principal's Leadership Institute; USA	Poster 3
Monday 9:40 am	Poster Area 3		After the Plan: The Role of Technology in the Urban Educational Environment	Lee Allen Dallas Independent School District; USA	Poster 3
Monday 9:40 am	Poster Area 4		P.A.S.S. Port to Writing: Co-Teaching Students with Disabilities Using Technology	Sheila K. Barnes Northwestern Oklahoma State University; USA	Poster 10
Monday 9:40 am	Poster Area 5		ATM - Global Professional Development	Sheila K Donis Vigo County School Corp.; USA	Poster 7
Monday 9:40 am	Poster Area 6		Integrating Java Applet Courseware Components into Consumer Product Case-Study Modules	Chu Ryang Wie SUNY at Buffalo; USA	Poster 12,11,10
Monday 9:40 am	Poster Area 7		Electronic Support for Special Education Teachers	Marty Beech Florida State University; USA	Poster 8
Monday 10:15 am	Presentation Room 1	A	Using Computer Graphics and Animation to Visualize Complex Programming Concepts on the Web	Isaac Herskowitz, Raynes Anna Touro College; USA	paper, poster 1
Monday 10:15 am	Presentation Room 1	B	The Magic of a PowerPoint Presentation	Lorraine C. Martinez Los Alamos High School; USA	Paper 1
Monday 10:15 am	Presentation Room 1	C	Digital Acculturation in the New Communication Technology Curriculum	Andrew Kurtz Bowling Green State University, Firelands College; USA	Paper 1
Monday 10:15 am	Presentation Room 2	A	How to Create a Technology Preview Center	Kate J. Kemker Florida Center for Instructional Technology; USA	Paper 2
Monday 10:15 am	Presentation Room 2	B	Using the Internet to Bridge the Gap Between School and Home	Susan Graham SmarterKids.com; USA	Paper 2
Monday 10:15 am	Presentation Room 2	C	Strategic Synergy: Integrating Multiple Delivery Technologies	James A. Brown Lehigh University; USA	Paper 2
Monday 10:15 am	Presentation Room 3	A	Luddite Learning: A Call For Low-Tech Alternatives	Jamie Murphy, Susan Fell Florida State University; USA	Paper 3
Monday 10:15	Presentation Room 3	B	The Reeducation Curriculum to Train the Elderly Engineer	Makio Fukuda Osaka Int. University for	Paper 3

am				Women; Japan	
Monday 10:15 am	Presentation Room 3	C	A Decade of Initiatives to Integrate Technology in P-12 Schools and in Teacher Education in North Carolina	John M. Nagle University of North Carolina at Charlotte; USA	Paper 3
Monday 10:15 am	Presentation Room 4	A	Students Design and Build Smart Room	Brad Barrett Connect Center, Inc; USA	Paper 4
Monday 10:15 am	Presentation Room 4	B	Establishing a Faculty Technology Center	Roger Von Holzen Northwest Missouri State University; USA	Paper 4
Monday 10:15 am	Presentation Room 4	C	School Based Change Management	Sal Majied, Leslie Dews, Gwen Weaver Mitchell & Titus, LLP Education Consultants; USA	Paper 4
Monday 10:15 am	Presentation Room 5	A	Is School Really Open? A "Report Card" of Web Based Accessibility in High Education	Ellen Cohn School of Health and Rehabilitation Science; USA	Paper 10
Monday 10:15 am	Presentation Room 5	B	Computer Assisted Education: An Internet Model	Marisol Gonzalez Lozano Instituto Tecnologico Autonomo de Mexico; Mexido	Paper 10
Monday 10:15 am	Presentation Room 5	C	Transforming Technology Training for Teachers	Victoria Giordano Barry University; USA	Paper 11
Monday 10:15 am	Presentation Room 6	A	Java Applet in Distance Learning	Zheng Song Nanyang Technological University, Singapore; Singapore	Paper 7
Monday 10:15 am	Presentation Room 6	B	Putting the "Dis" to distance Education	John H. Laflin Dakota State University; USA	Paper 7
Monday 10:15 am	Presentation Room 6	C	The Oncourse Project at Indiana University: Design, Development, and Implementation of an Enterprise Course Management System	Ali Jafari Indiana University Purdue University, Indianapolis, IUPUI; USA	Paper 7
Monday 10:15 am	Presentation Room 7	A	How Youth and Adult Mentors Experience Problem based Learning in an Internet-based Shared Environment	Paul Wangemann Motorola University; USA	Paper 8
Monday 10:15 am	Presentation Room 7	B	Shifting the Online Course Paradigm	Roger Von Holzen Northwest Missouri State University; USA	Paper 8
Monday 10:15 am	Presentation Room 7	C	harmony Elementary School: A Context For Collaborative Projects	Troy Isaak, John Ward Millersville University; Millersville University; USA	Paper 8
Monday 11:30 am	Main Auditorium		Theme Keynote Address -- **BRIDGING THE GROWING DIGITAL DIVIDE** Owen F. Gaede, Ph.D. Director and Professor Learning Systems Institute Florida State University	The growth of information technology is accelerating the globalization of society with geopolitical borders becoming more transparent. Wireless and satellite technologies can bring the libraries of the world into the most remote village, creating new opportunities for learning. Unfortunately we also see a growing digital divide between the information rich and the information poor. Are we doomed to a world in which	Keynote Address

				the rich get richer and the poor get poorer? Old learning paradigms will not be sufficient. One thing is clear: Only the wise use of educational technology offers the hope of bridging the digital divide. Offering real hope to those who so far have been left out of the information revolution is the greatest challenge we face in the decade ahead.	
Monday 1:15 pm	Presentation Room 1	A	K-12 Student Perceptions of Classroom Computer Use	Morris I. Beers State University of New York, Brockport; USA	Paper 1
Monday 1:15 pm	Presentation Room 1	B	Integrating Technology in the Undergraduate Curriculum: Preparing Students to Communicately Effectively in Business and Professional Contexts	Barbara J. Levine Robert Morris College; USA	Paper 1
Monday 1:15 pm	Presentation Room 1	C	Teaching Technology in the Focused Calendar	Deborah Dunn Tusculum College; USA	Paper 1
Monday 1:15 pm	Presentation Room 2	A	The CyberQuest: A Focused Tool for Evaluating Web Resources	Nancy Deal Buffalo State College; USA	Paper 2
Monday 1:15 pm	Presentation Room 2	B	Using HyperCard in Education and Research	Cecil W. Hutto Northeast Louisiana University, College of Education and Human Development; USA	Paper 2
Monday 1:15 pm	Presentation Room 2	C	Once and Future Technology Innovations in Teacher Preparation: Vidio Microteaching in a Reflective Practice World	David S. McCurry Monmouth University; USA	Paper 2
Monday 1:15 pm	Presentation Room 3	A	A Faculty Professional Development Center Must Serve Two Masters - Technology and Pedagogy	Helen Youth Montgomery College; USA	Paper 3
Monday 1:15 pm	Presentation Room 3	B	Titanic II: The Legal Floodgates of Y2K	Robert N. Diotalevi, Esq., LL.M. The College of West Virginia; USA	Paper 3
Monday 1:15 pm	Presentation Room 3	C	Implementing Government Policy at a District Level	David Williamson Haringey Education Services; England	Paper 3
Monday 1:15 pm	Presentation Room 4	A	Proving the Concept	Elizabeth Newby Liverpool City Council; England	Paper 4
Monday 1:15 pm	Presentation Room 4	B	Teacher or Technician - Who Picks up the Slack?	Susan Rae Regan John Abbott College; Canada	Paper 4
Monday 1:15 pm	Presentation Room 4	C	The Elementary Computer Initiative: Teacher Benefits	John Pisapia Florida Atlantic University; USA	Paper 4
Monday 1:15 pm	Presentation Room 5	A	Cultivating High School Female Interest in AP Ctt using browser Java Script	Gary W. Tubb Hillsborough High School; USA	Paper 11
Monday 1:15 pm	Presentation Room 5	B	Teach Internet client/Server Computing Using JAVA Network Protocols	Jiang B. Liu Bradley University; USA	Paper 11
Monday 1:15 pm	Presentation Room 5	C	Technology Integraton: Training, Education, Indoctrination	Jerry P. Galloway Indiana University Northwest; USA	Paper 11
Monday 1:15 pm	Presentation Room 6	A	Courses with CLASS: Web-Based High School Courses	Kevin Smith University of Nebraska; USA	Paper 7

Monday 1:15 pm	Presentation Room 6	B	Talking Head Videos: Using a Task-Based Approach to Enrich Perspectives on Knowledge	Ian Douglas Florida State University; USA	Paper 7
Monday 1:15 pm	Presentation Room 6	C	Effectiveness of Interactive Distance Learning for K-12 Academic Learning	Cavanaugh Catherine Florida Center for Instructional Technology, College of Education; USA	Paper 7
Monday 1:15 pm	Presentation Room 7	A	Development of a Distributed Learning Environment: The Plan, Design and Development	Scott P. Schaffer, Judith A. Converso Florida State University; USA	Paper 8
Monday 1:15 pm	Presentation Room 7	B	Asynchronous Collaborative Learning: the Case of the UOC	Montse Guitert Catasus Open University of Catalunya; Spain	Paper 8
Monday 1:15 pm	Presentation Room 7	C	Creating a Technology-Rich Teaching Paradigm	Constance Pollard, Richard Pollard Boise State University; University of Idaho; USA	Paper 8
Monday 2:30 pm	Auditorium B		Textbook Publishers in a Networked World	Jamie Murphy Florida State University; USA	Panel 1
Monday 2:30 pm	Auditorium C		PC Management: Solutions That Work	Dennis Sievers Central Community High School District # 71;	Paper 4
Monday 3:15 pm	Exhibit Area		Coffee Break -- Exhibit Area		Coffee Break
Monday 3:15 pm	Poster Area 1		Class Web Pages Enhance Academic Achievement	Laura Woods John M. Sexton Elementary; USA	Poster 1
Monday 3:15 pm	Poster Area 2		Technology Support School Reform	Peter Tamburro Oneida City School District; USA	Poster 1
Monday 3:15 pm	Poster Area 3		An On-line Continuing Medical Education Program	Sheree Aston Temple University School of Podiatric Medicine; USA	Poster 7
Monday 3:15 pm	Poster Area 4		Computer Competence and the Pre-Service Teacher: Three Years of Program Revision and Technical Support	Dane Hughes, John A. Gretes College of Education; USA	Poster 11
Monday 3:15 pm	Poster Area 5		Florida's Curriculum Planning Tool	Marty Beech Florida State University; USA	Poster 2
Monday 3:15 pm	Poster Area 6		Intermat - Internet Based Information System for Support of Research and Education on Mathematics	Veljko A. Spasic Center for Multidisciplinary Studies, University of Belgrade; Yugoslavia	Poster 2
Monday 3:15 pm	Poster Area 7		School Room to Home Room	Stan Silverman New York Institute of Technology; USA	Poster 8
Monday 3:45 pm	Presentation Room 1	A	Technology in Mathematics Teacher Education	Conrad Van Voorst SUNY College at Brockport; USA	Paper 1
Monday 3:45 pm	Presentation Room 1	B	Training Adult Learners to Use the World Wide Web	Ed Youth Skills Update of Maryland; USA	Paper 1
Monday 3:45 pm	Presentation Room 1	C	Toward the Year 2000: Delphi Study of Beneficial Uses of the Internet in K-6 Education to Increase Student Learning	Margaret J. Cox School District No. 2; USA	Paper 1
Monday 3:45 pm	Presentation Room 2	A	The Electronic Teaching Assistant	Charles R. Bauer Illinois Institute of Technology; USA	Paper 2

Monday 3:45 pm	Presentation Room 2	B	Middle School Web-Based Mathematics and Science Learning Materials	Charles R. Bauer Illinois Institute of Technology; USA	Paper 2
Monday 3:45 pm	Presentation Room 2	C	Using Repurposed Science Rich Feature Films in Science Instruction	Terence Cavanaugh Florida Center for Instructional Technology, College of Education; USA	Paper 2
Monday 3:45 pm	Presentation Room 3		New Skills for Old Pros: A Tale of Technological Literacy and Tight Budgets	Judith A. Nichols, Tresa Zumsteg The Berkley School District; USA	RoundTable 3
Monday 3:45 pm	Presentation Room 4		Community Technology and the Internet	Joe Parks, Helen L Kennedy California State University, Fresno; USA	RoundTable 10
Monday 3:45 pm	Presentation Room 5	A	WebQuests: An Approach that uses the Internet Instructionally, not Recreationally	John F. Beaver Buffalo State College; USA	Paper 11
Monday 3:45 pm	Presentation Room 5	B	Innovative Academic Managment Solutions	Sal Majied, Leslie Dews Education Consultant Mitchell & Titus, LLP Education Consultants; USA	Paper 11
Monday 3:45 pm	Presentation Room 5	C	High Tech, High Touch: Romance in the Wired Classroom	Susan Rae Regan John Abbott College; Canada	Paper 11
Monday 3:45 pm	Presentation Room 6	A	Web Page Annotator	Dale Reed Learning Sciences, Northwestern University; USA	Paper 7
Monday 3:45 pm	Presentation Room 6	B	Graduate Computer Education: Past, Present, Future	Phillip J. Heeler Northwest Missouri State University; USA	Paper 7
Monday 3:45 pm	Presentation Room 6	C	Teaching Net.Generation.Com: Leadership, Change, and Technology...Or...How to Change a Tire on a Moving Car While in the Fast Lane	Marielizabeth Crompton Groton Public Schools; USA	Paper 7
Monday 3:45 pm	Presentation Room 7	A	Using Technology for Teacher Internships in the Next Millennium	Richard Pollard University of Idaho; USA	Paper 8
Monday 3:45 pm	Presentation Room 7	B	Learning Environments for Studying Argumentation - Learning Effects of E-mail and Face-to-Face Study	Miika Marttunen University of Jyvaskyla; Finland	Paper 8
Monday 3:45 pm	Presentation Room 7	C	Collaborative vs. Co-operative Learning in a Web-Based Environment	Philip Crompton University of Stirling; United Kingdom	Paper 8
Monday 5:30 pm	Riverwalk		Reception	A reception with snacks, refreshments, and entertainment will be held in the Riverwalk area of the Tampa Convention Center. (See registration information or check at the ICTE Registration Desk at the Convention Center to purchase tickets to the Reception.)	Monday Evening Reception

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Tuesday Program

Day / Time	Room	Seq	Session / Title	Presenter(s), Institution	Session Type / Theme
Tuesday 8:30 am	Presentation Room 1	A	A Task Based Management Approach for Technology Instruction in a Rapid Degree Completion Program	John W. Gudenas Aurora University; USA	Paper 1
Tuesday 8:30 am	Presentation Room 1	B	Malcolm Knowles Would be Proud of Instructional Technologies	Debra Hargrove, Valerie C. Bryan Ahai Learning Resources, Inc.; Wild Horses Consulting, Inc.; USA	Paper 1
Tuesday 8:30 am	Presentation Room 1	C	The German "Learning Field" Approach and its Support by Multimedia	Andre Bresges Gerhard-Mercator, university of Duisburg; Germany	Paper 1
Tuesday 8:30 am	Presentation Room 2	A	Making it Work, BEFORE You Buy It	Mark Geary Seminole County Public Schools; USA	Paper 2
Tuesday 8:30 am	Presentation Room 2	B	Foundations for Designing MIMIC, an Intelligent-Agent Based Learning Enviornment	Amy Baylor Florida State University; USA	Paper 2
Tuesday 8:30 am	Presentation Room 2	C	What are the Possibilities of Intelligent Agents for Education?	Amy Baylor, Ali Jafari Florida State University; Indiana University Purdue University, Indianapolis, IUPUI; USA	Paper 2
Tuesday 8:30 am	Presentation Room 3	A	Education Development in the Ukraine	Oleg Komiakov Industrial Marketing Department on Methodical Work; Ukraine	Paper 3
Tuesday 8:30 am	Presentation Room 3	B	A Process Model for the Concurrent Design of Change	Robert K. Branson Florida State University; USA	Paper 3
Tuesday 8:30 am	Presentation Room 3	C	Occupational Safety Education in Ukraine in the Economic Crisis and State Appearance Period	Victor V Zatsarniy National Technocal University of Ukraine; Ukraine	Paper 3
Tuesday 8:30 am	Presentation Room 4	A	Technology and the Educational Process: The View From the Student Trenches	Kristina Mattson, John Lew Cox University of West Florida; USA	Paper 2
Tuesday 8:30 am	Presentation Room 4	B	Using JavaScript and LiveStage to Create Online Assessments	J. Christine Harmes, Kate J. Kemker University of South Florida; Florida Center for Instructional Technology; USA	Paper 2
Tuesday 8:30 am	Presentation Room 4	C	SJPDesigner - A Flexible Tool for Generating Web-Based Presentations	Kevin Smith Al Akhawayn University in Ifrane; Morocco	Paper 2
Tuesday 8:30 am	Presentation Room 5	A	Middle School Applications for Windows Based Digital Video Capture and Nonlinear Editing	Workman Robert Southern Connecticut State University; USA	Paper 11
Tuesday 8:30 am	Presentation Room 5	B	Computer Literate Teachers: Keeping Teaching Staff Up-To-Date	Michael Churton, Barbara Lewis, Diane Austin, David Lewis University of South Florida; University of South Forida; USA	Paper 11
Tuesday 8:30 am	Presentation Room 5	C	VITAL: A Successful Faculty Suport System	Ann Barron, Christine Harmes University of South Florida; USA	Paper 11
Tuesday	Presentation	A	Changing Traditional Universities into	Annette Lorentsen	Paper

8:30 am	Room 6		Universities of the New Millenium	Aalborg University; Denmark	7
Tuesday 8:30 am	Presentation Room 6	B	An Interactive E-Book Applied to Mathematical Learning	Francesc Vallverdu, Teresa Sancho Universitat Oberta de Catalunya; Spain	Paper 7
Tuesday 8:30 am	Presentation Room 6	C	ODL Pedagogy, Organisation and Technology: A Review	Philip Crompton University of Stirling; United Kingdom	Paper 7
Tuesday 8:30 am	Presentation Room 7	A	Design a Creative Interactive Learning Environment	Ann-Charlotte Markman Rosjoskolan; Sweden	Paper 8
Tuesday 8:30 am	Presentation Room 7	B	Collaborative Exploration of a Hypermedia Prototype	Isabel Cabrita University of Aveiro; Portugal	Paper 8
Tuesday 8:30 am	Presentation Room 7	C	Multilevel Teacher Education, Supervision Systems & Collaborative Learning; Analysing Interaction Through Photographic Hypertext Representations	Idalia Sa-Chaves, Antonio Moreira University of Aveiro; Portugal	Paper 8
Tuesday 9:40 am	Exhibit Area		Coffee Break -- Exhibit Area	-- ;	Coffee Break
Tuesday 9:40 am	Poster Area 1		Lesson Learned from Five Years of Distance Delivery: Two Media May be Better than One	Fred Spooner University of North Carolina at Charlotte; USA	Poster 7
Tuesday 9:40 am	Poster Area 2		Self Pacing Technology Approach: The Preservice Course as a Catalyst For Learning	John Wm. Sanders Middle Tennessee State University; USA	Poster 1
Tuesday 9:40 am	Poster Area 3		Study Planning and Registration Software	Ton Oudshoorn, Cor van Schuijlenburg, Rickelt de Boer APS; CPS; Holland	Poster 10
Tuesday 9:40 am	Presentation Room 1		Rural Outreach Project	Maritta Belcher, Kim Isner Pike County Board of Education; USA	Poster 7
Tuesday 10:15 am	Presentation Room 1	A	Multimedia Computer Assistant Instruction System on Course of Human Anatomy and Physiology Applying to Normal University	Chunxiao Jiang Sichuan Normal University; China	Paper 1
Tuesday 10:15 am	Presentation Room 1	B	Augmenting the Traditional Course with Internet Ancillaries	Donald B. Egolf University of Pittsburg; USA	Paper 1
Tuesday 10:15 am	Presentation Room 1	C	Synthesizing New Technologies with Traditional Instructional Methods: The Challenge of Distance Education Communication	Sherri Smith, Pamela A. Seay Florida Gulf Coast university; USA	Paper 1
Tuesday 10:15 am	Presentation Room 2	A	What is an ILS (Integraded learning System) - Pros & Cons of Implementing it in Your District	Marielizabeth Crompton Groton Public Schools; USA	Paper 2
Tuesday 10:15 am	Presentation Room 2	B	An Interactive, Remote-Controlled Computer Projection System for Use in a Large Classroom Environment	Richard R. Eckert SUNY Binghamton; USA	Paper 2
Tuesday 10:15 am	Presentation Room 2	C	Student Perceptions of Their Technology Skills Before and After a Basic Computer Applications Course: A Three Year Study	Gregg Miller, John A. Gretes College of Education; USA	Paper 2
Tuesday 10:15 am	Presentation Room 5	A	Teacher's Guide to the Holocaust: An Online Resource	Ann Barron, Roy Winkleman University of South Florida; Florida Center for Instructional Technology; USA	Paper 12
Tuesday 10:15 am	Presentation Room 5	B	The North West Learning Grid	Elizabeth Newby Liverpool City Council; England	Paper 12
Tuesday	Presentation	C	Demonstration of the First in Ukraine	Sergey Sidorenko	Paper

10:15 am	Room 5		PC-Based Course "The Structure of Liquid"	National Technical University of Ukraine, Kyiv Polytechnic Institute; Ukraine	12
Tuesday 10:15 am	Presentation Room 6	A	CPR and the Molsci Project: Web-based Writing, Peer Review, Curriculum Development, and Dissemination	Michael Fiore UCLA Molecular Science Project; USA	Paper 7,2
Tuesday 10:15 am	Presentation Room 6	B	Web-Based Learning - A Community of Learners or a Learning Community	Lee Droegemueller, Sue Norman University of West Florida; USA	Paper 7
Tuesday 10:15 am	Presentation Room 6	C	Internet Based Videoconferencing in Distance Education: Experiences From the Past and Visions to the Future	Jari Multisilta, Jari Lahti Tampere University of Technology; Finland	Paper 7
Tuesday 10:15 am	Presentation Room 7	A	Universities Towards the 21st Century: The Integration of Technology-Based Educational Models	Marisol Gonzalez Lozano Instituto Tecnologico Autonomo de Mexico; Mexido	Paper 8
Tuesday 10:15 am	Presentation Room 7	B	Assisting International Partners Through Distance Learning	Michael Churton, Lynn Rejniak University of South Florida; USA	Paper 8
Tuesday 10:15 am	Presentation Room 7	C	Insure Class Participation with CMC	Andrew J. Brovey Valdosta State University; USA	Paper 9
Tuesday 11:30 am	Main Auditorium		Special Theme Keynote Address -- TBA	-- ;	Keynote Address
Tuesday 1:15 pm	Presentation Room 1	A	Technology Rich Lessons: What Might They Look Like?	Colleen Swain University of Florida; USA	Paper 1
Tuesday 1:15 pm	Presentation Room 1	B	Using the Internet for Teaching in Remote Regions: A Finnish Experience	Terry R. Armstrong, John Lew Cox Armstrong Consulting; University of West Florida; USA	Paper 1
Tuesday 1:15 pm	Presentation Room 1	C	Adding Interactivity to Web-Based Instruction	J. Christine Harmes, Kate J. Kemker University of South Florida; Florida Center for Instructional Technology; USA	Paper 1
Tuesday 1:15 pm	Presentation Room 2	A	Developing Critical-Thinking Skills Via Internet-based Learning Modules	T. Rick Whiteley Department of Business Administration, West Virginia State College; Canada	Paper 2
Tuesday 1:15 pm	Presentation Room 2	B	Developing an Internet-based Subject Pathfinder for K-5 Students	Grace E. Jamieson Calabash educational Software; Canada	Paper 2
Tuesday 1:15 pm	Presentation Room 2	C	Virtual Experiment in Bio-Medicine	Veljko A. Spasic Center for Multidisciplinary Studies, University of Belgrade; Yugoslavia	Paper 2
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Tuesday 2:30 pm	Auditorium C		Using Technology to Foster Collaborative Learning at a Distance: The National Academy of Sciences of Belarus and Bryant College Connection	Judy Barrett Litoff, Harold A. Records, Gaytha A. Langlois, Mikhail Makanoik, Gajane Valchevskaya Bryant College; National Academy of Sciences of Belarus; USA	Panel 8
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Tuesday 3:15 pm	Poster Area 2		CD-ROM Laboratory Explorations Replace Traditional Labs in an Introductory Biology Course	Sandra A. Holmes, David K. Foster Messiah College; USA	Poster 1
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Tuesday 3:45 pm	Auditorium B		Electronic/Computerized Matriculation Requirements Tracking and Advisement	Cash Kowalski South Carolina State University; USA	Paper 3
Tuesday 3:45 pm	Auditorium C	A	A Copyright Law for Educators?	Patricia Ann Brock Raritan Valley Community	Paper 6

				College; USA	
Tuesday 3:45 pm	Auditorium C	B	Copyright Dot Com: The Digital Millennium in Copyright	Robert N. Diotalevi, Esq., LL.M. The College of West Virginia; USA	Paper 6
Tuesday 7:00 PM	Rooms 5,6		Tuesday Evening Dinner Address **Making Distance Learning Work** Steve Duncan, Ph.D. Deputy Commander, U S Army Training Support Center Ft. Eustis, Virginia	Dr. Steve Duncan, Deputy Commander of the U.S. Army Training Support Center (ATSC) at Fort Eustis, VA, has worked in the field of training for the U.S. Army and Department of Defense for over 28 years. He came to ATSC in August 1992 from Orlando, FL, where he spent 5 years with the Department of Defense Training and Performance Data Center as the Director of Individual Training. Prior to that he spent 5 years at the U.S. Army Training and Doctrine Command, Fort Monroe, VA, in the Training Concepts Analysis Directorate, Deputy Chief of Staff for Training, after spending a year at the Training Development Institute. He went to Fort Monroe from Fort Huachuca, AZ, where he was in charge of the U.S. Army's Intelligence School Staff and Faculty Training Division.	

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Wednesday 8:30 am	Presentation Room 1	B	Teaching-Learning Economy in a Secondary School Using a Qualitative Computer Modelling System	Gustavo Schmidt Moreira Federal University of Rio de Janeiro, NCE/UFRS; Brasil	Paper 1
Wednesday 8:30 am	Presentation Room 1	C	CNN Student Bureau-News By, For and About Students - In a Virtual Way	John Richards Turner Learning; USA	Paper 1
Wednesday 8:30 am	Presentation Room 2	A	Use of Agents for Physics Learning	Pietro Pantano Universita della Calabria; Italia	Paper 2
Wednesday 8:30 am	Presentation Room 2	B	Information Model of Evaluation for Educational Software	Spyros Bakoyiannis University of Athens; Greece	Paper 2
Wednesday 8:30 am	Presentation Room 2	C	The Elementary Computer Initiative: Technical Support	John Pisapia Florida Atlantic University; USA	Paper 4
Wednesday 8:30 am	Presentation Room 6	A	Initiating a Distance Education Program: One College of Education's Planning Process	Marty Bray, Claudia Flowers University of North Carolina at Charlotte; USA	Paper 7
Wednesday 8:30 am	Presentation Room 7	A	How do we Know? Using a Computerized Assessment to Measure Student Growth in Reading	Elizabeth L. Pearman, Barbara G. Rhine, Kathleen B. Metsch University of Northern Colorado; Trails West Elementary; USA	Paper 9
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Wednesday 10:15 am	Presentation Room 1	B	Using Technology to enhance Foreign Language Competency	Janet Flewelling University of Windsor; Canada	Paper 1
Wednesday 10:15 am	Presentation Room 1	C	Mind Over Matter: Changing Mindsets	Vicki C. H. Ooi University of Hong Kong; China	Paper 1
Wednesday 10:15 am	Presentation Room 2	A	The Best of Both Worlds	Christine Frank Georgian College of Applied Arts and Technology; Canada	Paper 1
Wednesday 10:15 am	Presentation Room 2	B	Integration of Tridimensional Logo With an Animation Environment in the Process of Construction and Visualization of Spatial Objects	Rosana Giaretta Sguerra Miskulin State University of Campinas; Brazil	Paper 1
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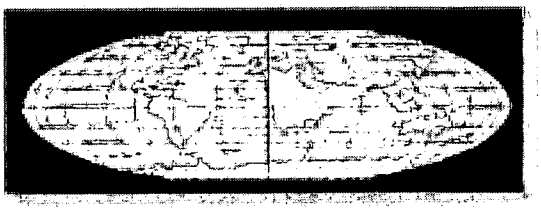

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Following the completion of *ICTE Tampa 1999* papers, we will continue with *ICTE Edinburgh 1999*, and then *ICTE Santa Fe 1998*, and so on. For Conferences prior to *ICTE New Orleans 1996*, papers will be selected based on their continuing relevance.

(Note to *ICTE Tampa 1999 Presenters*: This process, as well as publication of the *ICTE Tampa 1999* printed, bound Proceedings was delayed due to serious and continuing problems with ICTE's Internet Service Provider over the past several months, and the

resulting change in June, 2000 to another ISP. Unfortunately, continuing problems with the new ISP, including unsatisfactory service and support, have further contributed to delays. We regret the delays, but in order to make publication of the ICTE Papers both in printed form and on-line on this web site economically feasible, it has been necessary to plan for software utilities and related process for digitization, indexing, and access that we can support on the ISP that we use.

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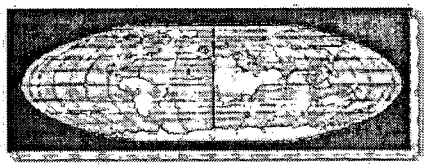

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A TASK BASED MANAGEMENT APPROACH FOR TECHNOLOGY INSTRUCTION IN A RAPID DEGREE COMPLETION PROGRAM

John W. Gudenas, Ph.D.*

INTRODUCTION

Aurora University developed A Bachelor of Science Program in Professional Studies (BSPS) that is directed at working professionals who have not as yet received an undergraduate degree. The BSPS program is offered in six week terms allowing thirty five contact hours for each three credit hour course. Students involved in this program are encouraged to also enter the LEAP program.

LEAP allows practicing professionals to examine their life experiences from an academic standpoint and develop, under the guidance of a faculty member, experience essays, that document outcomes that may be worthy of university credit. LEAP essays do not necessarily have a direct mapping to existing course offerings of the university. However, each LEAP essay is assessed by a faculty member in the program most closely related to it. This faculty member then establishes the academic merit of the petition and recommends to the LEAP committee what specific credit, if any, and at what level should be awarded.

It is not unusual for students to establish credit for information technology literacy by demonstrating their proficiency in word processing, spreadsheet use and presentation graphics. Albeit, it is highly unusual for students to demonstrate upper division outcomes that are associated with conceptual foundation prerequisite course work.

Caterpillar Corporation has a highly automated plant located in Montgomery Illinois, which is approximately five miles distant from Aurora University. Caterpillar, being technologically current, had established training centers at its plant site to enhance their employees knowledge level. While the notion of corporate universities had already been established (Meister, 1998, p. 6-9) this was not an election for Caterpillar. This corporation did, however, have many employees that had demonstrated their worth to the corporation but had not completed a baccalaureate degree and were lacking in width and breadth of education in the arts and technology. A partnership was developed between Caterpillar and Aurora University that allowed select employees in cohort groups enter the BSPS program of study.

The question of program delivery was of immediate concern. Rather than establish a specific asynchronous distance learning system directed at the corporate culture of Caterpillar, Aurora University elected to establish a "virtual campus" on the Caterpillar site. This campus would use all the technological training facilities at Caterpillar, but taught by regular Aurora University faculty. Thus, students would enjoy easy access to classrooms and experience as little as possible perturbation in their work schedules. While the program enjoyed success it was not without difficulties. Students needed to perceive, when they entered the classroom, that they were at Aurora University and not at Caterpillar and course outcomes needed to be established and assessed in a rapid time frame.

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THE INSTRUCTIONAL OUTCOMES

Teaching in this environment requires unique and adaptive pedagogical techniques The course of specific interest to this discussion is titled "Information Systems & Research" which is essentially an undergraduate MIS course. While the stated outcomes for this class are typical, Aurora University (AU) and Caterpillar (CAT) faculty and respective management had decided the program as a whole should produce other assessable outcomes and have a process established to do the assessment. These outcomes are essentially delineated in "Liberal Arts for Business:

A Partnership Built by Faculty" (Rao, 1999, p. 8) and reflect the AU-CAT partnership:

Understand data and apply learning

- predict how one piece of data can affect an entire process
- organize wide ranges of narrative or computational data information through basic computer applications
- evaluate performance quickly and completely, such as the teams of coworkers

Think and function independently

- adapt to unforseen circumstances with minimal
- foresee and solve problems
- take charge of their own career education

Communicate and work effectively in teams

- work in teams to accomplish tasks
- employ appropriate and necessary social skills
- present information coherently
- help to train others

Integrating these general purpose outcomes and the technical outcomes required by a MIS course and deliver them in six weeks was a challenge. However, by using a process where the students were divided into task groups each with specific well defined leadership and evaluation, several knowledge and assessment outcomes could be met. In addition to the above process a mid-term written exam consisting of essay questions and a case study was established with decision support spreadsheet computer lab exercises.

THE TASK BASED PROCESS

Listed below is the algorithmic pedagogical technique that uses task based management to achieve the above objectives. The narrative is basically presented as the students would receive it in order to be as useful as possible for readers of this document.

Information Systems & Research Task Based Project

The commercial use of the Internet is becoming a vital part of any enterprise. How an individual enterprise is represented and what is displayed is critical to the users perception of the value of that enterprise. Most major corporations have significant Internet web sites. Your research area is going to be focused and task distributed. Students in Information Systems and Research will follow this procedure to satisfy their research requirement:

1)You will be divided into teams of 4-5 individuals. Membership selection will be

based upon meritorious argument. You will keep this same team membership for your "Team Presentation", however, you will have a different task and an oral report for that project.

2) Your team will elect to critique and evaluate corporate web sites that have a functional grouping, such as automotive sites.

3) You will all agree on a set of ten metrics for evaluating these sites. Each team member will evaluate one site according to the agreed upon metrics. Print out a few pages of each site.

4) One team member will be designated to coordinate and present the information in a completed written report. This team member is not required to critique a web site.

5) The written report must conform to the technical guidelines in the syllabus. (Printed web pages are considered attachments and not part of the narrative.)

6) Make sure you include your metrics in the report.

7) An index is required indicating editor of the document and the author of each web site evaluation.

8) Your metrics should have a level of specificity associated with the functionality of the sites you are evaluating. (The whole class better not have the same metrics!)

Information Systems and Research Team Presentation

1) You will keep the same team that you utilized in your research project.

2) Established a set of metrics to evaluate each other and record the evaluations according to these metrics and submit them privately to your professor.

3) Prepare an oral presentation using presentation graphics software of your teams research report.

4) Grading will be according to Team Presentation in your syllabus.

ASSESSMENT

An outcome assessment matrix was established by Aurora University (Voight, 1998) in order to assure that the CAT students were attaining established goals. The task based management technique combined with the mid term exam and computer laboratory exercises produced an assessable program. The process was quite successful although very intense. Student perceptions indicated a high level of satisfaction as well as the independent AU-CAT assessment goal assessment matrix. Problematic areas were associated with creating an atmosphere where CAT students would perceive that they were on an AU campus when they entered a technical training room rather than an extension of Caterpillar. Techniques of shutting off pagers and cell phones and strong instructional delivery to adult students helped create the proper environment for a "Virtual but not Distant Campus". The results indicate that rapid technological education is possible and assessable with good outcome.

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ADDING INTERACTIVITY TO WEB-BASED INSTRUCTION

J. Christine Harmes° Kate Kemker°

INTERACTIVITY

Rick clicks through his course website. He scrolls through various pages of content, and occasionally clicks on an icon that sends him off to another website. Michelle navigates through her course website stopping to explore a virtual reality movie and tests her knowledge with a drag and drop activity. In which of these scenarios was the student more engaged with the content? In Michelle's case, she was not just reading, clicking, and scrolling, but was actively participating and working with the content. Rod Sims suggests "It is no longer adequate to see our field of practice. . .being limited to products where interactivity is trivialized to simple menu selection, clickable objects or linear sequencing" (Sims, 1999, p. 1). Damarin (1982) identified several descriptions of interactivity, such as finding, doing, using, constructing, and creating. Merely placing course content on the web as opposed to delivering it in the classroom does not make for true interactivity. Using tools such as QuickTime movies, virtual reality movies, and dynamic web pages, web-based instruction can become a more meaningful educational tool.

DYNAMIC HTML AND JAVASCRIPT

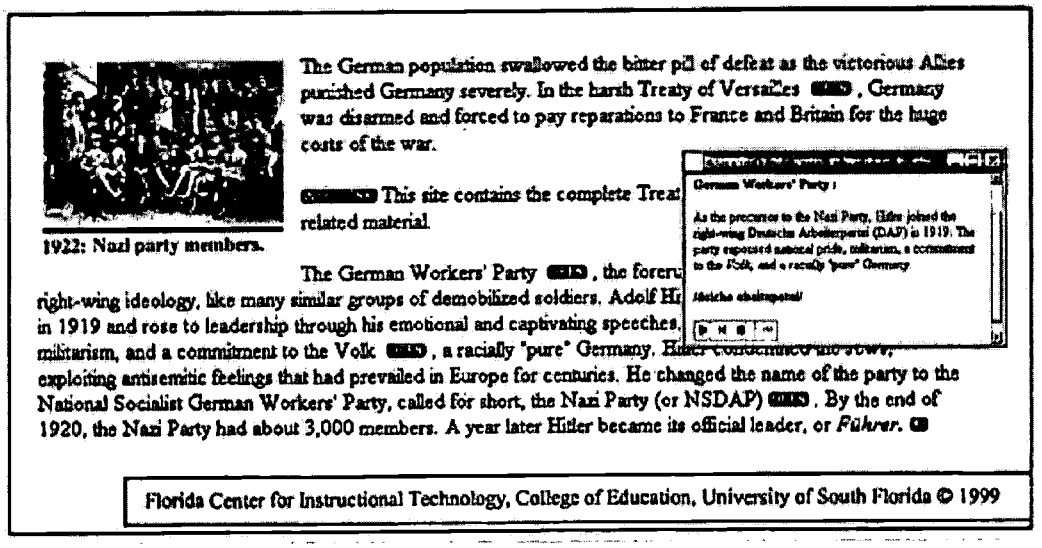
Dynamic HTML allows for the division of a web page into sections called layers, which are defined by coordinates. Using these coordinates, activities can be created that involve path-based animation. Layers can also be used to create activities in which a student clicks and drags various elements on the page to specified positions. Based on the placement of the elements, appropriate feedback can be given. JavaScript is an easy-to-learn scripting language that enables creation of activities that have responses such as pop-up boxes, status bar messages, and validation and feedback based on form data. Software packages are becoming more widely available that will generate JavaScript for you, within an HTML editing program. Without such a program, JavaScript can simply be inserting into a text-based HTML document.

In order to be interactive, an instructional website must respond individually to student actions. For example, the original glossary section in *A Teacher's Guide to the Holocaust,* produced by the Florida Center for Instructional Technology, provided links from content pages to a multi-page glossary. Clicking on a linked word in the text would send users to the top of the glossary. They would then have to scroll through the glossary to find the word for which they were looking. To make the glossary feature more interactive, JavaScript was used to create a pop-up window that displays the specific glossary term that was clicked on from a content page. In addition to the text definition, an audio file with the pronunciation of the word automatically plays when the term is selected. The sound can be controlled by the user, played multiple times, played

°*Florida Center for Instructional Technology, University of South Florida*

slower, or played in individual segments. The new interactive glossary feature is shown in Figure 1.

Figure 1. Interactive glossary from *A Teacher's Guide to the Holocaust*



QUICKTIME

QuickTime is a cross platform multimedia technology that has been developed by Apple Computer and is available as a free download. QuickTime is an enabling technology that allows for the handling of music, video, sound, text, graphics, animation, and virtual reality scenes.

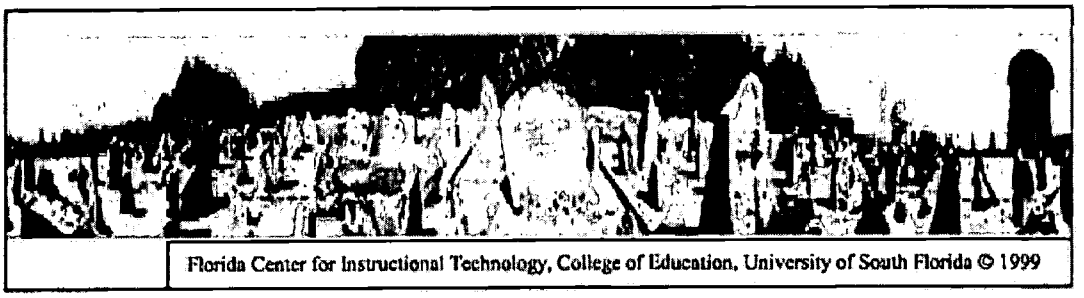
With sprite animation or wired movies, it is possible for the user to truly interact with the animation. When describing sprite animation it can be compared to a theater that includes a cast of characters. The actor that performs on the stage is called a sprite. This actor is able to move, change appearance and even interact with other characters on the stage. Like in theater, there is a background for the play's set and it may be a solid color, and image or a combination of images. A sprite will have properties that describe its location and appearance at a given point time on the stage. In fact, during the course of the animation, it is possible to change its properties so that it can be modified to even change its appearance.

Totally Hip's LiveStage is a multimedia authoring tool based on a scripting language called QScnpt. This scripting language is what makes it possible to create interactive QuickTime movies within any media that supports QuickTime. The QScript tells the movie how to respond to user input, as well as executing events at specified times. In addition to QScripts, LiveStage has a Stage Window that contains all of the images that are involved in the movie and are assigned a sprite name as they are placed on the stage. The Object Window contains the images, paths and sounds that can be incorporated into the sprites. It is in the Objects Window that paths and sounds are created, and where sprites can be expected. The Media Library is the place to view and access media resources, in the programmer is able to drag and drop objects into a movie project.

QuickTime Virtual Reality (QTVR) allows for the creation of panoramic movies in which the viewer is placed "within" the scene. The viewer can move

left, right, up or down, can zoom in or out, and can pick up objects and view them at all angles. Figure 2 shows a QT\TR from *A Teacher's Guide to the Holocaust* in which a user can experience the Treblinka memorial.

Figure 2. QT\TR movie of Treblinka from *A Teacher's Guide to the Holocaust*



In the examples discussed, the web pages are not merely presenting pages of content for users to scroll through. They have been designed with added functionality that enables individual responses based on user actions. The tools required to create interactivity may be a little more difficult to learn, but the benefits they bring to the educational experience make their use worth the effort.

ONLINE RESOURCES

JavaScript Resources:
http://www.infohiway.com/javascript/indexf.htm http://www.builder.com http://www.javagoodies.com

QuickTime Resources:
http://www.quicktime.com http://www.ultralab.anglia.ac.ukIullI
http://cdi.byu.edu1examp1es/guicktime/index.htm1
http://users.skynet.be/livesite/pages/home.html http://www.totallvhip.comlmain.html
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CLASS WEB PAGES ENHANCE STUDENT ACHIEVEMENT
by LAURA WOODS°

Imagine entering one of the second grade classrooms at John M. Sexton Elementary of St. Petersburg, FL. There, it is not uncommon to see students working diligently at their computers, creating and editing writing or art projects which they are preparing for internet publication. Students regularly confer with peers to critique their writings to gain another perspective on what they have written. This happens before final editing is done and the work is submitted to their teacher for final modifications. When these are made, the project is given the "Good Writing" stamp of approval and permission is provided for inclusion to their classroom web pages.

This may seem to be a very simple process. Simple, however, is not the case when working with many students who are functioning below grade level. These students, for what ever reason, need additional incentives to try a little harder and work a little longer to reach their potential. The use of projects for their classroom web page, for many of these youngsters, seems to be the magic key that unlocks their desire to try their hardest to learn and achieve.

There are many such classes at John M. Sexton Elementary which participate in the school web site project with more joining the ranks with each passing week. Teachers at Sexton recognize the potential power of the magnetism created by the use of classroom web pages. In a world in which the educational arena is driven by research based documentation, sometimes plain old fashioned teacher instinct is what is needed to instill the desire for some students to pick up the gauntlet for driving their own educational freight-train.

The direction of this student maneuvered train is piloted by teachers who are provided training on classroom web page creation. Along with this training, 9uidehnes for steering students through deciding what should be included in a class web site is also addressed. Student creativity comes to the fore during this process as they can come up with some really wild ideas. It is up to the teachers to focus this explosion of excitement with reason yet tolerance. Not an easy bill to fill.

A school web site, that is maintained by students, as well as teachers and the school web master, is a large undertaking that could become totally overwhelming. However, with training for both students and their teachers, this becomes a labor of pure enjoyment for all stake holders. This affords the students the opportunity to boost their sell-esteem and take pride in their work that follows, when they see the fruits of their hard earned labor published for the whole world to see. Teachers gain that same pride in their students, as well as themselves. They see their teaching strategies paying off, as their students achieve higher skills through creativity and hard work, making all their efforts worthwhile.

How all this creativity comes about is the responsibility of all stake holders. The teachers are provided hands-on training in the computer lab by the school's technology specialist providing time to practice and explore the

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many options afforded them using web page software. Students are then brought to the lab where lessons on the use of the internet along with word processing software is provided by both the technology specialist and teacher working cooperatively. On returning to the classroom, brainstorming begins between teacher and class as they determine what they want to show the rest of the world. As soon as the students are comfortable with the process and can use the software "on their awn", they are then given the time to create, edit and publish original stories and projects that may be included in the class web page. From this point students, under the guidance of their teachers, take on the responsibility of monitoring and maintaining the web pages.

Classroom web pages are created using software such as Claris Home Page which is very easy for the students to understand and implement. Students create mini sites connected to the main class web page that exhibit the many skills practiced in the classroom. Sites for computer generated and scanned in art work, original stories (one of the most popular), class environment pages showing off animals and other unique characteristics of their classrooms, management tools students utilize daily, homework calendars, classroom wish lists, newsletters and many other ideas are displayed on these collaborative sites. Many students have computers at home so this, we have found, is an excellent way for students to share their knowledge with family and friends at the home level.

Our students also use the Internet to collect information through research strategies which provides them with a broader perspective of where information may be obtained. Their curiosity is always peaked when browsing the WWW for they are never quite sure what interesting facts they may dig up. As teachers provide safe sites for the students to use, they are also supporting the concept of placing the responsibility for browsing the Internet on the students shoulders. Consequently, they are expected to act dependably when maintaining their own sites. It can be difficult at times but rewarding in the end. Student achievement can be impacted through the use of web pages coupled with classroom strategies that enhance what the students are exhibiting.

As the year accelerates, the children's progress is monitored to determine the validity of the use of the web pages. Standardized testing is a strategy which helps track student progress but is by far not the only measure that should be utilized. Although many strategies are in place in the classroom to help children achieve, keeping track of the students who take an active part in their web pages helps support the idea that creative publication can have a positive impact on student productiveness. To the left, you will notice in Figure 1 a classroom's reading

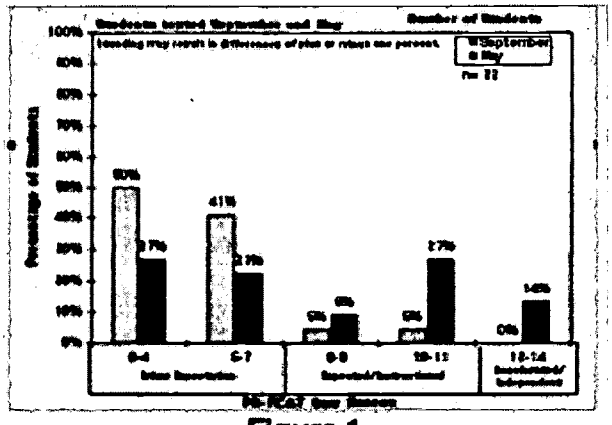

Figure 1

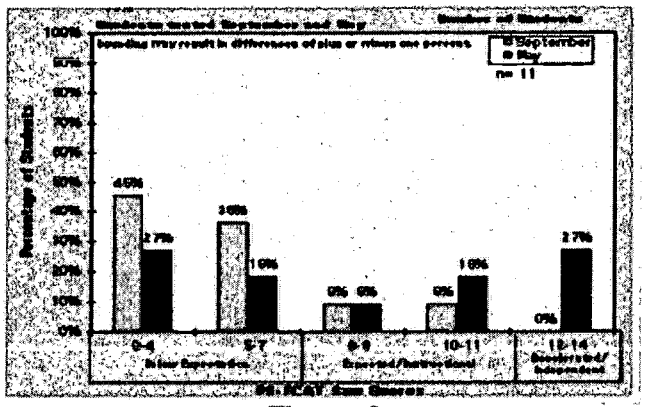

Figure 2

achievement scores from Sept. to Jan. Please note the improvement of many of these children. You also have a class in Figure 2 that did not do any web page publication.

Much of the proof manifests itself in the form of teacher observation as students exhibit a keen desire to create academically based projects throughout the school year. Critiquing done by peers and interested adults such as, other teachers and/or parents, is another excellent way for students to self assess what they have created. All of this input, along with the grades they receive on their projects and written pieces, gives kids an extra boost to strive for excellence. There is nothing like the respect of your peers and adults who care about you to make you want to do even better and reach that much farther. Although the class web page is not the sole motivational piece which impacts these students, it becomes evident as classes are observed, that is a definite stimulus helping move them toward their final destination, that of highest student achievement.

Through the use of class web page creation and maintenance, students share their skills, knowledge and the environment in which they learn in an interesting and creative manner. They use real world information to support their research, reports and projects which are then published proudly. As teachers continue to work with classes and expand the school web site with additional class sites, it will be interesting to see how many more creative, as well as, innovative ideas the students will generate as the years progress. Since the school's inception in 1997, many classes have joined the ranks of classroom web site creators and the school looks forward to many more classes joining the site to make this a wonderful place to come, explore and find out about our student's educational world. If you are interested in seeing some of the creative work these children have generated, as well as the teachers, join us at ...sexton-es.pinellas.kl2.fl.us...and watch our progress as we advance into the new millennium. See you on the Internet.

DIGITAL ENCULTIJRATION IN TILE NEW COMMUNICATION TECHNOLOGY CURRICULUM

Andrew Kurtz, Ph. D.*

In less than a decade, the Internet has moved from the esoteric world of government-funded research to become ubiquitous for many millions of people around the world. A number of different factors have contributed to this phenomenal growth: government initiatives promoting education and access, the declining cost of computer technology coupled with a parallel increase in processing speed, and the Internet's commercialization being some of the more important ones. The growth of the Internet and the general rise in corporate utilization of information technologies have created a demand for workers that far exceeds the number of workers trained in these areas (Information Technology Association of America [ITAA], 1998). While it is out of the purview of this paper to go into the specifics of this gap, it is worth mentioning that the Information Technology Association of America commends the efforts of two-year degree granting institutions who have, *en masse,* responded to the Internet's growth with a range of new programs designed to give workers training and experience in applied computer and information technologies (ITAA, "Response," 1998).

Such responsiveness is m keeping with the pragmatic mission of the two-year college, to respond to regional workforce deficiencies with efficient and relatively inexpensive training programs (acknowledging, of course, the foundational component of each college's curriculum). However, I would like to suggest that new communication technology, especially those areas involved in such things as content development and interface design, poses a unique challenge to this paradigm. This challenge stems from a couple of basic facts. First, unlike all other vocational areas typically addressed by the two-year college curriculum, new communication technology interacts with popular culture in such a fundamental way that an understanding of this dynamic becomes a necessary component to any program designed for student success. Second, those embarking on careers in new communication technology will be contributing to the evolution of a brand new medium and must therefore possess the critical faculties necessary for active participation within a community of like-minded individuals. While the pragmatics of technology training will always remain at the forefront of the two-year curriculum, we must begin to ask ourselves if, in the special case of new communication technology, such an approach may deny our students access to the very discourse community to which they aspire. In this paper I would like to provide an analysis of this situation, arguing that the combination of traditional communication skills coupled with a knowledge of the history and culture of new communication technology not only affords our students a more complete understanding of their vocational field but also begins to address the issue of entitlement and the extent to which our students are able to become a voice of change in this rapidly changing discourse. I call this process *digital enculturation.*

Before I explain what I believe to be the most important aspects of digital enculturation, I would like to situate this discussion within the context of the community involved in the evolution of new communication technologies. John Brockman's (1996) term, *digerati,* is a useful starting point. For Brockman, the digerati consists of those communicators, technicians, and cultural workers at the vanguard of new communication technologies. They are, in his words the "cyber elite," who make their living thinking about and discoursing on the cultural and technological potentials inherent to new systems of communications. Consonant with other similar terms, such as literati and illuminati, Brockman's digerati suggests a close-knit cadre, membership within which is regulated by a highly rarified, unwritten code of entitlement. The digerati are, for the most part, public intellectuals whose ability to speak about the emerging communication revolution," indeed, whose access to lines of public communication, is guaranteed by such things as their educational degrees, their status within the industry, and their

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ability to generate recognition from their peers. This last aspect should not be underestimated, for in Brockman's book, the digerati talk as much about each other as they do about new communication technology.

While the list of people profiled in Brockman s book are characterized first and foremost by their notoriety, people such as Howard Reinhold, Sherry Turtle, and John C. Dvorak, Brockman is careful to point out, that his list is "representative of a much larger group of cyber elite," who, together, "have tremendous influence on the emerging communication revolution surrounding the growth of the Internet and the World Wide Web" (p. xxxi). This statement is provocative for its ambiguity, raising the obvious question of just how closed the world of the digerati is. Brockman's allusions notwithstanding, I think the answer is fairly obvious. As painted by Brockman, the world of the digerati is absolutely closed to the vast majority of workers entering into the field of new communication technology. In a sense, the ideology of entitlement that functions to produce such a notion as the digerati runs counter to the democratizing effect some within the digerati, notably Howard Rheingold, suggest the Internet is capable of. At the same time, I believe having such a concept is important. However circumscribed by elitism, it has the potential to impart a sense of community to a group of disparate workers struggling with understanding their economic and cultural impact (and responsibilities) m a world in which all processes of everyday life are quickly becoming part and parcel to the digital domain. I would suggest, however, that as educators in new communication technology~ it is incumbent upon us to repurpose the concept so that it becomes inclusionary instead of exclusionary, wresting it from the elitism informing Brockman's work so that the technicians we train may add their voices to the conversation.

But why would we want to, especially when our task as educators within two-year degree granting institutions is largely determined by the acute and sometimes frenzied vocational aspirations of our students? This question is deceptively complex. For it is overdetermined at both the student and the institutional level by what I see as something like the *curricular ecology* of the two-year college. By curricular ecology, I mean to suggest a system within which a range of social political, and institutional ideas are conserved through the implementation of various programmatic curricula. At the two-year degree level, this system is situated on an institutional terrain that privileges the pragmatic over the abstract, the vocational over the avocational. This is clearly demonstrated by the language used to define the various permutations of two-year degree granting institutions -- in Ohio, where I teach, these are Community Colleges Technical Colleges, and University Branch Campuses. According to the Ohio Board of Regents the educational governing body in the state of Ohio, the main mission of a community College is to offer "pre-baccalaureate/transfer degree programs, career/technical education programs, developmental education, workforce training, adult continuing education, and community service activities (Ohio Board of Regents 1998, p. 201.01). Similar definitions apply to Technical Colleges and University Branch Campuses. By law and by custom, the vocationalism which governs the educational mission of these institutions is inherited by the programs which make up each institution's offering.

All of this is obvious. What is not so obvious are the subtle ideological contours endemic to the curricular ecology at Associate Degree granting institutions. For the purpose of this paper, the primary ideological effect of traditional vocational education is constituted at the level of discursive entitlement. The ability for a student to actively participate, indeed to effect change, within the discourse community of which she aspires to be a member is in direct correlation with the sheer quantity of education attainable. In other words, education becomes the hallmark of credibility. This is certainly one of the assumptions behind Brockman's account of the digerati and I believe holds true for all discourse communities in which the public voice is also an intellectual voice. Relatedly, this sense of entitlement also obtains at the very practical level of work within one's field. More education (not necessarily more vocational education) means being granted permission to register that education in a position higher than those with less education. I am being very simplistic here, for there are other factors that govern entitlement, not the Feast of which is the economic class out of which one obtains

education in the first place. However, I believe my point is clear -- the two-year degree granting institution does little in the way of instilling in its clientele a mode of entitlement necessary for active participation in the configuration of one's field or discipline. This is not its purpose.

To the extent that the ecology of two-year curricula is informed and maintained by educational objectives that have clear ideological effects on its students, I believe there are two major reasons for new communication technology programs to work against this grain and to reclaim social and cultural entitlement from the hands of the elite digerati, or at the very least, from the Bachelor's Degree program. Arguing from the vocational interests of our students the terrain of new communication technology is just as much informed by the workings of *communications* as it is by the technology that make such communications possible. Thus it is imperative that our students obtain proficiency m the critical understanding of the way images and text work together, their ideological effect on the media consumer, and the critical processes media workers go through in the creation of their product. Such knowledge begins with a thorough and theoretical examination of mass media and its social effects -- media literacy, as it were. Additionally, specific knowledge of the history and culture of new communication technology affords students the ability to construct their identities in relation to a discourse that does little in the way of differentiating between work and leisure. As Nicholas Negroponte (1995) has put it, "Computing is not about computers anymore. It is about living" (j). 5). In other words, for the digerati new media communications permeate all aspects of everyday life. And in a field that is characterized by radical change on a daily basis such immersion is essential for active vocational participation. If educators understand the important role media literacy and knowledge of the history and culture of new communication technology have in constituting a student able to participate filly in the field then the second reason for reclaiming the digerati will take care of itself. By shifting our perspective to consider these more abstract/avocational aspects of new communication technology, we are also doing our part to shift the whole structure of entitlement which currently disallows students such as ours from becoming active in the field's very discourse. This is because the ideology effect of such a perspective will be to produce a subject with background knowledge currently available only to those at higher levels of education. Hopefully, this will translate into a student more capable of participating *as a voice* m the communication revolution that is currently underway.

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K-12 STUDENT PERCEPTIONS OF CLASSROOM COMPUTER USE

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Karen Paquette**
Jennifer M. Warren***

INTRODUCTION

The Department of Education and Human Development of the State University of New York at Brockport is in its fifth year of a Goals2000 funded project to prepare pre-service and in-service teachers to use technology. The project has involved placing hardware in individual schools, training teachers to use the hardware, networking the schools, setting up a listserv for communication, and having periodic meetings and mini-conferences. SUNY Brockport has been involved in both the in-service teacher training and primarily in the pre-service training of future teachers.

The fourth year of the project, 1998 - 1999, focused on preparing teachers in the use or presentation graphics, HyperStudio or PowerPoint, and to increase teacher and student use of the World Wide Web. Teacher training sessions centered on learning to use presentation software, using the WWW as a research medium, and using Microsoft FrontPage to create classroom web pages.

SURVEYS AND INTERVIEWS

To evaluate the effectiveness of training for in-service the first author developed a Likert-Type questionnaire for teachers, interviewed a sample of teachers, and analyzed training records. Survey questionnaires focused mainly on the knowledge and use of the World Wide Web. Data from district Technology Integration Teachers indicates what types of training were provided and the

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number of teachers attending. The Technology Office has also provided information regarding special requests by teachers for help with projects.

The authors developed three different student surveys. For grades K —2 the survey consisted of three three-part questions (computer use, videos and filmstrips, and overhead projectors). For grades 3—5 the survey contained four questions (computers, the Internet, videos and filmstrips, and overhead projectors). For grades 6— 12 the survey contained seven questions representing an expansion of the same four topics. All surveys focused on the student's perceptions of how information technology, in general, and the World Wide Web, in particular, had been incorporated into their classes. Ninety-five students from grades K — 12 participated in the survey.

Surveys in grades K —2 were administered by their teachers and then returned to the researchers. Survey items were read aloud to the students and they were asked to respond by placing a mark on the "happy face" indicating a "yes" or the "sad face" indicating a 'no." In grades 3 — 5 surveys consisted of four statements each with four possible responses related to frequency of teacher use of information technology: every day, once a week, once a month, and never. For grades 6— 12 the surveys contained seven items that further expanded on the four topic areas and with the same response categories as grades 3—5. Two of the researchers visited each high school, middle school and K — 5 school participating. Students were randomly selected to complete the surveys.

The two researchers also interviewed seven students from different grade levels in a one on one format. The interview questions were based on the surveys and allowed the researchers to validate or further expand on the findings. The interviews were conducted with randomly chosen students who did not complete the surveys. Responses were recorded verbatim and no tape recorders were used. The interviews lasted between ten and fifteen minutes.

TEACHER PERCEPTION OF INSTRUCTIONAL TECHNOLOGY USE

An analysis of the surveys returned by teachers involved with the Goals2000 project has indicated a substantial increase in the use of WWW resources in planning for instruction. The surveys have provided the following information regarding teacher use of Educational Structures and the World Wide Web in general:

- Most teachers responding to the survey used their computers between 1 and 5 hours per week with the World Wide Web.
- These teachers used the World Wide Web for class preparation and not for instruction or as part of work within the classroom.
- Teachers viewed World Wide Web use as a supplement to their usual teaching.

STUDENT PERCEPTION OF INSTRUCTIONAL TECHNOLOGY USE

Students in grades K —2 use the computer anywhere from one to five days per week. They typically work alone at the computer and use it for practice, "games," and "typing stories" they have written. Videos and filmstrips are used often in classrooms with this age group as are overhead projectors.

In grades 3 —5 students use computers in their classrooms at least once per week. Students work alone or with a partner. Some students use the computer for specialized purposes such as art. Students in this age group occasionally use the Internet. They also only occasionally watch videos or filmstrips. Interestingly the teachers at this grade level rarely use the overhead projector.

At the grade 6— 12 level it was apparent that the teachers used the computers in the classroom more than the students. When students have a chance to use computers they work individually to "research, play games, e-mail, and type labs or other homework assignments." Most of the teachers and students used the Internet in the classroom. Filmstrips and videos were used occasionally and overhead projectors were used frequently. Teachers at these grade levels often give assignments that require the student to use a computer in some way.

CONCLUSIONS

The Goals2000 project has been successful in increasing the use of information technology both in and out of the classroom. Teachers are using the technology more than ever to prepare for their teaching. Teachers are also encouraging students to use the technology both for their own research and to prepare presentations for class. In a very short period of time teachers involved with the project have become very sophisticated computer users.

As a secondary outcome, teachers and technology integration teachers are looking at the placement of new computer equipment. The elementary classroom configuration with 4 to 5 computers in each classroom needs to be investigated for use at the middle and high schools. The location of computer labs, no matter how numerous, inhibits spontaneous use of information technology by students and prohibits its regular use as part of the instructional process by the teacher.

Students notice the technology being used in their classrooms. Many of the teachers actively use technology in their classes. This occurs more frequently at the elementary grade levels than at the middle and high school levels. Students at the elementary level tend to use computers as part of their lesson while use at the middle and high school levels seems to have the teacher using it as a presentation device or model.

MALCOM KNOWLES WOULD BE PROUD OF INSTRUCTIONAL TECHNOLOGIES

DEBRA L. HARGROVE, ED.S *
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When Thomas Edison invented the motion picture in 1893, educators praised it as a way of bringing the world into the classroom (Withrow, 1997). Classrooms that depended solely on textbooks for delivering history and language lessons were now equipped with what would become one of many new technologies for delivering instruction. As Withrow noted, this invention moved education a giant step forward.

When the first digital computers were invented in the 1940's, research institutions and the military used them primarily as number-crunching machines, not for delivering instruction. These computers were programmed only for performing calculations and it would not be until the 1960's that education would benefit from this new technology. During the 1960's the Department of Defense developed a communication strategy called ARPAnet (Advanced Research Projects Agency Network). ARPAnet flourished in the 1970's and 1980's as non-military users such as colleges, universities and businesses came on-line. Global communication became the buzzword of the 1980's as new 'virtual learning communities' emerged and began a new era in communication called the Internet.

However, it has only been in the last 5 years that technology has affected the role teachers' play in the learning environment. Web-based learning and other Distance Learning opportunities literally free students from geographical boundaries that may otherwise limit their participation in adult education programs. Judith Boettcher, Executive Director of the Corporation for Research and Educational Networking (CERN), noted in a recent *Syllabus* article a shift in higher education from a teaching paradigm to a learning paradigm. That is, many educators have begun to accept the importance of learners being active participants in their learning. As Boettcher notes, the only changes in the teaching process have occurred in the way we store information. "The major difference" Boettcher explains, "is in how we store information – whether it is stored on a slate, on a blackboard, on a book, or on a computer" (p.50). Teaching in the 21st century now means that the teacher becomes what Boettcher identifies, as the "embedded teacher" (p.50). In this capacity, the teacher is now captured in silicon, embedded in the software, the web, or videos that many distance learning and higher education courses use for the delivery of education.

Some educators, particularly those who have been scripted in the ideals of Malcolm Knowles argue that this influx of instructional technology negates the Principles of Adult Education. On the contrary, instructional technologies have provided educators with a variety of tools that can assist in the delivery of instruction. Following the notion that adults learn differently, and enroll in learning situations for various reasons, the following table illustrates how the use of Instructional Technologies can assist adult educators in meeting the needs of adult learners. All types of instructional media allow the adult educator the ability to vary the method of instruction.

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Instructional Media	How you can use IM to meet the needs of the Adult Learner
Chalkboards AND/OR Whiteboards	***Method of instruction should vary.*** While the mention of the word "chalkboard" may send some into an uncontrollable fit of laughter, chalkboards and their newer counterpart, the Whiteboard are still very applicable in today's learning environment. Many students still request that important information be presented either on paper or in some visual format. Chalkboards or whiteboards meet the need of the visual learner.
Flip Charts AND/OR Computer-Created Transparencies	***Students should participate and accept some responsibility for the learning process.*** Most undergraduate and graduate education classes now require students to present some project as part of a learning contract. By encouraging students to use flipcharts and transparencies, they become involved in their own learning and utilize their creative talents to meet their objectives. Transparencies are good when major points need re-addressing or summarizing. Flipcharts are a good visual tool to reinforce prior learning and targets visual and auditory learners. Technology, through programs like PowerPoint, and others, provide the tools to create better visuals.
Normal Classroom AND/OR Computer-Aided Classroom AND/OR Multi-media/Distance Learning	***Learning should be related to and should make use of the students' life experiences. There should be an informal and friendly learning environment.*** By utilizing the Internet, or software on a CD-ROM or computer hard drive, students can actively participate in the learning process. Through assigned multimedia projects students can use past skills or experiences. Online courses allow students to break the geographical/social boundaries and complete their work from home without the fear of stereotypical thinking or prejudiced responses based on ethnicity or social status.
Classroom Small Group Discussions AND/OR Listservs, Distribution Lists, E-mail	***Learners should be involved in planning, evaluating and problem-solving.*** Utilizing electronic forms of communication students are encouraged to interact with one another, to challenge, to create scenarios, and to do real-world problem solving in real-time. Through technology this is often accomplished across distances and disciplines either in the classroom or in classrooms at far locations. The discussions are not limited to information available at the learner's site.
Online Assessments AND/OR Quizzes, Tests	***Students should be aware of his/her progress.*** Technology offers instantaneous grading, self-assessments and even simulations to test and reaffirm a student's learning. Through spreadsheet programs and databases the student can manage his/her own learning and assessment.
Lecture with Interaction AND/OR Video in Class, Streaming Video, Audio Tapes, Tutorials in Class or at Home	***Multimedia should be used to address the various multiple intelligences in meaningful ways.*** The use of technology opens the door for using sound, movement, visuals, and color as a means to address the learning modalities of all the students. Even the student that requires movement can become engaged with joysticks, keyboards, and simulators.

Using instructional technologies in the teaching and learning process can also impact a learner's cognitive domain. Understanding the different levels of Bloom's (1971) Taxonomy is important and can influence what type of instructional media is used in the learning process. For example, if the objective

is to teach at the *knowledge* level, that is, the recall of specific events, information or sequences, teachers can use flip charts, chalkboards and whiteboards to reiterate information. Teaching to the *comprehension* level, the ability to use knowledge without relating it to other material, can be accomplished by having the student demonstrate the opening and closing procedures of a computer program. This can be completed via whiteboards, bulletin boards or flip charts. The *application* level, the ability to "abstract information such as rules, general methods, and procedures, and to apply them" (Driscoll, 1998, p.50), can be addressed by the student designing a learning module on basic computer competencies. Students can demonstrate this learning level using flip charts, whiteboards, transparencies, and handouts. *Analysis* is the ability to break down items into different elements or parts. Students can use whiteboards, email, chatrooms, transparencies, flip charts, and the Internet to assist them in the analysis of the components of a computer. *Synthesis,* the ability to bring all parts together and see the whole picture, is described as a higher order thinking level and demands more complex activities. Using audio/video conferencing, the Internet, chatrooms and listservs will assist the advancing through the synthesis level of learning. Activities that encourage learners to synthesize information include having students design a 3-hour workshop on "An Introduction to Computers." The workshop should include all previous learning through the levels of learning and culminate with one final project. This final project can be showcased via flip charts, handouts, transparencies, multimedia presentations, bulletin board discussions, chatrooms and audio/video conferencing. Finally, having students evaluate the workshop encourages the use of the last learning level, *Evaluation.*

Instructional technologies, when used properly, can assist adult educators in providing meaningful learning activities that involve learners in the learning process. As Knowles postulates, adult learners demand learning that is based on experiences, is meaningful and is presented in a positive environment. By using media that encourages collaboration, analysis and synthesizing, educators not only follow the cognitive domains of learning but also equip learners with the knowledge and tools necessary to excel in the technology-driven marketplace.

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SELF-PACING TECHNOLOGY APPROACH: THE PRESERVICE COURSE AS A CATALYST FOR LEARNING

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PREPARING THE PRESERVICE EDUCATOR FOR THE CLASSROOM

One of the major problems facing teachers in K —12 classrooms today is finding enough time to teach students who have an ever-widening range of academic abilities. In addition, with the recent nationwide accountability movement by state boards of education, classroom teachers are under increasing pressure to identify the academic level of their students and then proceed to assist them in "moving forward" to reach their full potential. Although these goals are worthy, it gets increasingly more difficult for teachers to help each and every student meet their individual learning needs. Among technological applications available to classroom teachers are the Internet-connected computer, networked computer labs, and the world wide web—all of which assist in individualizing educational experiences (ERIC doc. 94-6, 1999).

By carefully designing preservice technology courses that model instructional strategies and that enable students to work at their own pace, teacher educators are providing an avenue for students to engage in practices that they can later take to their own classrooms. In addition, many of the technology courses required within teacher education guidelines model utilization of the World Wide Web, assist students in integrating web-based materials in lessons and instructional units, and enable students to observe classroom practices which model technology-infused instruction.

SELF-PACING TECHNOLOGY APPROACH

In the "teacher-in-training" technology courses offered by the Department of Educational Leadership at Middle Tennessee State University, web-based instruction has successfully assisted the process of training preservice students for the challenge of the academically diverse classroom. By facilitating instruction in a way that mirrors the self-pacing so desperately needed to meet the needs of students within a classroom, the preservice course enables students to work at their own pace by beginning at their individual level of technological literacy and moving forward. The course—designed to train the preservice student as well as the practicing teacher—utilizes the Internet in order to help students integrate technology into lesson plans and units of instruction. Over the past four years, we have experimented in our *SPSE 322 - Technology in Teaching* course with how to vary the rate of instruction in order to produce the highest rate of learning for academically diverse groups of future teachers. Not surprisingly each semester, students enrolled in the technology classes are similar to what can be found in the typical public school classroom. The preservice students can usually be categorized into three distinct learning groups with regard to technological literacy levels and pacing: a) beginners who typically move at a slow pace, b) intermediate students who move at a moderate pace when completing assignments, and c) advanced users who usually progress forward at a relatively fast pace. The beginners and the advanced users are usually the smallest in number with each group representing approximately 10—15% of each class population.

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In order to allow self-pacing, we have facilitated the Sanders Self-Pacing Model for Classrooms with Varying Student Abilities. Components of the model include:

1. *Web-based Materials* —scheduled in-class instruction time and non-scheduled instruction where students work on their own using website instructions and e-mail.
2. *Criterion-Based Assessment System* - Employing a criterion-based assessment system, which enables students to submit materials in printed form or via email, which is then examined by the instructor.
3. *Reflective Feedback* —students complete each "portfolio" section and resubmit each section in order to reach an acceptable or mastery level which allows students to rethink, rework -reflect
4. *Pacing* —students to work at their own pace—even working ahead
5. *Peer Sharing and Conferencing* -
6. *Alternate Computer Stations* —enables students to work at off-site computers The site assists the instructors in: 1)Providing examples of each project and assignment, 2) Developing a course calendar for scheduling specified times for in-class instruction and due dates for projects, 3) Enabling students to view course materials from alternate computer stations, 4) Making available animated PowerPoint presentations which are utilized throughout in-class instruction as well as at alternate computer sites.

The outcome of the course is a professional technology portfolio, which the final grade is based on. The technology portfolio becomes part of the larger professional portfolio, which is required to complete the student teaching experience.

PERFORMANCE AND EFFECTS OF SELF-PACING

Through the four years that the course has been offered, instructors have kept field journals and completed informal reflections on observations as students engage in computer-assisted activities, complete assignments, and conference with peers. Using the three types of learner groups mentioned above, the following recorded observations are offered for teacher educators.

During the semester, the class is structured into: a) one-third "in-class instruction mode," and b) two-thirds "lab mode." Typically 90—95% of the instructor's time is spent assisting the slow-paced learners who make up approximately 15—20% of the each class. With extra instruction provided by the instructor and more capable peers, the beginning computer user-slow-paced learner usually struggles to keep up with assignments and projects. However, most complete the course and submit a professionally designed technology portfolio. The drop-rate for the course is less than 5% and usually occurs within the first two weeks of the semester.

Throughout the early part of the semester, the class sessions are very structured, but transitions into a very unstructured environment as students become comfortable working on the computers and conferencing with each other. Similar to previous research findings (Craig, 1997), the male students share ideas in a very loose, unorganized manner—beginning early on and continuing throughout the semester. The female students, however, tend to write down problems and solutions

and are more apt to share suggestions slowly as work progresses.

All three groups of learners generally meet the target due dates for each section of the technology portfolio. The advanced group/fast-paced learners usually turn in completed portfolios early—ranging from a few days early to several weeks before the semester ends. The intermediate group/average-paced learners as well as the beginner group/slow-paced learners submit completed technology portfolios usually on the last day of class. The overall quality and professional appearance is similar for all three groups. The use of creative images, animation, and additional features is scattered with no obvious pattern and seems to be based on the individual student's interest level rather than their pacing group.

In general, the self-pacing approach has been successful and appears to work well for all three groups of students. The end products—student knowledge gain, technological literacy, and computer skills—are evenly distributed across all three levels of learners. The big difference between this approach and a more traditional approach to technology instruction where a strict schedule for submitting assignments is adhered to is that the amount of assistance and time the instructor is able to provide each student can be altered to meet the needs of individual learners.

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ADDITIONAL RESOURCES

Technology in *the Classroom —SPSE 322* website URL: http://www.mtsu.edu/jsanders and click "SPSE 322" for regular class and "322 OnLine" for the online class.

Full text of an expanded paper on this topic is available at: http://www.mtsu.edu/~jsanders/Self-Pacing.htm

TEACHING TECHNOLOGY IN THE FOCUSED CALENDAR

Deborah Dunn*

INTRODUCTION

Tusculum College has engaged in a process of examining and reviewing its programs which has resulted in a significant and far reaching transformation of the curriculum and the campus culture. Under the heading, *Civic Arts*, five principal reforms have been inaugurated since the fall of 1991: the Commons, a set of interdisciplinary courses required for all students; the Competency Program, where students demonstrate competency in 9 areas prior to graduation; Self-Governance, in which the college is governed by committees composed of students, faculty, and staff; the Civic Arts Project, where students complete an 80-hour service project prior to graduation; and the Focused Calendar, where all courses are taught one at a time for a duration of 18 days. This paper will focus on the pedagogical changes necessary to teach technology under the focused calendar environment. This is timely because many higher education institutions are currently reexamining both curricula and programs.

THE FOCUSED CALENDAR

Tusculum College is one of three colleges in the nation to utilize the focused calendar. The focused calendar is often referred to as the "block program" because courses are offered in "blocks" of time. Each block consists of an 18-day period, or 3 ½ weeks, during which students take one 4-hour credit course at a time (and instructors teach one course at a time). Classes meet an average of 3 hours per day for each of the 18 days giving a total of 54 contact hours per course. There are four blocks per semester, allowing students the opportunity to earn 16 credit hours per semester. Students may also take a 1-hour activity course each block if they so desire. In addition, there are several courses that span the semester.

There were several reasons for implementing the focused calendar. An important aspect for many of our courses, especially in the science field, is the opportunity for field trips. Many of the disciplines have incorporated field experiences into the curriculum and several have been designed to last an extended amount of time (as much as 2-3 weeks). There is more opportunity for supervised hands-on coursework and greater opportunity for the teacher-student relationship to be cultivated. The students have an advantage in that they only have to focus on one course at a time. This gives the students the opportunity to learn the material better because they are in class every day and do not have to juggle their time between courses.

TECHNOLOGY AND THE FOCUSED CALENDAR

The Computer Information Systems/Computer Science curriculum is similar to that of other institutions. All CIS/CS majors must complete Introduction to Computing, Introduction to Programming, Data Structures and Algorithm

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Analysis, Database Management Systems, and Systems Analysis and Design. Other courses in the curriculum include Operating Systems, Data Communications and Networking, Programming Languages, Computer Organization, Physical Design and Implementation, Systems Development Project, and Internship in Computer Science. Teaching technology courses in the focused calendar involves significant changes in pedagogy, opportunities for implementing a variety of instructional paradigms, and challenges for coping with the potential problems inherent in the learning environment.

The primary difference between teaching technology at Tusculum College and teaching technology at a more traditional college is the pedagogy employed to convey the necessary information without overwhelming the student. Having taught for 8 years at a traditional university, I found it challenging to make the transition to teaching in the focused calendar. The major pedagogical changes involve the method of delivery, the number of assignments, and the types of assignments.

Since each class day lasts an average of three hours, as opposed to 50-75 minutes, it is imperative to modify the traditional method of delivery. Although it may be possible to lecture for three hours, students are unable to absorb that much information, especially when it is difficult, technical material. A typical day of technology in the focused calendar involves approximately 60-90 minutes of lecture, with the remaining time spent in the computer laboratory working on assignments.

The number and types of assignments given in the focused calendar differ from the number and types of assignments given in a traditional calendar. At a traditional university, students may be given 5-7 rather comprehensive assignments, each scheduled to take approximately 2-3 weeks. That, of course, is impossible to do in the block program. Assignments take the form of shorter, less comprehensive assignments, which allow the students to demonstrate understanding of a specific topic. Typically, the students are given daily assignments, some of which may take the form of written exercises, while others are completed using a computer.

Although the method of delivery and the number and types of assignments made can be viewed as significant changes to pedagogy, there are other approaches that may be used to exploit the advantages of the block program. The focused calendar provides substantial opportunities for implementing a variety of instructional paradigms in order to convey the necessary information, including building upon the concepts of previous courses, utilization of hands-on exercises, and collaborative learning.

Much thought and planning has gone into the scheduling of classes in the focused calendar. The computer curriculum has been planned such that students take the Introduction to Computing (which focuses on problem-solving and algorithm development), Introduction to Programming, and Data Structures and Algorithm Analysis courses consecutively, and in the same semester. The advantage of this approach is that there are opportunities to build immediately upon the concepts that are covered in the previous course(s). Typically, the same

instructor teaches all three courses so there is also the opportunity for continuity amongst the course concepts and the course contents.

Teaching technology in the focused calendar almost dictates utilizing hands-on exercises and collaborative learning as a method of conveying information. As stated earlier, it is impossible to lecture for three consecutive hours, 18 days in a row. Therefore, hands-on exercises are a way to have students practice, under the guidance of the instructor, the concepts that have been taught. Many of the courses utilize group work in order to convey the information and to introduce the students to the concept of collaboration. Most students believe that upon graduation they will be working on computers in isolation. The focused calendar provides the opportunity to mimic a more "real world" environment.

Although the focused calendar provides many opportunities for utilizing a variety of instructional paradigms, there are significant challenges for coping with the potential problems inherent in the learning environment. These challenges include facility management, conflict with other activities, lack of time for absorbing the material, and, most noticeably, the lack of time for problem-solving and critical thinking.

One of the challenges of teaching technology in the focused calendar involves resource management. We, like most other colleges, have limited facilities, and scheduling two facilities amongst three classes a block has proven to be a challenge (and this does not include the non-computer classes that want to utilize technology). The students also have the challenge of juggling their schedule between class, athletics, work-study, jobs, and, of course, time to study for the next day.

The two biggest challenges of technology and the focused calendar are the lack of time for absorbing the material and the lack of time for problem-solving and critical thinking. The courses in the computer curriculum are technical in nature. It is difficult for the students to read and absorb large amounts of technical information. It is also extremely difficult for students to solve problems effectively in such a short amount of time. The focused calendar forces the students to think faster, thus reducing the time available for critical thinking.

CONCLUSION

Teaching technology in the focused calendar offers many benefits that are not found in a traditional calendar. Instructors have the opportunity to provide more of a "real world" environment in terms of collaborative learning. The focused calendar presents one major problem for teaching technology. Technical courses, especially the ones involving programming, require time for the students to exercise their problem-solving abilities. The students, for the most part, do not have adequate time to accomplish effective critical thinking.

A modification of the block program, perhaps courses spanning two blocks, may be a solution to the problems inherent in teaching technology in the focused calendar. This could provide many of the same benefits while also allowing more time for problem-solving and critical thinking. We at Tusculum College are constantly reevaluating our curriculum and many opportunities exist for improving education in the focused calendar.

TEACHING-LEARNING ECONOMY IN A SECONDARY SCHOOL USING A QUALITATIVE COMPUTER MODELLING SYSTEM

Gustavo Schmidt Moreira* & Fábio Ferrentini Sampaio, PhD.**

Abstract This paper discusses some ideas about System Dynamics and computer modeling and its importance in Economy classes. It also presents a study being developed with students aged 15-16 years old in a private technical school in Rio de Janeiro - Brazil using a semi-quantitative computer modeling system called WLinklt (Sampaio, Ogborn, 1996). From a perspective of System Dynamics (Forrester, 1992), the students have to engage in exploratory tasks intending to externalize and discuss their ideas about some subjects such as inflation and unemployment.

INTRODUCTION

Education has taught static snapshots of the real world. But the world's problem are dynamic. The human mind understand pictures, maps and static relationships in a wonderfully effective way. However, with systems of interacting components that change through time, the human mind is a poor simulator of behaviour. To deal with that we present WLinklt - a computer modeling tool —and System thinking — the method.

SYSTEM THINKING

System Thinking can be understood as a new way to understand the dynamic behaviour of a phenomena. With this approach the system behaviour is not only seen as the cause-effect relationship between pairs of variables but as a whole that gives the student a higher level of perception of the situation.

The idea of perception of the "whole of a model" is strongly connected to the concept of **feedback loop. Feedback loop** can be seen as a structure that *"brings results from past action of the system back to control future action"*. (Forrester, 1971)

WLINKIT MODELLING SYSTEM

WLinklt allows the construction and simulation of semi-quantitative models. Its direct-manipulated interface uses a causal loop diagram metaphor to relate variables and give them semi-quantitative values. Thus, WLinklt animates

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causal diagrams containing boxes (which represent variables) with vertical levels inside (which represent semi-quantitative values).

When the model is running the system is responsible for calculating the graphical output of the variables values over time.

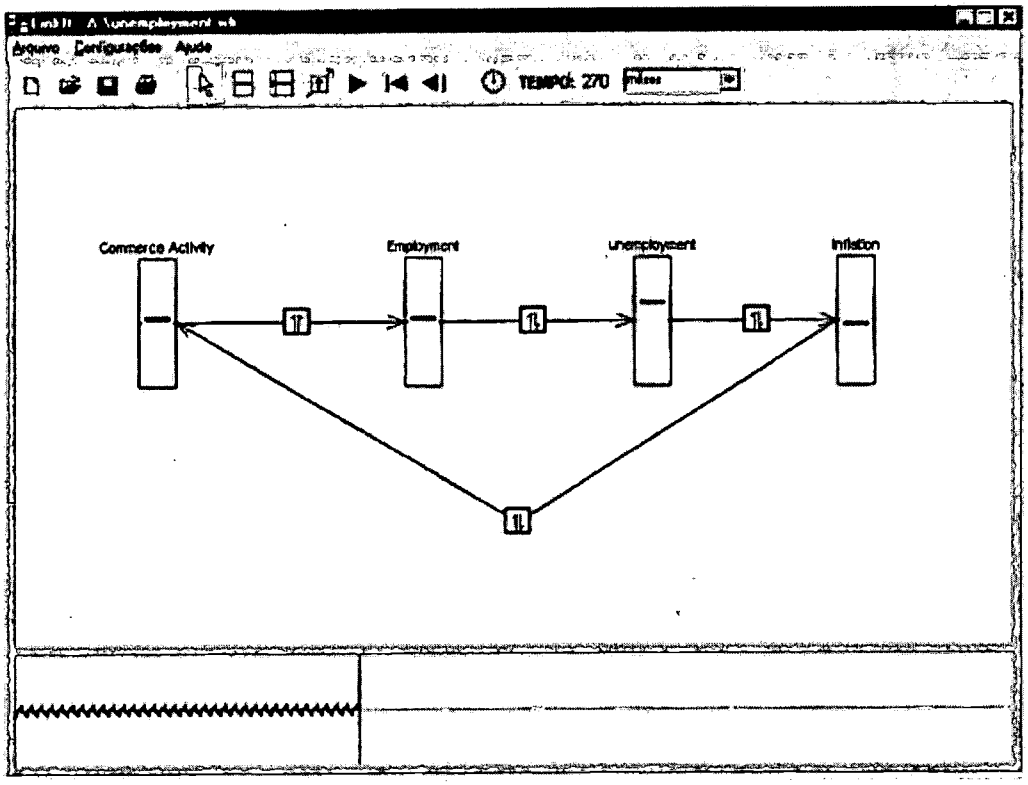

Fig. 1: WLinklt environment with a model about unemployment showing the graph of the variable unemployment X time

THE CONTEXT OF THE EXPERIMENT

The aim of the experiment is to investigate whether the students are able to think in a system level, using their own knowledge to construct (with WLinklt) and understand models about economy containing (causal) feedback ioops.

The school where the experiment is been developed is a private technical high school located in a low-medium class area of Rio de Janeiro, Brazil. The students are *15-16* years old. Although, they have some computer experience, they never heard about modeling and WLinklt. Their knowledge about economy is what they read in newspapers and other communication vehicles.

THE TASKS

The modeling tasks were divided in two stages. The first one intend to introduce WLinklt modeling system and its features. In this stage the students

have to work with (construct and explore) very simple models about subjects not related to economy.

In the second stage they work with two topics related to economy: inflation and unemployment. First they have to produce a text with their own ideas about those subjects. Later, after reading very short motivating text, they are asked to discuss (talk aloud) their ideas about these subjects and represent them using the modeling tool. In a third activity in this stage they are asked to confront their models with the text they produced and asked to re-elaborate their text and their models.

FINAL REMARKS

There are at least two important arguments to justify the use of modeling environment in economy classes.

The first one is that throughout the construction of models the students may develop their own knowledge about the functioning of the system (knowing how and why the system works in a certain way). During such activities, the students have the opportunity to externalize their ideas giving concrete shape to abstract ideas.

The second one is that working with economy is essentially working with dynamic models. We cannot think about economy without thinking about systems evolving over time.

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TECHNOLOGY IN MATHEMATICS TEACHER EDUCATION

Conrad Van Voorst*

Graduate mathematics courses for beginning and experienced secondary mathematics teachers should do two things: help students answer the question *What is mathematics?* and focus on multiple ways to represent and communicate mathematical concepts. Based on the core principles of the Interstate New Teacher Assessment and Support Consortium (1NTASC), ideally "teachers responsible for mathematics instruction at any level understand the key concepts and procedures of mathematics and have a broad understanding of the K-12 mathematics curriculum. They approach mathematics and the learning of mathematics as more than procedural knowledge. They understand the structures within the discipline, the past and future of mathematics, and the interaction between technology and the discipline." Understanding what mathematics is requires knowledge of the big *ideas* in mathematics. Shulman (1986) elaborates on that special knowledge as *pedagogical content knowledge,* what teachers need to grasp in order to be able to effectively teach their subject. The experienced teacher with this knowledge base is able to come up with examples, authentic problems, and rich applications that enable students to see the usefulness of mathematics, the links to other disciplines, and the interconnectedness of ideas in mathematics. Once they master the content knowledge, mathematics teachers need strategies for arranging the learning environment so that their students, by doing mathematics, develop an understanding of the patterns in the structure and applications of mathematics. Polya (1965) suggests that the principle of *consecutive phases* should be applied more often in teaching: *exploration, formalization,* and assimilation. However, mathematics classes often spend the majority of time on formally developing a concept, and little time on establishing an intuitive basis for the concept. Seldom do they apply the concept for deeper understanding through the use of non-routine problems. The key is often technology. Technology can be a useful tool in changing the way we *think* about mathematics and in the way we *teach* mathematics to our students.

In a graduate class at SUNY Brockport, we use technology to help teachers think about math and think about teaching math. Teachers in this graduate mathematics course are working towards permanent certification for a Master's degree in secondary mathematics education. Some have not taught school, but most are middle school and high school teachers who have taught mathematics anywhere from 1 to 6 years. These New York State teachers are in mathematics departments that are currently working on implementing new learning standards. They are looking for mathematical activities and strategies to help their students understand, communicate, and apply mathematics. Amazingly, most of the teachers have limited experience in using technology for teaching.

This course addresses many of the topics covered in the secondary mathematics curriculum. The instructor's lessons and activities created by the students in this class reflect the goals of the NCTM Standards and the New York State

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Math, Science, and Technology (MST) Learning Standards. Students discuss and model effective ways of integrating technology into the mathematics curriculum. They observe mathematical models constructed from real data and represent the patterns numerically, graphically, and symbolically. To develop a greater appreciation for mathematics, students read and present mathematical topics from the book *Journey Through Genius* which focuses on the lives and creativity of certain mathematicians and on their great theorems.

Participants in this course do the following:

- Engage in problem-solving tasks, look at the interrelationship between problems and situations, and use a variety of approaches (algebraic and geometric, numerical and visual, inductive and deductive).
- Develop lessons using a conceptual approach (focus on exploring, acquiring knowledge, and extending and applying that knowledge)..
- Use the technology in the design of lessons to enhance the learning of math concepts through exploratory activities to build mathematical intuition, and as tools to solve problems.
- Work on activities that require them to draw upon situations from various content areas and apply a variety of math skills, concepts, and procedures.
- Reason inductively and deductively using the language of mathematics. They make conjectures based on their observations and then use mathematical arguments to validate their mathematical thinking.
- Share ideas about how to teach and think about mathematics from different perspectives and at different levels.

The assumption in this graduate course is that students can easily refresh their memories on procedures for solving systems of equations and finding derivatives of functions, so the focus is on building mathematical intuition and a deeper understanding of concepts in the secondary mathematics curriculum. To that end, the emphasis in the class is on engaging students in solving problems, searching for and representing patterns, and discovering relationships. The graphing calculator, Calculator Based Lab (CBL), and Geometer's Sketchpad are important technology tools for accomplishing these goals. The table below shows the results of a survey given to the students at the end of the course. The question they were responding to was: "to what degree has this course contributed in a *positive* way to *changing your thinking* about mathematics or the teaching of mathematics." Based on student responses and my observations, the following are my reflections concerning the role of technology in mathematics education:

- Technology was useful in helping students view mathematics less passively, as a set of procedures, and more actively as reasoning, exploring, solving problems, generating new information, and asking new questions. Students enjoyed interacting with other group members as they shared their observations and solutions to problems. They could compare algebraic and graphical solutions, share conjectures concerning geometric relationships, discuss different models for representing real-world behaviors, and think together about multiple ways of solving problems.

- Students felt the technology not only helped them visualize certain math concepts better, but also added a new dimension to the teaching of mathematics to their students. They felt they were able to offer students alternatives for success and address issues of teaching to students with different learning styles. Some students commented they were taking most of the resources back to their department to share with their colleagues. Many used the activities with their own students and through practice gained confidence in their ability to use technology for teaching mathematics.

Student Responses to Course Survey

Topics	Low				High	mean	S.d.
Mathematics Content	1	2	3	4	5		
1. Lines and linear functions (geometric and algebraic representations, model data)	0	0	1	5	9	4.53	0.64
2. Parabolas and quadratic functions (geometric and algebraic representations, data fitting)	0	1	0	6	8	4.40	0.83
3. Exponential functions (familiar models, nature of growth, model data)	0	1	2	5	7	4.20	0.94
4. Trigonometric functions (unit circle activity, periodic nature, model data)	0	0	2	4	9	4.47	0.74
5. Polar coordinates (rectangular and polar graphs, applications, polar equations)	1	1	0	3	10	4.33	1.23
6. Calculus (representations: graphical, numerical, symbolic; limits, continuity, derivative and applications)	1	1	1	3	9	4.20	1.27
7. Geometry (constructions, investigations, proofs)	1	0	5	3	6	3.87	1.19
Teaching Mathematics Approaches							
1. Use of graphing calculators (regression, problem solutions, graphing, investigations)	0	0	2	2	11	4.60	0.74
2. Use of Geometer's Sketchpad (constructions, investigations of relationships, making conjectures)	0	0	3	2	10	4.47	0.83
3. Study of history of math topics (*Journey Through Genius* readings and presentations)	2	3	3	3	4	3.27	1.44
4. Sharing of individual projects (Presentations of activities used in class reflecting implementation of Standards)	1	1	1	2	10	4.27	1.28

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TECHNOLOGY RICH LESSONS: WHAT MIGHT THEY LOOK LIKE?

Colleen R. Swain *

Mention the phrase "technology rich lesson" to technologists, administrators, and teachers and the resulting discussion will contain diverse ideas about the use of technology in daily instruction. Unfortunately, the proliferation of this phrase in educational journals, research reports, and conference proceedings often leads educational technologists to erroneously assume that everyone has similar ideas of what integrating technology into daily teaching should look like. However, this is not the case. We know from research (Rogers, 1995) that the diffusion of any new innovation is a slow process. Since integrating technology into the classroom is a process and teachers will always be at different stages in the diffusion process, the technology rich learning environments created by the teachers will always vary. However, I believe there are commonalities among these different technology rich lessons and learning environments. When I speak with people about technology rich lessons and how I began to effectively function as a change agent when working with teachers in the creation of these lessons, I share the story of my evolution of understanding on integrating technology rich learning environments into my teaching. This allows me to recount some of the events that shaped my insight about technology rich lessons and to show similar elements evident in these learning environments.

After talking with numerous educational technologists, I find my story is similar to others. The way I function as a change agent now is dramatically different from the approach I took when I first started working with teachers and technology. My beginning experience in the integration of technology into the curricula was as the computer science teacher in a large public high school with an extremely innovative principal. In the early 1990s, this principal saw computers as a way to enhance student learning and provide additional means for our students to become life-long learners. The principal acted as the primary change agent for our school. His leadership was strong yet supportive, and a majority of teachers responded in a positive fashion. During the early 1990s, the use of Power Point, Hyper Card, and email in the classroom was rather innovative for teachers and students; yet most of our teachers did not know how to operate computers much less use them in instruction. Therefore, the principal and I devised a plan to teach the faculty how to use these computer applications in their teaching. Our plan was to start with a cohort of teachers and train them first. Cohort members would attend a semester long 3 hour weekly class where I would teach them to use the various computer applications. In return for being a member of the cohort, teachers who completed the training would receive a computer and a projection panel for their classroom. (During 1990-91 school year, it was a rarity for a teacher at our school to have a computer in their classroom.) The following semester another cohort of teachers would begin their computer adventure and eventually, the entire faculty would be trained.

The first semester of training went well. I taught the teachers how to word process, use spreadsheets, create databases, perform mail merges, make Power Point presentations, and create Hyper Card stacks. The teachers were extremely positive and created simple yet dynamic lessons that included graphics, sounds and simple animations. Students clamored to get into classes where teachers used technology. The principal and I were pleased and congratulated ourselves on our great success. Unfortunately neither of us realized we were working with the early adopters. Our task was going to quickly become more difficult. My experience with the second and third group of teachers caused me to consider that I was approaching the integration of technology into daily teaching from an extremely narrow point of view. I realized it was impossible to have "cookie cutter" lessons that would work for all subject areas. In addition, it was unrealistic for me to assume that everyone could and would easily alter their style of teaching. I was shortsighted in believing that everyone wanted this innovation in their classroom. I recognized that I needed more assistance and a better understanding of how to assist teachers, but I was unequipped with the knowledge to progress. It was at this point that I returned to night school and began my graduate studies in educational technology.

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Much to my surprise, I discovered that what I experienced first hand with my peers at the high school is mirrored in research. Data from over a decade of research from the Apple Classroom of Tomorrow (ACOT) research project indicates that teachers progress through five stages (entry, adoption, adaption, appropriation, and invention) in their pursuit of integrating technology into their teaching (Sandholtz, Ringstaff, & Dwyer, 1997). While other stages have been identified (Becker, 1994; Berson, 1996), it is undisputable that it takes time for teachers to become effective technology users in the classroom. Results from numerous studies (David, 1995; Jones, 1994; Roblyer, 1997) on the successful and unsuccessful integration of technology allow us to see how various levels of technology rich lessons emerge. But what are some common characteristics seen in the various stages of teacher produced technology lessons? Again, research provides information in this area and the findings are reflected in the classroom.

Dr. David Jonassen provides nine attributes of meaningful and engaging learning environments. The attributes are: active, intentional, reflective, conversational, complex, contextual, collaborative, constructive, and responsible. These attributes certainly do not require the use of technology. However, I noticed as I continued working with teachers that as they created their technology-rich lessons these attributes consistently appeared. There was a common thread that ran through the various technology rich lessons that I saw teachers create! When I started to ask the teachers why they created their lessons in the manner they did, the response always dealt with wanting students to have a deeper understanding of the concept and how it related to various disciplines. Many times the teachers created lessons that allowed students to perform the same strategy (ie. researching information) but in a better or more efficient manner. Other lessons allowed students to perform tasks that they previously were not able to do at all. I repeatedly heard teachers express the desire for their students to function at a higher level and make connections with other academic disciplines and real-world applications. The teachers seldom used Jonassen's exact attributes of a meaningful and engaging learning environment, but the same premise was there. My peers and I found that not only were we thinking more globally about our lessons, but our students were starting to consider concepts from multiple perspectives! The technology was enabling us to function and learn at a higher level. More recently, many students and teachers are beginning to see the Internet as a totally new learning environment.

I was also able to see evidence of Rogers' (1995) innovation diffusion theory when working with teachers. Rogers' grouped people into five adopter groups in order to discuss and compare them. This continuum included innovators, early adopters, early majority, late majority, and laggards. By determining where teachers were on the diffusion continuum, I could better understand and relate to them when assisting in the infusion of technology into their daily teaching. I constantly reminded myself that infusing technology into daily teaching requires a shift in teaching style and is often a time-consuming and uncomfortable process for many teachers. Using the knowledge from research and my own experiences, I restructured how I work with teachers on creating technology rich learning environments for their students. In the past, I did not effectively communicate with my peers that technology rich lessons evolve with the teacher and student. Now I share the idea that the diffusion of an innovation is a process. This results in products being different but having similar elements. Creation and implementation of technology rich learning environments expands and improves just as teaching should constantly evolve. Once these general themes have been shared and discussed, the next hurdle is having each teacher determine what a technology rich lesson is for him or her.

Once teachers are ready to start creating technology rich learning environments for their students, I remind them that the use of technology is not an "all or nothing" commitment. This allows teachers to experience trialability which is one of Rogers' characteristics of successful innovation. Every lesson does not have to be rich in the use of technology. This provides a great deal of encouragement to teachers. I use several strategies simultaneously with teachers as we begin to create technology rich learning environments. First, I ask teachers to bring in a lesson that has not been very successful in their teaching. We all have a lesson that is frequently flat when we teach it. I encourage teachers to start with a poor lesson and leave their great lessons alone for now. We take the flat lesson and let the work begin! We brainstorm different ways to approach the lesson, the technology available (bulletin boards, application programs, using the

Internet and web) and the technology's impact on student learning. We also explore the web to see if another teacher has already created a lesson teaching the same or similar objectives but with a different emphasis. The brainstorming and exploration of various web sites allows the teacher to begin thinking about creating a richer technology lesson. These beginning technology lessons are not always "rich" in the use of technology. Most of the time, the technology is being used as a substitute for a more traditional method of teaching. However, the teachers become excited and develop multiple perspectives of their lessons which can lead to deeper understanding by the students. We are successful when the teacher starts allowing technology to assist in answering new questions for students instead of having technology answer the same questions. One teacher remarked that she realized she was asking technology to be the answer to old questions instead of finding new questions where technology could be part of the answer!

Another strategy I use to assist teachers in the integration of technology is to bring sample lesson plans at various stages of "richness". I show teachers that are anxious and unsure of creating and using technology rich learning environments examples that are close to what they might currently do in class. We discuss how this lesson might provide students with a deeper understanding of the topic or better tools to accomplish the required task. Simply providing a number of ideas sparks the teachers into action. As the group of teachers continues to progress, I provide lessons or lesson ideas that model a richer environment for the students. It is important to remember this process takes time. Using technology rich learning environments is not something that can be accomplished during the course of one or two workshops. It is a process that takes commitment from the administrator, teachers, and educational technologists.

In conclusion, my work today with teachers on the integration of technology into daily teaching is vastly different than when I worked with my peers at our high school. I emphasize to the teachers that the look of technology rich lessons will always depend upon the teachers' stage of adoption with respect to integrating technology into teaching. The diverse lessons that are created do have commonalities which lead to a greater emphasis on higher order thinking skills, cross-curricular activities, cooperative learning, researching and evaluation of material. In my opinion, teachers are moving toward creating more technology rich lessons which in turn creates richer learning environments for students. Still, educational technologists must understand where teachers are on the diffusion continuum and advance with them as a team. Examples of various technology rich lessons created by the faculty and students at the School of Teaching and Learning at the University of Florida can be found at the Teacher Resource Support Center on the Educational Technology web site. The URL is:
http://www.coe.ufl.edu/CourseslEdTech/Support/Teacher/index.html.

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TECHNOLOGY SUPPORTS SCHOOL REFORM

PETER TAMBURRO, Ed.D.

The Oneida City School District is located halfway between Utica and Syracuse in upstate New York State. The District is comprised of a small city (16,000 pop) and several rural and suburban areas. The school district has 2700 students; six neighborhood elementary schools; a middle school and high school. The community is primarily blue collar and approximately *35%* of our students receive free or reduced lunch. We are proud of the fact that 70% of our graduating students each year attend college, and our high school offers nine advanced placement courses.

Technology has long been a part of the long-range planning process in the District. We have generated technology plans since 1986. In the early 90's, the Board of Education made technology a financial and program priority. At that time, a committee of parents, teachers, administrators, and students was given the task of thawing up a five-year plan to develop a program including hardware, software, staff development, and assessment. The plan was fully implemented by 1996 at which time the committee was committed to creating a new, more sophisticated and integrated plan. This new plan was built around the school district standards (Table 1), program goals, and benchmarks. While the technology committee was planning, building advisory teams consisting of parents, teachers, and community members were hard at work developing the standards and benchmarks. The two projects have interfaced very well, and educational reform has taken place as a result.

Once technology program goals were determined, the committee was able to develop the hardware and software components needed to achieve our objectives. The focus of the plan is upon instruction and how technology serves as a tool to support instruction. Our program underscores the primacy of communication, computation, problem solving, and information management.

Table 1

Standards of Excellence

- Each student will develop communication skills as a foundation to create and comprehend written, spoken, and visual presentations of various media.
- Each student will gain and apply knowledge and skills to include language arts, fine arts, social sciences, mathematics, the sciences, career/occupations, and health/physical education.
- Each student will use current and developing technologies for academic and occupational pursuits.
- Each student will develop positive attitudes to include emotional/physical health, cultural/social diversity, global interdependence, aesthetics, and ecological consequences.
- Each student will develop the skills to think logically and apply decision-making skills to issues and problems
- Each student will respect and practice basic civic values necessary to participate in a democratic government and social system, including justice, honesty, self discipline, equality, and inter-dependence.
- 'Each student will develop attitudes that allow for creativity, individual initiatives, cooperative efforts, and life long learning.

These efforts have energized the district's commitment to language arts, technology, shared decision teams, and a multi-dimensional staff development program. Our approach has been to integrate the content, as illustrated by Table 2. Recognizing the demands being placed on teachers with the state, district, and building goals, it became imperative that we integrate for ease of implementation and evaluation.

Table 2

Critical Thinkers

State Standard	*District Standard*	*Technology Applications to meet District and State Standard*
Engaging in Mathematical Analysis, Scientific Inquiry, and Technological Design Interdisciplinary Problem Solving Understanding Civic Values and Responsibilities	Each student will develop the skills to think logically and apply decision-making skills to issues and problems.	-using CD-ROM and Internet technology, students will assemble, classify, tabulate, and analyze facts or data to make decisions -gathering information regarding authentic issues and problems in their or others' communities using CD ROM/Internet technology, students develop and defend a point of view

The technology Committee then set the stage for school improvement by centering on three common themes; each accompanied by a question:

- Establish a technological culture in our schools to promote our vision: What will our schools look like and what will students know and be able to do?
- Build upon our program strengths: writing, library services, and research. How can technology help me do my job better?
- Focus upon curricula and learning, and not the acquisition of hardware: How will technology support instruction?

We were not experts when we embarked upon this program. We relied, and continue to rely upon our Regional Information Center of the Madison-Oneida BOCES, and the Model Schools Program. With their assistance, we were able to develop a staff development plan and inservice courses for all staff. The courses are taught by teachers with the expectation that trainees leave each training session with a lesson to be implemented in their classroom. We have moved this training model to the next level with a peer review committee. Once a lesson meets the standards of the committee, it is published on a web site for other teachers to access.

So what do our schools look like? As a result of our planning and staff development, Oneida students use computers daily as tools to perform the everyday tasks of writing, problem-solving, creating art and music, locating information, analyzing data, and sending and receiving messages. In our elementary schools, clusters of computers are utilized in center-based instruction. All elementary classrooms are equipped with four networked computers with CD-ROMS; curriculum related software, e-mail, and Internet access.

Our secondary schools have a student/computer ratio of 4:1 with a combination of labs and clusters providing access for students in all subject areas. At our middle school new classrooms were constructed with attached mini-labs. Each lab services two classrooms. This allows for the integration of technology without having to leave the classroom. Each team and department creates lessons/units to support instruction and teach computer skills. At Oneida High School, we have created an art/technology/communications suite with a TV studio for graphic design, desktop publishing, photography, CAD, and broadcasting. Computers are available in all areas. Students have open access to a lab and the library, while two other labs are fully scheduled with classes. The Distance Learning Lab provides access to college courses, electronic field trips, and guest lectures. Technology is a part of our academic culture and supports our instruction.

Beginning with the 1993-1994 school year, the Board of Education established a revolving fund by a one-time transfer of reserve funds. Thereafter, only the State Aid from the prior years expenses were appropriated. This resulted in an expenditure of $2 million since that time. An additional $200 thousand was appropriated through capital projects. Approximately 90% of these funds were spent on hardware and 10% for software. In addition, we average $12 thousand annually for staff development.

Staff development is ongoing. We offer classes during the day, nights, and during the summer. The course selection is based upon teacher needs, program changes, and survey results. This approach is a primary reason for our success -- our staff is trained and training is ongoing.

Our staff have developed rubrics for grades 3,6, 8, and 12 which are utilized to assess student performance and program. The staff is surveyed regularly to evaluate and redesign program.

We believe we have a successful program for our staff and students. The keys to our success are: a shared vision, long-range planning, ongoing staff development, and program assessment. Our staff and community consider technology to be an essential skill area necessary for life-long learning.

Technology has changed how we do business: new strategies for teachers, more hands-on instruction, more writing, research and better focused students. Teachers are motivated to create new practices and students are more productive and creative. Emerson said, "the true object of education is to provide children with resources that will endure as long as life itself" (Emerson, 1833). We believe this to be true in Oneida and we see technology as one of our prime movers.

TEXTBOOK PUBLISHERS IN A NETWORKED WORLD

By Brian L. Massey* and Jamie Murphy**

Textbook publishing houses, like many other businesses, are scrambling to stay relevant in a world increasingly inter-connected by computers, modems and the Internet. Yet conventional wisdom aside, their transition into the networked world – by what means and with what level of success – has yet to be systematically researched. Also lacking quantified answers are the important questions of the receptiveness of students and professors to the textbook publishers' forays outside of their traditional ink-and-paper boundaries, and whether their new-product innovations really improve education.

This paper attempts to lay groundwork for future research of textbook publisher initiatives to secure a pivotal role in the burgeoning field of online learning. And, as often is the case with exploring emergent phenomenon, it draws upon press accounts of publishers' efforts to use the Internet, and its World Wide Web graphical interface, to position themselves for corporate growth, profit – and survival – in a networked world.

ADAPTING TO LIFE WITH THE WEB

Three major textbook publishing and distribution trends appear ascendant at present. First, publishers are silencing expensive printing presses to post supplemental textbook materials on the Web. They also are no longer content with printing textbooks; they now offer online courses and full degree programs. Third, electronic booksellers are chasing the once exclusive clientele of traditional college bookstores by opening virtual stores on the Web.

Web as a Venue for Supplemental Textbook Materials. That textbook publishers are posting Web sites is not particularly noteworthy. Many brick-and-mortar companies are homesteading the Web to primarily promote traditional products, and facilitate product ordering and customer service. What makes the publishers' sites arguably unique, however, are their innovative uses beyond merely digitizing traditional textbooks and study guides.

For one, a number of publishers, Wiley, Glencoe/McGraw-Hill, International Thomson Publishing, and Prentice Hall among them, are banking on the Internet's technological capability to hold time at bay – to keep textbooks safe from the age-old problem of rapidly falling out of date (Mendels, 1999a). They are hoping that the expense of printing revised textbooks can be delayed, if not avoided altogether, by publishing new, must-include subject-matter material online. Internet "addresses" published in the printed-paper texts direct students and educators to these virtual chapters.

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Such supplemental materials are not limited to textbook revisions (Murphy, 1998). Publishers also are coupling their "dead tree" textbooks to Web-delivered lesson plans for educators and interactive exercises for students. Some publishers even are offering to tame the paperwork of teaching by providing educators with Web-based "course management systems" that automate student-performance tracking.

Web as a Venue for Moving Beyond Textbooks. It used to work like this: publishers provide the content (textbooks), while colleges and universities provide the venue (classrooms), expertise (teaching faculty) and audience (students) for its consumption. But in today's networked world, the publishers are angling for a bigger piece of the pie. They want to become broad-product "learning companies," rather than mere publishing houses (Mendels, 1999b).

To make this transition, a number of publishers are gearing up to move into the consumption part of the education equation through the provision of courses and degree programs online. Examples are the Concord University School of Law by Kaplan Educational Centers, and the planned Harcourt University Project, for which textbook publisher Harcourt Inc. envisions an initial enrollment of up to 10,000 students sitting for 120 virtual courses.

Web as a Venue for Competing with E-tailers. College bookstores are the traditional distribution nodes for textbook publishers. However, bookstores are being given a run for their money – and for the student market – by electronic retailers, or "e-tailers," that are leveraging on the technology of the networked world (Mendels, 1998; Guernsey, 1999). Discounts and crowd-free virtual stores are the chief attractions.

A number of traditional college bookstores are fighting back, however, by establishing a cyber-presence of their own (Mendels, 1998; Guernsey, 1999). Their national association has joined the fray with an ad campaign against online-only textbook sellers (Blumenstyk, 1999).

UPSIDE AND DOWNSIDE OF THE NETWORKED WORLD

Posting supplementary materials on their Web sites undoubtedly benefits publishers in terms of cost; it is cheaper to upload than to physically print. Adapting their products to the networked world also gives publishers an edge over competitors who are not accommodating educators' yearnings to bring the networked world within the four walls of the classroom. It also has promotional value: material provided solely on the Web could whet consumers' appetites for purchasing its traditional, printed companion.

There clearly is plenty of upside. Indeed, Bosley (1999), for one, finds that students believe their educational experience is enhanced by computer-mediated communication, of which online coursework material is an example.

But there also is tremendous potential downside. Bosley, in what publishers could read as a "proceed with caution" sign, also finds that students enjoy the traditional education experience – with its classroom interactions and portable printed textbooks – and would not wish it replaced by Web-posed texts and online classes. It is a feeling that has currency with educators, who are

concerned about the quality and rigor of the kind of learning-by-Web that many textbook publishers now are practicing (Hara & Kling, 1999; Mendels, 1999b).

The risk of turning traditional clients (schools and educators) into competitors by getting into the degree-granting business, as well as the immediacy of buying a shelved text rather than waiting for its delivery by mail, are obstacles that publishers face as they experiment with their new online business models.

And there is the generally under-studied question of whether the current configurations of Web-posted educational materials truly enhance learning – whether hyperlinked and multimedia-augmented online content is a better learning tool than the tried and true printed-page textbook.

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THE BEST OF BOTH WORLDS

Christine E. Frank*

In education, computer conferencing has most commonly been employed to facilitate distance learning. Indeed, the contact among teacher and students that computer conferencing provides can greatly enhance distance learning. However, on-campus courses that blend face-to-face and online interaction retain the advantages of face-to-face class meetings while making use of a rich new learning environment.

For educators who are interested in employing learner-centred principles, computer conferencing adds a valuable dimension. In the early research on computer conferencing in education, Harasim (1989) found that conferencing exchanges were student-centred, involving dynamic and extensive sharing of information, ideas, and opinions among learners. Davie and Wells (1991) later described computer conferencing as a medium that empowers learners by allowing them to take a more active role in the social construction of meaning. Davie and Wells pointed out that a computer conference allows all students an equal opportunity to contribute, unlike face-to-face classes where timed-constrained synchronous interaction is often dominated by the teacher and a few students. Other advantages that have been described are time for reflection during class discussion and the ability to compose thoughtful written contributions, both leading to the expression of deeper thinking (Andrusyszyn, 1996; Berge, 1997). Computer conferencing, then, provides new avenues for learners to engage in active learning.

An additional benefit of blended courses is that they allow both teachers and students to gain electronic communication skills gradually. When a course is moved partially into a computer conference, everyone has the chance to gain technical skills and comfort in the new environment while still having regular face-to-face contact.

Blended courses provide fundamental practical advantages to institutions where there is pressure on classroom space. Furthermore, they give students the advantage of more flexibility. As more and more students have Internet access at home, they can "attend" the online hours of the class at any time and may even save a trip to school.

In 1995, I began to make use of conferencing in my courses at a community college. I required students in my Senior Research Seminar to post their research proposals and progress reports in the class conference. I also invited them to discuss research problems online with one of our librarians, who had graciously agreed to join our conference. My chief initial goals were to extend students' access to assistance, to allow them to experience the high quality of writing of some of their classmates, and to introduce them to online research. At the time, I retained the three face-to-face hours per week allotted to the class.

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Encouraged by my first experience and armed with the research into educational uses of conferencing, in 1996 I created a new course called Critical Thinking in the Information Age. This course was arranged as a two-hour face-to-face class and a one- hour online class to continue discussions begun in class. Students began the discussions by selecting and presenting articles on controversial subjects.

To attend the online hour, students entered the conference when it was convenient, read the discussion contributions to date, and then composed messages to the group. Thirty per cent of the course evaluation was based on their online participation. In addition to my earlier goals, a new main goal was to ensure that students were examining issues from multiple perspectives and synthesizing and expressing informed points of view. According to Davie & Wells (1991), this goal, also associated with critical thinking, is an important part of student empowerment and is achieved in computer conferencing through a sense of mastery and community.

An overlapping goal was to ensure that students were employing the three types of knowledge that have been established in the cognitive research literature (Phye, 1997):

> **Declarative knowledge:** facts, concepts and vocabulary stored in memory. A student must identify information that is important and then use strategies to hold and fit the information into previous knowledge structures.
>
> **Procedural knowledge:** the intentional use of cognitive tools such as analysis, application, synthesis, evaluation.
>
> **Strategic knowledge:** knowing how and when to use declarative and procedural knowledge to solve problems, think critically, and approach novel tasks. (p. 54)

When students are required to engage in ongoing academic discussion in a computer conference, they are engaged regularly in the processes outlined by cognitive research. They must identify information or ideas that are important, analyze and evaluate issues and other students' comments, make choices about when and to whom to reply, and synthesize responses that advance the discussion.

Through the hundreds of messages that students sent to our conference, I found that the sense of community and the momentum of discussion established in the face-to-face class carried over and deepened in the online conference. Students' response to this blended method in the first iteration was overwhelmingly positive, and at the end of the semester, they produced a booklet of their favorite contributions. An indication of how well the learning goals were reached can be seen in comments made by the students at the end of the third iteration:

> It was really neat to be able to voice our thoughts and opinions online. I, for one, find my words come out much more clearly when I write them down. Also, in-class discussions can be hard for some people. I found it really interesting to read everyone else's thoughts. I've known most of my classmates since September, but through the use of this forum, I've learned a lot about them. There are some pretty amazing people around here.

> I am one of those people that likes to take in what everyone else has said in class, think about it my own time, and then share my opinions. That is why I found the online stuff to be very beneficial. It gave me time to think and there was no pressure to come up with a quick reply.
>
> As I read along, the argument unfolds and I am able to see the level of critical thinking I am at, that if this were not online, I would not be able to. I often say in my head "this could be better stated this way or that way" or "that argument leads to this thought."
>
> I preferred to listen in class because I didn't usually have an opinion until I had heard what everyone else had to say. The most important thing I probably learned is that everyone has a story to tell and you never know what someone has gone through or experienced until they choose to share it with you.
>
> Getting my hands on the computer has been a great low-stress way to become more aware and comfortable with them. I also feel that the choice of discussion medium is useful in eliminating unnecessary talk and focusing in on the issues. I found that through reading responses and opinions this way, people were forced to be more precise and that made for some very strong points of view.

The students' comments reveal their appreciation of time to reflect, as well as the deeper sense of community that I had detected. Students who tended to be quiet in class were empowered to participate more actively. Moreover, the comments indicate that students were meeting the main course goals: examining issues from multiple perspectives, synthesizing and expressing points of view, and employing the three types of knowledge outlined in cognitive literature.

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The impact of technology to education in the developing countries

Mercy N. Fodje*

Abstract

The combination of education and technology has been considered the main key to human progress. Education feeds technology, which in turn forms the basis for education. It is therefore not surprising that to be "developed" is to have had education based on western knowledge, science and technology. This is today considered progress. The rapid emergence of new technologies brings certain worries to mind. If these new technologies at a time of dramatic population increase continue to produce more and more with less and less labor input then we are heading for a world with hundreds of millions of marginalized humans. What the world needs today is not talent in producing new technologies but talent in understanding the impact of technology on the society and individuals. This calls again on education. We have to produce graduates of all disciplines with some depth of understanding of the environment, of the consequences of large-scale inequity, and the difference between technological development and human development. Educational programs in the third world heretofore have been designed around the western ideals. These need to be reworked to reflect the indigenous cultures and promote human values while at the same time producing the talent for 'controlled' technological advancement. Only then would we be able to talk of development.

This paper attempts to provide highlights on areas of the educational system of Cameroon, which can be improved for development to be a reality, and also proposes how information technology could be of use to education in the third world for the 21st century.

Introduction

For the majority of underdeveloped countries especially those of sub-saharan Africa, the quality of life is deteriorating despite several decades of development efforts. Economic growth has stagnated, with GNP per capita insignificant compared to the higher income countries. As if to make matters worse, population growth is higher in these countries and are accompanied by increasing poor health, rising incidence of AIDS, a disproportionately high level of poverty and hunger, low educational levels, increasing civil strife, and a deteriorating infrastructure base. The gap between the Developed' and 'Underdeveloped' countries is therefore widening by the minute.

Fortunately, the emergence of several powerful institutional forces such as the information revolution and the democratization of ideas are changing the global economy by affecting the relationship of markets, products, competition and trade. For the first time, developing economies have a chance to leapfrog over certain

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cumbersome development steps and constraints to speed up the development process, if only their educational systems, which feed technological development with the necessary skills, is overhauled.

Education and Work force in Sub-Saharan Africa

The ability of Sub-Saharan Africa to actively participate in the new global economy and to solve the many social and political problems that it faces depends largely on the intellectual capacity and skills of its labor force, particularly in Science Technology and business. There is therefore a great need in Sub-Saharan Africa of professionals in a broad range of disciplines skilled in using and adapting existing and new knowledge and information to changing local and international conditions; and even more basic, a need for continual access to various forms of knowledge and information in a flexible and timely manner. Unfortunately, the distribution of stilled processionals and access to knowledge is highly skewed in favor of developed countries. It is very imperative to future economic and social development of these countries that swift steps be taken to bridge this knowledge gap without which the economic and social disparity will widen even more rapidly.

The need for a better educational system

It is the place of Sub-Saharan Educational systems to bridge this gap. Unfortunately, they have failed to develop the critical mass of processionals necessary to fuel development under the industrial-growth model. It is already almost failing to develop the core professionals necessary to benefit from the emerging knowledge-based model. This is because these unevolved educational systems were primarily meant to produce elite civil servants to replace colonial administrators. It continues to prepare a disproportionate number of students to join a public sector which had long stopped expanding and is now shrinking in many cases.

What Africa needs is a substantial overhaul of education and training that can match the technology revolution and keep pace with continued technology development. A good educational system will focus on laying the best foundation of knowledge and skill that are laid during the first years of education. Teachers and trainers must be targeted and their training must include multimedia education content, the use of computers and other associated tools, the same tools they would be using in the passing on the knowledge to the young. At a young age, individuals should be taught how to look for information and how to effectively make use of gathered information rather than just passing on classical material to cram and recite. This "Learning in the Information Society" will produce dynamic individuals who can easily adapt to the work force or quickly retrain to suit the emerging dynamic growth-growth model.

Education and Training must be reoriented so that learning institutions are much more responsive to the skill needs in business and industry. The basic principles of education

and training have to be based more on the notion of learning Capacities rather than formal education and training. Degree programs at the level of higher
education should therefore be developed to be dynamic, with particular regard to learner needs. New forms of partnership between business, other organizations and educators are needed to ensure that new and changing skills required are made available. Governments should therefore encourage enterprises to invest more in the training of their core labor force.

The place of Technology in a revised educational system.

The mention of the use of multimedia and information technology in education in the poorer Sub-Saharan countries may be followed by questions of finance. As a matter of fact, achieving quality education in these countries by use of information technology is a far cheaper alternative. Most educational institutions in these countries lack quality facilities, journals, conferences, etc. The quality of educational materials is often poor. Library collections have become out of date. Laboratory equipment is most often old, in disrepair and out-of-date, while current budgets for consumables are lacking.

It would seem almost impossible for these countries to setup efficient educational systems but for the availability of multimedia and information technology. Efficient growth bases with vast multimedia content can be setup at a minute fraction of the cost of setting up modern facilities comparable to that of developed countries. With the advent of the internet and world wide web, and already existing knowledge bases, many educational institutions will be able to make use of the same resource thus further minimizing the cost requirement. The internet opens up a way of exponentially expanding the physical limits of the school, giving students and teachers access to each other, experts and resource around the world. Information technologies help create more equitable and accessible education systems. Students can use technologies to access courses not available at their school; rural students can complete their studies without leaving their communities, and adults can take advantage of a more flexible study schedule. Cultural development will also benefit as knowledge-bases of art, culture and history can be easily created, made widely accessible and easily updated.

Governments should therefore set as a task to make the internet as widely available to their people as possible. Part of the costs of financing this trend should be born by the private sector as s they are beneficiaries of the more vibrant and dynamic workforce it produces.

Concluding Remarks

Finally, I wish to invite all interested parties to reflect on the possibilities of formulating a set of recipes to assist developing countries especially those south of the Sahara to make use of the information revolution for faster development in the 21st century.

THE MAGIC OF A POWERPOINT PRESENTATION

BY: Lorraine C. Martínez

This activity was designed to help those students who hate giving an oral presentation in front of a class. It gives them a sense of security because they have several visuals and sounds to make their presentation more interesting and effective. The lesson is as follows:

AUDIENCE
Students taking Spanish.

BEHAVIOR: Create a PowerPoint presentation based on his/her essay "Yo" and present it to the class.

CONDITIONS: After receiving his/her graded 200 word essay, student will have 260 minutes to create a PowerPoint presentation.

DEGREE:
Student should have:

-10 slides (one title page, 3 slides about his past, 3 slides about his present, and 3 slides about his future).
-Each slide must have a different:
  -color
  -transition
  -photograph
  -sound to match the content
  -10-50 words of context in Spanish

ASSESSMENT:

A holistic writing rubric was used to grade the essay and the context of the presentation.
A speaking rubric was used to grade the oral presentation.
A PowerPoint rubric was used to grade the slides (copy on next page).

STANDARD 5.1 AND STANDARD 7.1
5.1-Students will use the language studied to reinforce and expand knowledge of other disciplines, (access, analyze, and use information from other content areas in the language studied).
7.1-Students will use the language studied for personal enjoyment, enrichment, and employability, (apply language and knowledge of culture in work, educational, and social settings).

PowerPoint Rubric for Slides
by Lorraine C. Martínez

SCORE	SOUND	COLOR	TRANSITION	CONTEXT
3	IS CREATIVE AND MATCHES CONTENT.	HAS CREATIVE COLORS AND COLORS COMPLEMENT TEXT.	TRANSITION IS CREATIVE AND MATCHES CONTENT.	CONTEXT MATCHES PHOTO, LETTERING IS CLEAR, AND LETTER SIZE IS APPROPRIATE FOR AUDIENCE.
2	HAS SOUND.	HAS COLOR BUT COLOR INTERFERES WITH TEXT.	HAS TRANSITION BUT IT DOES NOT COMPLEMENT CONTENT.	CONTAINS CONTEXT, BUT LESS THAN 10 WORDS, AND LETTERING IS TOO SMALL OR TOO BIG.
0	HAS INAPPROPRIATE SOUND AND/OR CONTAINS PROFANITY.	DOESN'T CONTAIN COLOR.	DOESN'T T HAVE A TRANSITION.	CONTAINS INAPPROPRIATE CONTEXT AND/OR CONTAINS PROFANITY OR HAS NO CONTEXT.

ABSTRACT

USING COMPUTER GRAPHICS AND ANIMATION TO VISUALIZE COMPLEX PROGRAMMING CONCEPTS ON THE WEB

* Issac Herskowitz
* Anna Raynes

This presentation describes the **C-book** and **C++ book** software development projects. C-book is a computer aided teaching tool (CAT) for instructors of the C programming language. C++ book is a CAT tool for instructors of the C++ programming. The C++ book project has been developed to run directly on the WEB.

The tools provides graphics and animation allowing the instructor to visualize selected complex lecture concepts. Related literature has shown that visualization is a highly effective pedagogical way of transmitting information, and both tools reflect in this area.
The rational of the C-book development project design is to respond to the following needs:

1) To present complex programming problems in order for them to be easily learned.
2) To provide materials with alternative representations as a response to different learning styles.
3) To present, in a pedagogically sound way, a programming language whose design parameters don't include teachability.

The presentation will contain a detailed description of the software, a discussion on development tools used to create the software and thoughts why it is important to develop educational software on the WEB.

PROBLEMS WITH TEACHING PROGRAMMING

Three general problems related to teaching programming in C are addressed by C-book. First, complexity is characteristic of even relatively straightforward programming problems. Second, the differences in learning styles among those who would learn programming rule out a single approach as suitable for all. Third, the absence of teachability in the C language from conception through its many versions makes it particularly hard for a beginner to grasp.

* Touro College

Complexity characterizes even relatively straight- forward programming problems. According to Sanders & Gopal (1991) programming is difficult to learn. Many techniques and approaches have been undertaken to help new students of programming grasp complex programming concepts. Some programming languages such as Basic, Pascal, First Programming Language

(FPL) and LOGO are designed for instruction. Other approaches use graphical representations of programming languages such as Flowcharts, Nassi-Schneiderman diagrams and other graphic representations. C-book is an additional teaching tool for instructors of the C programming language. It was designed as a computer-aided teaching tool and not as a tutorial. C-book provides graphics and animations, allowing the instructor to visualize selected complex programming concepts. Thus, C-book helps instructors explain difficult programming constructs and render them visually concrete to their students.

The differences in learning styles among those who would learn programming rule out a single approach as suitable for all. C-book provides materials using alternative representations that respond to different learning styles. Gardner (1983) points out that students have different learning styles and require expanded modes of learning. Constructivist theorists (Spiro, 1991) provide a model of teaching that is facilitated by allowing the learner to view multiple perspectives, analogies, representations, explanations and dimensions. There are many studies that show that complex content material requires multiple representations, analogies, explanations and dimensions (Spiro et al, 1987). Research has shown that visualization is pedagogically a highly effective way of presenting information (Bergin et al, 1996). According to Arnheim (1969), the literature suggests that learning is facilitated when abstract concepts are visually broken down into smaller, concrete, digestible units. Students of the television generation are naturally visual learners (Healy, 1990). Mayer (1975) did an empirical study showing that low-ability students benefit more than higher-ability students by using "models" or visualization techniques. Many students do not understand programming concepts because programming languages are not representing conceptional features of natural languages. DuBoulay (1981) states that "visibility" is an important aspect for novices to understand programming processes by being able to view selected parts and processes of the program. C-book uses graphics and animation that help students visualize exactly what is taking place behind the scenes in the program. This helps students digest abstract concepts that can be visually broken down into simpler units. C-book lets students comprehend difficult concepts that would remain unclear in the absence of visual dissection.

The absence of teachability in the C language, from conception through its many versions makes it particularly hard for a beginner to grasp. This programming language design parameters did not include teachability but was designed to provide professional programmers a language that can easily be used to control a computer's hardware and peripherals. This makes the C programming language difficult to learn (Obrien, 1995). This language has many

obscurities of syntax that inhibit a learner from understanding basic logic constructs and problem-solving skills needed to learn a first programming language.

CONCLUSION

Although C and C++ is not pedagogically suited for an introductory course, it is an industry standard. It is also widely adapted as a standard for computer-science curricula at colleges and universities in the United States and in many other countries. Therefore, the C-book project was developed to address the need for improved modalities of instruction for a language not designed for teachability.

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USING EDUCATIONAL TECHNOLOGY TO INCREASE STUDENT ACHIEVEMENT IN A STANDARDS BASED ENVIRONMENT

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During the mid '80s, American school systems purchased computers for administrative and teacher use. Student computer use was limited to the occasional lab setting. Typically, procurement was predicated upon best pricing or software bundled with promotional items. As computers arrived in classrooms, educators with computer knowledge began to use the systems, and software was purchased based upon individual preference. During this time period, academic accountability and standard curricula had not attained priority status among the educational issues of the day. Teachers were free to modify instruction to teach the information they deemed important using instructional strategies the teachers felt were correct. This environment led to the evolution of technology plans driven by the hardware purchases with software and teacher training added on as after-thoughts.

The classroom of the '90s is a very different place. State mandated standards-based curriculum and testing programs are the motivating force in all educational decisions. The goal of a standards-based curriculum is to produce high levels of student achievement. Therefore, any method of instruction selected within a school must support state testing programs and lead to higher levels of student success in standardized testing programs. Much information included on standardized tests relies upon rote memorization of dates, places in history and essential facts and algorithms. How has technology continued to remain an important focus for schools in this rigid environment? With increased technology funding purchasing expensive hardware and software, the selection and use of both within a standards-based curriculum must show positive influence on achievement and test scores.

This end result has been paramount in the evolution of technology plans developed for schools. Rather than purchasing equipment and determining its use later, current technology plans focus first on curriculum and student testing. Software is selected to support the curriculum, hardware and networks are designed to deliver software and Internet services, and most importantly, extensive staff development is provided on a continual basis.

Heterogeneous classrooms are today defined not only by the students' cognitive abilities but also by their multiple learning styles. As learning occurs, students need to express and apply the learning in various ways. The current generation of students has grown up learning electronically

with a hands-on approach to many activities. The information explosion has caused society to rely upon electronic access to data. Additionally, the preparation of a 21st century workforce requires the technologically literate graduate. Even the conventional teacher preparatory programs and certifications require teachers to provide evidence of mastery of technology skills.

Just as state curriculum has mandated a standard knowledge set of expectations for students, this concept applies to the configuration of hardware and software in our schools. Equity of access is no longer an issue, development of lessons using software and Internet sites can be shared throughout the division, and technical support for the equipment and software becomes less problematic for information technology services personnel. Continuous professional development for administrators and teachers based upon initial assessment of application skill levels evolves to true integration of these tools into daily instruction. This instruction reflects the various differentiation strategies necessary to create an environment for positive achievement for all students.

Both lab settings and computers in the classroom allow for technology-enhanced instruction and assessment and management of student progress via computer. Teachers then provide appropriate interventions promoting greater retention and application of knowledge. As students receive report cards from standardized testing programs, technology is used for remediation in conjunction with other instructional strategies. Testing data and other information about schools is easily accessible by parents in the community to school and division web sites. These sites influence the relocation decisions of parents as they select a school and community based on their perception of their school via this Internet. Today's parents enter the virtual classroom through electronic learning sites provided for classroom and home use.

Assessment has focused on student achievement but is actually multi-faceted in the world of technology. Technology skills for teachers are tied to teacher pre-service and in-service programs. Educators must show evidence of mastery of basic computer skills outlined by the state. When student test data and teacher computer competencies require it, technology plan revisions are based upon documented outcomes and technology plans are modified to support the needs of staff and students.

Instructional technology is criticized by politicians, community members and some educational experts as being expensive while showing little effect on student achievement. However, we have found that student achievement is enhanced while we also teach basic skills such as word processing. Technology skills are not taught in isolation, promoting inclusion in the classroom rather than the lab setting. Schools today meet

student needs in standardized testing programs but more importantly, by changing instruction, prepare students for university education and the work force. Changing the face of the technologically infused classroom models the expectation of business and industry in our nation.

USING TECHNOLOGY TO ENHANCE FOREIGN LANGUAGE COMPETENCY

Janet Flewelling*

ORAL TESTING OF FOREIGN LANGUAGE STUDENTS

One of the tasks faced by second/foreign language teachers is to evaluate the oral skills of their students. A key principle related to evaluation is that oral testing must be done orally, not through written tests. (Brown, 1987, Curtain and Pesola, 1988). This places a heavy burden on teachers who can have hundreds of students to evaluate in any given school year. At times, individual students can be evaluated in a whole class or group setting but for the best and fairest result, it should be done on an one-to-one basis. Given the large number of students foreign language teachers must evaluate, this would go against the evaluation principle which suggests that testing techniques should be practical (Brown, 1987). On the other hand, teachers who try to evaluate more than one student at a time (eg. asking a pair of students to converse with each other on a given topic while the teacher evaluates) face problems which can affect the end result: it is difficult for the evaluator to focus on the speech of both students equally at the same time, students can be disadvantaged in their efforts if one student is stronger or weaker than the other and frequently students feel uncomfortable being tested in the presence of a peer. (Hughs, 1989).

One way in which teachers can make the task of doing Oral evaluations easier for both themselves and for students is to test in a language lab setting. This allows teachers to evaluate an entire class of students at once and students often feel more relaxed responding to an inanimate machine than in front of a person. The additional advantage for teachers is that since responses are recorded, they can evaluate them at their convenience and responses can be replayed many times, allowing the instructor to focus on different aspects of the recorded material at different times. (Hughs, 1989 The result is a more accurate and fair mark As Borich comments, "using...audiotapes can enhance the validity of performance assessments when direct observation of performance is required". (Borich, 1996, p. 667).

Many foreign language teachers do not, however, have access to a language lab. This is, in fact, the case at the University of Windsor. Since I am responsible for testing the oral language skills of a large number of students each year, I was eager to find an alternative means of doing group testing. In conjunction with the University's Department of Instructional Development, a means for testing groups of students orally in a computer lab setting has been developed. The advantage of computerized oral testing is that, unlike language labs which are available in only a limited number of schools, teachers in virtually all school settings now have access

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to computers which could be used for oral testing. Furthermore, teachers are being encouraged more and more to incorporate technology into their teaching programs. Computerized testing is one means of achieving this goal and Gronlund suggests that "as computers become more widely used in the classroom, we can expect computer-assisted testing...to play an increasingly important role". (Gronlund, 1998, p. 131).

THE SOFTWARE

The computer program developed for oral testing is capable of delivering pre-recorded French language instructions and questions to students. It also has graphic and video capability which makes it possible for teachers to include prompts for the students in the form of sound material, still pictures, moving pictures and written text. Thus questions may be tailored to appeal not only to aural learners but to visual learners as well. The software requires students to record their responses in a controlled format The program permits instructors to specify a time limit for responses which are then stored on the computer hard drive. Instructors are then able to retrieve the student responses on disk and mark them from any computer to which they have access. When evaluating the recordings, instructors are able to record their own comments and reactions to what the students have recorded in sidebars. Thus students, when listening to their marked recordings, are able to hear not only what they recorded but also their teacher's comments and corrections. This makes the feedback students receive meaningful and immediate, two factors which are of the utmost importance if students are to benefit from the evaluation (Gronlund, 1998). At the current time, the software is only available in PC format but a long term goal is to create a multi-platform application which would make the software available to users of all commonly-used computer systems.

There are many strengths associated with this software program:

- teachers may easily author in their own questions if they wish to tailor their questions to specific material taught in class;
- students tend to feel more relaxed responding to a machine than in front of a person;
- the software has visual as well as audio capability;
- teachers can mark the responses at their convenience, even at home if they have a computer there;
- teachers can play the same response as many times as they wish, thus allowing them to focus on different aspects of the student's speech at different times. The result is a fairer and more accurate assessment;
- teacher comments can be inserted into the recording so that students can play back not only their own answers but also the teacher's corrections
- the software can either be loaded onto a network and used by a group of students in a computer lab setting or it can be used on a single computer by one student at a time. This allows teachers who have access to a computer lab in their school to test a group of students at once or alternatively, they can give the disk to students individually and have them record their answers on a computer at the back of the classroom while the regular lesson is taught by the teacher;

- the volume of students' recorded work can be increased or decreased even after the recording has been completed according to the marker's preferences.

FUTURE DIRECTIONS

Computerized oral testing has been working extremely well for the past two years with my students at the University of Windsor and I am now interested in exploring how this technology could be used beyond this limited setting. Several French as a Second Language teachers in the Windsor area have expressed an interest in using the software in their classes to evaluate their students, In order to prepare them for working with the software and for authoring their own questions~ a video will be developed which will provide step-by-step instructions. In addition, a team of local teachers is currently developing a database of questions, activities and media assets that could be used to create units that would reflect the curriculum for French. Ready-made units based on commonly-taught themes for teachers who would like to use the software but who do not have the need or the inclination to author on their own material will also be created. Early in the new year, teachers will begin to pilot test the software. Their feedback will assist us in the refinement of the program and will indicate to us whether or not this software has further potential to educators. Ultimately, the software might be used in conjunction with commercial French or other foreign language teaching programs with test questions and activities preprogrammed to reflect material taught in each unit of the program. It is also entirely possible that it would be useful to teachers in other subject areas.

Feedback received to date suggests that foreign teachers will find this software a useful tool which will not only simplify the task of evaluating the oral competency of their students but will also make their evaluations more accurate and fair. Enquiries about the software should be directed to the author.

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USING THE INTERNET: ENHANCING THE SECONDARY ENGLISH CURRICULUM

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INTRODUCTION

With the current trend of integrating technology into the classroom, teachers have had to quickly search for effective training in new skills and the implementation of them into their classrooms. Even though teacher education programs are currently creating technologically prepared teachers (Maurer & Davidson, 1998), there is still the need to help currently practicing teachers. In addition, the state of North Carolina has created a computer skills curriculum, which is now, required for graduation of all high school students. This curriculum focuses on "preparing the student to be an independent user of technology for personal and school needs" (NC Correlation Chart, 1993).Tying both the need for training teachers and students in technological skills due to both the state requirements and the educational potential to provide effective instruction (Pea & Soloway, 1987; Panyan, McPherson, Steeves, & Hummel, 1994), state funding was sought to provide the avenue in which to accomplish these goals.

After obtaining a *Rural Challenge Technology Partnership* grant from the state of North Carolina, three school districts created a partnership to employ technology as a learning tool. Core academic instructional areas included language arts, math, and science classrooms. Over a two-year period, hardware was purchased, training was provided, networks were established, and integration of this technology into the classroom was monitored.

The purpose of this report is to discuss an Internet enhanced curriculum designed through collaboration between high school teachers and university professors which was part of this grant. Challenged by both new state English competencies and a state mandate to integrate technology into the curriculum, this faculty chose to use the Internet as a resource, to provide new learning methods and as a venue for student publishing. The desire for an increased student pass rate on state mandated technology testing was also an impetus for this collaboration.

METHODOLOGY AND RESULTS

University faculty members met with administrators and faculty of the participating high school to discuss the desired skills' instruction, immediate hardware needs, time for both in-class and after class consultations, and the evaluation process. Upon completion of these meetings, hardware was ordered, instruction was delivered and personal consultation was completed. This training was evaluated at the end of year one and again at the end of year two.

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During the end of year one evaluation, it was noted that teachers with fewer years of teaching experience were utilizing technology less than those teachers with more experience. These less experienced teachers were focusing on the North Carolina state curriculum without applying the technology curriculum to other subjects. Observations and discussions with teachers indicated a lack of classroom access to strategies on incorporating language arts writing components with new technologies. Additionally, the majority of language arts' teachers had received technology training focusing on skills, rather than integration techniques or strategies.

Communication strategies were developed after the first year's evaluation. These included: l)professional training schedules and topics listed on a web site to inform all teachers, coordinators, and administrators, 2)superintendents' endorsements and explanations of activities to participants, and 3)implementation schedules created further in advance.

The greatest need expressed by teachers was the integration of technology into the new English competencies for the state. During the second year of implementation, after discussions and training on various types of uses such as PowerPoint, subject-specific curriculum software, and the Internet, the participating English teachers agreed to proceed with work using the Internet to enhance the state's curriculum. The greatest concern of this effort was limited time. Workshops were seen as a valuable time to explore new possibilities. An effort was made to include both experienced and beginning teachers in these groups. A list and plan was created jointly between six high school English teachers and a university consultant. The six teachers engaged in additional workshops on the Internet, after which they wrote a list of integration ideas for each new English competency.

DISCUSSION

This study has shown that not only are teachers willing to integrate technology into their senior English classes, but they also are willing to create the ways in which this can be accomplished. When given the hardware, training, support, and most of all, time, these teachers were highly successful at creatively and effectively planning lessons around existing curriculum enhanced by technology. An additional value of this type of training is the way in which it creates a community of learners between experienced and less experienced teachers. This example has paved the way for additional work in this school district in using the Internet to enhance classroom curriculum.

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The Elementary Computer Initiative: Teacher Benefits
John Pisapia, Kimberly Knutson, Eleni Coukos

In 1995, a metropolitan school district (44,000 students) placed five computers and an ink jet color printer in each of its regular elementary classrooms first through fifth grade. The goals of the initiative were numerous but focused on: (1) increasing student performance, (2) addressing different learning styles, (3) providing students with daily access to computers, (4) increasing student proficiency with computers, and (5) preparing students for the future. To accomplish these goals, teachers were required to acquire the capacity to integrate computers into their daily classroom lessons and the school division needed to install, maintain the technical hardware and courseware required to support teacher efforts.

The implementation of the Initiative was evaluated each year for three years to provide information to the school division for use in planning, work tasks and staff development. Teacher attitudes, ability, and instructional behaviors were sampled as well as their perceptions of student motivation and performance due to the Initiative. During the three years, data were collected through classroom observations, focus group interviews, teacher surveys, software surveys, and standardized test scores. This paper provides specific information which describes the benefits teachers received from Initiatives.

Teacher Benefits

Computer Ability. The Computer Initiative has had a dramatic impact on teacher ability to integrate computers into instruction. For example, non-technology using teachers were eliminated after the first year of the initiative. Furthermore,

- Fifty six percent (56%) of year 1 teachers reported that they were Beginners (i.e., they can perform basic computer tasks such as word processing quite well although they do not know or utilize the full potential of the program). This percentage declined to twenty-four percent (24%) by year three.
- Eleven percent (11%) of year 1 teachers reported that they were Advanced computer users (i.e., they can perform numerous tasks on the computer such as word-processing, graphics, and information management quite well and are familiar with the software's capabilities). This percentage increased to forty-eight percent (48%) in year three.
- One percent (1%) of year 1 teachers reported that they were Accomplished computer users (they know a great deal about computer software and hardware and can perform many tasks using a variety of software). This total increased to twenty-seven percent (27%) of the respondents in the third year of the initiative.

These findings lend support to the conclusion that computer ability can be influenced by factors such as training, instruction and administrative support.

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Teacher Growth. Most teachers (95%) agree or strongly agree that the Computer Initiative has facilitated their professional growth. And, ninety-nine percent (99%) say that it has made them aware of the creative uses of computers in education. Additionally, teachers report that they have more than sufficient knowledge to use computers to aid their instruction. For example, seventy-seven percent (77%) of all teachers report that computer knowledge is less than moderately difficult to the least difficult barrier that they face in implementing the Initiative. However, teachers continue to be less sure of their knowledge of the technical side of the initiative than the instructional side. Forty percent (40%) of them reported that their technical knowledge is the most difficult barrier to implementing the initiative.

Teacher Beliefs and Attitudes. Teacher reaction to computers in their classrooms has been overwhelmingly supportive. They continue to see the computers a very important to their work as a classroom teacher. For example, ninety-seven percent (97%) of all teachers agree or strongly agree that the Initiative is very important to their work as a classroom teacher. Additionally, teachers continue to view the Computer Initiative as worth the cost and time. Ninety-three percent (93%) of all teachers agree or strongly agree that the computers are worth their cost and time. They continue to enjoy working with their students on the computers. Teachers continue to be satisfied with their progress they have made since the Computer Initiative was implemented.

Furthermore, teacher integration of the technology into their instructional strategies seem to be less complicated than in year three than in year two. For example, fewer teachers (20%) in year three perceive that the Computer Initiative requires too much of them than teachers (28%) who reported in year two.

Teacher Instructional Behavior. The primary curricular objective of teachers is improvement of language arts rather than math, social studies or science. For example, fifty-eight percent (58%) of the teachers responded that improving language arts skills was the primary goal for using computers in the classroom. In this area, seventy-four percent (74%) indicated that their primary objective was to use computers to improve writing skills and fifty-two (52%) reported using classroom computers to improve reading skills. On the other hand, teachers rank mathematics, social studies and science as moderate instructional objectives for computer use by teachers.

Instructional Goals. Teachers computers in their classrooms to: (1) introduce new concepts by preparing students for instruction on a topic by using an appropriate software package, (2) reinforce the core curriculum by providing students with extra practice on material already learned, (3) extend the core curriculum by providing additional information on a topic, and/or (4) remediate the core curriculum by providing appropriate software for students who need additional help on a topic

Instructional Strategies. Teachers believe they are (1) better able to present more complex material to their students, (2) use less lecture and whole class instruction, and (3) use more small group instructional strategies.

- There is a strong consensus among teachers that the computers have allowed them to create better products such as newsletters. For example, ninety-eight percent (98%) of the teachers strongly agreed or agreed with the statement.
- Teachers at all grade levels indicate that they discuss technology ideas with other teachers. However, teachers in the primary grades engage in more cooperative planning with their colleagues than the upper grades.

School Technology Teaching Culture. Schools were classified as having "strong," "stable," or "weak" cultures to support the implementation of the Computer Initiative. The results of this examination indicate that after 3 years of the Initiative:

- Teachers in schools with a "strong" school teaching culture reported greater changes in teacher instructional behaviors than teachers in "stable" and "weak" school cultures.
- Teachers in schools with a "strong" school teaching culture reported teacher attitude scores that were closer to the "Ideal" profile than teachers in schools with "stable" or "weak" cultures.

Schools in which teachers attributed significantly greater changes in their instructional behavior to the Initiative also demonstrated greater student growth in student test scores.

Table 1
THE COMPUTER INITIATIVE: SUMMARY OF MAJOR FINDINGS FROM THREE YEARS OF IMPLEMENTATION

Teacher Benefits	Teacher computer ability dramatically improved since beginning of initiative. Teachers are satisfied with: (1) working with students on computers and (2) Increased knowledge about technology, (3) Importance of initiative to teacher work, and (4) progress thus far. Beliefs remain that: (1) school is getting most out of initiative and (2) is worth the cost and time. Computers are primarily used to improve language arts, reading and writing skills. Instructional focus on: (1) challenging high ability students and (2) improving student directed learning rather than remediating deficiencies. Instructional delivery changed by: (1) better able to present more complex material, (2) use a more thematic approach, (3) less lecture and whole class instruction, and (4) more small group instruction. Instructional delivery improved in by: (1) teachers being able to present more complex material and (2) software availability. Teacher work behavior changed by: (1) planning how to integrate computer into subject matter delivery and (2) produce better teacher products.

AN INTERACTIVE E-BOOK APPLIED TO MATHEMATICAL LEARNING[1]

Francesc Vallverdu, Teresa Sancho[2]

ABSTRACT

This work will discuss on a course material in web-format for teaching and learning Discrete Mathematics, a subject that is offered at the Computer Science School of the *Universitat Oberta de Catalunya (UOC)*. This university is an open one, where any communication between teachers and students is via e_mail.

For UOC students the classical textbook is no longer useful, so we propose a digital and navigable didactic material that integrates the basic elements of the self-learning process. Also, it contains self-evaluation exercises, computer animation, audio, conceptual maps and glossaries. Obviously, this material will include any kind of typical navigator functionality too.

The learning and teaching process is evolving with the new information technologies. The teacher-student relationship is changing, even more in distance education. The interactivity between the student and the material can be done through the resolution of exercises and the experimentation with simulated cases. The simple exercises are usually Java Applets embedded in the same html page where the exercise evolves, in a xml framework. Depending on the student's behavior and skills, different paths are presented in order to optimize the learning process. The more the student knows, the more difficult questions are. A tailor-made and oriented evolution implies an intelligent tracking of the student's actions. In this respect, we might say that this kind of activity allows either the student to learn significantly or the teacher to keep the process under control.

DIGITAL BOOKS FOR DISTANCE LEARNING

The UOC student profile is not usually the same one as in a traditional university. UOC is an open university with a virtual campus (http://www.uoc.es) where both students and teachers interact, breaking time and distance constraints. Most students are aged between 25 and 35 years old, they are mostly married with children, have not studied for a long time and, last but not least, have a regular job. Hence, they are usually highly motivated and responsible students.

With regard to technical studies, the learning process of mathematics has some particular characteristics: a mathematical course requires a minimum basic formation, but hardly ever meet the student's particular interests. The student is demanded to make an initial effort to acquire previous knowledge, to develop mathematics skill and, finally, to attain abstraction. For these reasons, the didactic material, so fundamental in this context, should consider different factors: previous knowledge, interests, objectives, capabilities and practical constraints.

[1] This work has been developed within the IBM/"la Caixa"/UOC 1998 agreement.

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Nowadays there is a general trend to use electronic books instead of traditional paper ones. They have many advantages (hyperlinks, fast find, and link to other material or web page, etc.), even though our students still prefer to have paper books. The main problems exposed by the end users are related with a lack of a real added value. They consider that hyperlink and search facilities are not enough to prefer this kind of material. On top of these general aspects, it is important to stress on some practical considerations: initial rejection by the students, a visual fatigue caused by the computer screen and the impossibility to have a mobile workplace. To sum up, dependence on computers implies physical uneasiness in most cases.

The teacher-student relationship is changing, even more in distance education. Newborn tools allow tailor-made individual training. Here we present a contribution concerning the evolution of a textbook towards a digital one. We define a learning environment that includes the basic material and a virtual bookcase with library books, FAQ, complementary notes, interest links, complementary exercises and glossaries. This environment provides orientation to the student by guiding him through the learning process.

Here it is presented an interactive learning material prototype. Coming from a navigable book [2], nowadays used in the Discrete Mathematics course [1], some new features have been implemented. The main ones are: interactive simulation space, text to speech conversion of the selected text (including mathematical notation), insertion in any point of a page of personnel notes, marks or text underlying, open question possibility, dynamic page generation (depending on user activity), automatic evolution report generation and assessment.

AN EXEMPLE: THE CHICAGO'S PROBLEM

In order to show some of these interactive features we present the implementation of Chicago's problem (mismatching problem), a typical combinatory one.

The basis of this problem consists of counting the number of mismatching couples selected out from a pair of sets. In this particular exercise, we are playing with letters and their corresponding envelopes. The first time you get the problem it is only shown a general statement and a simulation space, as shown in fig. 1.

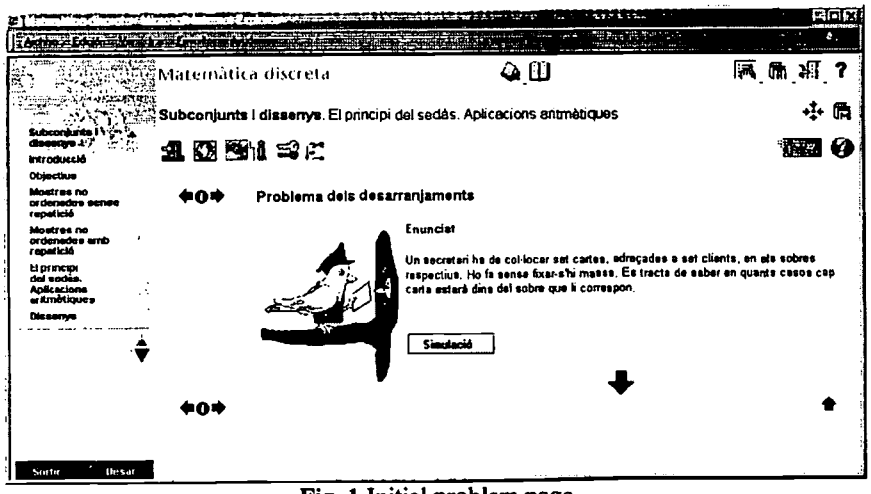

Fig. 1 Initial problem page

The simulation space is an interactive tool that makes it possible to experiment and play so, understand and get insight the problem. The user can select the number of couples. The coupling procedure can be made either by hand ('drag and drop') or automatically with a random function, one by one or altogether. The coupling result is also displayed, marked with a cross if a mismatch occurs, otherwise a *v*. Fig. 2 shows the implementation of Chicago's problem simulation. It is also possible to select the number of iterations of this experiment, hence, to treat some probabilistic results through the frequency representation of different events. In this example, a graphic of absolute frequency couple matching is displayed, after the achievement of 200 experiments.

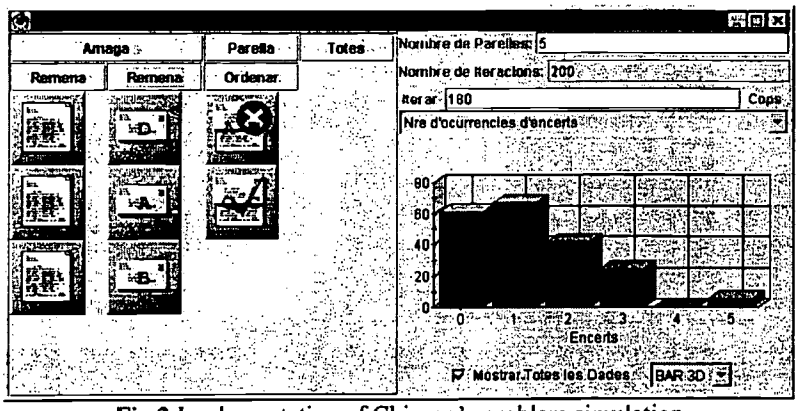

Fig.2 Implementation of Chicago's problem simulation

Once you decide to continue the page evolves introducing a mathematical statement and a question is posed. You have to write a numerical answer, and depending if it is correct or not, the page will progress in one way or another. The page evolution depends on a previously strategy defined by the teacher. Different strategies should be defined to match different student skills.

PRACTICAL CONSIDERATIONS

There are two practical considerations to be pointed out. The first one is related to mathematical notation and how mathematical formulas are pronounced. We write mathematical formulas in Latex using Techexplorer, an IBM plug-in, and we have implemented a Java applet that controls a text to speech system, developed at the UPC (http://gps-tsc.upc.es/veu) that converts Latex to speech, in catalan language.

The second one is related to personnel annotations. A Java applet makes it possible to mark a selected text, to underline it or to include personnel notes in any point of the page. Thus it is possible to build a personal version of the digital book.

Learning mathematics in a distance education system requires specific interactive and multimedia material. This work is an example of such a material using Internet based technology.

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ATM (Asynchronous Transfer Mode)
Sheila Kathleen Donis

Imagine the power and convenience of participating in a videoconference with school superintendents, staff from the Department of Education, teacher colleagues, and college faculty from all across the state, all at your computer workstation. Imagine recording a conference, a demonstration, or class and being able to easily make that recorded information available network-wide. Imagine having one simple, managed connection that allows your users to simultaneously participate in a videoconference and browse the Internet. Imagine chatting with global friends and colleagues. Imagine seeing and speaking to relatives abroad. Imagine your students visiting with another class oversees. The technology is here!

As the need for telecommunications in K-12 schools increases, it is necessary to have high quality transporting systems in place. Switching is needed at high bit rates for lower costs. With ATM, all kinds of data (telephony, speech, full video, and computer) transfer is possible. High speed applications of ATM include: high speed data transfer, HDTV, video-on-demand, distance learning, real-time collaboration, telemedicine and teleconferencing.

DEFINITION

ATM - Asynchronous Transfer Mode is a networking technology for now-generation, multimedia communications. ATM protocols are designed to handle isochronous (time critical) data such as video and telephony (audio), in addition to more conventional data communications between computers. **This is a transfer mode in which the information is organized into cells. It is asynchronous in the sense that the recurrence of cells containing information from an individual user in not necessarily periodic.**

ATM protocols are capable of providing a homogeneous network for all traffic types. The same protocols are used regardless of whether the application is to carry conventional audio, entertainment video, or computer network traffic over local area networks (LANs), metropolitan area networks (MANs) or wide area networks (WANs).

ATM technology is based on small, constant-sized cells that permit sufficiently rapid switching in which multiple isochronous data can be statistically multiplexed together, along with computer network traffic. The communications channel will not be limited to a fixed data rate. Each application uses only the bandwidth required. Statistical multiplexing provides for "bandwidth on demand".

ATM protocols are standards-based through the ATM Forum.

WHY ATM?

- is proactive in solving problems
- handles all aspects (video, audio, and data)
- provides sufficient improvements in capability
- is standards-based (interoperability)
- has power (access to vast amounts of information with unaccustomed ease)
- is flexible (mix of services with the ability to modify)
- has scalability (enterprise-level of equipment for reliability and stability)
- has reliable routing
- has network management capabilities (one network-all different types of traffic)
- has proven Quality of Service

IP OVER ATM WORKING GROUP BORN

As recently as August 1999, the ATM Forum recognizes the importance of partnering with other technologies; therefore, the Technical Committee is broadening and redirecting their scope in support of IP-based (Internet Protocol) services. This plan is expected to generate a unique opportunity for IP-based applications and services to take advantage of ATM's inherent QoS, security, and management features. IP over ATM provides a transition path to the deployment of ATM enterprise and end-user networks.

ATM BACKBONES — ALIVE AND KICKING!

Keith Pierce, system director of network services for Samaritan Health Systems in Phoenix, uses ATM backbone switches to tie together a 3,000-node campus network linking three hospitals, a corporate center and several clinics.

Pennsbury Schools of Pennsylvania recently launched an ATM metropolitan area network (MAN).

Access Indiana State Backbone Network is a high-speed transport system capable of simultaneously handling data and video. This system is interconnecting colleges and universities, K-12 schools, public libraries, state government offices, and other public sector clients. The overall goal is to facilitate information generation and distribution within the state of Indiana.

EDUCATOR SENSE

Finding sense becomes very difficult. We lose ourselves between vendors, large telecommunications companies and everyday needs of the classroom teachers and students. The new millennium calls for new communications systems. It is crucial that educators and students become part of a global learning community. Authentic student research is nestled in a complex system of information retrieval and

communications.

To accommodate the diversity and complexity of the challenges and dreams of the new millennium, educators must be positioned at the forefront. Very simply, we must demand high quality two-way video. Ask to participate in simulated video-conferencing. Archive anecdotal notes about your hands-on experiences with the multimedia equipment and infrastructure highlighted by vendors. How does it work? How *smoothly* does it work? Does it look good and sound great? Give a call to school corporations who use the technology. Why pay money for mediocre services. We must not accept poor quality video, data or voice into our classroom environments. Set high standards and expectations for the "two-way video" ride of *your* life and the life of your students!

BEACON LEARNING CENTER: ONLINE LEARNING FOR K-8 STUDENTS

Barbara G. Eubanks and Kristy A. Rousseau

The State of Florida has demonstrated a commitment to increasing the academic achievement of each student through a number of educational initiatives over the last few years. Florida's Goal 3 Standards describe broad areas of knowledge and competence that high school graduates are expected to know as they enter the workplace. The Sunshine State Standards define what students should know and be able to do at various learner levels in specific content areas. Florida's Curriculum Frameworks further describe what schools will be held accountable for attaining, as measured on the Florida Comprehensive Assessment Test (FCAT) and Florida Writes.

Making the transition from a tradition of minimum competencies and selected-response assessment measures to more rigorous standards and performance-based assessments challenges Florida's teachers. To help students demonstrate higher achievement as envisioned in reform efforts, teachers need resources of innovative instructional tools and strategies. This is where technology fits perfectly.

Numerous studies on the use of technology for impacting educational reform herald the same message: Technology is most effective when clearly tied to curriculum, assessment, and instructional goals (Means, et a!., 1983). These findings are consistent with the message of many reform efforts and provide the basis for all activities of the Beacon Learning Center, an online curriculum resource center for students, teachers, and parents. The Beacon Learning Center, which is the focus of this paper, utilizes the best features of technology to improve student achievement.

BACKGROUND

The Beacon Learning Center (www.BeaconLC.org) began in November 1997 with a grant from the Technology Literacy Challenge Fund to develop Web-based curriculum activities for students of grade 3 mathematics. With the addition of Goals 2000 funding the following year, the purpose of the project grew to develop model lesson plans for teachers in grades K-8 in mathematics, health and social studies. The focus of development since that initial year has broadened to include more Web-based student activities for students of grade 3-8 in mathematics and language arts, and lesson plans for all subjects, K-12. As the Beacon project begins its third year, a new component will be added. Unit plans will provide a structure in which related lesson plans and students activities will be grouped.

An intense validation process ensures that all content meets stringent quality standards and tightly aligns the curriculum, assessment and instructional efforts. In addition, feedback from pilot teachers provides further suggestions for improvements to student activities and teacher lesson plans. By August of 1999, over 100 online student activities and approximately 250 teacher lesson plans had been approved and posted to the Beacon Website.

Beacon Learning Center, Bay District Schools, Panama City, Florida

A major goal of the Beacon Learning Center has been to create a user-friendly resource tool for both developers and users. A master database of all validated curriculum resources can be searched by keyword, Sunshine State Standard, Goal 3 Standard, or resource title. This feature makes it easy for the classroom teacher to quickly identify quality resources to match specific curriculum needs. The intuitive interface and descriptive features included throughout the Website help users easily navigate the site. Educators, parents, and students can choose to browse the site by audience or by content.

CONTENT

Teacher Lesson Plans

The Beacon Learning Center provides high quality model lesson plans tied to specific Sunshine State Standards. For example, a teacher interested in ideas for teaching benchmark MA.C.2.2.1--Understands the concepts of spatial relationships, symmetry, reflections, congruency, and similarity—searches for lesson plans by typing in the keyword "symmetry" or by selecting the exact benchmark identifier from a drop-down list. A list of related lesson plans appears, with a brief descriptor of each activity. "Boarding of Symmetrical Shapes," one of the lesson plan choices, begins with the students using the "Let's Learn Symmetry" online lesson, then provides a number of related activities that teachers can do with students individually, in small groups, at learning centers, or in whole-group sessions. The lesson plan concludes with a brief descriptor of how the teacher might formatively assess each student's progress toward mastering the benchmark.

Online Student Activities

Students using the Beacon Learning Center enjoy the benefits of computerized, individual instruction on content tied to the Standards. For example, one typical lesson introduces the concept of symmetry. The lesson begins with a graphic of a brightly colored butterfly, an image students can immediately recognize. The second screen displays the same butterfly with a line of symmetry drawn in, and accompanying text defines the concept of symmetry. On subsequent screens, the lesson presents additional information, accompanied by clear, colorful graphics. The lesson checks students' understanding as they progress through the screens; navigation is controlled to introduce new ideas by building on previous information.

A key feature of the online student activities is their strong similarity to FCAT and Florida Writes. In the symmetry lesson, for example, two types of questions are used: multiple choice and short response, as recommended in the FCAT Item Specifications Guide (p. 65). Multiple-choice answers appear in the form of drop-down boxes. Each choice is a "believable answer for someone who does not really know the correct answer," another requirement for FCAT items. Short response items are featured with open text boxes in which students actually type in their responses. The program uses a text search to look for keywords that were used to explain students' answers. Based on the presence or absence of any keywords, specific feedback is generated. The feedback provides suggestions or

additional questions to help students re-think their selections. In this way, Beacon lessons foster continuous improvement for students.

Responses to student choices do more than simply mark the choices right or wrong. Specific suggestions or additional explanations are provided for incorrect answers, and the student must try the item again. Correct answers also receive responses that reinforce the concept in question. Simply telling students that answers are correct or incorrect is not enough. Students need immediate and specific guidance to help them work through new ideas, and the individualized environment provided by the lessons places even more importance on that immediate guidance.

Unit Plans

As mentioned earlier, a new component of the Beacon Learning Center will be the inclusion of unit plans to connect various lesson plans and online student lessons into summative learning experiences and assessments. Specific academic and process goals, as detailed by the Sunshine State Standards and Goal 3 Standards will be taught and assessed. At least two authentic assessment tools will be provided to summatively measure student performance according to the Grade Level Expectations for the selected Sunshine State Standards. The instructional section of the plan will list the lesson plans, student online lessons, and other related Internet links integral to the development of the unit.

Other Features

When visiting the Beacon Learning Center, users can also take advantage of the Software Evaluation Library, a Website Review Library, Instructional Websites, Software Training Manuals, professional growth Training Modules, and a Guided Learning Center for directing student use and progress while using the online student lessons.

Striving to be a user-friendly, one-stop resource for educators, parents, and teachers, has required the Beacon Learning Center to maintain a dynamic process of growth and development. In keeping with the findings of the studies discussed in the Means report, each resource of the Beacon Learning Center clearly identifies and supports the curriculum, assessment, and instructional components being emphasized by the State of Florida. As student achievement takes center stage on the platform of educational reform, the Beacon Learning Center is there to spotlight the innovative and technological tools that can be implemented in the instructional process to help students demonstrate higher achievement.

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CHANGING TRADITIONAL UNIVERSITIES INTO UNIVERSITIES OF THE NEW MILLENIUM

Annette Lorentsen*

Changing universities into virtual universities of the new millennium represents a methodological challenge. Traditional universities are conservative institutions, not used to such radical change. Successful change thus presupposes a profound understanding of both the traditional and the virtual university culture, and an appropriate method for implementing change must then be selected.
In order to fully understand the challenges we shall meet in the change process, I shall in this paper first analyse the differences between traditional university culture and the new virtual university culture. The analysis will comprise the characteristics of distance education. Next, two interconnected challenges will be discussed in more detail, i.e. the new role of the university teacher and the change from traditional transmissive teaching models to collaborative, experiential and situated learning models in virtual distance education. Finally, I shall discuss the concept of structured concrete experimentation as an appropriate method for changing universities of today and gradually transforming them into genuine learning organisations of the next century.

TRADITIONAL AND VIRTUAL UNIVERSITY CULTURE

The traditional university may be characterised as a unique type of organisation, with its own standards, norms and ideals, living a life of its own, not totally but to a high degree separated from the outside world. It is in fact a conceptual cornerstone that the academic quality of the teaching and research activities going on at traditional universities does to a high degree depend on independence from influences from outside, i.e. from government, industry etc. Another important characteristic of the traditional university is the close relationship between teaching and research. Individual university professors simultaneously conduct research and teach a limited number of young students (Rasmussen 1998).
Today, this ideal of a traditional university is under pressure from different angles. Both politically and economically there is a need for more open and dynamic universities in a world of change. It should be mentioned that distance education activities – also those that are not located at specific open universities but are carried out within traditional dual mode universities - have always been a threat to the concept of the traditional university. Peters' (1973) comparison between distance education and industrial production clearly shows that distance education represents a culture different from the traditional university culture (market orientation, division of work etc.). Today the pressure against traditional university culture doesn't come from distance education activities alone - on the contrary. The development of the work force and of the enterprises in modern society depends on universities being able to deliver and update knowledge. Therefore networks between university and the outside world are a must, and 'lifelong learning' has to be implemented in the activities of universities. Inevitably, this radically changes the concept of the traditional university into knowledge institutions with a much broader range of activities than the two traditional core activities of teaching and research, and with a much more diverse target group for their study programmes. Such a university has to rely on flexibility, and on teams conducting a manifold of activities inside and outside the university.
The virtual university is part of such a modern university and shares its cultural aspects. The use of the Internet stresses the need for collaboration and team building.

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Internet supported teaching and learning furthers openness, and forces us to view the study programmes as whole programmes instead of as consisting of separate parts belonging to different professors. Therefore the virtual university culture becomes a highly communicative culture, where solutions have to be found in teams, preferably through communication and negotiation.

CHANGING LEARNING MODELS AND TEACHER ROLES FOR VIRTUAL DISTANCE EDUCATION

Traditional distance education has relied on transmissive teaching models supported by high quality teaching materials and the use of one way mass media. However, the idea of educational dialogues as a bridge between teaching and learning have existed and have, within the overall transmissive model, been used, primarily as a guided didactic conversation, internally within the individual student, initiated by study materials with built-in questions, activities etc, or as tutor-student talk in regional teaching sessions. (Holmberg 1995)

Modern society, however, calls for a new paradigm of knowledge acquisition, focussing on learning by the individual throughout his or her life. Within this context, ideas from the experiential and the collaborative learning paradigms must gain importance, successfully combining important elements of modern knowledge acquisition such as action, reflection, collaboration and learning. (Kolb 1984; Koschmann 1996; O'Malley 1991). For adults, learning at work or learning integrated with work (Lave/Wenger's situated learning (1991)), supported by distance education activities, will be a crucial learning setting of the future. Therefore distance education programmes must change and in the future take their starting point in supporting learning processes, incorporating ideas from experiential as well as collaborative and situated learning.

This means, however, that the role of the distance teacher will have to change dramatically. Guidance and support will have to replace transmittance of knowledge. Therefore teachers have to find new role models, their own teachers or older colleagues being outdated as such. A new understanding of the crucial qualifications of this new teacher role has to be established and generally accepted. One may go in different directions to seek inspiration for the modern distance teacher role (the sport coach, the organisational change agent etc.). At present, some important competencies of the successful distance education teacher of the future might be (inspired by Buchanen/Boddy's description of the expertise of the organisational change agent):

- A profound knowledge of learning (as opposed to teaching) and of the principles and learning implications of available learning resources
- Team building abilities and networking skills for establishing effective working groups (for teachers and for learners) and for supporting collaboration in teaching/guidance and in learning
- Highly developed interpersonal skills, comprising both empathy (being able to listen and to identify ideas, objectives and concerns of others) and excellent communication skills (being able to express personal enthusiasm, manage conflicts, support collaboration, and stimulate motivation and commitment)
- Flexibility in responding to changes.

Such radical change in the teaching/learning paradigm and the teacher roles and qualifications will not take place unaided. The university must take measures to further the process. Simultaneously, appropriate methods have to be formulated in order to overcome the resistance against change and for change to become successful.

STRUCTURED EXPERIMENTATION AS A METHOD OF CHANGE

A key theme in modern organisation theory is organisational change. In the effort to find theories and methods relevant for the change of a university – universities being the kind of organisations described above – one has to abandon traditional concepts

of organisations (focussing on structures) and of organisational change (focussing on a technical-rational change approach based on planning and management). Instead, one should turn to a change model that stresses change processes in a humanistic *and explorative* change perspective (Borum 1995a and b).

In accordance with this, both individual and collaborative *learning processes* of university staff and students should be furthered as a prime element of university change. One may turn to Senge's theory of *the learning organisation* (1990) and his five learning disciplines and to Schön's reflective practitioner (1983) for inspiration.

A crucial element of success in such change processes is the creation and use of a competent, locally suitable so-called *change agent*, supporting the change processes (Buchanan & Boddy (1992)).

At Aalborg University, Denmark, an IT Innovation programme has been initiated in 1998, adhering to such modern principles of organisational change (Lorentsen/ Christensen 1998). The University Senate created an *IT Innovation Center* to play the role of the change agent. In all departments, study programmes, and administrative units of the university, learning processes are generated through concrete experimentation in de-centrally located projects (Dirckinck-Holmfeld/Lorentsen 1999). During the first year 60 projects were registered, involving several hundred staff and students. A considerable part of the projects lay within distance education. Each project experiments on its own, supported by consultants representing the change agent, and the projects share their results and experiences at seminars and workshops. Such concrete experimentation has proved to be an appropriate method for combining de-central initiatives and responsibility with a centrally structured transfer of experience between projects. The task of the IT Innovation programme will be to gradually further an expansion of the number of projects in order to transform Aalborg University into a truly dynamic learning organisation of the 21st century, with staff and students actively participating in the creation of their own reality (Senge 1990).

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CPR™ AND THE MOLSCI PROJECT: WEB-BASED WRITING, PEER REVIEW, CURRICULUM DEVELOPMENT, AND DISSEMINATION

Orville L. Chapman°
Michael Fiore*

Scientists must write. Most science educators readily admit this fact, but few incorporate technical writing into their courses. Calibrated Peer Review (CPR)™ software brings technical writing and peer review broadly to the educational experience. CPR has special value in large courses. Peer review provides a valuable tool and enhances the "scientific writing experience" in undergraduate education (Koprowski, 1997). CPR goes beyond simple peer review. Students must be calibrated before they review their fellow students' work. This calibration assures a base-level competency.

CPR achieves several key educational goals. CPR provides ample opportunity for regular student writing about science and about issues that impinge on science. Students write in a professional context-publication. Students receive feedback on the content and clarity of their writing, and they read exemplars of good scientific writing on the same topics about which they have written. Regular critiques of student writing show students what matters in peer review of manuscripts and proposals. In addition, students learn crucial skills such as abstracting, reading for content, reviewing, and self-evaluation. CPR leads students to think more carefully about important areas of molecular science and encourages students to ponder ethical, moral, and policy issues that impinge on molecular scientists.

Calibrated Peer Review comprises a set of network tools that manage all aspects of the peer review process. CPR can manage the entire process without instructor intervention, and it enables the instructor to enter writing assignments. Even the latter process minimizes faculty work. CPR provides a tool for entering new writing assignments with the necessary calibration documents and review questions. The program manages all student documents, provides peer review documents, enables self-review, and creates both student and instructor reports. If an instructor wishes, he or she can use writing assignments from the library of writing assignments that CPR provides. Currently, the library comprises fifteen assignments, and we are constantly adding new assignments to the library. Some of the assignment topics include: the chemistry of vision, the importance of symmetry, the moral, ethical, and policy decisions that arise from the fact that almost every academic scientist involved in biotechnology is also involved in the commercialization of biotechnology. We expect the assignment library to contain more than 100 assignments by June 2000. These assignments will cover

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multiple disciplines and multiple educational levels.

The student begins the CPR process by submitting electronically his or her writing sample. CPR, in turn, presents the first calibration document, which the student reads thoroughly. The student then answers a series of content questions about the document. When the student has finished the content questions, he or she answers a series of simple questions about writing style. CPR then presents a second document for similar review and then a third document for review. The student then ranks each document giving one a top ranking, one a middle ranking, and one a bottom ranking. The documents are prepared so that one is an excellent example of scientific prose, one is a modest example, and one is unsatisfactory. If the student ranks the documents correctly and answers the questions sensibly, that student is considered "calibrated" for review on this subject; if not, the student is given instruction in peer review and must then repeat the calibration process. After student calibration, CPR then delivers successively three peer documents for review, and the student repeats the review process with one change. In ranking student documents, the student ranks them from 1 to 10, with 10 the highest score. Finally, the student repeats the review process for his or her own document. CPR then compares all reviews and reports the average score and the four individual rankings. The program red flags the instructor if serious disagreement among rankings exists. CPR also reports to the student how he or she did relative to other peer reviewers of the same document and how the self-review compared to peer review. At the instructor's option CPR will also report the peer reviewers' answers to the content and style questions.

What does CPR accomplish? Students gain experience in writing about molecular science. They learn to read carefully for content. They learn to evaluate critically both peer writing and their own writing. In CPR, students encounter ethical, moral, and policy issues in molecular science. Finally, CPR achieves all of these good things with little or no additional faculty work.

What does the future hold for CPR? We have made CPR available to all interested parties. The CPR web site (http://cpr.molsci.ucla.edu/cpr/) contains all necessary information for using CPR. We are actively expanding the library and improving the core CPR technology. These improvements will insure that CPR is more broadly available and powerful.

ACKNOWLEDGMENTS

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GRADUATE COMPUTER EDUCATION: PAST, PRESENT AND FUTURE

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At Northwest Missouri State University, graduate computer education has existed since 1980 with the establishment of a Master of Science degree in School Computer Studies. This degree was designed specifically for teachers who were either currently teaching high school computer classes or were planning to implement computer classes in their schools. Since that first degree program, and based upon graduate student expectations and preparations, two significant revisions in curriculum and delivery methods have brought the program through the 1990's.

As we prepare for the 21st century, the interest in distance learning, Internet availability, curriculum topics, and modified student expectations are each having an impact on the next revision of this degree program. This paper will discuss the current issues of graduate level computer education using a twenty-year history to analyze the problems and to help prepare for the next generation of computer education students.

BACKGROUND

At Northwest Missouri State University, graduate computer education has existed since 1980 when the Department of Computer Science established a Master of Science degree in School Computer Studies. This degree was designed specifically for teachers who were either currently teaching high school computer classes or were planning to implement computer classes in their schools. The students, who completed this degree during the early 1980's, of which there were over 100, reveled in the curriculum which placed heavy emphasis on computer science. Also, their academic preparation and intense motivation allowed them to successfully complete the fifteen credits of programming courses, six credits of statistics, a three credit research component, a two credit seminar on computers and society and six credits of general electives.

At the time there were very few masters degrees offered in the Midwest that included such intense computer science courses. Fewer yet were available during the summer months and were specifically designed for high school teachers. This School Computer Studies degree served such a focused clientele.

PROGRAM EVOLUTION

During the middle part of the 1980's some of the students who entered the original School Computer Studies program were not as interested in computer science but were more interested in a combination of computer science and education. In an attempt to meet the expectations of this growing population, the department designed two alternative degrees which combined some computer science courses with an already established set of core education courses. This change in focus produced two degrees titled Masters of Science in Education-Teaching: Educational

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Uses of Computers and a degree titled Masters of Science in Education-Teaching: Using Computers in a Specific Discipline.

The difference between these two degrees was the amount of computer science. Since both degrees included the same twelve credits of graduate education courses and six credits of general electives, the remaining fourteen credits of courses were designed for the two different audiences. The first audience consisted of teachers who were quantitatively inclined. The Educational Uses degree included eight credits of computer science and six credits of computer education. The second audience was interested in less computer science and more computer education courses. The Using Computers degree included eight credits of computer education and six credits of approved electives not necessarily in computer education.

This two-way proposal met with moderate success and over 100 students successfully completed the modified programs. At the same time the enrollment in the School Computer Studies program was continuing to decline to the extent that the alternative programs had larger enrollments. After several years of small enrollments and a challenge to optimize the graduate offerings of the department, another curriculum revision was designed and implemented.

The department now offers two graduate degrees in computer education. The original School Computer Studies degree has been modified to contain a set of five core computer education courses totaling fourteen credits, six credits of electives, and twelve credits of graduate level computer science courses. This degree appeals to only a small group of students who have the interest in studying advanced computer science and computer education.

The modified Master of Science in Education-Teaching: Educational Uses of Computers degree contains twelve credits of graduate level education courses, six credits of general electives and the same fourteen credits of core computer education courses used in the School Computer Studies. Based upon the interests and the abilities of the students in the program, this combination degree meets the expectations of the students and the objectives of the faculty.

MOVING TO THE WEB

At the present time Northwest Missouri State University is entering the distance learning arena. Attempting to move a degree program to the web involves much more than simply redesigning course materials for delivery across the Internet. Much of the effort in such a move is highly political in nature. For both masters programs in computer education, convincing faculty in the affected departments that their courses can be moved to the web while still maintaining quality has been a challenge. Specifically, the courses associated with the College of Education require a longer development time because of the need to broaden the level of participation of its faculty members in online courses.

Due to the nature of the politics involved, the initial phase of moving courses to the web is being restricted to the core graduate-level computer education courses. These five courses cover the areas of software applications, programming, multimedia, networking and seminar/research.

Once fully developed all of these courses can be delivered on the World Wide Web using the course management software program CourseInfo from Blackboard, Inc. Some of the key features of this software package are:

- asynchronous communication (threaded discussions)
- synchronous communication (real-time chat and whiteboard)
- assessment tools and gradebook (quizzes, exams and project grades)
- collaborative work groups (group projects)
- content creation (syllabus, course description pages, lecture notes, PowerPoint presentations, tutorials, etc.)
- database reporting and course site statistics (tracking student usage)
- messaging system (e-mail notification and correspondence)
- online file exchange (between instructor and student and between students)
- online tutorial (training in the use of CourseInfo)

By moving to the creation of the online versions of the core courses in the CourseInfo system, we have found that the development time has been significantly reduced. This is primarily due to the fact that much of our course materials are already in electronic formats that are quite suitable for delivery in their present forms. This, therefore, enables us to concentrate more on revising our materials (versus creating them) to include advanced instructional technology features (such as multimedia, sound, and video). In the process we have also moved to place the course materials in modular formats so that we can more flexibly integrate the materials across several course offerings in the department.

Some of the other issues we've had to deal with include:

- textbook delivery—Have students purchase their textbooks through Missouri Bookstore Store Direct
- online testing—Focus more on project-based evaluations and frequent online quizzes
- faculty release time—Apply for funding from the campus faculty technology center for the hiring of adjunct faculty to provide full time faculty release time

CONCLUSION

Overall, the masters degree programs in computer education have been very successful in meeting the needs of their constituencies. However, the advanced study needs of practicing teachers continue to change. In order to meet these needs, the department is modifying the Master of Science in Education degree in order to comply with the National Council for Accreditation of Teacher Education and International Society for Technology in Education standards. This curriculum effort is continuing at this time. With the movement of our graduate programs to the World Wide Web and the updated curriculum, Northwest will continue to be positioned to meet the demands of graduate-level computer education students.

IMPLEMENTING AN MBA ON THE INTERNET: INSOURCING DEVELOPMENT AND TEACHING AND OUTSOURCING WEB HOSTING

Stanley L. Kroder, Ph.D.

ABSTRACT

The University of Dallas (Texas) (UD) began offering graduate credit-bearing courses on the Internet in the fall of 1997. Three courses and thirty students were involved in the first semester. By the fall semester of 1999, at the time of the ICTE meeting, UD will have 12 graduate courses, 20 sections, and approximately 500 students taking courses on the Internet. UD has committed to offer the full MBA by 2000. We have named this the IMBA (http://imba.udallas.edu). The first degrees offered in this venue are Electronic Commerce, Information Technology and Telecommunications.

This paper discusses the methods used to develop, teach and administer Internet courses using university resources--insourcing. UD has chosen to outsource the Web hosting for all aspects of this program. The reasons for selecting this option, and the issues and procedures implicit with this course of action, will be explored. The paper will stress the pragmatic and pedagogical aspects of this significant undertaking.

BACKGROUND

When UD began offering graduate management credit bearing courses on the Internet, we made the decision to outsource the Web hosting and Internet support. Initially, UD and Pace University (New York) formed an alliance for this purpose. UD professors were responsible for course development and teaching, while Pace University School of Computer Science and Information Systems provided the hosting support. Over a period of six semesters, the UD-Pace alliance demonstrated that the Web support required for Internet education can be outsourced effectively. This is a demanding requirement. Considerations include:

- Seven days a week, 24 hours a day support by highly trained staff members.
  Enormous peak loads on the system during the evenings and weekends when UD's part-time MBA students take their on-line courses.
- Issuance of user ID's and passwords for a new set of users every semester.

The university offering Internet-based courses must either be prepared to support this complex, capital-intensive and skills-intensive hosting requirement or locate the appropriate partner.

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STRATEGY

Our partnership with Pace University proved the feasibility and desirability of outsourcing. We were able to get off to a fast start without a major investment in infrastructure or specialized staff. We look upon this two-year period as a pilot project that prepared us to move from an Internet-based five-course Telecommunications Management Certificate Program to a full MBA on-line.

In the spring of 1999, we investigated outsourcing alternatives for Web hosting of the full MBA. Since Pace University offers an MBA, continuing that partnership was not possible. UD selected eCollege.com (Denver, Colorado) for Web hosting this significantly larger undertaking. They were prepared to support us during our period of expansion. The first 12 courses were developed over the summer and launched in the fall of 1999. UD has an aggressive plan to add courses at the rate of approximately 10 per semester for the next four semesters to round out the MBA offers. Beyond that, UD plans to continue to add courses and programs to the Internet based on demand.

COURSE DEVELOPMENT

UD professors began their task of converting courses to the Internet with a class on instructional design taught by eCollege.com. For many, new skills were required. They were all subject matter experts and teachers of the course that they were converting for the Internet. Lectures had to be presented in text or PowerPoint slides, with or without audio. The design assumption was that the students and professor would not need to be on-line at the same time. Using the asynchronous distance learning approach, interaction with students was implemented with a threaded discussion method or email depending on whether the communications is public (i.e. class discussion) or private (i.e. between teacher and student).

eCollege.com starts by setting up the course shells on the Web site. Professors can manage the course creation process themselves or send materials electronically to eCollege.com for a web-master there to do the necessary conversion from Word, PowerPoint or audio files to HTML for inclusion in the on-line course. Some professors relied extensively on this conversion assistance, while others did most of the work directly in HTML themselves. The eCollege system has a Course Manager software package that professors can use to develop new materials or modify those that are on the Net already. For those who are not interested or unsure of themselves, the web-master at eCollege.com is available to do maintenance of course materials under the direction of the professor. Others are controlling maintenance themselves.

The dominant lesson from this first semester of significant development is that it is time-consuming. The professor has to rethink the teaching strategy for the Internet. Biweekly meetings of the development team were held in order to share

ideas and approaches. Again, the instructional designers at eCollege.com were helpful in reviewing our approaches and suggesting new ones.

TEACHING

Next, the professor must learn how to interact, coach, encourage and evaluate the students' work. Of these, the most important task for the professor is that of tracking students' interaction on a week-by-week basis. They must not be permitted to "hide." Students need to receive feedback from the professor regularly. They must be made aware that their work is important to the professor, and that they can expect to receive comments and feedback regularly. Since the professor must review the work of all students on a continuous basis, we have found that the class size needs to be in the order of 20 students. When demand for a class exceeds that threshold, various approaches are used to control the class size. Most obvious is the division of the total demand into two or more independent sections. Alternatively, the professor may work with a graduate assistant who can perform some of the more clerical and computer oriented tasks. Ultimately, students' believing that they are important to the professor is a major determinant of the program's success.

ADMINISTRATIVE SUPPORT

The University of Dallas' administrative support system was designed long before the Internet. As a result, much work was required on the part of the support staff to register students on-line. First and foremost, correct email addresses are required for all students registered for Internet classes. Even if the email addresses are in the students' file, they may not be up-to-date due to changes in ISP's or employment.

The students are advised, via email, of their student ID and password. Time is required for them to check out the learning site. Most of our students have knowledge of the Internet; however, there is a learning curve to navigate and use all the tools that are required within the course. In fact, to facilitate this learning, we schedule the first class "week" to be longer than all the rest. The first week is 11 days long (from Monday, the first day of class to the following Thursday) to allow time for all students enrolled in the class to learn the "ropes."

SUMMARY

The demand for the IMBA has taken us by surprise. In one semester we went from 125 students on-line to nearly 500. The dominant reason given is convenience, since our student body has many competing interests for their time. We saw no alternative but to in-source course development, teaching and administration. However, we are convinced that the decision to outsource Web hosting was absolutely the right one.

INCORPORATING STREAMING VIDEO INTO INSTRUCTIONAL WEBS

Jerald D. Cole*

ABSTRACT

This Article describes how to incorporate streaming video into instructional Webs. Streaming video is a relatively high quality/low bandwidth format suitable for asynchronous Web-casting. The production system utilizes a digital video camera and digital capture card for recording, and a non-linear video editing system and streaming video producer for post-production in streaming video format.

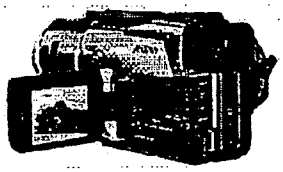
BACKGROUND

With the deployment of a Real™ G2 streaming video server in the summer of 1999, the New York Institute of Technology realized its goal of providing the capacity for instructors to deliver video lectures in an asynchronous format. This capability augments the institution's synchronous broadcast facilities, which have for years served in the delivery of televised instruction in its distance learning (**DL**) programs worldwide. Links to streaming videos add a significant dynamic to traditional Web-based delivery. Streaming video effectively adds the sense of *presence* previously lacking from online vehicles, such as text-only threaded discussion lists, listservs, or "chat" areas. Watching a recorded lecture is almost as good as being there. Research has shown that 90% of the questions that a participant might have asked during a "live" lecture are anticipated by an audience member in recorded lectures (Willis, 1994). In fact, the ability to time-shift lecture viewing to accommodate the schedules of busy students, and the capacity to pause or replay segments is in the estimation of many a critical development. It may mark, at long last, a fundamental paradigm shift leading to the acceptance of DL as the preferred manner of tuition.

HARDWARE

A significant drop in the cost of components needed for streaming video production in the past 6 months has put the technology within reach of consumers. The author's forays into this realm began with a lot of reading, shopping around, and discussion with colleagues who had experimented on their own. The best advisory for purchases of system components turns out to be an online source, Deja News at http://www.deja.com. Here, consumers give candid feedback on products based on their experiences.

It immediately becomes evident in a visit to the local video store that the consumer camcorder world is transitioning from analog to digital. The entree of digital camcorders instantly obsolesces analog technologies. Sony, JVC, and Panasonic, to name a few, offer competitive cameras based on the new Digital8 standard. The author chose a Sony DCR-TRV103, pictured at left (best price at B&H Photo online at http://bhphotovideo.com, $650) thought for an additional $100, the DCR-TRV310 with its larger LCD display is the better value. The LCD screen swivels 180° which is handy



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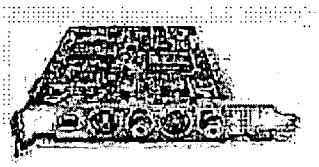
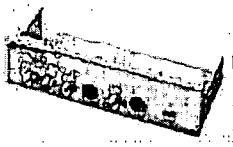
for monitoring oneself while on camera; as a rule, the larger the display, the better. Both models feature S-Video jacks (in addition to standard composite), which are a "must."

The new breed of Digital8 camcorder records *in real-time* seventy minutes of video compressed at a ratio of 5:1 *in the camera.* The video is then played back through an industry standard IEEE i.LINK firewire into the computer via a digital capture card. Capture cards come in analog and digital flavors, but since digital camcorders do the work of digitization and compression in the camera, the task of the capture card is reduced. Thus, it makes *no* sense to buy an analog card these days (they cost on average 3 times as much since they effectively have to "do" what the newer cameras do internally). One can always transfer an analog recording to a digital camera by interfacing through a standard RCA composite or S-Video cable.

Again, after consulting colleagues (one of whom claimed to have wasted over $2,000 on experimental hardware) and consulting Deja News, the author opted to buy a Canopus DV Raptor card, pictured at right (best price, Video Guys at http://www.videoguys.com, $625) which rated better than a comparable offering by chief competitor Pinnacle Corporation. All capture cards at this price-point use the computer's sound card for audio capture/playback (SoundBlaster Live! is the reigning champ at this time, $79). A handy item that turns out to be a must is a breakout box, illustrated to the left. Breakouts allow one to interface the camera to the computer from the front of the system unit, without having to fiddle around with connectors at the rear.





Once you "have it on tape," the Digital8 video source must be recorded by the capture card onto the hard disk. It is necessary to have a drive with sufficient capacity and speed. If your PC was purchased prior to January 1999, you may need to buy another drive. Pentium motherboards prior to that time did not universally support ATA/33 or ATA/66 drive technologies. (If it is touted as a "multimedia" drive, it is probably sufficient.) Since one hour of compressed video translates into 13 gigabytes of storage, buy drives in increments of roughly 13 gigs. A 20-gigabyte drive is a practical minimum for holding the software plus captured video segments. The top contenders in the storage arena are Western Digital (http://www.weterndigital.com) and Maxtor (http://www.maxtor.com). Whatever your choice (Maxtor offered the better price-performance ratio at the time of the author's purchase), ATA/33 drives operating at 5,400 RPM are minimally sufficient, while ATA/66 drives at 7,200 RPM are preferred. If your vintage (pre-1999) motherboard does not support the ATA/66 standard, there is an add-on PCI controller available from Promise Technologies (http://www.promise.com, $49) that will enable your system to accommodate it. A benchmark utility called Raptest is available for free download at the Canopus site (http://www.canopuscorp.com) that will perform a quick test to help you determine if your drive is fast enough. When working with DV data, a sustained transfer rate of at least 4.5 MB/second is required. Ultra Wide SCSI drives (and the requisite controllers) are an expensive, but unnecessary alternative. Most ATA/33 drives have a sustained transfer rate of 12 MB/second, which is more than sufficient.

A final consideration is the video card, which should be an AGP-type adapter. It must support DirectDraw in hardware and DirectDraw overlay to enable monitoring of video

playback in real-time while downloading clips from the camera. Capture card manufacturers will typically list compatible adapters on their Websites for shoppers (see for example http://www.canopuscorp.com/video2/compatibilty.htm). This allows you to pre-select segments prior to capture, saving both time and storage space.

SOFTWARE

With the digital source resident on-disk, one enters the post-production phase. Most capture cards come bundled with Adobe Premiere™ (http://www.adobe.com), a low-cost, but flexible non-linear video editing system. Premiere allows one to splice segments, add transitions and other special effects, and blend in audio tracks. A title generator is built-in, allowing for rolling credits and the like. The resulting video may then be output in a plethora of video formats (Marchant, 1997), but for streaming video, the usual choices are Microsoft's Audio-Video Interleave (**AVI**) format or Apple QuickTime (**MOV**).

A wonderful utility for capturing computer screen interactions in AVI or MOV format is Hyperionics' Hypercam. This shareware lets you easily select the screen area you wish to record and then "live capture" the region with mouse movements and audio. With a good mike you can simply voice over while recording (http://www.hyperionics.com).

As a rule-of-thumb, it takes at minimum 2 hours of editing to produce one hour of video (Johnson, 1994). It then usually takes upwards of an additional hour to output the resulting production to disk/tape. The process is still not complete, however!

The final step is to convert the video into streaming format. Acting as a filter of sorts, streaming producer programs basically read in the digitized video, and output a streaming version to another file. Here you have two choices: RealVideo™ by Real, Incorporated (http://www.real.com, basic—free, enhanced—$149), and Apple Computer's competing "Streaming QuickTime" (http://www.apple.com, $29.95). Real format is more ubiquitous. The cost of the streaming video *server* software that will furnish your content is another consideration (Jones, 1998). Apple QuickTime streaming server is free of charge while Real Video Server costs $1,995. QuickTime server currently only runs under Macintosh OS/X, however, though its source code is freely downloadable. The source is touted as being cross-compilable onto other platforms, such as Wintel and Linux.

Upon conversion to streaming format, the finished video is ready to be FTPed and hyperlinked (via a standard HREF) to your target Website.

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INDIVIDUAL ACCESS APPLICATIONS: TRANSITION FROM TRADITIONAL TO ALTERNATIVE INSTRUCTIONAL DELIVERERY METHODS

Marty Bray*

Claudia Flowers*

Institutions of higher education, which have traditionally required students to attend classes on campus at specific times, are beginning to offer classes via distance education. At one medium-sized university, this growth in distance education placed a strain on the audio/video facilities. To address this problem, the university initiated a summer program to explore the possibility of reducing faculty/student contact time that would free up the audio/video facilities.

Traditionally, distance education has referred to delivery of instruction through a two-way teleconferencing system. This method of delivering instruction is expensive and limits the number of classes that can be offered. In response to these problems, the university encouraged faculty to investigate possible alternatives for delivering course instruction. A stipend was offered as compensation for this activity and additional stipends were offered to those faculty willing to redesign and develop their course so that at least 50% of the course material could be presented outside the two-way teleconferencing facilities. The goal of the summer program was to explore asynchronous alternative instructional delivery methods, called individual access applications (IAA). The purpose of this paper is to present the planning process and outcomes of the summer program.

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PLANNING PROCESS AND ACTIVITIES

Initially, the Dean of the College of Education, the Director of Continuing Education, and select faculty met to discuss the objectives for the summer program. A series of objectives were defined for the project. These objectives were: (1) provide an overview of individual access applications; (2) learn about possible individual access applications, including Web-based applications and the implications for faculty, students, remote sites, and technical support; (3) demonstrate IAA based activities currently being used by the College of Education faculty as well as faculty at other institutions; (4) decide which courses are suited for IAA delivery; (5) identify the type and degree of technical assistance necessary to support courses; (6) develop sample exercises for the courses to be delivered; and (7) develop specific program proposals for future development.

In response to these objectives, the authors of this paper developed a series of activities that would help to meet the stated objectives. The activities took place both during three formalized meetings and independent exploration activities. The first meeting introduced faculty to the history of Web Based Instruction (WBI) and the tools used to develop and deliver WBI. Then, the faculty were asked to utilize some of these tools and explore some sample sites. At the next formal meeting the faculty were asked to brainstorm some of the good and bad practices they saw as well as ways in which they could use the tools in their own instruction. The faculty then independently developed matrices that matched course activities and objectives to appropriate IAA alternatives. During the final meeting the faculty were to identify training needs, hardware needs, additional release time needed, and the courses for which they could develop IAA activities.

CONCLUSION

At the conclusion of these activities, the faculty were to submit a list of the courses that would be adapted for at least 50% IAA. Interestingly, few faculty members were willing to adapt their courses until several questions were answered. First, who owns the "intellectual property?" Second, what technical support would be provided? Third, would there be technical support for the students? Fourth, who would support the hardware? Fifth, who would support the software?

A few faculty who plan to develop IAA based courses plan to use several of the IAA tools discussed during the summer sessions. These tools include the

publishing of course materials such as syllabi via the World Wide Web, the creation of online discussion sites, exploration of web based presentations using PowerPoint or streaming video, and the use of internet based teleconferencing to interact with students. By incorporating activities into their courses it is hoped that the faculty will achieve the goal of delivering at least 50% of their courses via IAA These faculty will be developing and field testing these application during the 1999-2000 academic year.

FORMAL DESCRIPTION OF COMPUTER COURSEWARE

Jaak Henno[1], Hannu Jaakkola[2], Jari Multisilta[2]

ABSTRACT

There is great need for courseware description language, which would allow describing computer courseware in an implementation-independent manner. This would allow to study courseware design before implementation, systematically introduce design methods based on learning/instruction theory, separate knowledge entities from instruction/interaction framework and thus enable to use the same knowledge entities with different modes learning/instruction (presentation, assessment) and enable to re-use both the knowledge objects with different learning/instruction frameworks and instruction shells with different subject domain knowledge.

INTRODUCTION

The use of computer courseware, Computer-Based Training (CBT), Computer-Assisted Learning (CAL) etc is rapidly increasing. In 1997, CBT accounted for 15% of total training effort of American business, government, and education institutions (from all questioned organisations in USA)[i] and CBT market was witnessing a 38% annual growth; already in the next year[ii], average percentage of training effort delivered via CD-ROM or LAN-based CBT was estimated 23% and 80% of respondents said this type of training delivery was growing in their organisations. On university level[iii], percentage of classroom and online delivery is expected to be equal by year 2000.

Thus more and more trainers, teachers, university professors get involved in creating computer courseware. Quite often courseware created in one university or for training needs of enterprise remains in this university or enterprise, i.e. the distribution level of courseware is very low. Courseware designers learn best from existing examples, but if those examples are not distributed, they also do not help to raise the general design level. Creation of computer courseware is still very implementation-dependent and very labour intensive: "... computer-based multimedia interactive instruction, is too labour intensive usually requiring more than 300 hours of development for a single hour of instruction"[iv] One of reasons for is uniqueness of every implementation, currently re-use of successful designs is at very low level.

Evaluation of courseware only after implementation has also other weaknesses. Even when courseware is reviewed or shown on exhibitions, quite often "cool" multimedia features and visual effects are considered far more than systematic, based on learning/instruction theory design.

To discuss design virtues and to help distributing and re-use of successful designs there should be methods for formal description of courseware, its content and user interactions. Such descriptions allow to pre-program courseware shells and thus allows subject matter

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experts to design effective computer-based, interactive multimedia without requiring them to have extensive training in instructional design or authoring systems.

Currently, most often the courseware design is described using text-based storyboards. There are several problems with such informal descriptions. They are

- often implementation-dependent, e.g. in the above description: "window", "viewer", "highlighted" (some authoring/implementation environment may not allow these constructs); therefore implementation in different computing/operating environments becomes very difficult;
- leave many things ambiguous or are too specific - what is "panel to the left" and why the "left" is better than "right", "below" or "upper"?
- are (in most cases) topic-specific, i.e. can not be re-used for teaching/explaining other similar tasks;
- the purely descriptive (what happens on screen at run-time) representation does not allow distinction between instruction/teaching style (i.e. user interactions) and exposed data (knowledge objects), what makes it nearly impossible to check soundness of design according some learning/instruction theory; this also often results in cognitively difficult to understand screen and interaction designs and makes very difficult collaborative authoring, which is very desirable because of labour-intensity of courseware design and implementation).

Thus storyboard-style informal and implementation-dependent descriptions do not allow evaluate courseware design before implementation, compare different design decisions and re-use successive designs. It is very difficult to base design on some established learning/instruction theory, since it is very difficult to understand in the above description, which decisions were made because of theory predictions and which because designer thought this to be "cool". It does not provide guidance for interaction design and does not specify an adequate syntax for knowledge representation and is therefore not adequate for computer-based interactive instructional multimedia development. With the storyboard method, every courseware application can basically be adequately evaluated only after it has been implemented. But after implementation, implementation features (visual appeal, "cool" multimedia tricks and other implementation features) often "screen off" theory virtues, hinder evaluation of instructional value of design. The situation is somewhat similar to the famous "no significant difference" discussion about value of different media in instruction[v]. There is abundance of learning theories, e.g. [vi] provides overview of 50 learning theories, but it is very difficult to evaluate value of any theory using some already implemented courseware. Hopefully virtues of theory, level of application of a theory etc can be better evaluated using a formal description of a courseware.

PRINCIPLES OF COURSEWARE DESCRIPTION LANGUAGE

The proposed formalism for courseware description should allow to describe courseware on implementation-independent level, so that the visual design, "cool" multimedia/technical tricks can not influence evaluation of the design, only some implementation guidelines are provided. It should be possible to consider basic features of design: subject domain knowledge representation and quality of instructional interactions (instructional design) before any implementation; it should also be possible to re-use successive elements of design or re-implement courseware (e.g. when there appear new multimedia technologies).

The main target of this proposed method is description of possible interactions. This allows implement instructional methods, proposed by learning theories[vii][viii]

The description should make it possible to describe and classify semantically different interactions. Interactivity is one of the worst understood features of any software[ix],[x] and often causes conceptual difficulties in understanding intended functionality of courseware. The formalism should allow to describe interaction structure of a courseware application and to classify different types of interactions - navigation, providing further (deeper) explanations, providing parallel (using a different media or language level) explanations, implementing a prescriptions of a learning/instruction theory for different instruction modes (presentation, exploration, practice) etc.

Interactive multimedia courseware has complicated structure. Courseware is a special case of interactive hypermedia, and all interactive hypermedia applications have at least these three "inner" structures[xi], [xii]:

- conceptual structure of the subject matter
- material organisation (presentation) structure; in courseware the presentation should correspond to Instruction (learning) Theory.
- appearance - user interface (visual design), "cool" multimedia tricks.

The proposed formalism is based this observation and targeted to describe the first two levels; only some guidelines are given for implementation (implementation level also changes most rapidly). Conceptual structure of subject matter corresponds to database of so-called knowledge objects and the presentation structure should be based on some learning/instructional theory. Unfortunately, there are quite many theories (aimed for different types of learning/instruction); of all learning/instruction theories, the presented method seems to be most close to principles of the Instructional Design Theory of M.D. Merrill[iv]:

- "subject matter is data and as data it can be uncoupled from the instructional strategy used to teach this subject matter"[xiii]
- "there is a number of different kinds of instructional transactions and the same data (knowledge objects) can be used with different instructional transactions, and the same instructional transactions can be used with different data (knowledge objects)"

Thus the main difference of courseware (compared to arbitrary hypertext) is that there are (at least) two type of links (user interactions).

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ODL PEDAGOGY, ORGANISATION AND TECHNOLOGY: A REVIEW

Philip Crompton, Simon Booth and Duncan Timms*

This paper was part of a larger state-of-the-art review of both the pedagogy of Open and Distance Learning (ODL) and current practice in the field, with particular reference to the use of communications technologies. It concentrates more on the practice and how other practitioners of ODL are using the technology and reports the findings of a questionnaire distributed in Europe, USA and Australia.

Technology has proven in the past that it can revolutionise the way people learn. With the increased adoption of the Internet and the World Wide Web there is some indication that fundamental changes in how teaching, training and self-directed learning will change. One of the purposes of the report was to illustrate the bridging of the gap between multimedia communication technologies and their application for educational and community purposes. Technologies have become more readily available, costs have decreased, ease of use has improved, and a rich variety of examples have been generated by the Internet's rapid growing user base. At the same time, societal factors such as high unemployment, need for retraining and multi-skilling, shortages of tertiary education places and funds, and demand for the delivery of information at lower costs, create opportunities for innovative applications directed towards educational and community purposes. Nevertheless, there is a gap between availability and the readiness of technologies, and the deployment of applications that meet end-user needs. Data was collected by means of a web-based questionnaire.

SURVEY

The aim of the questionnaire was to investigate the development of open and distance learning (ODL) delivered via communications technology. The methodology was to survey a sample of individuals engaged in delivering ODL about the various approaches, experiences and attitudes towards ODL in relation to three main areas: a) Pedagogy, b) Organisation, and c) Technical. The questionnaire was split into three sections. Section One covered general details about the respondents whilst section two covered the details of the system used to deliver the ODL course as well as information about the course itself. Section Three, was for comments and a brief outline of the course. A search of various distance learning Web sites generated the first batch of individual practitioners. The remaining practitioners in the sample were obtained via electronic distribution lists in England, Germany, Sweden, Finland, USA and Australia. In total, 141 questionnaires were returned and were analysed.

RESULTS

The large majority (83%) of participants in this survey came from higher education (HE) institutions. They came from a variety of backgrounds within the

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higher education community. There were a small number of commercial interests also represented (15%). The remaining 2% are a joint venture between commerce and HE. This second section of the questionnaire was sub-divided into a further four sections:

Pedagogy

The majority (80%) of the courses were newly developed for the medium. Exactly what types of learning the courses were designed to provide for the students was the subject of Q1f, and the majority provided "domain content" (hardly surprising considering the number of postgraduate and undergraduate courses.

The most frequent methods used to deliver course materials was the Web, with email coming next. Other methods employed were course handouts, while course books and face-to-face were used in 15 courses. Some less frequently used methods were video conferencing (6), videotapes (6), phone tutorials (6), fax (4) and audio tape (3). Amongst the others, CD-ROM was the most popular with 13 courses employing this technology. Lastly, in this section, we asked about how assessment was performed. The question asked for the percentage split between assignments, continuous assessment, examination and on-line contributions. (Other was also allowed for). The average for assignments was 34%, continuous assessment 24%, examinations 22% and on-line contributions 19%. Some courses had yet to decide, some had no assessment and some had optional assessment.

Organisation

The second section within part two was concerned with the organisation of the online courses. The majority of the courses were a series of modules, 70% and the majority of students studied at home (93%) with significant numbers also studying at their place of work, a learning centre or satellite campus. Here we see one of benefits of utilising communications technology that is widely supported in that the location of study can be very flexible. Next we looked at the split of time spent under several headings: self-study; reading; assignments; on-line contributions; examinations; on-line tasks and other. It was noted that the figures reflected the sort of balance that might be expected on a normal ODL course (i.e. lots of time spent in self-study and reading) with smaller but significant amounts of activity being organised around the computer technology. The means of communication used showed email as the most popular and video-conferencing as the least. We asked whether students were expected to make regular contributions to the courses. Only two required daily contributions! The remainder wanted contributions at pre-planned times within the course.

Technology

Of the courses sampled, on average, teachers spent about six hours and students about two hours undergoing training in the use of the systems. There were no surprises in technological developments but rather confirmation that the Internet (in particular the growth of the Web) had made the most significant impact on teaching and learning. This coupled with the ever-decreasing cost of very powerful computers makes an attractive combination. Add to this picture, authoring systems that make building multimedia content considerably easier and we can understand why these technologies have been taken-up by many deliverers.

By using the information provided in the course title, course objectives, and short description we were able to classify the different types of courses offered. There were a wide range of subjects offered in the courses, modules and units that we have sampled. This demonstrates how computer technology can usefully be employed delivering material in a wide range of subjects. This is not surprising as the Web, the most popular technology used in the courses sampled, is primarily a broadcast technology and thus well suited to the delivery of information to the student at a distance. The general conclusion to be drawn is that much ODL activity is very much centred around collaboration between the students. Indeed, this can be the only extra dimension that the technology brings but this is an important extra dimension for the on-line learner as they are no longer isolated. They can engage with other learners and their tutors in ways that would simply not be possible without the presence of the technology.

CONCLUSIONS

Collaboration between students and tutors is one feature that emerged strongly from our survey with the widespread use of email and CMC within the courses. The central idea that SCHEMA subscribes to is that by engaging in dialogue with fellow learners and tutors is the way in which students learn. This process of dialogue is how learner's refine their ideas of the concepts of what they are learning. Ultimately this process of refinement leads, we hope, to an understanding of the concepts and issues involved in the material being "learnt". We believe that ODL can deliver a sufficiently meaningful form of dialogue through email and discussions groups to enable learning to take place. For some ideas and concepts interactive courseware can also facilitate learning. For instance, a simple model of a dynamic system where the students can modify the parameters and see the results is in our opinion a particularly powerful way of getting the learning across. This does not preclude collaboration between the students. They may collaborate on understanding the model as they interact with it or they may collaborate discussing the results they obtained. This is something that most of the current examples of Web based ODL lack. In conclusion, the current "state-of-the-art" in Web based learning is of students accessing web pages for learning materials and then engaging in collaborative activities using either email or one of the many systems that support CMC. The collaborative aspects of this learning process are Project SCHEMA's major area of research and will be the subject of future research work.

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PUTTING THE 'DIS' TO DISTANCE EDUCATION

John H. Laflin

"No book can get through the number of minute questions which it is possible to ask on any extended subject, or can hit upon the very difficulties which are severally felt by each [student] in succession. Or again, that no book can convey the special spirit and delicate peculiarities of its subject with that rapidity and certainty which attend on the sympathy of the mind with mind, through the eyes, the look, the accent, and the manner, in casual expressions thrown off at the moment, and the unstudied turns of familiar conversation . . . . The general principles of any study you may learn by books at home; but the detail, the color, the tone, the air, the life which makes it live in us, you must catch all these from those in whom it lives already." John Henry Newman, "The Rise and Progress of Universities."

Unfortunately, what Cardinal Newman said of books (or by extension, of distance learning) has been largely ignored by those who aver that distance learning is the future of higher education. Although in a few limited circumstances, distance education can be a reasonable approach to parts of a university degree, it cannot and should not attempt to replace a university education.

If your institution is still planning to rush blindly into distance education, you must first determine your target audience: do you want to teach students on your own campus, or on satellite campuses of your university; do you want to teach advanced high school students in far flung corners of your state; do you want to attract home bound students from your state, your region, the entire world; do you want to provide specialized courses for employees of certain businesses? No matter which group comprises your target audience, the issue now becomes: "How should I market these distance education courses?"

"If you build it, he will come" may have worked for Ray Kinsella in *Field of Dreams*, but it is a poor way to market distance education. You must find a way to draw the target audience to your distance courses. But how? Mass mailings cost money and are generally ineffective (and it seems a kind of oxymoron to market courses that promise electronic wizardry via "snail mail"); advertising your courses with listservs or discussion groups is generally discouraged and may result in your being flamed by others on the list; and posting courses on your school's web pages presupposes that students are anxiously awaiting your course offerings, that they are already technically

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savvy enough to know that distance ed courses exist and that your school is offering them. All too often the best marketing method is the very low tech "word of mouth," although nowadays the mouth has been extended to include email. One student who has a positive experience in a distant course may tell one or two of his friends, who may enroll in the future, and who may tell one or two of their friends. Slowly, over an extended period of time, enrollment may grow; however it will probably fall far short of administrators' expectations.

Marketing problems aside, let us assume that you have found a viable target audience. Now you must determine what shape your course will take. Many professors still assume that they can simply put their voluminous lecture notes onto the web (using the <pre> tag, naturally) and have students read the assigned texts and the lecture notes. This method is simple to use and while it may work to some degree with advanced students, it is disastrous for undergraduates with little or no prior knowledge of the subject matter. Adding an asynchronous discussion board to these lecture notes is similarly ineffective: a student who doesn't understand a Donne sonnet will have little to contribute to the discussion other than his own confusion; others who may share that confusion will contribute nothing at all.

The truth is that delivering an effective course requires a tremendous amount of work. Even if you have taught the course before, day to day maintenance is daunting, as each semester's class brings its own set of problems and frustrations. Yet how will your school support your efforts with distance courses? Will you be paid extra? Will you have a student assistant? Will you get release time? Will you have free access to the necessary hardware and software to make planning and teaching your course possible?

What kind of technical support will you receive? Adequate technical support makes for a much more enjoyable experience for both the professor and student; yet many smaller schools lack the budgets and the personnel for anything other than a d-i-y approach. For one course that I taught, I had to design the course, code the various web pages, test, purchase and install conferencing software, maintain the course web site, and troubleshoot my own technical problems as they arose. The support that I received from my own campus computing services was, at best, minimal.

Yet adequate technical support is crucial to any distant course: a system crash is like finding your classroom locked! No one can access course materials, no one can contact you via email – everything stops and waits for the system to be brought back on line. When a system crash happens, and it will, what kind of backup plan do you have? Or, even more common than massive system failure, how will you handle a remote student's computer problems? When his system locks up, his email "screws

up," his files are corrupted by a virus, or his hard drive melts down, what will you do? I guarantee that most students will expect you to "do something" to help them.

When and how will you make yourself available to your students? On campus office hours are normally scheduled within the regular operating hours of the university. But how will you accommodate the distant student who does not access the course materials until "after hours?" What about the student who needs an immediate answer to a question as he struggles at a late hour against a deadline? Can you afford to be as callous as the professor who told one of my students, "They don't pay me enough to answer email"?

Distance education can work in limited circumstances, but it is not a panacea for low or stagnant enrollments; it is not generally a cost effective method for delivering courses or programs; and many students simply do not like it. Effective distance education requires a lot of effort and a lot of support. Distance education courses are best delivered to upper division students, preferably graduate students or working professionals who have some knowledge of the subject and the motivation to work with minimal direction. Students must be self motivated and largely self directed to keep pace. For many students, working on their own means working "whenever" which all too often translates as "never." Once they fall behind their only recourse is to withdraw. In some circles, a drop out rate of 50% is expected; anything less than 50% is seen as a success.

To keep students motivated, a successful course should use a combination of technology: web pages; content outlines to guide reading; discussion questions to spur on line discussion; two way video conferencing; asynchronous discussion; and synchronous chat. But to implement these strategies, you must have the full support of your administration, your technical support staff and your colleagues.

So if it is not already too late, perhaps you should carefully consider whether or not venturing into distance education is worth the time, money and effort that need to be invested by faculty, administration and technical support staff. Perhaps your students would be better served if they could learn "the detail, the color, the tone, the air, the life which makes [a subject] live in us, . . . from those in whom it lives already"— on campus, from your teaching faculty.

SAILS: SEAMLESS ACCESS TO INSTRUCTION AND LEARNING FOR ALL STUDENTS.

Dr. Michael W. Churton*
Dr. Barbara Emil**

Purpose

The University of South Florida is positioned for the twenty-first century and beyond to provide seamless educational opportunities to its constituents. Providing the leadership in distance learning, the University of South Florida through Educational Outreach has developed a comprehensive network among elementary and secondary public schools, community colleges, and the four campuses and the Downtown Center of the university. The network is designed to facilitate educational opportunities for students and faculty, provide effective instructional assistance and training, and serve to ensure that post secondary opportunities are available to all students. The importance of SAILS and its distance learning infrastructure is that no one modality serves the best interests of all students and faculty. Distance learning at the University of South Florida and its partners is provided through educational broadcast television, satellite and ITFS technology, videoconferencing and videostreaming applications, web-based deliveries, and instructional sessions offered through videotapes/CDs. An underlying premise supported by Educational Outreach is the integration of technologies to more appropriately address the learning needs of students. The SAILS network encompasses in excess of 28% of the geographic area and population base in the State of Florida, USA. SAILS also supports, international networking including programs in South America, Europe, and in Southeast Asia (in development). The intent of this paper is to present the development, design, and administration of the SAILS network.

Background

Distance education, although not a new development, has gained much attention recently as postsecondary institutions struggle to serve increasing numbers of students. It is anticipated that universities and community colleges will face a student population increase of 40% by the 21st century without the space or budgets to accommodate them. As an alternative to traditional forms of service delivery, institutions of higher education are developing distance education programs to serve new and continuing students from a distance. Distance education refers to the delivery of instruction or services where time or distance separates the instructor and the learners. Keegan (1993) suggested that distance education includes distance teaching, which identifies the instructor's role, and distance learning, which describes the student's participation.

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From the Open University concept initiated during the early seventies to current telecommunication and electronic formats, a variety of distance education service delivery models have developed. The use of technology has revolutionized the types and quality of distance education alternatives available. As programs rush to meet the demand, justifiable concerns about the quality and cost-effectiveness of technological applications to teaching and learning have developed. Bates (1995) provides an ACTIONS model that might be considered when planning and designing distance education programs including:

- Access: Can learners access the technology?
- Costs: What is the cost effectiveness of the technology?
- Teaching Functions: What are the most appropriate teaching methodologies for the design?
- Interactivity and user-friendliness: How easy is it to use?
- Organizational Issues: What changes in organizational structure are required?
- Novelty: How new is the technology - is it adaptable?
- Speed: How quickly can courses be applied to the technology?

Delivery modes for electronically mediated courses are composed of live and tape video programming which varies in time. Delivery technologies for video programs include broadcast television (including public television), telephony, cable satellite, fiber optic, computers, CD-ROM, CDI/DVI, videodiscs, and radio. Through these technologies, institutions reach learners who are at other sites or are unable to attend campus-based classes due to distance, time, disability constraints, or scheduling.

Some institutions across the country have decided that there is a need to share courses, enrollments, and instructors between campuses, thus increasing the number of classes delivered without a commensurate increase in teaching faculty. Multiple site deliveries enhance the cost effectiveness of the network. Without distance education programs, lower enrollment at one site would force the cancellation of the class for all students. With a viable form of distance education, this occurrence would be minimized as courses can be transmitted to a variety of campuses, training sites, and to students learning independently (Churton, 1999).

It is clear that for the 21st Century:

1. Education will be the major public agenda item.
2. Education will continue to be viewed as the key to economic growth.
3. Technology will provide more opportunities for schooling, education and training, and employment.
4. The number of public school students will increase.
5. The attrition of aging teachers, class size policies and increased school enrollment will be major factors in increasing the number of needed teachers.

6. Supply of new teachers will meet less than 60% of the need.
7. Non-Traditional teacher training programs will develop.
8. Increase in core subjects such as math, science, and basic reading will occur.
9. Community and senior colleges will become major technological centers for training and learning.

Shared Responsibilities

The increased access to postsecondary education can not be accomplished without the support and cooperation of programs, institutions, and personnel. Seamless access refers to the ability of a student not to get "lost" in the process of transitioning from high school to postsecondary education. The Florida Virtual Campus, located at USF serves the distance learning needs of the 10 public state universities and the 28 community colleges. F.A.C.T.S. is a statewide electronic advisement network located at USF providing additional seamless access and information to Florida's students.

At the University of South Florida over 80% of majors in select colleges come from Florida's community college network. The University of South Florida has collaborated with a series of partners throughout the region to ensure seamless access. This partnership has included a variety of educational and business partners focusing on faculty training and support, network consultation, and shared facilities utilization. Partners include:

The University of South Florida

USF is a major research I university enrolling in excess of 35,000 students. Campuses of USF include regional locations at Sarasota, St. Petersburg, and Lakeland. In addition, a new USF facility has been added in downtown Tampa to serve the inner city and business needs. Already one of the 20 largest universities in the United States, USF has built a solid reputation as a leader in learning, offering comprehensive state-of-the-art, student-centered programs. With growing prestige and a dedicated faculty, including 73 Fulbright Scholars and 42 endowed chairs, USF has become recognized as a national and international research institution.

One of the top 50 public research universities in the country, USF was recently classified together with the University of Florida and Florida State University as a Research I university by the Florida Board of Regents, which will enhance its graduate school and research status. USF attracted $135 million in sponsored research, contracts and grants last year and is fast becoming a model urban research university for the 21st century (http://www.usf.edu).

- **St. Petersburg campus**: The campus is nationally recognized for its graduate program in marine science. The campus also houses a Center for Ethics and the Knight Oceanographic Research Center. Noteworthy programs include a respected graduate program in journalism studies and

related writing components such as the Florida Suncoast Writers' Conference.

- **New College/Sarasota**: The Sarasota-Manatee campus includes New College and is adjacent to the state-owned Ringling Museum. USF at Sarasota has significant responsibility for historic and environmental preservation of the beautiful Ringling and Caples estates. New College is a residential, highly selective and innovative liberal arts college that made the top category of Princeton Review's exclusive rating of college admissions competitiveness. Kiplinger's Personal Finance Magazine ranks New College in the top 25 public university "best values" in the nation.
- **Lakeland campus**: The campus is designed to take advantage of advanced educational technologies. Along with traditional instruction, the campus has television receiving and transmitting labs for individualized computer instruction.

Hillsborough Community College (HCC)

Founded in 1968, Hillsborough Community College is now the seventh largest of Florida's 28-member community college system. HCC is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (1866 Southern Lane, Decatur, Georgia, Telephone number 404-679-4501) to award certificates, diplomas and associate degrees. HCC strives to meet the ever-changing demands of business and industry. To that end, we offer dozens of practical academic programs. Students are learning how to design web sites, develop multimedia technology and the latest techniques in telecommunications engineering. Some of the most highly regarded experts in the local computer industry are HCC alumni. Business management, architecture, firefighting and environmental science also remain popular. We take pride in the fact that students come from all over to enroll in our outstanding nursing program and our health science programs, such as nuclear medicine and radiography (http://www.HCC.edu.)

St. Petersburg Junior College (SPJC)

Change and growth have been the hallmark of St. Petersburg Junior College, Florida's oldest two-year institution of higher education. Founded in 1927 as a private institution, with its initial classes held in one section of a Pinellas County public high school, it stands today as a multicampus public institution with sites throughout the county. Campuses are located in Clearwater and St. Petersburg; a center is in Tarpon Springs; the Health Education Center and the District Office with its central services facilities are in Pinellas Park; and the Marine Science Center at Bay Pines and the Allstate Center with its Criminal Justice Institute are also in St. Petersburg. Development of a new, high technology campus is under way on a 103-acre site in the city of Seminole. In addition, courses are offered in various community facilities throughout the county via the Open Campus program (http://SPJC.edu).

K-12 Public School Districts

The Southern region of Florida consists of 20 public school districts (1.6 million K-12 students and 400,000 postsecondary students), over 65% of the state's population, and 75% of the state's geographic area. Over 10.2 million people live in the Southern region of Florida with a demographic breakdown of 80% white, 10% Hispanic, 9% Black, and 1% other diverse groups. Florida's public postsecondary institutions serve in excess of 60,000 students through some form of distance learning annually, representing the largest distance learning enrollment in the country. As the third largest state in the country, Florida is a microcosm of the country relative to size, diversity, and increasing and changing population base as well as postsecondary educational needs and services. An U.S. Department of Education Grant (DIALs) developed videoconference learning centers throughout the 10 school districts comprising the USF service region. University students, high schools students, and district personnel have participated in ongoing programs. School districts include Hernando, Pasco, Pinellas, Hillsborough, Polk, Manatee, Sarasota, DeSoto, Highlands, and Glades counties.

Business and Corporate Partners.

A variety of regional businesses and corporations have partnered with USF to enable distance learning to be a viable and active means of accessing postsecondary education in Florida. GTE, AT&T, BellSouth, Honeywell, PictureTel, South Florida Water Management, and others have supported programs and courses being delivered via distance learning.

Collaborative Assistance

As part of USF Educational Outreach's leadership, a comprehensive distance learning faculty development program and student support services providing seamless access to post-secondary educational opportunities. Educational Outreach has provided instructional and technological assistance among all partners. Faculty development, a key factor for successful distance learning programs has been extensively conducted across all campuses of USF and among our partners.

- **Faculty Support:** Educational Outreach provides comprehensive faculty services throughout the entire instructional process.
- **Materials Reproduction and Distribution**: Reproduction and distribution of course materials are available to faculty. Guidelines are provided to assist in the efficient delivery of all materials in a timely manner.
- **Web Based Design and Support**: Assistance is provided in the design of web-based instruction and/or the development of web enhanced instruction.

- **Graphic Design**: Assistance is provided to faculty in developing solutions for the visualization of instructional theories, concepts, and/or processes for class presentation.
- **Video Classroom Instruction**: Coordinates studio classrooms and remote operations for distance learning productions and assists in arranging live and/or tape delayed delivery. Production of audiovisual projects, which requires the use of graphics, special effects, and editing, is also supported.
- **Library Resources**: Electronic *Reserve* puts all course materials on the www for distant access. *Virtual Library*: Remote students can access databases, journals, and other materials (www.lib.usf.edu/virtual/index/html) *Florida Distance Learning Reference and Referral Center*: provides access to statewide resources. (rrc@lib.usf.edu) or thorough http//www.outreach.usf.edu.
- **Distant Student Support**: Support services assist students with all aspects of instructional needs. Material for distribution to local and remote students in distance education classes is also provided. *Access USF*, a publication by Educational Outreach, catalogs all distance education classes taught at USF. A web version is also available. **Regional Campuses**: Faculty are supported at each of the regional campuses.

The University of South Florida approaches the 21st century aware of its commitment to provide an academic community that celebrates teaching, scholarship and research, and professional service. Distance learning is but one means that USF, through Educational Outreach, is attempting to provide access to academic programs and activities across all campuses and beyond. Access to educational opportunities and experiences is neither a recent issue nor one that has been easily addressed by institutions of higher education. Time and distance have been the major encumbrances preventing students from accessing post-secondary programs at all levels. This trend will continue into the next millennium.

Keegan (1993) suggested that the process of teaching and learning in which geographical distance and time separates the instructor from students refers to distance learning. For the past twenty-five years, effective distance learning programs have been delivered through a variety of instructional mediums including print materials, electronic means, and through other technological formats. *USF: Educational Outreach* has the institutional responsibility for distance learning and offers a variety of instructional formats for USF faculty to participate in distance learning activities. Through the talents of the faculty, USF will continue to meet our responsibilities as a major comprehensive research university. Distance Learning is but one means by which this end can be accomplished.

Technological Network: A Multi-Dimensional Approach

Distance learning has experienced an exponential growth in the past ten years due to the rapid advances of technologies that assist in delivering instruction to students at distance sites. Nearly 75% of institutions of higher education are offering not only courses through distance learning but entire degrees programs on local, national, and international levels (Connick, 1999). The increase of distance learning opportunities at USF is directly related to the decrease in the cost of the technology that delivers the instruction. USF's distance learning opportunities not only include the aforementioned formats but also satellite communications, microwave transmissions, interactive videoconferencing through telephony and the Internet, audio-conferencing, World Wide Web based courses, and emerging technologies such as vsat (very small aperture transmission).

Satellite Communications

An uplink and downlink is required to receive electromagnetic signals from an orbiting geostationary unit. The signal is usually transmitted from a single source and retransmitted over a wide geographic area. Domestic bands operate on two frequency ranges designated C and KU bands. C bands are a category of satellite transmission, which transmit from the earth at 4.0 to 6.0 Ghz and are received from satellites at between 3.7 and 4.2 Ghz. They are also shared with terrestrial line-of-sight microwave units. C bands transmission has less path loss than KU bands, which must have a large antenna for the same receiver input power level due to its use of longer wavelength frequencies. Other problems relating to the use of C bands include the shared use of these frequencies with the terrestrial microwave transmission, which can cause interference with the weaker satellite signals in certain areas. Most area schools, libraries, and other government facilities have at least downlinks or transponders to receive the communications signal. By the year 2006, all signals will need to convert to digital format which will certainly increase educational opportunities due to the increased number of frequencies available through a digital signal.

Microwave Communications (Instruction Television Fixed System-ITFS)

ITFS are local (up to 25-mile radius) one-way, over-the-air block of TV channels operating at microwave (very high) frequencies reserved for educational purposes. They can be received only by TV installations equipped with a converter to change signals back to those used by a television. The antenna may be omnidirectional or rotated to cover a specific geographic area. The Federal Communication Commission for educational television first authorized the ITFS television transmission system in 1963. The ITFS band has subsequently been re-allocated for shared operation among multipoint distribution services, multichannel multipoint distribution services, operational fixed services, and ITFS

users. For educational purposes, this network operates similarly to satellite transmissions and will also be digitized by the year 2006.

Satellite and ITFS communications offer a variety of educational opportunities for students and teachers. National and International broadcasts are conducted through the Public Broadcast Service and other agencies. Instructional lessons can be delivered through these formats. Broadcasts consist of one-way video transmissions with return communications via telephone, fax, or email.

Students and teachers, however, will need to identify the closet facility which has a transponder allowing for the linking of the telecommunication signal to the site. Most urban areas across the country will have at least one facility capable of receiving with signal. Rural areas, however, may be more pressed to identify a facility. Many Chapter I schools have been equipped with downlinks, as have universities, hospitals, and other social and public service agencies.

Interactive Videoconferencing

Videoconferencing refers to a particular format for conducting interactive distance learning. Videoconferencing enables the instructor and her/his local and/or remote students or community to initiate and maintain synchronous interactive two-way video and audio communication in real time. Videoconferencing closely approximates face to face communications with similar outcomes. Compressed video is a technology that uses a digital network providing interactive two-way video and audio synchronous communication. A Codec (coder-decoder) is required for each videoconferencing site. The codec codes inputted video/audio data which is then compressed and transmitted across the digital network to the receiving codec which decodes the data and displays the resultant video/audio on the videoconferencing system.

The network consist of either ISDN (integrated services digital network), ATM (asynchronous transmission mode), or a full or partial T1 line. A minimum of 386kbps is recommended for effective active learning instruction. In addition, the increasing use of the Internet as a means of conducting interactive videoconferencing is increasing due to increased bandwidth and compression technologies. At some point in the very near future, the internet may well be the most cost-effective means of transmitting video data. Videoconferencing provides opportunities for:

- Interactive instructional strategies.
- Simultaneous communication.
- Incorporating diversity in the classroom.
- Inter-class activities and interactions worldwide.
- Connectivity with schools and agencies.
- Virtual global field trips for children.

Compressed Video is the process of transmitting video data by coding each fame, which reduces the required bandwidth to send the data through a telecommunications medium. The most publicized compression techniques are proposed by two expert groups, that of JPEG (Joint Photograph Expert Group) and MPEG (Moving Picture Expert Group), who are defining methods for image

compression in still frame and real-time video. The advantage of JPEG and MPEG is that the algorithms are symmetrical; that is, the same amount of processing is required for the encode and decode functions.

Videoconferencing is a synchronous form of communication that allows for two-way video and audio recognition in real time. Each site or sites that is (are) participating will require a unit or a codec in order to communicate. The costs of videoconferencing units, as with most technology, are becoming more and more affordable for educational purposes and residential purposes. For under $1,000, a videoconferencing system can be purchased and adapted for an educational environment. A quality camera and microphone are required to ensure quality video and audio acuity. A set of speakers will assist in projecting the audio to a larger group. Using a scan converter, the VGA image can be converted to NTSC (television signal) and the image displayed to a larger group on your television. The codec consist of high-speed data cards, which are inserted into your computer enabling you to access digital telephony. Residential and small group programs will probably use an ISDN line secured from your local telephone company providing a bandwidth of 128kbps. Advantages of using videoconferencing either through digital telephone lines or through an internet protocol lies in the synchronous two-way video and audio communications.

Instructional significance of videoconferencing parallels face to face instruction in any classroom. All parties can see and hear each other in real time and communicate synchronously. Instructional strategies and methods utilize overheads, slides, videotapes, etc. Cameras can be zoomed in and out to gain the best perspective for all involved in the call. Distance cameras can be controlled locally and can serve to enhance a lesson. Videoconferencing is perhaps the closest one can approach being in the same space at the same time (Churton, 1999).

The World Wide Web and the Internet

The Internet is a global, decentralized system of computers, software, and network connectivity. The World Wide Web (WWW), also known as "the Web", is a dynamic, multi-faceted, cross-platform, hypertext communication system. In explanation the Web is:

- **Cross-platform** - Documents can be developed on a PC-compatible system and then later used on a Macintosh or Unix-based computer. Hypertext is nonlinear and can link any document to other documents in the system. This allows a person to navigate or browse the Web in varied sequences.
- **Dynamic** - The Web can be rapidly edited. Updating a webpage is as easy as word processing in many cases. Because of this feature, online information is constantly being changed. You may go to a web page today and read the latest on a topic, then return tomorrow and read completely new material.

In addition to text, the Web can display a variety of file types. Graphics as well as animation, audio, and video can now be presented on the Web by a variety

of users and user groups. Through authoring software academic lessons, resources, and materials can be created and placed on the internet for anyone to view. A WWW site can be created that accesses tools such as bulletin boards, email, and chat applications for interactive communication among students and teachers.

Email: Electronic mail provides for electronic messages to be transmitted through cyberspace and received by the address indicated. Messages are stored until the receiver opens their email account and accesses their email. Received messages can be edited, forwarded, copied, printed, stored and/or resent to the sender with a response. The costs for email communications depend upon the connectivity provided, but are relatively inexpensive as compared to other forms of distance communications.

Electronic Bulletin Boards (EBB): EBBs provide a forum by which individuals can post information to a particular site. Others may read this information as one does when reviewing a "real" bulletin board in any school building in the country. Messages are sent to a particular Bulletin Board address and not to an individual. Information can be posted to the bulletin board and retained for a period of time. Asynchronous conferences can be established whereby teachers and students can respond to each other by reading the bulletin board and typing a response to be posted for all to read.

Chat Rooms: Chat Rooms are a synchronous communication option, which provide a forum for ongoing interactive discussions between two or more individuals. Listserv(s) can be created that mass deliver one message to everyone contained on the listserv. This is extremely advantageous when many individuals need to be linked quickly with the same message. Chat rooms also allow for teachers and students to engage in a two-way interaction in real time.

File Transfer: Complete files, programs, WWW sites, etc. can be sent using the internet. Files stored can be addressed to a particular individual or bulletin board for posting. Curriculum, material, and other resources are made available to the users by transferring the files that have been stored.

Distance learning using the WWW and the internet supports the:

- Separation of teacher and learner during at least a majority of each instructional process.
- Use of educational media to unite teacher and students for course content.
- Provision for two- (or more) way communication between teacher, facilitators, other resource people, and the student.
- Separation of teacher and learner in space and time.
- Volitional control of learning by students rather than by distance teachers.

The excitement and viability of the Internet as an educational tool and resource is significant and will continue to expand given time, creativeness, and ease of accessing WWW locations. However, teachers and parents must use caution to determine which WWW sites on the internet are used for what instructional purposes. There is much useful information available through the

WWW and the internet. With little regulation as to what can be placed on the Web, those individuals who are facilitating learning should be aware of what and how information can be accessed (Churton, 1999).

Summary

The state of Florida as well as other states in the country are faced with increasing numbers of students seeking admission to postsecondary programs. Seamless access for students transitioning from secondary to postsecondary programs require a comprehensive and concerted effort by institutions providing these services. Effective distance learning opportunities can contribute to the access of postsecondary programs for students constrained by time, distance, and resources. SAILs demonstrates this concerted effort to ensure students are not forgotten in the process.

The University of South Florida is anticipating a 30-40% increase in the number of students wanting access to postsecondary education. To provide the quality educational services required, alternative forms of service delivery must be developed and reinforced. Through SAILs and other programs, USF has planned a seamless continuation of student's educational careers through distance learning and also through a partnership among the various public institutions of higher education in the region. By working closely with the public and the private sectors, USF plans to continue and enhance its current distance learning programs to meet the increased numbers of students.

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SUPPORTING FACULTY USERS OF ONLINE COURSE MANAGEMENT SYSTEMS

Gina P. Roberts and Rhonda J. Spearman*

OVERVIEW

In the fall of 1997, the Innovative Technologies Collaborative (ITC) at the University of Tennessee, Knoxville (UTK) was charged with evaluating issues surrounding online teaching and learning. This led to a project to select an online course management system (CMS) that would be purchased through Student Technology Fee funds and supported by the ITC. Because CMS packages offer a multitude of options for sharing course resources, testing online, communicating and collaborating, and managing student information, it was determined that this type of package would be useful for our 1,300 faculty members as they developed and delivered online courses and course components. A twelve-month process of reviewing packages culminated in a faculty focus group, which unanimously selected Blackboard CourseInfo. CourseInfo was purchased and installed on an ITC server in late December 1998.

In January of 1999, twenty-two faculty members (Pilot I) began using CourseInfo. The Pilot I group took responsibility for troubleshooting their own CourseInfo problems and consulted with the ITC when solutions were more difficult to uncover. Midway through the semester the ITC staff began to offer courses for faculty on using CourseInfo. The courses were open to all faculty members and attendance was required in order for faculty to receive access to CourseInfo and support from ITC during the last half of the spring 1999 semester. This provided thirty-six additional faculty members (Pilot II) with the opportunity to use CourseInfo. Full CourseInfo implementation began in June of 1999. From June to August 1999, over one hundred additional faculty members began using CourseInfo. By the end of the fall 1999 semester, it is estimated that approximately two hundred and fifty faculty members will be developing or delivering over five hundred CourseInfo enhanced courses.

SUPPORT STRUCTURE

ITC provides CourseInfo faculty members with instructor led courses, web-based resources, email and phone assistance, a users listserv, and feedback opportunities.

Courses

Several sections of a five-course series are offered each semester. The first course, *Introduction to CourseInfo* is required in order for faculty to receive an account on the CourseInfo server and to have permission to request an unlimited number of CourseInfo course sites. This course provides a broad overview of CourseInfo student features and instructor tools. In addition, policies and procedures for using

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CourseInfo at UTK are shared. The other four courses in the series, *Organizing Course Materials*, *Facilitating Communications*, *Managing Assignments and Grades*, and *Incorporating Visuals*, are optional but highly recommended. While the required course is mainly skills based - how to use CourseInfo - the additional courses focus on strategies for teaching and learning in an online setting as well.

Course participants are provided with a copy of the CourseInfo Instructor's Manual developed by Blackboard. The ITC provides supplemental readings and CourseInfo Quick Start Guides during most sessions. Class sizes are limited to fourteen participants. This small instructor to student ratio enables us to offer more one-on-one assistance to faculty during the courses. Faculty members are given the option to participate in three of the courses in an online setting, which enables the ITC staff to demonstrate online facilitation techniques.

In addition to the regularly scheduled CourseInfo courses, faculty members are encouraged to participate in the Lucky Seven program. If seven or more faculty from a department agree to participate in a course on the same day, at the same time, the ITC conducts special sessions arranged to meet their schedules. Since July of 1999, fifteen courses have been offered as part of this program.

In addition to the CourseInfo offerings, courses in learning strategies, using digital media, authoring multimedia, and using productivity tools are available through the ITC. Faculty members are encouraged to take related courses that will enable them to make the most effective use of CourseInfo.

Web Resources

The GetOnline@utk.edu Web site is a central location where faculty and students can gather information about using CourseInfo, read articles about teaching and learning online, and link to other ways to get online at UTK. In addition to faculty and student guides for using CourseInfo, Frequently Asked Questions (FAQ) pages are provided.

Email and Phone Assistance

Faculty members are encouraged to email ITC with questions, problems, or suggestions for improving CourseInfo. Telephone calls are accepted, but email communication is encouraged since problems are easier to archive electronically. Phone and email support is provided from 7:30 a.m. to 5:30 p.m. Monday through Friday. Questions and answers are archived and moved to the faculty and student FAQs on a regular basis.

Users Listserv

After completing the required course, faculty users are added to the CourseInfo users mailing list. The ITC staff uses the list to notify users of hardware maintenance, software upgrades, and procedural changes. Occasionally the listserv is used to poll faculty about CourseInfo uses and to gather students' reactions to the program.

Feedback Frenzies

Feedback Frenzies are face-to-face gatherings of CourseInfo users and ITC staff members. These meetings give faculty a chance to share their CourseInfo experiences and ITC staff the opportunity to share information about future plans for CourseInfo. These meetings help to build a community of CourseInfo users, while providing the ITC with valuable feedback on ways that this service can be improved.

KEYS TO SUCCESS

UTK faculty members overwhelming report that they find CourseInfo very useful for delivering online courses and augmenting face-to-face courses. In addition to the fact that the program is full-featured and easy to use, we feel that part of this satisfaction is due to the support structure ITC provides based on lessons we have learned along the way.

Start slowly. We gained valuable feedback from pilot users that made the full implementation of CourseInfo run smoothly. Faculty members continue to be enlisted as "testers" before any change is implemented system-wide.

Be accessible. We provide faculty members with answers to questions and solutions to problems in a timely manner.

Listen. We implement suggestions from faculty members on ways that we can enhance our services. They also offer excellent suggestions for improving the CourseInfo software, which are often implemented by Blackboard.

Form partnerships. We rely on partnerships with other departments on campus to ensure the successful integration of CourseInfo at all levels.

Look to the future. We have found it crucial to always be thinking ahead, not only to the next semester, but also, to the next year and beyond in anticipation of our faculty member's needs. Coupled with a good grasp of the University's vision and the upcoming innovations in technology, we will be armed with the tools to continue to provide faculty with a valuable service well into the future.

RESOURCES

GetOnline@UTK.EDU - http://itc.utk.edu/getonline/

ITC's CourseInfo Overview - http://online.utk.edu/courses/Overview/
(username: guest, password: guest)

WEB PAGE ANNOTATOR

Dale Reed* and Sirisha Garapati+

The increased presence of distance learning and on-line course offerings mean content is delivered using the Internet and viewed using web browsers. Students need to electronically make notes on what is presented and be able to share notes. Teachers need to be able to customize Internet-delivered curriculum as well as generate shared curriculum.

There are two phases to this project. The first, called *Web Notes*, gives the ability to associate a note with any web page, where successive visits to that page automatically cause that note to appear. It is an approach for annotating on-line curriculum, both for students and teachers, including presentation of notes similar to a threaded newsgroup.

The second phase is a content editor/filter and consists of free-form customization of a displayed web page, acting as an "overlay" that filters the original content. A user will select a portion of a page and substitute replacement content, modifying, deleting, or adding to what is already there. These changes will then automatically be applied when that page is next loaded.

A working prototype exists for Web Notes, while the content editor/filter is under development.

This work is sponsored in part by a NSF PFSMETE fellowship, DGE-9809497.

Need to Customize Web-based Curriculum - The Problem

Course content is increasingly being presented using a web browser as a delivery mechanism. Teachers using this type of curriculum do not have tools to customize it. Teachers' changes to curriculum must also be easily shared with colleagues who might be facing similar problems. Similarly students using web-based curriculum need to be able to "mark-up" their browsing experience, much as one would a text book or lab notebook. Students can also benefit from sharing their web-based experiences and observations (via shared Web Notes) in contexts such as cooperative learning groups or when constructivist pedagogy is being used.

Related Web Content Filters

At its inception the web was a mechanism for researchers to share findings and annotations of their work. A current web page annotating program called *Third voice* [http://www.thirdvoice.com] allows user notes to be shared, though information is stored on a proprietary server. The Interactive Paper Project [http://lrsdb.ed.uiuc.edu:591/ipp] also enables sharing comments on underlying, though it is forms based. A primary motivation behind web page content filters has been the elimination of banner ads, with a notable example being [http://www.junkbusters.com]. The site [http://www.junkbusters.com/ht/en/links.html#blocking] has a fascinating description of filtering history and software used to eliminate web-based advertising.

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It includes links to customizable filtering programs such as WebFilter as well as links [http://www.junkbusters.com/ht/en/ijbfaq.html#companies] to some of the advertising industry's comments on this type of technology.

The Solution: Annotating Pages with Notes and Customized Views

Annotating web pages gives users the flexibility of associating information with a particular web page seamlessly *within* the browser environment. A non-digital analogue might be post-it notes applied to a page in a book. A post-it note could be copied and distributed, while the underlying page in the book remains unchanged.

Customizing the actual view of a web page takes this a step further. Rather than associating additional information that is ancillary to the page (a Web Note), the changes filter the view of the page itself. The non-digital analogue might be scribbling on a transparent sheet that can be used to overlay a page in a book. Again, the content of the book remains unchanged. The only change is to the user's view at the user's option.

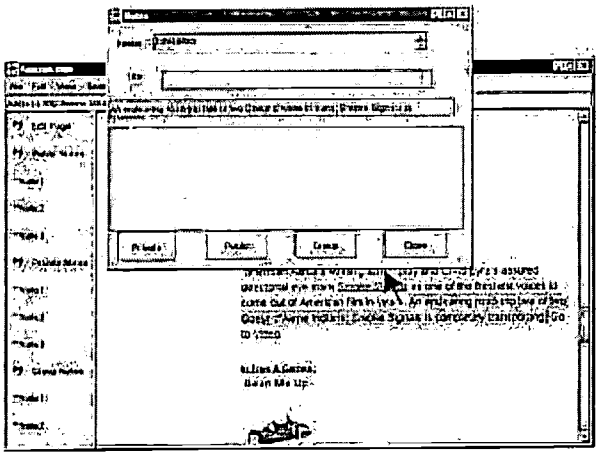

Figure 1: Web Notes Interface

Annotating Pages with Notes

Consider the example shown in *figure 1*, where a section of text is highlighted and a note is associated with it. Highlighting text gives the option of associating a note with that text. Choosing to create a note brings up the note edit window shown in *figure 1*. Notes can be organized by folder, and users can make them private (could be stored on users machine only), public, or group. The existence of public and group note attributes implies storage on a server so that this information can be shared. Created notes are then displayed in a threaded newsgroup-type presentation, where the display of groups of notes can be "exploded" or reduced through an outline format.

Content Editor / Filter

The content editor window uses the same idea, though the relationship between the edit window and the browser window will be more complex. Consider the following example, for instance, where a teacher wants to add an item to a curriculum list given in some on-line curriculum. As shown in *figure 2*, the teacher first will highlight the section of the screen to be modified. The edit window contains the highlighted information, allowing modifications to be made. In this instance an additional item (Lab Notebook) is added to the list. Menus allow limited formatting of changes, and the changes will once again be given an attribute for private, public, or group sharing. The preview button will bring up a new window with a view of the changes, and once the "Submit" button is selected, the changes will be stored.

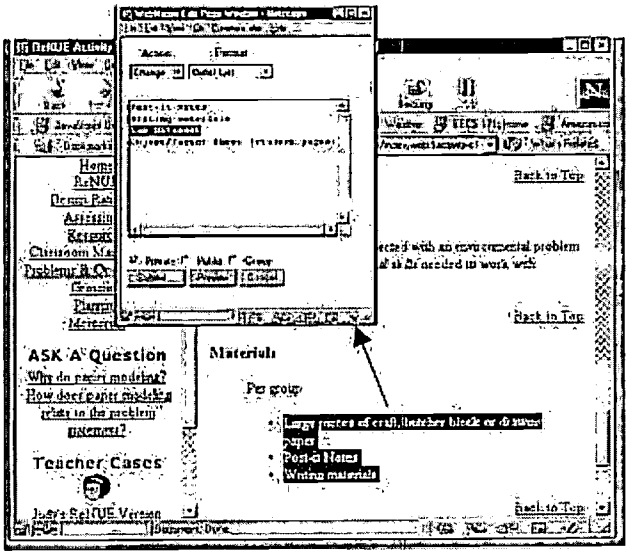

Figure 2: Selecting Content to Edit

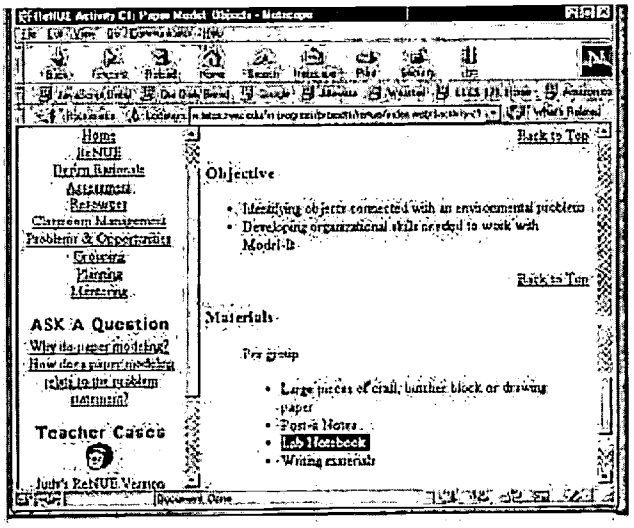

Figure 3: Filtered Contents Now Displayed

All web page names (URLs) pass through a filter to determine whether or not any changes have been stored for that page. When a page address is submitted to a browser where that page has been modified, the underlying changes are retrieved from a database. The database is either a flat text file on the user's machine (in the case of private notes) or stored on a server for group or public changes. The changes are then applied to the page before it is displayed, with the net effect that the page appears in the browser, changes and all, as shown in *figure 3*.

Future work: HTML Parser, Page Builder

The most difficult problem is to create a correspondence between a browser's graphical display and an underlying description of the HTML used to generate that display. Simple filtering such as that used in Web Notes can use a proxy server, intercepting the web page name and calling up an additional window when a note exists. A fully functioning content editor, however, implies the existence of an HTML parser to keep track of the underlying data structure associated with each displayed object in the browser window. We are in the process of modifying the Java HTML Editor class to give this. We would also like to create a page builder which could bring together pieces of curriculum from different sites, giving a personalized unified seamless view on otherwise distributed material.

CHALLENGES IN THE CREATION OF AN ONLINE PROGRAM AT SYRACUSE UNIVERSITY

*Robert M. Colley and Stuart C. Williams

In 1996, Syracuse University's Continuing Education Division received a grant from the Office of the Chancellor to develop the institution's first series of fully online courses. The intent of this new university-wide initiative was never to offer entire degree programs online, but to increase the range of options for students pursuing Syracuse degrees through daytime or evening study, and to meet the needs of a broader audience for individual courses in certain subject areas. The first three online courses were launched in the fall of 1977, with a total enrollment of 40 students, and current fall 1999 enrollment in 16 courses has reached 260.

To date, the bulk of the online courses have come from the College of Arts and Sciences, but individual courses have also been offered by the School of Management, the School of Engineering and Computer Science, the College of Visual and Performing Arts, The College for Human Development, and the School of Architecture; the College of Law will offer its first online course this coming spring. On the noncredit side, courses have been offered in Investing and Trading, Grant Writing, and Sports Psychology, and we expect this area to grow as well.

While the program has so far been generally successful, the following issues have arisen in the course of our efforts to foster its further growth and stability.

TECHNOLOGY ISSUES

Initially, we decided to create our own web-based course delivery system, which included template-based content creation, secure student access and management tools, personalized coursework options, threaded discussion groups, a robust e-mail system, and a testing facility. The system functioned fairly well for a time, but sporadic system crashes led us to look for a commercial product that would afford greater stability and vendor support. Finally, we chose WBT Systems' TopClass, which had a design architecture remarkably close to our existing system, and could be installed and configured with a minimum of effort. TopClass allows us to support all standard web functions in the class materials, and gives us the flexibility to keep up with the latest web technology.

Having now been online 24 hours a day for seven days a week since January of this year, our uptime has approached 100%. Most faculty and students report having minimal connectivity or navigation problems over the past two terms, and 74% of the students responding to evaluations have rated their overall satisfaction with the software as "good" or "excellent."

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*Syracuse University Continuing Education/University College

As with all off-the-shelf systems, there are tradeoffs. Since TopClass uses a browser interface, it requires navigation through several "pages" to get to a particular function. Some users find the icon buttons confusing, the current e-mail system is rather primitive, and the management of graphic files has proven to be awkward. In addition, we have had to change the 'front-end' pages to make them more consistent with our own web site, and write our own help manuals to replace the vendor's more obscure versions.

Syracuse's recent conversion to a University-wide PeopleSoft student records system has created two additional problems for the online program. First, the initial version of PeopleSoft does not allow for first-time students to register online, which is a disincentive for potential new customers who find us on the Web. We expect that PeopleSoft will add that capability within the coming year. Also, the registration functions of PeopleSoft and TopClass cannot be coupled, so additional manual steps must be taken to provide students with passwords and faculty with class lists, often creating frustration during the crucial first week of classes. We hope that a new UNIX-based version of TopClass will correct this problem, but then we'll have a new set of problems associated with acquiring and running a UNIX server.

FACULTY ISSUES

It is a challenge to attract the best University faculty to teach in the online program. The ultimate goal is to develop organized clusters of courses that could evolve into certificate programs, or serve as concentrations in degree programs. In its early stages, however, the program has necessarily evolved course by course, thanks to a small cadre of senior faculty who have agreed to devote the necessary time to this effort. Since the available course development money would not by itself entice them, we have had to identify professors who are interested in online instruction for intrinsic reasons, committed to reaching out to new populations, or simply fascinated by the technical challenges.

The courses have so far been offered on an overload basis, and budget limitations have necessitated a sliding scale of compensation based on enrollment, which is never a popular arrangement for faculty. Given the scarcity of full-time faculty available for the online effort, departments sometimes assign qualified adjuncts or graduate students to teach a particular course, but the long-range credibility of the program requires that the majority of the online teachers be "regular" professors. If the program is to prosper over time, departments will have to provide more creative incentive options, such as load relief, and the traditional university reward structure should ideally be broadened to include recognition for online curriculum development and teaching.

Senior faculty who have taught online are satisfied with the software's two-way asynchronous communication capability, and they like the flexibility of teaching from almost anywhere: a summer home in Maine, a "cyber-cafe" in Siberia, or a wife's hospital room. Some faculty are doing research on the differences between traditional and online student performance, and others have been able to use some of the skills learned in the online experience to improve their campus offerings. As the word about positive experiences gradually spreads, other faculty will hopefully be induced to join the effort, and departments will build more online courses into their strategic plans.

STUDENT ISSUES

Assuming students have the right equipment, are comfortable with Internet navigation, and have the required discipline, online courses can help them successfully surmount a variety of obstacles to conventional study. Evaluations from the summer show that 90% of the respondents were pleased with their online experience and would be willing to take another online course. These results may be misleading, however, in that the roughly 50% who returned the evaluation form are probably those who had the most positive experience.

Despite our attempts to publish clear equipment specifications, some students continue to register without properly functioning computers, even at times without Internet access. Others may have all the right equipment, but lack of technical proficiency results in their dropping the course within the first week. Those who take the initiative to contact our "help desk" can usually be salvaged, but sometimes students disappear without a trace, and faculty and staff efforts to reach them go unanswered as well. Others are able to master the technical difficulties, but drop out because of frustrations stemming from isolation and lack of in-person interaction.

Full-time, main campus students are increasingly drawn to the online option, especially those who wish to enroll in summer courses while travelling or working elsewhere. However, some campus students find that they lack the discipline to keep up with weekly online assignments, and some have even admitted that they see online courses as easier alternatives to regular courses. We are now imposing certain restrictions on campus students' enrollment, and trying to communicate more effectively to the campus community that online courses are no less rigorous, despite their flexibility.

Syracuse's online program has so far provided a valuable service for a certain segment of the university population, and each semester of operation teaches us a bit more about how to improve retention by minimizing some of the frustrations mentioned above. Our primary marketing challenge for the future is to attract more true "distance" students to the program, thus making a greater contribution to the institution's aggregate enrollment base.

WEBACADEMICS SOFTWARE DELIVERS MATH ON THE INTERNET
by Quentin T. Wells *

Knowledge of math through basic trigonometry is fundamental for students learning vocational trades such as electrician, carpenter, machinist, plumber, etc. Most adults who enter these apprenticeship programs have little skill in math and frequently a past history of difficulty with the subject which makes them still less inclined to study it further.

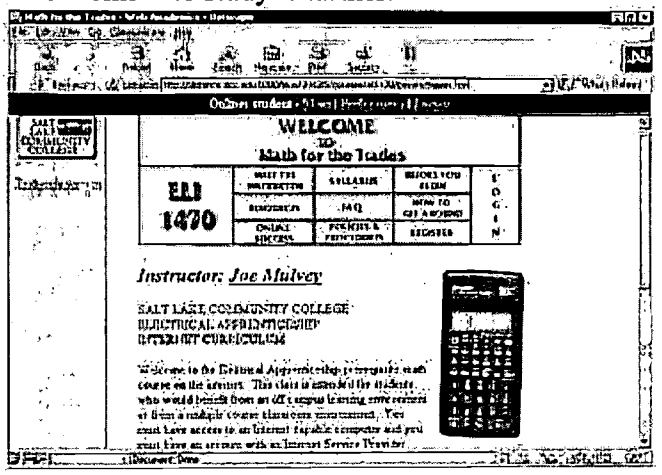

Figure 1 Math for the Trades course home page.

Connecting new material to be learned with an existing knowledge base and defining its specific application for the user enhances the student's ability to master and retain what is being taught. Allowing learners to proceed self-paced through a course and integrating the learned material into hands-on, job-related tasks also improve the understanding and retention of the related concepts.

Both of these methodologies are utilized in an Internet-based Math for the Trades course designed specifically for trades apprentices by Salt Lake Community College (SLCC). This course provides access to high quality math instruction in both urban and rural areas.

The instruction is delivered and managed through WebAcademics, a program developed by Hathaway Technologies in cooperation with SLCC, which has served as a beta test site for the software.

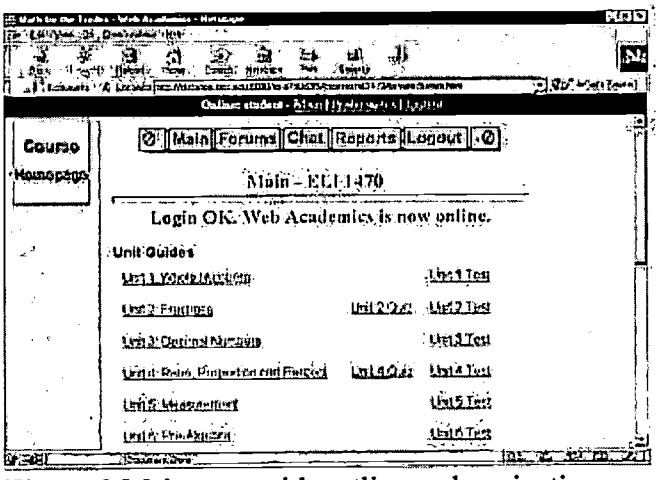

Figure 2 Main page with outline and navigation.

WebAcademics. is a comprehensive solution for course delivery on the World Wide Web. It provides full interactive capabilities and flexibility, yet is simple enough that many courses can be created and delivered on it in a short time. The program distributes the workload of online course management between faculty, administrators, and staff members. It also allows developers to customize each course while remaining consistent with the proven navigation and operating parameters of the SLCC Web site.

* Quentin T. Wells is Director of Program Innovation at Salt lake Community College

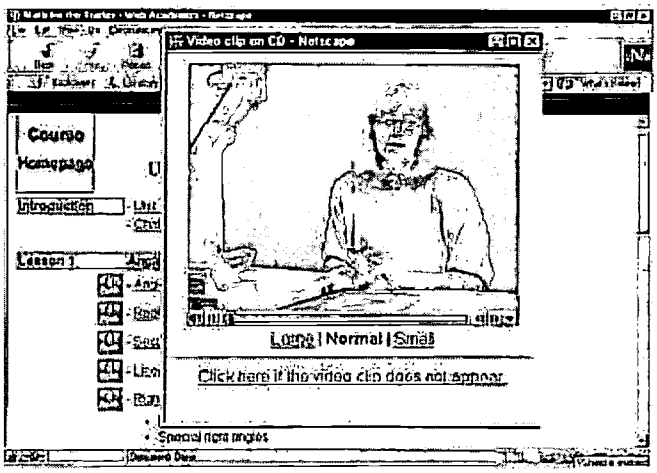

Figure 3 Unit guide with video clip playing.

Web Academics is actually a specialized Web server that uses dynamic HTML to deliver online course content. The program provides a complete course delivery system that enhances the learning experience yet allows the instructors to apply proven, traditional teaching methods.

Courses are created and delivered through a library of pages which serve as a template. Instructors do not have to write most of the HTML because it has already been done for them. An easy-to-use interface allows the instructor to create both the look and content of the course including text, graphics, multimedia, quizzes, tests and assignments, without custom programming. An FTP client optimized for WebAcademics permits up or downloading of multiple file changes at the push of a button. Every course also has a built in discussion forum and online chat session which students can access with a click.

Web Academics supports all of the following standards:

1. XML, a new portable data format
2. SQL and JDBC, for accessing existing databases
3. HTML, the "face" of the World Wide Web
4. Java, a robust and comprehensive programming language
5. SMTP, for sending Internet mail
6. DES encryption, the same type used by UNIX servers worldwide
7. TCP/IP, Internet communication protocol
8. FTP, for transferring files to and from the server

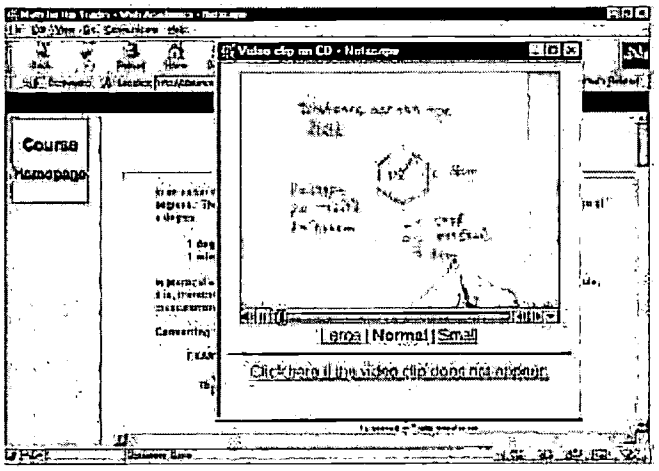

Figure 4 Typical explanation/example video screen.

Web Academics has an extensive online testing system. Grading is automatic for multiple choice and true/false type questions. Short answer and essay questions are deferred to the instructor for evaluation. A set of comprehensive, hyper-linked score reports are bundled with every course. All grading is organized into a simple spreadsheet. At the instructor's option, it can be condensed to show only those students waiting for evaluation of a quiz or assignment.

Rather than attempting to replace the human teaching function; WebAcadem extends that function in the distance learning environment. by encouraging and facilitating communication between students and the instructor. All instruc-

tion is competency-based and any number of alternative methods for completing a unit or module can be provided to accommodate a wide variety of learning styles and evaluation techniques.

The software is platform independent and will run on UNIX, Windows NT, or LINUX servers. It is also scalable to the point that several servers can be running Web Academics, coordinating data when needed.

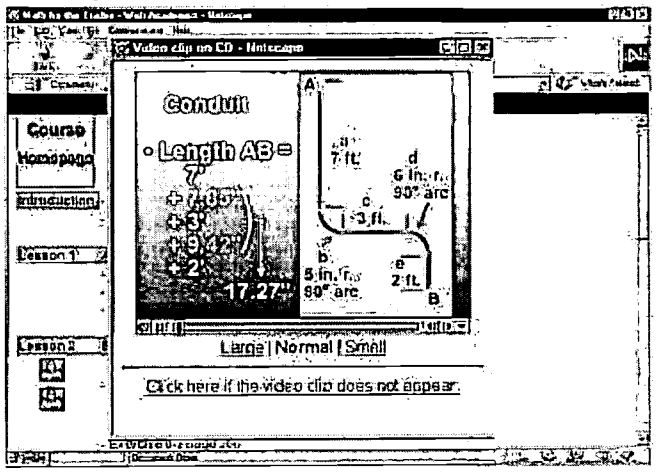

Figure 5 Practical application exercise video.

The WebAcademics-based Math for the Trades course features an extremely rich learning environment including on-line concept explanations, electronically graded exercises, forums, chat rooms, textbook, and more than 13 running hours of video instruction by a developmental math professor and a journeyman trades professional. The video instruction is delivered in compressed format from CDs provided to each registered student. Each learning module includes all of the following instructional features:

1. Competency to be achieved
2. Instructional outline
3. On-screen explanation of concepts
4. Computer graded exercises with instant feedback
5. Video explanations with instructor handwriting step-by-step solutions to problems.
6. Video explanations with step-by-step graphic solutions to problems.

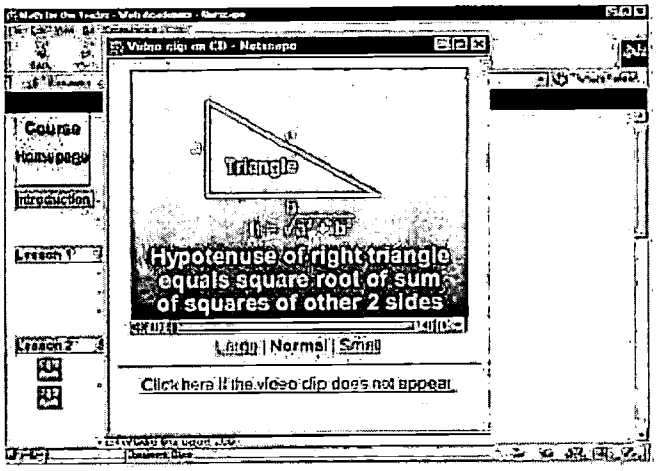

Figure 6 Elementary geometry video explanation

7. Chat room for on-line student and instructor interaction.
8. Bulletin board for instructor postingg of responses to frrequently-asked questions.
9. Written assignments submitted for grading by mail, e-mail, or fax showing actual student work.

Math for the Trades is now beling delivered on the Web. In the fall of 1999 the SLCC distance education server was completing more than a gigabyte of data transfers per month for this and other courses.

International Conference on Technology and Education

Abstracts -- ICTE Tampa

Abstracts for presentations at ICTE Tampa 1999 are being published on this web site. The Abstracts for all twelve ICTE Tampa themes will be published over the next several days. *Please note that several late abstract submissions are still being evaluated, and a number of these will be added to the appropriate theme in the next ten days.*

In mid-August, the complete ICTE Tampa Program and Schedule will also be published on this web site.

The overarching focus of ICTE Tampa is ***Preparing for a New Century of Learning: Technology, Education, and the Internet*** . Twelve Themes support this focus, as listed following.

Abstracts for ICTE Tampa Themes:

Please send mail to icte@icte.org with questions or comments about this web site.

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Sunday Evening Conference Opening Address

Mr. Louis H. Kompare
Executive Director
Center for Effective Government for the State of Tennessee

The role of the Center for Effective Government is to drive the statewide strategic planning process for the Executive branch to ensure each department has a strategic plan that is consistent with the governor's plan, and to link those plans with the State of Tennesssee's strategic technology plan. As Executive Director, Lou Kompare is also charged with promoting the use of the Internet to deliver government services, and for recommending technologies that have the potential to create a more effective, efficient, and focused state government for all Tennesseans. He recently chaired a Task Force on Medical Technology uniting the 18 Southern states in addressing the barriers and enablers to the full practice of Telemedicine.

Lou was previously the Director of Information Technology for Gaylord Enterntainment in Nashville, operator of the Opryland Theme Park, the Opryland Hotel, and the Grand Ole Opry as well as cable networks TNN, CMT and Z-music, numerous radio and television stations, and other music publishing enterprises.

Lou retired from The Walt Disney Company after 25 years of service in 1994. At Disney, he held numerous senior technology-related positions. He served as Worldwide Director of Technology and Technical Services for the Walt Disney Company, and was responsible for the selection of all information technology used by The Walt Disney Company worldwide. He developed the business plan and participated in the initial design and staffing for the Computer Animation Production System that won an Academy Award for Technical Achievement.

Prior to joining Disney, Lou was a mathematician and real-time programmer in the defense industry, working on systems for use aboard nuclear submarines and other strategic military applications.

Monday Keynote Address

BRIDGING THE GROWING DIGITAL DIVIDE

Owen F. Gaede, Ph.D.
Director and Professor
Learning Systems Institute
Florida State University

The growth of information technology is accelerating the globalization of society with geopolitical borders becoming more transparent. Wireless and satellite technologies can bring the libraries of the world into the most remote village, creating new opportunities for learning. Unfortunately we also see a growing digital divide between the information rich and the information poor. Are we doomed to a world in which the rich get richer and the poor get poorer? Old learning paradigms will not be sufficient. One thing is clear: Only the wise use of educational technology offers the hope of bridging the digital divide. Offering real hope to those who so far have been left out of the information revolution is the greatest challenge we face in the decade ahead.

Tuesday Evening Dinner Address

Making Distance Learning Work

Steve Duncan, Ph.D.
Deputy Commander, U S Army Training Support Center
Ft. Eustis, Virginia

Dr. Steve Duncan, Deputy Commander of the U.S. Army Training Support Center (ATSC) at Fort Eustis, VA, has worked in the field of training for the U.S. Army and Department of Defense for over 28 years. He came to ATSC in August 1992 from Orlando, FL, where he spent 5 years with the Department of Defense Training and Performance Data Center as the Director of Individual Training. Prior to that he spent 5 years at the U.S. Army Training and Doctrine Command, Fort Monroe, VA, in the Training Concepts Analysis Directorate, Deputy Chief of Staff for Training, after spending a year at the Training Development Institute. He went to Fort Monroe from Fort Huachuca, AZ, where he was in charge of the U.S. Army's Intelligence School Staff and Faculty Training Division.

see http://www.atsc.army.mil/dpcdrbox_bio.htm
see also http://www.atsc.army.mil/

Special Presentations

Presenter / Title / Theme / Institution	Description
Pat Lucas, Principal; Dianne Williams, Lead Teacher; Martha Ford, Curriculum Integration Specialist -- Special Presentation -- B. T. Washington Magnet Middle School for International Studies Hillsborough County Public Schools, Tampa, Florida (see http://www.sdhc.k12.fl.us/~btwashington/) 'Innovative Practices for International Studies: Worlds to Explore, Knowledge to Build, and Business to Conduct'	Booker T. Washington is a unique institution in central Tampa. The school's goal is developing mature thinkers who are able to acquire and use knowledge as they work actively to integrate new information with what they already know. The school's teachers use the framework of global studies and world languages to provide students with both creative and critical thinking skills and strategies. Teachers and students collaborate and learn together as they utilize technology as a tool for learning. Booker T. Washington Middle Magnet School for International Studies holds the coveted title of Magnet School of America. The school Principal and selected staff will present details of the concept, planning, and implementation of the innovative programs at Booker T Washington Magnet School.
Michael Ferguson, Peter Lenkway -- Special Presentation -- Florida Center for Interactive Media, Tallahassee Community College 'Web World Wonders: Florida's Natural Habitats Through The Eyes of Robotic Cameras'	Florida's Star Schools Grant, Web World Wonders, makes it possible for anyone from anywhere around the globe to explore natural habitats of Florida, via the internet, through the eyes of live, interactive, robotic cameras. Visit Pigeon Key in the Florida Keys, Sawgrass Lake Park in St. Petersburg, Six Mile Cypress Slough in Ft. Myers, Wakulla Springs in Wakulla County and Kennedy Space Center on Florida's east coast. You never know what you'll see as you visit, perhaps alligators, a variety of native birds, an abundance of tropical plants, changing weather and beautiful sunsets. You can even look to see what is going on right now at one of the Space Center's launch pads. This web site contains lesson plans and student activities intended to increase environmental awareness and communication skills, a discussion board and on-line experts. To bring this unique educational experience to schools, the Florida Department of Education has teamed with The Florida Center for Interactive Media, Tallahassee Community College, to develop this site in cooperation with school districts, parks departments, other agencies and Kennedy Space Center.
Jamie Murphy -- Special Presentation -- Florida State University; USA	In a flurry of initiatives, textbook publishers are scrambling to profit from the Internet (Murphy, 1998). Harcourt Brace, for example, recently announced "an ambitious plan to establish an institution of higher education that only offers courses online" (Mendels, 1999).

'Textbook Publishers in a Networked World' Panelists: Robert Larson, Education Editor Times Company Digital http://www.nytimes.com/learning Bob Carlton, Senior Vice President, Electronic Products Thomson Learning http://www.thomsonlearning.com http://www.itped.com Pete Janzow Publisher, John WIley & Sons, Inc. http://www.wiley.com/college	Although a few trends such as complementary websites and course management software are emerging, the future is far from clear. Peek at the future as a panel of leading textbook publishers share insights about technology's influence and their evolving role in education. Complete courses, interactive testing, synchronous and asynchronous activities, textbook websites, on-line purchasing and multi-media presentations are among the enhanced learning possibilities that publishers are exploring.
Leon T. Hobbs, Sam Nichols, Stephanie B. Ash, Scott Lisenby -- Special Presentation -- Dothan City Schools; USA 'Technology in Technicolor with a Southern Accent'	Dothan, Alabama is an urban area with a population of approximately 65,000. It sits in the southeast corner of Alabama, 80 miles for the Florida Gulf Coast and 30 miles from Georgia. Although Dothan has major industries such as Michelin and Sony, the region is a predominately agricultural area. School enrollment as of January 1, 1999 was 9,058 students. The district has 19 schools: 11 elementary (five grades K-2, five grades 3-5 and one grades K-5), 4 middle schools (two grades 6-8 and one grades 6-7, and one grade 8), 2 high schools (grades 9-12), one technology center, and one alternative learning center. All schools have fully function LANS. Each school is connected to the central office and the transportation department with a WAN. This is a frame relay utilizing 128k and frame T1's. Every office, classroom, lab and media center have Internet access provided through the Alabama SuperComputer Authority in Huntsville, AL. This is a state grant that Dothan City has received. The following is an overview of the structure of the Dothan City Schools' presentation using the theme of a kaleidoscope. A multimedia presentation containing pictures and videos will enhance the speakers. As speakers and topics change the presentation will change as if turning a kaleidoscope to reveal changes in colors. Dr. Hobbs will open the presentation with an overviw of the Dothan area and school district demographics. As the kaleidoscope turns, Dr. Nichols will move the participants from a time in which Apple IIe computers dominated the classrooms and curriculum to a system connecting modern Pentium computers in offices, media centers labs and classrooms by a wide area network. Again the kaleidoscope turns to show students in the elementary and secondary schools utilizing technology in the learning process. The Director of Elementary Curriculum and the Director of Secondary Curriculum will provide curriculum integration techniques at the district level. The kaleidoscope will stop to focus on elementaray areas where teachers use Internet, e-mail and curriculum specific software in daily learning activities. It again turns to focus on middle schools with students and teachers in classrooms and labs. At the high school, the kaleidoscope stops to bring into focus one of the six 1998 Milken Award winners from Alabama.
Judy Barrett Litoff, Harold A Records, Gaytha A Langlois, Mikhail Makanoik, Gajane Valchevskaya, Joseph A Ilacqua -- Special Presentation -- Bryant College; USA National Academy of Sciences; Balarus	For five years, Bryant College, Smithfield, Rhode Island, USA, and the Information Technologies Center of the National Academy of Sciences of Belarus (NASB), Minsk, Blelarus, have participated in a comprehensive joint venture that uses advanced technologies to promote collaborative learning at a distance between the United States and Belarus. The projects that the two institutions have supported include seminars on financial

'Using Technology to Foster Collaborative Learning at a Distance: The National Academy of Sciences of Belarus and Bryant College Connection'	accountablility for scientists and engineers who worked for the Soviet defense industry, collaborative distant learning courses between Bryant College and the European Humanities University in Minsk, the creation of a Center for International Collaboration at the NASB, and the coordination of a 1999 Summer School on Collaborative Learning at a Distance in the Social Sciences in Minsk. In addition, plans are underway for the establishment of a virtual university that will bring together academicians and scholars from higher education institutions from Belarus, Germany, and the United States. These projects have utilized a wide array of information technologies including virtual roundtable discussions via email, special seminars on web site construction, internet protocol video teleconferencing between the U.S. and Belarus, software training and development, and the use of the internet to promote collaborative learning across diverse cultural and political boundaries. This joint venture has been spearheaded by scholars representing diverse academic disciplines, including history, economics, environmental science, mathematics, and computer information systems. The interdisciplinary nature of the Byrant College/National Academy of Sciences team has clearly contributed to the success of the joint venture.
Rocco Ferrario, Science Instructor, Education Committee Member for the Academy of Model Aeronautics -- Special Presentation -- Redwood Middle School, Napa Unified School District, California; USA 'Soaring Science!'	The Academy of Model Aeronautics, joining forces with educators, major organizations, and vendors from across the country, have assembled an exciting array of lesson ideas, web-based learning modules, and instructional materials to share. Come and join us in a special session at *ICTE Tampa*, and actually build a sample model airplane kit. Learn about related web-based learning modules, and their incorporation into more traditional classroom instruction and lab experiences. Model aviation in the classroom offers a golden opportunity for making abstract concepts more understandable. Modeling provides concrete, real-life applications in forces, center of gravity, mathematics, and experimentation. Plan on attending this special session, and learn how to plug model aviation into your science courses, and teach science concepts better.
Dennis Sievers -- Special Presentation -- Central Community High School District # 71 'PC Management: Solutions That Work'	With the rapid expansion of technology and classroom accessibility to computers, the task of managing networks, installing software and Internet access has become a time consuming and labor intensive process. For many districts like mine, these problems are further magnified by rural and technically isolated geography coupled with the all too common problem of inadequate financial resources. As we have grown, so have the problems of installing software on hundreds of computers. Repairing the minor issues of inappropriate backgrounds, removing unwanted files, disk space management and maintaining print drivers has taken most of the time allocated for our local maintenance efforts. After using a number of software products we have discovered a unique tool in Launch-EDU. The product enables me to remotely administer nearly 120 computers without leaving an office. I can monitor all activities, clean up files and restrict access to specific software from a single computer. The improved management has given more time for assisting students in learning both gross skills and the more subtitle nuances of technology.

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Theme 1 Abstracts

Presenter / Title / Theme / Institution	Abstract
John W. Gudenas Theme 1 Aurora University; USA 'A Task Based Management Approach for Technology Instruction in a Rapid Degree Completion Program'	A pedagogical system using task based management techniques to integrate information technology outcomes and newly developed e-commerce concepts is presented. This system was designed and implemented for an Information Systems and Research course in a rapid degree completion program. Aurora University developed this program in cooperation with Caterpillar Corporation at the highly automated Montgomery Illinois Plant which is located near Aurora. Rather than bringing a student to Aurora University, an extension of the University was brought to the Caterpillar plant. Select employees, needing degree completion, enter the program in cohorts. This process establishes classrooms on site using existing management/engineer training rooms and their technology. The learning system presented, creates an integrated environment that makes research and team management functionally dependent upon information technology skills. A standard Management Information System text is used for a knowledge basis and extended by the instructor by subdividing the class cohorts into task groups. Each task group has a specific current mission critical technology charge focused upon internet and intranet issues that have an association to their employment enterprise. Each group is required to prepare a written report, an oral presentation with multimedia and peer evaluation. Outcome assessment, independent rubric measurement and student perception indicate a successful system that can be adopted for other environments.
Philippos Pouyioutas Theme 1 Intercollege; Cyprus 'Employing Open Learning Techniques in Teaching Information Technology'	Considering the positive feedback we got from our college students regarding the use of a supported student-centric model in teaching a course on the World Wide Web (WWW), using the WWW, we decided to extend the utilization of this open learning and teaching environment to other courses. The combination of the learner-centric and teacher-centric model in an open learning environment was to be tested now with teaching a theoretical introductory information technology course. In this paper we describe how a theoretical course, previously taught in the classroom without any use of modern information technology, other than a simple overhead projector, can be redesigned to be delivered in a complete multimedia Web-based approach. Our aim at all times is to approach different student groups and by providing them with more flexible ways of learning to trigger their interest and attention towards their studies and enable them to learn by ways appropriate to their learning styles.
Barbara J. Levine Theme 1 Robert Morris College; USA 'Integrating Technology in the Undergraduate Curriculum: Preparing Students to Communicate Effectively in Business and Professional Contexts'	The well documented need for individuals with effective communication skills has prompted educators to find ways to help students develop the skills necessary to prepare and present information in business and professional contexts. Good communication requires more than writing and speaking skills. Increasingly, students must also know when and how to use information-related technologies separately and in combination with other media. And educators must be able to use and model the use of these technologies in the professions. This paper describes a business college's four-year experience in integrating technology in the undergraduate curriculum. In specially designed presentation classrooms that support program goals, technology is used in three ways: students learn to use technology to communicate ideas, instructors use technology to teach principles and concepts, and professors use technology to evaluate learning objectives. Preliminary multiple-measure assessment suggests that this program is meeting its goals: students' communication skills are improving, and they are learning to use technology to prepare and present information effectively.
Jamie Murphy Theme 1 Florida State University; USA	In a flurry of initiatives, textbook publishers are scrambling to profit from the Internet (Murphy, 1998). Harcourt Brace, for example, recently announced "an ambitious plan to establish an institution of

'Textbook Publishers in a Networked World'	high education that only offers courses online" (Mendels, 1999). Although a few trends such as complementary websites and course management software are emerging, the future is far from clear. Peek at the future as a panel of leading textbook publishers share insights about technology's influence and their evolving role in education. Complete courses, interactive testing, synchronous and asynchronous activities, textbook websites, on-line purchasing and multi-media presentations are among the enhanced learning possibilities that publishers are exploring. New York Times on the Web, Wall Street Journal Interactive Edition and Inside Technology Training magazine research provides the basis for my selecting three to five panelists and guiding the group discussion.
Jamie Murphy Theme 1 Florida State University; USA 'Luddite Learning: A Call For Low-Tech Alternatives'	While today's latest technologies tout synchronous and asynchronous collaborative multi-media learning environments, these same leading-edge technologies suffer from a host of problems such as incompatible platforms, different version and limited bandwidth. And, the more advanced the technology, the less available it becomes to students. Given that students are the customer (Tsichritzis, 1999), universities should consider "easy-edge" technologies for the masses rather than "bleeding-edge" technologies for the few. This paper uses the often-misunderstood Luddite rebellion against technology (Winner, 1997; Folkers, 1997) to support the argument for simple rather than complicated technological distance-learning environments.
Deborah Dunn Theme 1 Tusculum College; USA 'Teaching Technology in the Focused Calendar'	Tusculum College has engaged in a process of examining and reviewing its programs which has resulted in a significant and far reaching transformation of the curriculum and the campus culture. Under the heading, "Civic Arts", five principal reforms have been inaugurated since the fall of 1991: the Commons, a set of interdisciplinary courses required for all students; the Competency Program, where students demonstrate competency in 9 areas prior to graduation; Self-Governance, in which the college is governed by committees composed of students, faculty, and staff; Civic Arts Project, where students complete and 80-hour service project prior to graduation; and the Focused Calendar, where all courses are taught one at a time for a duration of 18 days. This paper will focus on the pedagogical changes necessary to teach technology under the focused calendar environment. This is timely because many higher education institutions are currently reexamining both curricula and programs.
Valerie A. Taylor Cynthia C. Rudy Theme 1 York County School Division; USA 'Using Educational Technology to Increase Student Achievement in a Standards Based Environment'	Technology can be an effective tool used to improve student achievement. As classroom technology is designed to support accountability standards, instructional methods require revision to meet the various learning styles of the students. Technology offers school districts the opportunity to reduce the pupil/teacher ratio, promote active student mastery of the curriculum and change the traditional lecture method to one of student/teacher collaboration. As instructional methods evolve using technology, electronic learning becomes a standard companion of the traditional textbook. This presentation will focus on the processes for technology implementation to support a standards-based curriculum. These systems include the selection process for software and electronic support materials and hardware and network design. In addition, an overview of professional development activities emphasizing daily instructional technology integration strategies will be provided. Student assessment and intervention strategies using technology will also be highlighted.
Maria Helena Araujo e Sa Theme 1 Universidade de Aveiro; Portugal 'Intercomprehension, Romance Languages and Hypermedia: The European Project GALATEA'	In this session we will present a hypermedia product for the learning of intercomprehension in romance languages. This product is the result of the work of a European team from different countries who intend to educate a plurilingual citizen in order to deal with different languages and cultures. The product explores the learning potential of the speaker contacting with a new language of the same linguistic family. The methodology develops the following principles: (1) to promote the discovery and analysis of the verbal data through specific activities; (2) to put forward a set of hypertext of lexical, grammatical and civilisational help tools in order to lead to the construction of meaning; (3) to explore the total communicative and metacommunicative

	competence acquired in other situations of contact with different languages. These principles will be exemplified with the CDRom for the learning of French by the speakers of Portuguese as a mother tongue.
Egil Toldnes Theme 1 ; Norway 'Project-Based Learning in Secondary School - From Information Chaos to Multimedia Text Production'	The new Norwegian curriculum (L97) has a strong focus on project based learning and ICT. Many Norwegian teachers have experienced that students when using ICT in this setting very often start their work browsing the web, getting a lot more information than they can handle. We therefore need strategies to avoid that the students go into browsing in an "entertain me" mode. In our session we want to present an action research project at Huseby school in Trondheim (Norway) where the students work project based with subjects from the Science curriculum using Arts & Crafts and ICT for motivation and presentation. The aim for the project is to help students develop better learning processes by making text productions in a multimedia and PBL context. The project focuses on three main questions: 1) When students use ICT in their projects, are they too focused on collecting information? 2) How can we encourage students to act more like producers of knowledge and culture? 3) What happens when students make projects where they create their own multimedia texts?
Rosana Giaretta Sguerra Miskulin Theme 1 State University of Campinas; Brazil 'Integration of Tridimensional Logo With an Animation Environment in the Process of Construction and Visualization of Spatial Objects'	In this paper, some reflections about the present trends in Mathematics Education in relation to the new technologies are presented, by making explicit the theoretical-methodological presuppositions of the Tridimensional Logo. In addition, some pedagogical and mathematical aspects related to the applicability of Logo Tridimensional in the process of construction and visualization of geometrical concepts are described in an animation context (AVI Constructor and ScreenCam). Under these perspectives, one tries to answer the following investigation problem: is it possible to redeem the didactic-cognitive possibilities of Tridimenstional Logo in the pedagogical exploration of geometrical concepts? In order to achieve that, some theoretical-methodological considerations are presented about the Case Study conducted in the research, which analyses microgenetically the mental and computational processes of one subject attending the 8th grade in a private school in Campinas, SP, Brasil, in problem solving situations, conceived as design activities. This approach provides teachers and researchers in Mathematics Education with a refelction on their teaching practice, and an opportunity for them to adapt it to the new needs that have become imperative with the advance of technology.
Conrad Van Voorst Theme 1 SUNY College at Brockport; USA 'Technology in Mathematics Teacher Education'	My presentation will focus on key elements of a graduate teacher education course that provides new mathematics teachers with a structured, supportive environment for "discussing" and "modeling" effective ways of integrating technology into the curriculum. The major objective of the course is for teachers to discover strategies for teaching topics from the secondary mathematics curriculum in ways that develop students' understanding of the underlying math concepts. Activities used and developed in the class reflect the goals of the New York State Math, Science, and Technology (MST) Standards. Technology is used as a tool for solving problems, experimenting, and verifying conclusions. Teachers are given the opportunity to develop "research lessons" in the course, present these lessons using the appropriate technology, and get feedback from their colleagues before implementing them in their own classes. Along with presenting an overview and rationale for the course, I will discuss the reactions of teachers as to the effectiveness of the course in changing their thinking about mathematics and the teaching of mathematics using technology.
Renee Jeffery Theme 1 Garland County Community College; USA 'Partnership in a Hospitality Program: Where Education Meets Industry'	The Hospitality Administration Certificate program at Garland County Community College in Hot Springs, Arkansas, was developed using the DACUM (develop a curriculum) process, allowing industry professionals to tell college officials what skills they wanted taught in the program. By developing the curriculum this way, industry is assured graduates possess appropriate knowledge, skills, values, and experiences. The Hospitality Program: The Certificate of Proficiency in Hospitality Administration is fully accredited with other colleges and universities in the state of Arkansas. Day classes consist of two-hour

	blocks that are taught on Tuesday and Thursday for a 12-week semester. Also, for the busy professional, GCCC has one-night a week classes for 16 weeks. This allows a student the flexibility of a working adult program. After the core courses are complete, the student participates in an internship program. The makeup of the student body is equally distributed among industry professionals, non-traditional students, and traditional college students. Industry properties have encouraged their management and supervisory employees to obtain the certificate during normal work hours. Some properties have also paid for the tuition, books and fees through corporate sponsorship, payroll deductions, and reimbursements. The Business Division also offers a Hospitality Administration Scholarship. Implementation in the Classroom: The textbooks used in the classes are industry recognized, from the National Restaurant Association and the American Hotel and Motel Association. All hospitality classes are taught in the Computer Resource Center or utilize a laboratory class where students are encouraged and required to conduct research, use CD based workbooks, and use hospitality software. This enables the student to become computer literate, understand how the hospitality industry can utilize cutting edge technology, and enhance the students overall perception of computer software for today's hospitality professional. The focus of GCCC's Hospitality Program encompasses three dimensions. The first is the student's knowledge of the computer. If a student has limited skills, then classes are tailored to meet the needs of the students. Then classes are made available so that the student can perform basic computer tasks. Second, are the hospitality textbooks that use computer software as exercises. These exercises and software help the student integrate the technology with the industry. Third, the industry. Since the program was developed by industry professionals, the "living laboratory" is utilized for internship opportunities, classroom presentations, and field trips. The Future of the Hospitality Administration Program: The instructor is currently involved in a partnership with the Arkansas Department of Workforce Education to develop hospitality and tourism curriculum to be taught in Arkansas high schools. Distance education classes, on-line courses, compressed video courses, and telecourses are in development and will be implemented by the fall 1999. Other plans include an associate degree at GCCC, a hospitality newsletter, and a student chapter of the Arkansas Hospitality Association. We hope that this program will help raise the consciousness of the people of Arkansas about the importance of the hospitality industry and its economic impact on our state, and that technology and quality education will continue to be at the forefront of the State of Arkansas.
Frans Doppen Theme 1 University of Florida, P.K. Yonge Developmental Research School; USA 'Multiple Perspectives: The Atomic Bomb'	The presenters will provide information about a Social Studies-English based multimedia unit for high school students. The unit focuses on the use of technology in the curriculum to help students become independent self-motivated learners. Through the use of PowerPoint, Hyperstudio, a teacher-created webpage and primary and secondary source documents, students will analyze multiple perspectives on the decision to use the atomic bomb against Japan. The unit provides a structured opportunity for students to create meaning within a multicultural context. Additionally, the learning activities allow students to not only review their content knowledge but also to enhance that knowledge through Internet links that enable them to gain an empathic, personal understanding of these historical events. Teachers will gain new ideas about how they can integrate technology frameworks in their classrooms by facilitating independent learning and assessing student progress.
John Wm. Sanders Theme 1 Middle Tennessee State University; USA 'Self Pacing Technology Approach: The Preservice Course as a Catalyst For Learning'	As technological applications become widespread in today's classrooms, the preservice technology course acts as the avenue for modeling successful instructional practices that addresses the needs of an academically diverse student population. Through a unique self-pacing approach, preservice students are given opportunities to work at their own pace in designing technology portfolios and in acquiring the skills that will assist them in becoming technologically literate. Suggestions are outlined which illustrate a preservice technology course that allows for individual differences, pacing, and practice in order to facilitate learning as well as technology integration

	within lesson plans.
Ed Youth Theme 1 Skills Update of Maryland; USA 'Training Adult Learners to Use the World Wide Web'	Whereas the Adult Learner community once felt little need for Internet access, the availability of e-mail, on-line shopping malls, travel assistance, and general medical information have brought record numbers of Adult Learners to classrooms in search of training. This paper discusses a tried and proven program of training which emphasizes non-intimidation. Class size, course content, class duration, and presentation techniques are all discussed. Critical ingredients such as what to purchase, how to get the equipment set up, how to get on-line, how to use the computer and, how to find help are at the heart of the Adult Learner's information desires. This paper discusses a successful approach to answering all of these questions plus more.
J. Christine Harmes Theme 1 University of South Florida; USA 'Adding Interactivity to Web-Based Instruction'	Move beyond a website that presents static pages of content for students to scroll through. Learn to create activities that get students more involved in the learning process. Using tools such as Dynamic HTML, JavaScript, and LiveStage you can easily build web pages that present your course material in a more exciting way while also giving students different opportunities to interact with the content. Dynamic HTML allows for the use of layers which can be used for animation or click and drag interaction. JavaScript is an easy-to-learn scripting language which lets you create activities with responses such as pop-up boxes, status bar messages, and validation and feedback based on form data. LiveStage is a software package that creates interactive QuickTime movies in formats such as games, puzzles, or sprite animation. This session will provide an overview of the tools, demonstrations of their uses, and support materials.
Sandra A. Holmes Theme 1 Messiah College; USA 'Multiple Intelligence Theory and the Internet: Designing Units to Foster Science and Technnological Literacy Through a Student's Learning Style'	Preservice education students created thematic Internet science activity units based on Howard Hardner's eight multiple intelligences. Content topics were selected from those which appear in 80% of published science texts. KWHL charts and content webs organized each thematic unit. Internet sites for children were identified and evaluated with an Internet Evaluation instrument. Activities were designed to enhance science content through Internet sites and multiple intelligences. Units focused at the early childhood (N-2), primary (1-3), intermediate (4-6), or middle school (5-8) level. Activities were aligned to the national mathematics (K-4 and 5-8) standards. Units were piloted by public school teachers in a district which emphasizes multiple intelligences as an instructional strategy. The revised Internet units were compressed into topical chapters. Samples of these exemplary units will be available for preview.
Sandra A. Holmes Theme 1 Messiah College; USA 'CD-ROM Laboratory Explorations Replace Traditional Labs in an Introductory Biology Course'	Real life CD-ROM simulations required application of practical and critical thinking skills, provided students a means to observe results of changes they imposed, and collect/analyze data in a period of minutes as compared to weeks in a true lab setting. By exploring the effects of variables, students learned key concepts; gained a better understanding of scientific processes through application; were introduced to physiology, genetics, cellular physiology and developmental biology concepts; and furthered their understanding of the evolutionary paradigm that underlies modern biology. Students constructed journals following each CD-ROM based experiment. Follow-up occurred through e-mail questions and assignments. The student journaling and e-mail component provided responsibility and accountability on content topics, helped students develop in-depth topical knowledge, explore their own interests as it related to the topic, developed a means for students to self-evaluate their work/knowledge to a prescribed standard/rubric, and fostered development of an appreciation for the search for knowledge.
Terry R. Armstrong Theme 1 Armstrong Consulting; USA 'Using the Internet for Teaching in Remote Regions: A Finnish Experience'	Offering a valid educational experience at remote locations having few academic resources has always been a problem, financially and logistically. Yet, previous models and attempts at distance learning came up short in a number of areas. Now, the Internet has opened up new possibilities. The authors were given the task to teach an undergraduate course in Strategic Management in a remote Finnish location without many needed library resources. Their experiences led, serendipitously, to an approach combining a few strategic management models, the Internet, and student presentations to allay

	fears they had about academic soundness in previous models. The presentation will give details of how the design of the course, which could not have been taught adequately without the Internet, has lead to a fascinating approach for using the Internet in a traditional classroom as well as in remote locations.
John Pisapia Theme 1 Florida Atlantic University; USA 'The Elementary Computer Initiative: Teacher Benefits'	This three year study describes the effects of placing five computers and an ink jet color printer in each regular elementary classroom in a metropolitan type school district of 55,000 students on teacher behavior. Data were collected through classroom observations, focus group interviews, teacher surveys, software surveys, and standardized test scores. The study concluded that: * Teacher computer ability dramatically improved since beginning of initiative. * Computers were primarily used to improve language arts, reading and writing skills. * Instruction focused on: (1) challenging high ability students and (2) improving student directed learning rather than remediating deficiencies. * Instructional delivery changed by: (1) better able to present more complex material, (2) use a more thematic approach, (3) less lecture and whole class instruction, and (4) more small group instruction. * Teacher work behavior changed by: (1) planning how to integrate computer into subject matter delivery and (2) produce better teacher products.
Valerie C. Bryan Theme 1 Florida Atlantic University; USA 'Old Technology Themed for the New Millennium'	The growing numbers of aging Baby Boomers has forced many adults into thinking about the aging process in a new way and with a new attitude. A brief overview will share the significance of this topic to both young and older audiences. An old technology, cartooning, will be introduced as a comfortable means for "attitude adjustment" during this change phenomenon. The session will address how humor can be used as a logical tool for this transition and how cartooning can play a specific role. The concept of storyboarding will be expanded as to how this introduction of humor can work in many teaching areas, particularly when addressing subjects that are uncomfortable or sensitive or require some change in views or attitudes. Participants will receive some exercises for writing a script for their own area of interest.
Debra Hargrove Theme 1 Ahai Learning Resources, Inc.; USA 'Malcolm Knowles Would be Proud of Instructional Technologies'	The correlation between the effective use of instructional technologies and the principles of Malcolm Knowles will be highlighted through an interactive session with some modified role-playing. The information will be based on current ongoing research. An overview of how the domains of learning are addressed through the various instructional technologies and when technology integration is appropriate will be provided to each participant. Participants will receive pertinent information as to what tools work best to distribute information, deliver lectures, help others to organize information, enhance problem solving, stimulate thought processes or discussions, and help to make decisions. Participants will leave with a PowerPoint presentation and other guided materials on a CD-ROM with suggested URL sites for the participants further study.
Andre Bresges Theme 1 Gerhard-Mercator, university of Duisburg; Germany 'The German "Learning Field" Approach and its Support by Multimedia'	In Germany, education is heading away from pre-structured lessons towards the more constructivistic approach of "learning fields". The goal is to analyze the large complex structures of tasks a subject may be confronted with at his working place or in his private/social environment and then set up a learning environment - the "learning field" - for problem-based learning. Current research in the Gerhard-Mercator-University of Duisburg/ North Rhine-Westphalia covers design, test and evaluation of supporting multimedia tools for this approach, beginning with information databases for self-directed learning and decision support for in-classroom projects, along multimedia supported real-life/hands-on experiments, towards fully virtual learning environments for online and distant, home and working-place learning. Special research interest are diagnostic tools for on-line learning support and the social behavior of learning groups.
Chunxiao Jiang Theme 1 Sichuan Normal University; China 'Multimedia Computer Assistant Instruction System on Course of Human Anatomy and Physiology Applying to	A multimedia teaching software on human anatomy and physiology has been developed which applies mainly to training students in normal university. This software consists of four subsystems: teaching demonstration section, director section, examination section and teaching analysis section. It provides an amount of demonstrating materials about human structure, simulating process about important

Normal University'	physiological phenomenon and mechanism, and some demonstrating experiments which practice difficult due to need for special equipment. It also includes simulating teaching - practice pattern. The MCAL system, providing an individual environment with multimedia(text, sound, image, animation and video) and interactive mode for students, enhances learning effect: 1) Average grade increased 4.8 in 100-grading system in the group applying the MACL system; 2) A group (students) applied some parts of the MCAL system to school teaching practice and received high evaluation. In addition, demonstrating materials and simulating experiments make up the shortage of specimen and equipment and the MCAL system's usage sharpens student's ability to apply modern educational method.
Barton D. Thurber Theme 1 University of San Diego; USA 'The Web in the College Classroom: Strategies, Evaluation, Implementation'	The authors review the uses of computers in the college curriculum, including the implementation of distance education strategies, the advantages and disadvantages of web-based instruction, and the constitution of traditional academic discourse in an electronic environment. We then propose a model for the use of computers in colleges, the web (a) as a bibliographic resource but also (b) as a means of expression. The former, while significant for college-level courses, essentially duplicates the function of a library; the latter, we argue is crucial for in substituting web page design for the conventional term paper--substituting nonlinear hypermedia for standard prose--we give our students the tools to occupy, rather than simply consult, the web, and demonstrate what writing may become in the computer age.
Donald B. Egolf Theme 1 University of Pittsburgh; USA 'Augmenting the Traditional Course with Internet Ancillaries'	Teachers of traditionally-taught courses have for years used text-bound computer support in their teaching, email and data-base searching, for example. The internet dramatically increased ancillary supports for the traditional course. Multi-media and higher-level interactive capabilities became available and the number of searchable data bases significantly increased. This presentation reports three studies where the internet was used as ancillary support for the traditional course. Study 1 involved a class where students created a website about the course material. Study 2 dealt with students who made in-class presentations using computer-projected, internet-found images. And, Study 3 demonstrated how students can use the internet to create new knowledge. Here nonverbal communication students had visitors to a website make judgments about human faces to test hypotheses about facial attractiveness. These studies show that teachers who prefer to stay with the traditional face-to-face approach can nonetheless exploit the internet to enhance the learning experience.
Sherri Smith Theme 1 Florida Gulf Coast university; USA 'Synthesizing New Technologies with Traditional Instructional Methods: The Challenge of Distance Education Communication'	This study presents an analysis of Internet-based distance courses from a communications viewpoint. Face-to-face communication is a key element of traditional classroom learning and teaching. Distance education changes the methodology of communication from face-to-face to asynchronous exchange. Alternative communication options are explored to analyze effectiveness and suitability in the distance education environment.
Colleen Swain Theme 1 University of Florida; USA 'Technology Rich Lessons: What Might They Look Like?'	Most teachers in the K-12 and higher education environment recognize the importance of integrating technology into their lessons but often are at a loss of how to create these "technology rich lessons" they hear about in workshops, conferences, and inservice sessions. Teachers have remarked how overwhelming the task of creating these lessons seems. When working with teachers on the seamless integration of technology into their curricula, the approach I have taken has been to demonstrate technology rich lessons, teach the skills needed for those lessons, and then let the teachers try out the lessons in their classroom. As teachers became more comfortable adapting these lessons for their students, they also began creating more technology rich lessons and desired to learn additional technology skills. This paper will discuss several of the lesson plans used with teachers and some of the responses of teachers from their experience.
Margaret J. Cox Theme 1 School District No. 2; USA	The rapidly approaching 21st century brings with it significant developments in the Internet that may revolutionize how students learn and gain access to knowledge. Today, teachers need guidance

'Toward the Year 2000: Delphi Study of Beneficial Uses of the Internet in K-6 Education to Increase Student Learning'	as to how best they can utilize these developments to improve student learning. This national Delphi study identified and establishes consensus of 93 specific Internet uses and eight major Internet categories beneficial to learning in grades K-6 over the next three years by recognized expert educators who use the Internet to enhance learning. No longer is the teacher confined to the four walls of the classroom nor are adopted materials, textbooks, and library books the sole means of acquiring curricula. Consequently, teachers need encouragement and practical examples of how to use the Internet, and these Internet uses and categories will serve that purpose.
Andrew Kurtz Theme 1 Bowling Green State University, Firelands College; USA 'Digital Acculturation in the New Communication Technology Curriculum'	Associate Degree programs in new communication technologies have taken an instrumental approach to curricular design. Assessing hiring trends and work-force deficiencies, two-year degree granting colleges seek to fill these gaps through the implementation of programs based upon pragmatic assumptions of skills-training, arguably the mission of such institutions since their inception. In this paper, I will suggest that the cultural component of new communication technologies forces us to rethink this pragmatic approach to curricular design. Specifically, I will argue that in focusing on technical training, Associate Degree programs ignore the fact that individuals engaged in the production of new communication technologies are part of a cultural group for whom digital technology is the basis of social interaction. Becoming part of this group, what I call "digital acculturation", is as important to individual success as learning the technology around which the group is organized.
Mercy N. Fodje Theme 1 Cameroon GCE Board; Cameroon 'The Impact of Technology to Education in the Developing Countries'	The combination of education and technology has been considered the main key to human progress. Education feeds technology, which in turn forms the basis for education. It is therefore not surprising that to be "developed" is to have had education based on western knowledge, science and technology. This is today considered progress. The rapid emergence of new technologies brings certain worries to mind. If these new technologies at a time of dramatic population increase continue to produce more and more with less and less labor input then we are heading for a world with hundreds of millions of marginalized humans. What the world needs today is not talent in producing new technologies but talent in understanding the impact of technology on the society and individuals. This calls again on education. We have to produce graduates of all disciplines with some depth of understanding of the environment, of the consequences of large-scale inequity, and the difference between technological development and human development. Educational programs in the third world heretofore have been designed around the western ideals. These need to be reworked to reflect the indigenous cultures and promote human values while at the same time producing the talent for "controlled" technological advancement. Only then would we be able to talk of development. This paper attempts to provide highlights on areas of the educational system of Cameroon, which can be improved for development to be a reality, and also proposes how information technology could be of use to education in the third world for the 21st century.
Christine Frank Theme 1 Georgian College of Applied Arts and Technology; Canada 'The Best of Both Worlds'	On-campus courses that blend face-to-face and online learning make use of two rich learning environments. They also give both students and teachers the chance to gain technical skills in a gradual way. A practical advantage is the freeing of classroom space for part of the class time. Founded in both socio-constructivist and adult learning theory, the learner-centered approach gives greater control and responsibility for learning to the learner and emphasizes the importance of collaboration in the learning process. Research on conferencing for learner-centered education, along with student response to blended classes, will be presented. Descriptions of blended courses and appropriate teaching strategies that encourage critical thinking will also be given. The presenter is currently finishing her doctoral thesis on online teaching and has taught several blended courses at the community college level.
Luis Valadares Tavares Theme 1	Since 1994, Universade Catolica Porguguesa, launched a Distance Learning Program in Management, DISLOGO (DIS-Distance + LOGO-

Universidade Catolica Portuguesa; Portugal 'Distance Learning in Management: The Dislogo Case-Study in Portugal'	Knowledge). Based on innovative technological products, the distance learning is based on textbooks, presential sessions every 15 days on Saturdays, a private e-mail network, a service provider network (ISS - Information Service for Students) and videoconferéncing. Nine courses are opened: General Management, Negotiation and Leadership, Marketing, Finance, Insurance Management, Project Management, Human Resources, Business Law and Banking Management. The targets of the program include SME managers, middle managers of several companies and technical engineers looking for skills on the management side. The DISLOGO programme already educated about 1000 managers from more than 450 organisations. The profile of the managers is diverse with 24% managers more than 40 years old and 42% more than 30 years old. The use of CD/ROM's in teaching started in 1996 when the first "Global MBA in Management" was launched in Portugal. The future takes the Internet as a new educational path as well as videoconferencing. This paper describes the evolution of the project and analysis of the students motivations to take the courses and the questions facing the future of the project.
Ward Brian Zimmerman Theme 1 Enterpriz Consulting; USA 'Using the Internet: Enhancing the Secondary English Curriculum'	The purpose of this report is to discuss an Internet enhanced curriculum designed through collaboration between high school teachers and university professors. Challenged by both new state English competencies and a state mandate to integrate technology into the curriculum, this faculty chose to use the Internet as a resource, to provide new learning methods, and as a venue for student publishing. These challenges along with procedures and implementations will be discussed. Future directions for Internet use within this school will be addressed.
Arthur Shapiro Theme 1 University of South Florida; USA 'Using Technology to Restructure the Classroom Paradigm'	By creatively utilizing technology, this proposal restructures the centuries-old classroom construct presently constraining education and schooling into a "family"-style unit, meeting a wider range of needs. Technology, largely utilized as an adjunct to education and schooling, becomes the organizing principle, reorganizing classroom structures and processes fundamentally. This construct reorganizes the classroom into a "family" group of 5 students as its basic unit. The family operates in its highly flexible turf as a group, as individuals, or with other individuals or families, depending upon goals and objectives, technology, and facilities. The attached diagram illustrates the flexibility of the turf/family concept, suggests possible technologies, and indicates major impact on educational practices. Because the basic instructional unit becomes the small family, cooperative learning, independent learning, and other models are extensively utilized. The teacher becomes facilitator, designing instruction and schooling to purpose, utilizing human, spatial, technological, time, and materials resources as needed.
Lorraine C. Martinez Theme 1 Los Alamos High School; USA 'The Magic of a PowerPoint Presentation'	Audience: Students taking Spanish. Behavior: Create a PowerPoint presentation based on your essay "Yo" and present it to the class. Conditions: After receiving your graded 200 word essay, student will have 260 minutes (5 classes that meet for 52 minutes) to create a PowerPoint presentation. Degree: Student should have 10 slides (one title page, 3 slides about your past, 3 slides about your present, and 3 slides about your future) and each slide must have a different color, transition, photograph, sound to match the content, 10-15 words of context in Spanish. Assessment: A holistic writing rubric was used to grade the essay and the context of the presentation. A speaking rubric was used to grade the oral presentation. A PowerPoint rubric was used to grade the slides. Standards: Students will use the language studied to reinforce and expand knowledge of other disciplines. Students will use the language studied for personal enjoyment, enrichment, and employability.
Peter Tamburro Theme 1 Oneida City School District; USA 'Technology Support School Reform'	
Ruurd W E van der Wal Theme 1 Technikon Witwatersrand; South Africa	The Centre for Career Development (CCD) at the Technikon Witwatersrand compiles and conducts industry specific courses. One of these courses is the Advanced Credit Management course. This

'Management Information Systems - Inadequately Trained Credit Management Officials at Transnet: A Case Study'	course is tailor-made for Transnet. Transnet as an institution consists of the railways, airways and ports (harbours) in South Africa. In conducting this course the author came to the realisation that the course participants' knowledge of computer hard and software was minimal. They only know who to contact if something has gone wrong. As these students are clients of CCD and also the author, the course material and presentation should be of high quality. Fortunately for the author a computer fair was held during the week of the course and that enhanced the quality of the course. The author used a case study approach utilising both qualitative and quantitative methods. The students answered a questionnaire and wrote an essay on their perception of the course as a whole. These results will be presented at the conference.
Laura Woods Theme 1 John M. Sexton Elementary; USA 'Class Web Pages Enhance Academic Achievement'	Students who help create and maintain their class web page, take more pride in their achievements at school. Class web pages showcase student accomplishments, creative works, and efforts of members of their educational environment. A classroom web page displays student writing, academic and artistic ability, organizational skills, and classroom management processes. The student's use of the Internet, serves two purposes. It allows access to real world information for use in their academic projects while providing the means by which students may share information about their classroom. Classroom web pages enhance academic achievement, as well as reading and writing, at all levels. This presentation targets ways to develop and implement classroom web pages that include the entire classroom environment and student creativity. Software demonstrated will be mPower and Claris Home page. Handouts on how to easily create a class web page will be provided.
Mun Fie Tsoi Theme 1 Nanyang Technological University; Singapore 'Multimedia Design in Chemical Education - A Constructivist Approach'	The learning to establish the connections among the three levels of understanding, namely, macroscopic, microscopic, and symbolic in chemical education is a difficult task for many students. Multimedia is one way to address this problem. As such, this paper provides insights gained into some practical design issues to be considered in developing a multimedia courseware in chemical education at secondary school level. It concentrates on the overall multimedia design that maximizes the potential of technology to enhance subject content and pedagogy as well as specific design tips for guidelines based on practical pedagogical experiences in constructivism, courseware design and storyboard. An important module, namely experimental techniques is selected to illustrate certain salient design issues. Implications for designing multimedia courseware in chemical education, which emerge as a result of the design issues considered will also be discussed in the context of both the writer and multimedia producer.
David Williamson Theme 1 Haringey Education Services; England 'Implementing Government Policy at a District Level'	Information and Communication Technology (ICT) is a central aspect of the British government's educational policy. The "National Grid for Learning" (NGfL) will connect all elementary and high schools to the Internet by the year 2002. A major training programme will improve teachers' use of ICT in teaching and learning. This ICT initiative is happening in parallel to other major educational changes to improve standards of literacy and numeracy. At a local level, Haringey Council, a small district of inner-city London, with high levels of deprivation, is enthusiastically tackling the NGfL programme by connecting all its elementary and high schools to the Internet and by training 2000 teachers to use ICT in their teaching, management and communication. The paper and presentation will examine the strategies to achieve these objectives in a period of major educational change in all aspects of the school curriculum.
Gustavo Schmidt Moreira Theme 1 Federal University of Rio de Janeiro, NCE/UFRS; Brasil 'Teaching-Learning Economy in a Secondary School Using a Qualitative Computer Modelling System'	This paper discusses some ideas about the importance of using computer modelling in Economy classes with students aged 15-16 years old in a private technical school in Rio de Janeiro. From a perspective of System Dynamics (1) and using a semi-quantitative (or qualitative) computer modelling system calld WLinkIt (2) the students are engaged in exploratory tasks where they externalize and discuss their ideas about some subjects in Economy such as inflation and interest rates. The work presented here also points to the relevance of working with modelling in economy in secondary schools and that we

	can make it happen when using appropriate computer tools. References: (1) Forrester, J.W. (1992). Road Map: A Guide to Learning System Dynamics, MIT - Massachusetts Institute of Technology. Soan School of Managment. (2) Sampaio, F.F., Ogborn, J. (1996). Linkit: A Modelling Tool without Mathematics. The Thirteenth International Conference on Technology and Education. Proceedings Volume 1, March 17-20, 1996, New Orleans, Louisana.
L.H. Christoph Theme 1 University of Amsterdam; The Netherlands 'On-Line Teaching: Results of a Training for Distance Tutors'	Nowadays the Internet is being used as a teaching tool more and more. One way in which the Internet is used in this respect is for the Virtual Pilot School, initiative of the Lilenthal project (partly funded by the European Commission under contract MM 1016). The Lilenthal project is a collaboration between various flight schools in Europe. The flight schools co-operate in developing a shared distance learning platform for the acquisition of a Private Pilot Licence (PPL), the first stage of any pilot training, professional or non-professional. Until recently, theoretical pilot training used only conventional forms of education, predominantly classroom teaching. Some efforts have been made to integrate the computer into the curriculum, without much success. One problem was that students lost touch with their instructor. The Lilienthal design of the Distance Learning Platform (DLP) takes this finding into account by providing various means of communication for students and tutors. The flight instructors involved in the Lilenthal Project are all traditional classroom teachers with little or no experience with the Internet or distance teaching. For this reason, extensive thought is given to the question of which new capabilities the flight instructors need to engage in distance tutoring and how these capabilities can be trained in a systematic way. A Tele-Tutor Training (TTT) was set up to teach the requirements and for each requirement a specific training method was used. This training for distance tutors has been thoroughly evaluated using different evaluation measurements. During the presentation results of the evaluation of the TTT will be presented and further recommendations for training distance tutors will be given.

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Theme 2 Abstracts

Presenter / Title / Theme / Institution	Abstract
Yun Wang Theme 2 Mercy College; USA 'A Crossroad to the Current U.S. Undergraduate Computer Science Education (UCSE) - Challenges and Opportunities in the Information Society'	The current U.S. UCSE has been called for remodeling from both the corporate world and the general public. The underlying reason is to insure that the UCSE is able to educate a globally competitive IT workforce for the U.S. On-line courses, virtual libraries, artificial intelligence labs ... all these new learning environments provide students with up-to-date, interactive, and convenient features. Updated curricula with object orientation programming, Internet and Intranet technology, and graphical user interface applications oppose questions to the fairness of paper-pencil exams. How does the traditional classroom-lecture teaching method shape itself to meet IT challenges? What type of role will distance learning play? This paper analyzes both cons and pros of the current UCSE, provides feasible implementations, and explores other innovated approaches. This paper presents actual and effective practices conducted at the author's institution and they are focused on faculty development, student-faculty evaluation, lab facilities, and industry cooperation.
Veljko A. Spasic Theme 2 Center for Multidisciplinary Studies, University of Belgrade; Yugoslavia 'Intermat - Internet Based Information System for Support of Research and Education on Mathematics'	Internet based information systems are new advances that support development in various fields of our society, where research and education are among the most important. This paper presents INTERMAT - Internet based multimedia information system we developed for support of research and education in mathematics. Main aims, functions and elements of the system are presented as well as the structure and implementation. Some of the obtained results are discussed.
Veljko A. Spasic Theme 2 Center for Multidisciplinary Studies, University of Belgrade; Yugoslavia 'Virtual Experiment in Bio-Medicine'	Among various methods and approaches that are present in computerized learning, especially in today's Internet based distance learning, virtual experiment is of fundamental role. The possibility to learn by self paced experimenting with virtual, simulated systems, opens new horizons. In the paper we discuss some pro and contra arguments relating virtual experimenting method as well as describe two of our contributions to the field of virtual experiment: GLUCOMAT - virtual system that simulates homeostatic glucose regulation in human, and PRODONT - expert system for supporting virtual experiment in dentistry.
Marty Beech Theme 2 Florida State University; USA 'Florida's Curriculum Planning Tool'	The "Curriculum Planning Tool" (CPT) is a simple electronic performance support system developed by the Center for Performance Technology at Florida State University for the Florida Department of Education (DOE) to help teachers plan lessons using Florida's Sunshine State Standards. The CPT includes a bank of learning activities linked to the standards and a wizard to help teachers develop additional activities following the critical components of instructional planning. The CPT also shows the correlation of the standards to the statewide testing program. The CPT is available in different versions for elementary and secondary teachers. In the secondary version learning activities are cross-referenced to the Course Descriptions used in Florida's secondary programs. The CPT was produced on a CD-ROM and may be downloaded from the Florida DOE Homepage. Additional instructional activities are available on the DOE website and can be downloaded.
John Pisapia Theme 2 Florida Atlantic University; USA 'The Elementary Computer Initiative: Technical Support'	This three year study describes the impact of school district efforts to support a computer initiative which placed five computers and an inkjet color printer in each regular elementary classroom. Data were collected through classroom observations, focus group interviews, teacher surveys, and software surveys to determine the impact of efforts to train teachers, and install and maintain the technical hardware, and the courseware required to support teacher efforts. The study concluded that: * Training at the school district level was adequate but school in-service was inadequate. Training on software content was adequate but training on development of materials and classroom management was less adequate. * Instructional support

	from fellow teachers, as a source of support, decreased in year two but support from: (1) technology committee, (2) school computer contacts, and (3) technology instructors improved in year two. * Administrative support from the principal was less adequate. * Administrative barriers: Lack of planning time is most difficult barrier to overcome. Time in the school schedule is also seen as a moderately difficult barrier. * Technical problems with (1) network and hardware less than moderately difficult and (2) printers more than moderately difficult.
Mark Geary Theme 2 Seminole County Public Schools; USA 'Making it Work, BEFORE You Buy It'	This presentation draws upon guidelines from the field of heuristic evaluation to help software purchasers decide what to look for and what questions to ask when evaluating software. As instructors and administrators get more involved with distance learning uses and applications, the need to effectively evaluate the software systems and web design grows. In the field of computer science and engineering, heuristic evaluation of the software user interface is a means to create "user-friendly" software. Unfortunately, what is user-friendly to a software developer, and what is user-friendly to a teacher or student end-user may be something entirely different. Heuristic evaluation does point the way to what is truly USABLE software and allows decision makers to make rational, unbiased decisions about their purchases. This program will provide an overview of heuristic evaluation as it can be applied to educational software.
Nancy Deal Theme 2 Buffalo State College; USA 'The CyberQuest: A Focused Tool for Evaluating Web Resources'	The proposed presentation will describe a scaffolding activity designed to help pre- and inservice teachers evaluate and use the Internet effectively in the classroom. The CyberQuest is a cooperative learning exercise in which participants adopt a role-play scenario to evaluate Web resources and to suggest strategies for integrating the Internet into instruction. CyberQuests utilize Cyberguides developed by the SCORE project, to focus teachers' evaluation on quality Internet materials to enhance the study of literature and the language arts. The process, however, can be applied to other disciplines as well. The presentation will review the activity's process, explain roles, and introduce several Cyberguides for potential classroom use. Results of CyberQuests conducted with pre- and inservice teachers will also be shared. The model has proved useful for teacher preparation and staff development to extend teachers' familiarity with quality Web resources and to provide a model for classroom implementation at all educational levels.
T. Rick Whiteley Theme 2 Department of Business Administration, West Virginia State College; Canada 'Developing Critical-Thinking Skills Via Internet-based Learning Modules'	Case study analysis is a common pedagogical approach used in university business courses. To effectively analyze cases, students must know the relevant subject area (knowledge), understand the meaning of this knowledge (comprehension), use abstract ideas in actual situations (application), decompose the case material into its constituent parts (analysis), develop new ideas based on the information analyzed (synthesis), and select the appropriate theories, concepts, or techniques to solve a particular problem (evaluation) (see Bloom's Taxonomy). Developing critical-thinking or problem-solving skills is very difficult for most students, no matter what subject area is under consideration. To help students develop the prerequisite skills for effective case or problem analysis in the area of marketing, self-paced learning modules, created using HTML, were developed. Each module includes a set of short marketing situations; a set of guiding questions for each situation, questions which become more general as the student progresses through the program; a predetermined list of possible (correct and incorrect) responses to each question; and separately accessed explanations for each response. Linking this program to the instructor's website allows for time-independent, external student access.
Dulal Chandra Kar Theme 2 Virginia Polytechnic Institute & State University; USA 'A Real-Time Software System for Detecting Plagiarism in Programming Assignments'	Plagiarism in assignments in computer programming courses is on the rise. There are many factors that contribute to this trend. The recent innovation in computer technology has made sharing, copying, and modifying a program as easy as "cut-and-paste." Lured by good job market, many ill-prepared students are enrolling in programming courses and some of them are eventually resorting to plagiarism out of desperation to survive in a large class where no or

	little individual help is available from the instructor. Detection of plagiarism by manual inspection in a large class is very laborious, time-consuming, and error-prone. In this paper, we introduce and discuss different techniques for automatic detection of plagiarism and their suitability for real-time implementations. Among all known techniques, the techniques based on statistics of symbols, keywords, and user-defined words found in source programs are relatively easy to implement. Based on some statistical technique, in this paper, we propose a simple real-time software system that can detect cases of plagiarism very efficiently. The system receives a student's program submitted from any machine connected to Internet and immediately checks for similarity with archived programs of other students. They system is found to be very effective and reliable to detect and deter plagiarism in large classes.
Gregg Miller Theme 2 College of Education; USA 'Student Perceptions of Their Technology Skills Before and After a Basic Computer Applications Course: A Three Year Study'	This paper includes the results of a three-year study of education students involved in a basic computer applications course. The study reports findings across several demographics including: academic rank, area of teacher certification, ethnicity, access to a computer outside of class, and type of computer used. Information is also provided regarding student performance levels related to the specified demographics. The overall purpose of the study was to examine student reactions to a set of 58 items or "Can You.....?" questions included in a survey form at the start of the course and again at the end of the course. The 58 items were organized around specific course topics and basic technology competencies required for teacher certification including: 2) Basic File and Document Management, 2) Operating System Basics, 3) Word Processing and Desktop Publishing, 4 Spreadsheets, 5) Databases, 6) Networking, 7) E-mail, 8) Audio-Visual, and 9) Multimedia. The study also examined these students' gains on the pre to post survey and performance in the course. Comparisons were also made between student reported entry level skills across the three years of the study. The final results of the study will be provided to conference participants.
Kate J. Kemker Theme 2 Florida Center for Instructional Technology; USA 'How to Create a Technology Preview Center'	Technology preview centers are an avenue to provide in-service and pre-service teachers with the opportunity to preview software before purchasing it for their schools. A preview center can supply in-service teachers and administrators with training in the latest technology. The Florida Center for Instructional Technology (FCIT) is a preview center located at the University of South Florida and serves the ten county surrounding district. FCIT is equipped with thirty computers (Macintosh and Windows), thousands of donated software titles, and many other related hardware devices. As part of university wide consortium, FCIT supports training of faculty to integrate technology into their classroom and provides opportunities for education majors to visit the center to evaluate software as a part of their course of study. This session will focus on establishing and maintaining a preview center, including methods of building relationships with major software and hardware vendors to provide technology training for teachers.
Amy Baylor Theme 2 Florida State University; USA 'Foundations for Designing MIMIC, an Intelligent-Agent Based Learning Environment'	MIMIC (Multiple Intelligent Mentors Instructing Collaboratively) is a proposed intelligent agent-based learning environment for perhaps the most critical component of pre-service teacher education: instructional design skills. As part of the system, instructional design case studies will be multimedia-enhanced, with video, animation and graphics so as to provide an engaging and realistic learning experience on the Internet. Through working with these cases, the learner will interact with three pedagogical agents, each reflecting a different instructional design perspective. The 20-minute presentation will describe this framework in more detail and demonstrate the MIMIC prototype system. The theoretical foundations contributing to MIMIC's potential to shape the thinking of pre-service teachers will also be discussed.
Amy Baylor Theme 2 Florida State University; USA 'What are the Possibilities of Intelligent	This 20-minute session will discuss the possibilities of using intelligent agents for education and demonstrate an implementation of intelligent agents in education. Specifically, the session will discuss what are intelligent agents, the value of agents for education, and the

Agents for Education?'	following specific educational uses: 1) as a tool for the learner; 2) as a tool for the instructor; 3) comprising an intelligent learning environment; and, 4) for students to learn through designing agents. Additionally, three cognitive design considerations for agent-based learning environments will be presented.
Richard R. Eckert Theme 2 SUNY Binghamton; USA 'An Interactive, Remote-Controlled Computer Projection System for Use in a Large Classroom Environment'	In this paper we describe an inexpensive, Windows/PC-based, virtual blackboard that can be controlled at a distance by a classroom instructor and/or students in the class. One component of our system is a wireless mouse emulator that is implemented using a software-controlled standard red laser pointer. A video camera looks at the projected screen and feeds its output to the computer. Our programs detect the location of the laser beam, map it to the screen coordinates, and move the system mouse cursor accordingly. With this system the instructor is no longer tethered to the computer. Another component is software that permits communication between student laptop computers and the instructor's computer over a local network. With it, students can make requests from their laptops to take control of the main computer's pointer device and keyboard. Both systems can dramatically enhance interactivity between student and instructor in a large classroom environment.
Robert A. Schultz Theme 2 Woodbury University; USA 'Access to Technology at Woodbury University'	In the fall of 1997, nearly 3 years ago, Woodbury inaugurated its Access to Technology program. Woodbury University is small, private, and provides professional education in bachelors and masters degree programs. We determined that we needed to go beyond just computer basics or even just literacy to computer fluency, the ability to use information technology easily and wherever its use is appropriate. To that end, we decided to put notebook computers in the hands of each of our undergraduate students. The issues raised included: What hardware, what software, what training for students, what training for faculty, and what other support should we provide. We struggled with these issues and revised our answers over the course of the program. Surveys indicate that the program as met many of our objectives.
Grace E. Jamieson Theme 2 Calabash Educational Software; Canada 'Developing an Internet-based Subject Pathfinder for K-5 Students'	School children of all ages are increasingly becoming part of the Internet generation. However, the needs and skills (e.g., cognitive, technological) of the younger members of this group (i.e., grades K-5) are quite different from those of the older members of the group (i.e., grades 6-12). For this reason, Internet subject-pathfinders for the younger students need to be designed with these concerns in mind. The content and the physical design of sites that may be appropriate for the older students may not be appropriate for the younger students. For example, the graphics, icons, and terminology used in the design of such pathfinders must be understandable to the younger students. One such pathfinder, based on the new curriculum guidelines for the Province of Ontario in Canada is illustrated. Links to subject sites and files include the areas of science, history, geography, mathematics, art, and literature.
Manolis Barbounis Theme 2 University of Athens; Greece 'Students' Solutions Diagnosis Based on Limited Evidences'	Teachers or students rarely use tutoring systems or tools capable to diagnose students' solutions in classrooms or at home. The main reason is that tutoring systems request from the students either to solve their exercises in the systems environment or at least to enter their analytical solutions into the systems. An answer to the issue is the development of intelligent diagnostic engines requiring limited evidences for the identification of the students' errors. In this paper is presented DIUME, an intelligent diagnostic engine developed and tested in the University of Athens applicable to students' solutions diagnosis. Its diagnostic mechanism needs only a limited but adequate for the diagnostic process, number of steps of a student's solution. DIUME acquires interactively from the user the required information in order to identify all the existing errors in a solution. It can diagnose students' solutions with many steps in a variety of problems.
David S. McCurry Theme 2 Monmouth University; USA 'Once and Future Technology Innovations in Teacher Preparation: Video	Microteaching with video recording as a feedback method has been used in teacher preparation since the mid-1960s. A substantial amount of research stretching back 30 years has mostly supported what was once innovative but is now ritualized technology use. The paper explores the historical use of video-assisted microteaching, the

Microteaching in a Reflective Practice World'	current emphasis on reflective practice, which can use new technologies (electronic journaling and portfolios), and the limitations of preservice teacher preparation programs in significantly changing attitudes and practices of future teachers. The paper describes an adaptation of video microteaching procedures to encourage critical self-reflection of performance and some of the limitations encountered. The changing contexts of performance expectations for new teachers are explored, especially in light of technology developments. A framework for using microteaching video data, along with other electronic data, as an electronic tool for gathering longitudinal information for assessment of student teachers is presented.
Kristina Mattson Theme 2 University of West Florida; USA 'Technology and the Educational Process: The View From the Student Trenches'	Much debate has been generated over the use of technology in the classroom and the use of technology instead of the traditional classroom; i.e., the Internet, distance learning, et.al. In the plethora of opinions and advertisements, what is often lost is the student view: i.e., how do students see the current instructional methods and outcomes in comparison to what they perceive as their needs when they look at the workplace? The proposed presentation will look at a "typical" MBA program in a State university, together with the technological tools currently used within its coursework, and contrast it with what a new MBA holder sees as her needs to prepare her for the working world. It will also compare and contrast current student views of lecture, demonstration, case studies, computerized analysis tools, and Internet resources, as concerns their perceived effectiveness in the educational process in preparation for the world of work.
James A. Brown Theme 2 Lehigh University; USA 'Strategic Synergy: Integrating Multiple Delivery Technologies'	Most organizations offering distance education programming began by using one delivery technology; satellite transmission, videoconferencing, cable, Internet, or some other system. However, the use of a single delivery technology limits both the size and character of potential distance education audiences. As distance education providers have attempted to increase and diversify their offerings, they have often been faced with the necessity of developing and using multiple delivery modes. The trick is to add new technologies in a manner that is cost-effective, creates opportunities for mutual support and synergy, and effectively service existing and new target market groups. This presentation will discuss how the process of integrating new technologies can be rationally planned and implemented. Based on Lehigh's experiences with satellite, videoconferencing, and Internet delivery modes, the presentation will concentrate on multiple uses of the same content, facilities design issues, technical and administrative staffing considerations, and the introduction of additional delivery systems to existing clients.
Iris Langer Theme 2 Ministry of Education, Script; Luxembourg 'Courseware in Education: Evaluation of a Case-Based Intelligent Tutoring System'	The objective of the study was to evaluate the efficacy of a case-based intelligent tutoring system, developed for the education and further education of medical students and physicians in the field of internal medicine. In a pre and post-test frame, students were given the software to be used during one semester. In a follow-up survey at the end of the semester, students with low pre test values showed a significant increase in learning gains. Furthermore, the students' general study motivation showed a significant increase at the end of the semester, too. A change in the use and attitudes towards computers could not be observed. The results show that the majority of the students found the software helpful but they have had difficulties with the program's technical aspects and its general use. The students also stated that they accepted the program's content, but that they would learn better with a textbook.
Pietro Pantano Theme 2 Universita della Calabria; Italy 'Use of Agents for Physics Learning'	The possibility to interact with characters living in virtual worlds and the use of pedagogical agents open several perspectives to make teaching materials more interesting and more efficient. In this paper we present an agent application for the Physics teaching. In particular, by using the MSAgent technology, we constructed some characters representing important people dealing with Physics and Astronomy, as such Galileo, Newton, Aristotle, Halley, Copernic and Kepler. These characters appear, move, listen to, and interact with each other according to some modalities which have been

	established by the user. We put two agents, Galileo and Aristotle, into an artificial historical context. These characters discuss among themselves the various scientific theories, they observe simulations of natural phenomena and they introduce some other characters. As in the Participatory Theatre, the user's role is not a passive one, but he can directly interact with the various characters.
Cecil W. Hutto Theme 2 Northeast Louisiana University, College of Education and Human Development; USA 'Using HyperCard in Education and Research'	For a very reasonable cost, HyperCard is software that provides a wide variety of uses for educators and researchers in that it can be used to create interactive databases with multimedia capabilities (referred to as 'stacks'). Its viability is particularly evident in three ways: (1) There are thousands of HyperCard stacks already in existence and in the public domain, many with instructional or informative content presented in engaging fashions; (2) The educator will find HyperCard easy to learn and ideal for creating stacks to fill specific needs in presentation, assessment, and data management; (3) HyperCard has its own programming language, HyperScript, which is a high-level language (that is, 'almost English') and is well suited to introducing students to structured programming concepts and techniques without their having to learn, at the introductory level, programming languages with more esoteric grammar. Several HyperCard stacks and stack creation will be demonstrated.
Susan Graham Theme 2 SmarterKids.com; USA "	The recent media frenzy surrounding standardized testing has created a culture of fear and misunderstanding among parents, students and educators. Families and teachers face the difficult task of tackling learning problems and finding solutions without terrifying and alienating students. Parents themselves find assessment tests to be inflexible and difficult to understand. In order to get down to the business of teaching, educators must find a way to locate the missing piece of the assessment strategy puzzle: the Internet. Susan Graham, director of education for SmarterKids.com and a long-time elementary school educator, will discuss methods for using the Internet to bridge the gap between school and home in order to find a personalized strategy for understanding and utilizing the benefits of standardized testing. By making assessment strategies more human and by helping parents to make test results more understandable, the Internet enables students and educators to match basic educational principles with individual methods of learning. Using the web, students, parents and educators will be able to build from assessment results by identifying the root problems indicated by scores.
Kevin Smith Theme 2 Al Akhawayn University in Ifrane; Morocco 'SJPDesigner - A Flexible Tool for Generating Web-Based Presentations'	Using technological advances to enhance education in lower technological environments remains a great challenge for most of the world. Java applets are a technology that can be used anywhere without requiring the newest hardware. A Java applet is a platform independent object that can be used as an aid to traditional classroom presentation, or it can be accessed via an arbitrary WWW interface for review or for distance learning from anywhere in the world. However, the design of an effective applet-based presentation is very complicated for the non-programmer. We are working to make this technology usable to any educator. The tool we have developed, SJPDesigner, allows a non-programmer to create a useful and flexible instructional tool in a arbitrary discipline by using a simple English script together with a collection of separately prepared components. Objects such as text files, images, or Java simulations which have been written separately or acquired from a repository can be arranged in a cohesive presentation with no further knowledge of Java applets or layouts. The tool provides a simple graphical interface to edit and preview the presentation. We are using this approach to develop aids for core science classes across our engineering curriculum.
Charles R. Bauer Theme 2 Illinois Institute of Technology; USA 'The Electronic Teaching Assistant'	Webwings is a web site developed cooperatively by the Academy of Model Aeronautics and the Outreach programs of the Indiana Academy, Ball State University. The purpose is to utilize aviation concepts, both model and full-scale airplanes, to provide middle school teachers with web-based materials that can be used to teach mathematics and science. Each application is a stand alone "Single Concept Learning Module". The web site and the materials contained

	are available free to anyone with internet access.
Charles R. Bauer Theme 2 Illinois Institute of Technology; USA 'Middle School Web-Based Mathematics and Science Learning Materials'	The Electronic Teaching Assistant (ETA) was originally developed for use with distance-learning, web-based internet courses. The ETA is an interactive web page that allows student access to twenty-four hour assistance, as well as information concerning assignments, lecture notes, and simulations of algorithms. Successful teaching requires three items: knowledge, organization, and presentation. The ETA is part of presentation and can be used with other than distance education internet courses. The concept and implementation of the ETA was developed by a team of students while taking a course on presentation techniques for web-based courses.
Terence Cavanaugh Theme 2 Florida Center for Instructional Technology, College of Education; USA 'Using Repurposed Science Rich Feature Films in Science Instruction'	This investigation explored the use of repurposed content-rich entertainment videos (versus traditional educational videos) presented in either an active or passive educational setting in science classes. The subject matter of the videos focused on basic chemistry, scientific method, and the nature of life. The repurposed content-rich entertainment groups watched a StarTrek the Next Generation episode, and the other groups watched more traditional educational videos. Significant gains in test scores were found for repurposed entertainment video over traditional educational video groups. No significant differences were found in test scores between the active and passive setting groups or were noted for attitude change toward science between repurposed entertainment and traditional educational video groups. A significant difference was found in how the subject's attitudes changed for the active versus the passive watching groups. This study indicates that the use of content-rich entertainment video may provide an additional effective alternative for science education.
J. Christine Harmes Theme 2 University of South Florida; USA 'Using JavaScript and LiveStage to Create Online Assessments'	Incorporating formative assessments into your courses is an easy way to help students gauge their progress and prepare for exams. One of the most important benefits of web-based quizzes is the immediate feedback provided. Using the web removes location and time constraints of the traditional classroom and allows students to work at their own pace. With JavaScript, you can easily build multiple-choice, drag-and-drop, or matching quizzes with detailed feedback and the option to send results to the instructor. LiveStage provides a simple interface for making interactive QuickTime movies such as matching, puzzles, and memory quizzes for students to assess their progress. These quizzes can be downloaded, then re-used without connecting to the Internet. Students can access these quizzes any time of the day or night, and can work through them as many times as necessary. This session will provide an overview of the tools, demonstrations of sample assessments, and support materials.

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Theme 3 Abstracts

Presenter / Title / Theme / Institution	Abstract
Helen Youth Theme 3 Montgomery College; USA 'A Faculty Professional Development Center Must Serve Two Masters - Technology and Pedagogy'	Most schools readily recognize the need to prepare their instructors for the use of technology. Workshops on word processing, presentation programs, Web page construction and e-mail are common place. However, the necessary emphasis on modifying instruction techniques as we incorporate these technologies into distance and traditional classes are sometimes overlooked. It is necessary to establish an environment in a faculty professional development center where technology can be learned as yet another tool to facilitate learning. This session presented by the Director of a well supported and widely used faculty professional development "Center for Teaching and Learning" will describe some of the ways that have been successfully used to combine technology and pedagogy on all three campuses of a large community college in Maryland.
Robert K. Branson Theme 3 Florida State University; USA 'A Process Model for the Concurrent Design of Change'	Many futurists advocate processes in which it is assumed that some person or group has the authority to approve recommended visions and goals. In many countries, education does not fit this model because no one has the absolute authority to provide resources and legitimize the change process and goals. To make visions into reality, divergent stakeholders must reach agreement for the common good. But, reaching agreement or achieving consensus on divergently held views is frustrating, time consuming, and rarely successful. Traditional models for holding meetings and following the normal democratic process usually require people to vote, a process that often leaves a significant minority highly dissatisfied. This paper has two principal objectives. First, to provide a model for the concurrent design of change and second, to describe technological enhancements for consensus reaching among diverse stakeholder groups. Successes, failures, and lessons learned from experience are described.
Judith A. Nichols Theme 3 The Berkley School District; USA 'New Skills for Old Pros: A Tale of Technological Literacy and Tight Budgets'	How do we help teachers and administrators learn to work effectively with new technologies? Solutions must address issues of time, technology resources, the nature of the learning required, and cultural context. Recent research in education and corporate workplaces suggests that broad-based, multilayered strategies will be more successful than traditional reliance on training sessions. Over the past four years in the Berkley School District we have employed such a strategy to help our instructional and administrative staff (300 people) learn new technologies. Features of this strategy include: customized training, consultation, and resource support for groups and individuals; direct connections to curriculum and student achievement; and highly integrated committee and administrative structures. In this round-table discussion we will share the details and results of our work with a multimedia presentation, and invite participants to share their experiences as well.
Gregg Brownell Theme 3 College of Education and Human Development, Bowling Green University; USA 'Institutional Leadership and Technology Trends'	This presentation covers the "Technology Trends in Institutional Leadership," course required in the Institutional Leadership doctoral program at Bowling Green State University. The target population includes education, social service and business leaders. Course goals are presented. Reasons for institutional leaders understanding technology's impact on institutional change, governance and organization are offered. Examples of project themes, including analysis of an MIS project in a large district, health care administrators consideration of distance learning, and a study integrating junior high school students learning about multiple intelligences in relation to their work on a HyperStudio project, are included.
Makio Fukuda Theme 3 Osaka Int. University for Women; Japan 'The Reeducation Curriculum to Train the Elderly Engineer'	In Japan, in 2015, the number of elderly people (more than 65 years-old people) becomes a quarter of all population. Moreover, the pigging population is decreased every year. In such society, to continue economy growth, even the elderly people must work. Therefore, we thought that reeducation for the elderly people is necessary. We developed the reeducation curriculum to train a computer engineer. For example, the system consultant, the system analyst and the computer instructor in the data processing. First, we compared the ability of the elderly people and the ability to be demanded as a technical expert in the data processing. Next, we examined about the one which is possible to train by the

	education in the ability for the elderly people to have. And, we made experimentally the education curriculum which corresponds individually with the elderly people who did an aptitude test. In this conference, I will present about this curriculum concretely.
Patricia A. Bergeron Theme 3 Family Education Company; USA 'Technology Leaders and New Paradigms of Leadership'	Transformational technology leaders are creators of future visions and laborers in everyday realities. They emphasize their strengths and minimize their weaknesses. They empower others as well as themselves and thereby transform organizations. They live the questions and paradoxes of leadership in a burgeoning age of technology.
Valerie Carroll Theme 3 Principal's Leadership Institute; USA 'Preparing Tomorrow's Leaders to Use Technology'	The role of the school principal is increasingly being cited as they keystone of educational reform. The Principal's Leadership Institute (PLI) at Teachers College, Columbia University, provides a yearlong leadership-training program for aspiring principals in New York City public schools, which helps them develop an understanding of the emerging design of 21st Century schools and the principal's changing role. One key element of the program is intensive technology training. Studies reveal that best practices in successful technology-rich schools include collaborations and planning among school leaders and stakeholders. Educators agree the nation needs strong leadership to meet the nation's technology goals. To improve technology training for principals, PLI developed a standards-based curriculum. Principals are prepared to meet these standards by assisting them in (1) creating a vision and plan, (2) insuring technology integration and equity, and (3) improving communication and decision-making. The presentation will include survey results of participants to determine the effectiveness of PLI's technology-training strand.
Lee Allen Theme 3 Dallas Independent School District; USA 'After the Plan: The Role of Technology in the Urban Educational Environment'	The rate of technological advances accompanying the transition to the 21st century is staggering. Students face the challenge of being exposed to a new technology as quickly as it emerges, yet are often schooled in antiquated classrooms. The challenge for educators is to chart a course towards a curriculum that engages students in relevant and meaningful ways. Technological advances will not replace fundamental educational values; current instructional strategies simply must include access to computer technology. Rapid changes in telecommunications and information systems often requires a high level of technical proficiency to insure competitiveness in the emerging global workforce - the world marketplace meets traditional graduation requirements. The Dallas/Fort Worth area is a key provider of technology-related employment. Urban school districts are realizing that deployment of technology can be used to enhance the educational environment, and insure that interested, motivated, and inspired students will acquire the necessary skills for the next century.
John M. Nagle Theme 3 University of North Carolina at Charlotte; USA 'A Decade of Initiatives to Integrate Technology in P-12 Schools and in Teacher Education in North Carolina'	For almost a decade, the public schools, community colleges, and four-year colleges and universities of North Carolina have been involved in a series of collaborative initiatives to integrate technology in the state's public schools and in its initial preparation and continuing education programs for teachers. The ultimate goal of these initiatives has been to ensure that future high school graduates and future teachers in the state will be comfortable with technology and will be able to use it effectively in their personal and professional lives. This paper will describe 1) the magnitude of its ten-year state effort, 2) the chronology of decisions made by the state's policy-makers since 1991, 3) the activities carried out by the state's educators in response to those policy decisions, 4) the technology competencies currently expected of P-12 students and teachers, 5) the use of high school graduation and teacher licensure requirements to command attention to technology in education, and 6) the challenges of developing valid and reliable "tests" for assessing technology competencies. The paper will conclude with some reflections on what has worked and what has not, a summary of lessons learned, and a list of continuing concerns.
Bengt Bengtsson Theme 3 Skolbas and University of Gothenburg; Sweden 'The Enator@school project - an industrial concept for education'	The new task and the new possibilities in education demand renewal and development in many educational areas. The material, pedagogical, administrative and organisational environment must support a partly new role for students and teachers. The use of ICT can be one of the most important factors for a successful implementation of the new goals and the new definition of knowledge. The teachers must complete their competence in many areas.The use of ICT must not be fragmentary and isolated but based on an overall view and elaborate ICT-strategies. Everyone in the school must be motivated, trained and engaged in the

	process. The concept is an effort from a company in Sweden, Enator AB to develop products and services that can assist the educational sector in the building of a new learning environment. This report describes the concept from vision to follow-up and evaluation. It concentrates on the background, the various steps in the process, competence analysis and a program for an activity-oriented in-service-training of teachers.
Robert N. Diotalevi, Esq., LL.M. Theme 3 The College of West Virginia; USA 'Titanic II: The Legal Floodgates of Y2K'	The Titanic exemplified man's defiance against the elements, nature and God Himself. It was named after the Titans, a mythical race of people who fought with the gods and later were cast into hell. Most people of the day felt that the liner of the elite too was immortal. Yet this behemoth fell to the most common of elements, sailing into the annals of history as a complete and utter disaster. In reality, the Titanic sank under the weight of doubt, dismay, apathy and unbelief. Today we face another Titanic. It is referred to as Y2K. Some call it such things as The Millennium Bug or The 2000 Time Bomb. It is estimated that it took some $663,000 to settle lawsuits related to this disaster of the early 1900's. This calamity may not be as deadly but one thing is certain: the legal ramifications will cause damaging ripples and good-sized gashes for some time to come. I propose to detail the legal ramifications of Y2K in light of recent statutes, proposed legislation and case law.

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Theme 4 Abstracts

Presenter / Title / Theme / Institution	Abstract
Thomas W. Hutchison Theme 4 Middle Tennessee State University; USA 'Computer Based Campus Information Services'	Some 1.2 million college students at 170 colleges and universities are already using web-based services for student transactions such as registration for classes, fee payments, and numerous other tasks. Middle Tennessee State University (MTSU) and 19 other Tennessee Board of Regents schools have recently joined the host of colleges offering students transactional services via the Internet. MTSU currently offers telephone services for students to register for classes and receive grades and has recently started offering web-based registration and other services. This paper analyzes student reaction to, and use of the new Internet service and compares its popularity to the commonly used telephone-based service and the kiosk-based systems which have been in place for 4 years. A survey conducted on undergraduate students indicates which of the Internet-based services are widely used at the present time. Students are asked to compare the various information services via the Internet, the telephone and through traditional "bricks-and-mortar" methods.
Brad Barrett Theme 4 Connect Center, Inc; USA 'Students Design and Build Smart Room'	Educational institutions intent on preparing students to function in the post-graduate world should set an objective to structure facilities and curricula mirroring the realities of this world. Schools today must provide students with the opportunity to become skilled and literate users of the technologies and organizational structure they will find in the workplace of the future. At Cass High School, Cartersville, GA, these challenges were addressed by a unique program. The Technology Honors Class transformed a storeroom into a network-enabled classroom with the help of Connect Center, Inc. and it's suppliers. Students formed teams to address tasks from Project Management, thru CAD planning, floor installation, and data cable termination. The students provided all labor, with Connect Center and its suppliers providing training and supervision. The students are also repairing and refurbishing "retired" computers donated by local firms. This hardware will be used to equip the new enabled classroom.
Suzanne H. Hoffmann Theme 4 Sanford School; USA 'Re-Engineering a School Network: Implementing Changes that Enhance School-Based Technical Support'	After four years of continuous and fast-paced Information Technology (IT) expansion, our institution realized that future growth and curriculum implementation hinged on re-engineering the school-wide network. Increased Internet and intranet-use by administrative staff, faculty and students from grades JK through 12, along with e-mail activities, on-line library resources, and network storage capabilities taxed the existing system limiting expansion. By re-designing the Sanford network with changes in hardware and software, the prospects for future expansion in an organized manner are bright allowing an increase in security and access to instructional and administrative applications and databases. Throughout the process easy-to-use solutions for in-house staff members were emphasized since no network engineer is on-staff. The initial assessment, final goals, and overview of chosen solutions will be presented in this paper.
David Bainum Theme 4 Washburn University; USA 'The Thin Client/Server Strategy'	Washburn University is an urban, liberal arts institution with graduate and professional programs. The Academic Computer Center (ACC) provides computing support for the academic and research missions of Washburn with particular attention given to doing so with minimal staffing and in the most cost-effective manner. We will discuss the thin client/server strategy employed by the ACC to accomplish these missions. The need to do a lot with a little is a common requirement in academic computing. Our response to the constraints of minimal funding and staffing, while developing and supporting a computing network with hundreds of nodes, has been to adopt a thin-client/server strategy. Our presentation includes details of the client, the server and the network in the thin client/server strategy. User support issues for the IBM RS/6000 and NT platforms involved in this strategy will also be summarized.
Roger Von Holzen Theme 4 Northwest Missouri State University;	In its Mission Enhancement proposal to the state of Missouri in 1997, Northwest Missouri State University outlined its plan for the establishment of a faculty technology center. One focus of this center

USA 'Establishing a Faculty Technology Center'	would be on the testing and development of personal computer applications that enhance student learning. But a major goal behind establishing a faculty technology center would be to provide significant support for faculty members working to create web-based and modularized courses. By the spring of 1998, Northwest was able to found its Center for Information Technology in Education (CITE). The focus of this presentation will be on the process involved in staffing the center, determining hardware and software needs, budgetary considerations, and other issues a college or university interested in establishing such a center may encounter. Key considerations related to faculty and administration relations, training, and the production of technology-based learning materials will also be discussed.
Susan Rae Regan Theme 4 John Abbott College; Canada 'Teacher or Technician - Who Picks up the Slack?'	With one technician servicing a hundred or more computers, problems occurring in class time may not be solved at all if teachers (and students) do not intervene. Draconian cuts to education budgets have forced teachers to assume technical support responsibilities that they are ill-equipped to execute, not necessarily because they lack the required expertise but by the very nature of their job as educator. When a computer "goes down", well-intentioned interventions on the part of technically-knowledgeable teachers often backfire, resulting in greatly reduced teaching time, frustrated students, and an administration that's unaware of the extent of the problem. This paper explores some of the concerns involved in perceptions of appropriate responses to technical problems and conflicting notions of where the responsibility for repairs, upgrades, and software compatibility difficulties lies - with teacher, student, or technician. While my own experience is at the community college level, this problem is quickly replicating at all levels of education.
Adriana Fantini Theme 4 Universidad. Nacional de la Patagonia; Argentina 'An Experience of Designing an Educational Hypermedia by Teachers of Elementary Education'	Many teachers are interested in adopting hypermedia as support of classroom activities. But at the same time they are not totally satisfied with the software available in the market. Then they try to design their own hypermedia. Teachers that try to do it using an authoring tool, most of times are not satisfied with the product they obtain, because those tools are not created to design an educational hypermedia. To support this task we have defined a method (MHAS) for designing educational hypermedias, based on conceptual network as a guide to create an argument for the hyperspace structure. This method assists the teacher in the software design and propitiate to obtain interactive and quality products for the educational purposes. Here we present this method by an experience with teachers of elementary education. They had building an educational hypermedia that is being used successfully for the students of a fourth course of elementary school of Patagonia, Argentina.
Sal Majied Theme 4 Mitchell & Titus, LLP Education Consultants; USA 'School Based Change Management'	The decentralization of education program management to the school level has encouraged administrators to either implement or consider the use of information technology as an effective means of supporting the delivery of quality education. The rapid change in technology, including the migration to more distributed system environments, provides an array of options for both administrators and teachers. A significant part of the implementation process is having a clear understanding of the need for and expected benefits to be derived from use of such technology. Solving the technology portion addresses only a part of the overall problem. Schools must also carefully examine how these new technologies will impact operations and current internal processes. Mitchell & Titus, LLP Education Consultants will address effective strategies for managing change that will assist site-level administrators in implementing technology to support program delivery and to ensure quality.
Elizabeth Newby Theme 4 Liverpool City Council; England 'Proving the Concept'	Liverpool City Council is installing a massive infrastructure in all its schools providing extensive access to the Internet for all teachers and pupils. This project demanded high level strategic planning and a pathfinder exercise has now been established to prove the concept, ahead of implementation at 236 school sites. The pathfinder school, a Victorian built inner city primary school has received: 72 network outlets; remote site hardware, including multiple 24 port switches; PCs, printers and educational software; whiteboard facilities; access via a 2 megabit fibre leased line to the City Council as Internet Service Provider, remote access from home for the headteacher; access to the TALIS server, linking the school to city-wide library services. This paper will analyse the

	outcomes of the pathfinder project, particularly: learning gains arising from accessing the Internet; child protection issues; changing teaching styles; network and human resource implications; pupil and teacher attitudes to ICT, the outcome of e-mail links between children in Liverpool, England and New York.

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Theme 6 Abstracts

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Robert N. Diotalevi, Esq., LL.M. Theme 6 The College of West Virginia; USA 'Copyright Dot Com: The Digital Millennium in Copyright'	With advanced technology comes new legal issues to battle. The age of information has given rise to greater concerns about copyright legalities. As new legal interpretations emerge from Congress as well as the courts, these thorny matters will be at the forefront. Copyright law ultimately affects faculty members, researchers, librarians, administrators and anyone interested in education. The Internet is the largest computer system in the world. This super information highway offers a variety of useful information as one navigates down its URL's, browsers and hyperlinks. With advanced technology comes new legal issues to battle. There are several bills such as H.R. 3048 still on Congress's plate. The latest Clinton Administration measure, The Digital Millennium Copyright Act, is a massive complexity of rules and regulations. This work addresses the above as well as explores new concerns in copyright law.
Patricia Ann Brock Theme 6 Raritan Valley Community College; USA 'A Copyright Law for Educators?'	Since the arrival of the quintessential photocopy machine in the inconspicuous corners of many teachers' rooms or teachers' centers, limited-budgeted educators have been making multiple copies of newspaper articles, book chapters, or advertisements to disseminate to their students as classroom teaching materials. Were they - and are they still - breaking Copyright laws? Now with the advent of thousands to tempting pages of easily accessible Web site information, educators are making multiple copies of downloaded and hard copied materials. Are they now breaking Intellectual Property laws as well? What are the rules? Do they apply to teachers, too? Can educators get caught by the cyber-police? What is the punishment, if they do? What are the legal, ethical and moral responsibilities of educators in now and into the next millennium? This presentation will provide a self-assessment, a brief case study and the answers to the presentation queries.

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Theme 7 Abstracts

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Michael Fiore Theme 7 UCLA Molecular Science Project; USA 'CPR and the Molsci Project: Web-based Writing, Peer Review, Curriculum Development, and Dissemination'	Calibrated Peer Review (CPR) software enables writing and peer review over the Internet. CPR provides a series of tools for exploring concepts, writing about those concepts, and reviewing peer writing based on those concepts. CPR significantly reduces the time instructors now spend reading and evaluating student writing and allows instructors of large classes to use intensive writing for assessment. The Molecular Science Project, with NSF support (DUE 95-55605), has developed CPR and uses it to author, review, and disseminate materials for use in lower-division chemistry courses. Instructors use the integrated CPR authoring tools to create new curricular units, which are then posted for review by other instructors. Using integrated review tools, reviewers provide feedback to the assignment author. After assignments pass the review process they are posted to the Project website where visitors can select the pre-built assignments and activate them for use in their classes.
Stanley E Kroder Theme 7 University of Dallas; USA 'Implementing an MBA on the Internet'	The University of Dallas (Texas) (UD) began offering graduate credit-bering courses on the Internet in the fall of 1997. Three courses and thirty students were involved in the first semester. By the fall of 1999, when the ICTE next meets, UD will have 13 graduate courses and over 200 students taking courses on the Internet. UD has committed to offer the full MBA by 2000. The first degrees offered in this venue are Electronic Commerce, Information Technology and Telecommunications. This paper will discuss the methods used to develop, teach and administer using university resources - insourcing. UD has chosen to outsource the Web hosting for all aspects of this program. The reasons for selecting this option and the issues and procedures implicit with this course of action will be explored. Initially, UD and Pace University (New York) formed an alliance for the purpose of course development, Internet support and Web services. This alliance demonstrates that the Web support required for the Internet education may be outsourced. Recently, UD selected eCollege.com (Denver, Colorado) as its Web hosting service in the future. The rationale and experience with these two arrangements will be covered. The paper will stress the pragmatic and pedagogical aspects of this significant undertaking.
Dale Reed Theme 7 Learning Sciences, Northwestern University; USA 'Web Page Annotator'	The increased presence of distance learning and on-line course offerings mean content is delivered using the Internet and viewed using web browsers. Students need to be able to customize Internet-delivered curriculum as well as generate shared curriculum. There are two phases to this project. The first is similar to "Third Voice" (http://www/thirdvoice.com) and the Interactive Paper Project (http://lrsdb.ed.uiuc.edu:591/ipp), and is an approach for annotating on-line curriculum, both for students and teachers, including presentation like a threaded newsgroup. The second phase is unique and consists of free-form customization of the underlying HTML, acting as a "overlay" that filters the original content. A user will select a portion of a page and substitute replacement content, which will automatically appear whenever that page is loaded. This work is sponsored by a NSF PFSMETE fellowship.
Marty Bray Theme 7 University of North Carolina at Charlotte; USA 'Initiating a Distance Education Program: One College of Education's Planning Process'	This paper describes the planning process that a College of Education faculty used to meet the challenges of delivering coursework using a variety of distance education tools including two-way audio and video, the web, and chat sessions. The planning process began with the faculty exploring the different distance education tools available to them. Next, the faculty looked at the courses that they would deliver to these students and sought to determine what course content was best suited to which instructional delivery method. Based on the rubric that was developed as a result of this planning process the faculty identified the resources that they would need to develop and deliver their online courses.
Sheila K Donis Theme 7 Vigo County School Corp.; USA 'ATM - Global Professional	This is a project intended for the primary application area: Education, Culture, and Life-long Learning and the secondary application area: Community Networking. The Vigo County School Corporation and its consortium members seek to connect to the Indiana State Backbone

Development'	network which is the latest advancement in network technology. Implemented by IHETS, the backbone provides video, data, and voice services on one single circuit. Goals: With this asynchronous transfer mode (ATM) backbone, we will have the power, speed and convenience to meet our first goal of improving instruction through increased staff development opportunities. Our second goal of communicating with educators around the world will be accomplished through videocasting by which we will be able to provide live or stored video multi-casting through high quality MPEG video. This allows for broadcast of video programs to unlimited remote sites simultaneously or electronically stored for later transmission. Our third goal of providing a library of 'great teaching' will be accomplished through video caching by which we will be able to store and deliver video content for designated use by individuals or on a distance learning network. Teachers all over the world can access samplings of great teaching from their desktop! Outcomes and Impact: The outcomes include the provision of cost-efficient and quality staff development to K-12 teachers. The video clips will show to teachers improved strategies for motivating students and show programs that positively impact achievement scores on standardized tests. Evaluation: After each live or cached video clip is viewed, an electronic evaluation form will be completed. The data will be reviewed to determine which "clips" are worthwhile and prove to be successful and/or helpful in the viewer's classrooms. Results of the evaluations will be stored on-line. Sites: Two-way video sites will be established to facilitate technology for one staff development center, 12 public schools, 3 private schools, and 1 college. Technologies Employed: We will use asynchronous transfer mode (ATM) - two-way video (broadcasting and caching), digital video photography, computer editing, and midi digital music. Users: The users will participate in live broadcasting of great teachers and great lessons. They will also be able to access the video clips at another time through the Internet. Communities to be Served: K-12 schools, colleges, businesses, libraries, parents, and community members of the Wabash Valley in Southwest Indiana, Inner City Chicago, Indianapolis and the Cherokee Indian Reservation in North Carolina (All school communities around the world will be able to freely access the videos through the Internet.). Participating Partners: Indiana: IHETS, Indiana Dept. of Education, Vigo Co. School Corp, Indiana University, Indiana State University, St. Mary-of-the-Woods College, Marian Hts. Academy, The Greater Terre Haute Chamber of Commerce, Terre Haute Public Library, The Holocause Museum, The Eiteljorg Museum, and the Gary Children's Art Institute. Illinois: Providence-St. Mel High School in Chicago. North Carolina: K-12 schools of the Eastern Band of the Cherokee Indians. New York: High School of Art and Design.
Ian Douglas Theme 7 Florida State University; USA 'Talking Head Videos: Using a Task-Based Approach to Enrich Perspectives on Knowledge'	Video has long been regarded as a useful tool in education although its creation requires a great deal of skill, talent and money. Educators sometimes shortcut this requirement by using a "talking head" approach. This is criticized as being a poor use of the medium affording little interaction for the student. An approach for using video over the Web is described, which focuses on developing interactive tasks for students viewing videos. Video interviews were conducted at several software companies. A Standard set of questions were asked and responses were recorded onto digital video. The educational value of this tool is derived from the formulation of good interview questions and tasks that require students to view the videos with a specific purpose in mind. Tasks involving analysis and comparison allow students to develop an understanding of the different perspectives on issues relating to the subject and how those perspectives are influenced by different working constraints.
Barbara Eubanks Theme 7 Bay District Schools; USA 'Beacon Learning Center: On-line Learning for K-8 Students'	The Beacon Learning Center provides interesting, interactive, Web-based lessons tied to Florida's Sunshine State Standards. Students work at their own pace and receive immediate feedback to reinforce the lesson content. Teachers can individualize instruction by prescribing a sequence of lessons for each student, or teachers can assign the same sequence for every student. Teacher-validated units of instruction, including pre- and post-assessments, daily lesson plans, and additional resources, suggest how to maximize the effectiveness of the on-line student lessons. Each unit provides ideas for additional student activities - some of which use technology and others that don't - to build similar concepts. In addition to the Web-based lessons, students may use electronic spreadsheets, word processors, Global Positioning Systems (GPSs), or other Web sites to

	complete a designated activity. Units can be downloaded in MS Word format for future editing or printing. Use this FREE internet tool with our K-8 students today!
Annette Lorentsen Theme 7 Aalborg University; Denmark 'Changing Traditional Universities into Universities of the New Millennium'	Changing universities into virtual universities of the new millennium represents a methodological challenge, since universities represent a unique type of organisation with its old academic values and often weak management structures. This paper starts out analyzing the differences between traditional university culture (Rasmussen, Simonsen/Ulriksen), distance education tradition (Holmberg, Keegan, Peters, Moore, etc.) and the ideology of the new virtual university (Collis, Harasim, Laurillard, Mason) to be able to formulate and fully understand the problems and challenges we will meet when changing universities of today into virtual universities. Two challenges will be discussed in more detail, i.e. the new roles for university teachers/researchers in virtual study programmes and the change from traditional transmissive teaching models to collaborative and experiential learning models (Kolb, Lave/Wenger). Examples from Aalborg University, Denmark as how to face these problems and challenges will be described and evaluated. The method chosen here for university change for the new millennium (called IT, Innovation Initiative [Lorentsen/Christensen]) is concrete experimentation (Dirckinck-Holmfeld/Lorentsen) - in projects dealing with different aspects of the virtual university - combined with a gradual more profound change of the university into a learning organisation of the 20 century (Schon, Sengue).
Brogan Pat Theme 7 Macromedia; USA 'Creating Interactive Teaching and Learning Solutions'	Many educators and trainers are looking to better use technology to deliver high quality instruction. This session will focus on the opportunities that the web creates to provide more personalized instruction, which can better meet a more diverse population of learners' needs. The session will include a demonstration of instructional authoring tools created specifically for non-programmer instructors, integrated with a management system, which provides an integrated teaching and learning system. The benefits of using an integrated mediated learning approach will be discussed, along with guidelines on how to successfully implement a program. Successful educational institutional and corporate success stories will be highlighted.
Cavanaugh Catherine Theme 7 Florida Center for Instructional Technology, College of Education; USA 'Effectiveness of Interactive Distance Learning for K-12 Academic Learning'	This paper summarizes a synthesis of studies of the effectiveness of interactive distance education using videoconferencing and telecommunications for K-12 academic achievement. Effect sizes for 19 experimental and quasi-experimental studies including 929 student participants were analyzed across sample characteristics, study methods, learning environment, learner attributes, and technological characteristics. The overall mean effect size was 0.147, a small positive effect in favor of distance education. Effect sizes were more positive for distance education programs that combine an individualized approach with traditional classroom instruction. Programs including instruction delivered via telecommunications, enhancement of classroom learning, short duration, and small groups yielded larger effect sizes than programs using videoconferencing, primary instruction via distance, long duration, and large groups. This synthesis supports the use of interactive distance education to complement, enhance and expand education options because distance education can be expected to result in achievement at least comparable to traditional instruction in most academic circumstances.
Philip Crompton Theme 7 University of Stirling; United Kingdom 'ODL Pedagogy, Organisation and Technology: A Review'	The paper is a review of the educational approaches used in telematics-based Distance Learning (ODL). Particular reference is made to projects supported by the Telematics Applications Programme (TAP) of the Fourth framework of the EC Research and Technological Development programme. The paper concentrates on practice, reflecting how practitioners of ODL are using information technology (C&IT) to deliver and support the learning process. The first part of the paper presents a summary of current theory relating to ODL, with particular reference to the constructivist model of learning. The next part describes the findings of a questionnaire distributed to practitioners of telematics-based ODL and presents a number of examples of current ODL projects. The final section deals with the gap between theory and practice in telematics-based ODL and the new convergence of communication and information technologies and their ability to provide a supportive environment for the development of learning communities.
Francesc Vallverdu	This work will discuss on a course material in web-format for teaching and

Theme 7 Universitat Oberta de Catalunya; Spain 'An Interactive E-Book Applied to Mathematical Learning'	learning Discrete Mathematics, a subject that is offered at the Computer Science School of the Universitat Oberta de Catalunya (UOC). UOC is an Open University with a virtual campus where both students and teachers interact, breaking time and distance constraints. For UOC students the classical textbook is no longer useful so we propose a digital and navigable didactic material that integrates the basic elements of the self-learning process. Also, it contains self-evaluation exercises, computer animation, audio, conceptual maps and glossaries. Obviously, the material will include any kind of typical navigator functionality, too. The learning and teaching process is evolving with the new information technologies. The teacher-student relationship is changing, even more in distance education. The interactivity between the student and the material can be done through the resolution of exercises and the experimentation with simulated cases. The simple exercises are usually Java Applets embedded in the same html page where the exercise evolves, in an xml framework. Depending on the student's behavior and skills, different paths are presented in order to optimize the learning process. The more the student knows, the more difficult the questions are. A tailor-made and oriented evolution implies an intelligent tracking of the student's actions. In this respect, we might say that this kind of activity allows either the student to learn significantly or the teacher to keep the process under control.
Maritta Belcher Theme 7 Pike County Board of Education; USA 'Rural Outreach Project'	The Pike County School System in Kentucky uses an innovative method of distance learning to overcome some of the barriers that come with being located in a rural mountainous area. This school system has initiated a combined effort of subject area experts, enhanced curriculum, dedicated staff, and state of the art video conferencing equipment to travel on a "Virtual Field Trip" to a large urban zoo, science museum, public library, university, or performing arts center. All K-12 students are given the opportunity to participate in the lessons provided by the subject area experts at each of these sites. Highly skilled high school teachers are also providing students in other high schools in this school system instruction in foreign language, math, and science. We believe this is the new dynamics of learning!
Phillip J. Heeler Theme 7 Northwest Missouri State University; USA 'Graduate Computer Education: Past, Present, Future'	At Northwest Missouri State University, graduate computer education has existed since 1980 with the establishment of a Master of Science degree in School Computer Studies. This degree was designed specifically for teachers who were either currently teaching high school computer classes or were planning to implement high school computer classes in their schools. Since that first degree program, and based upon graduate student expectations and preparations, two significant revisions in curriculum and delivery methods have brought the program through the 1990's. As we prepare for the 21st century, the interest in distance learning, Internet availability, curriculum topics, and modified student expectations are each having an impact on the next revision of this degree program. This presentation will focus on the current issues of graduate level computer education using a twenty-year history to analyze the problems and to help prepare for the next generation of computer education students.
Sheree Aston Theme 7 Temple University School of Podiatric Medicine; USA 'An On-line Continuing Medical Education Program'	The Temple University School of Podiatric Medicine launched a web-based program to offer continuing medical education courses to Doctors of Podiatric Medicine. A subdivision of the school's Institutional Technology Committee developed the template for the new programming delivered via TopClass software. The on-line program is approved by the Council of Podiatric Medical Education. The course elements include: Asynchronized delivery, learning objectives, images and text, assessment questions, evaluation form and e-mail with instructor. The advantages of the on-line courses are accessibility, convenience, self-paced instruction, flexibility, variety of topics, interactivity with faculty, high quality programming, inexpensive for practitioners and it leaves more time for patient care and family. The author will discuss the process for development of the on-line program and will demonstrate the courses.
Fred Spooner Theme 7 University of North Carolina at Charlotte; USA 'Lesson Learned from Five Years of Distance Delivery: Two Media May be Better than One'	Distance delivery appears to be living up to its billing as an effective way to reach students who may not be reached based on distance from a major university campus, geographic constraints, or due to the number of programs which may be officially offered in a state university system due to the nature of the content. Two-way interactive television as a distance delivery medium has been available within the University of North Carolina University System for over 15 years. On the other hand, using the Internet

	for individual access instruction has only been used as a effective tool for most instructors for about the last two years. We will report on the experiences and successes we have had over the last five years in using two-way interactive television coupled with the Internet as effectively delivery mechanisms. For example, using two media to deliver course content should be more effective than just using one media (e.g., two-way interactive television).
Gina Roberts Theme 7 University of Tennessee, Knoxville; USA 'Supporting Faculty Use of Online Course Management Systems'	An increasing number of higher education institutions are adopting course management system (CMS) software to support the development and delivery of online courses and course components. CMS packages offer a multitude of options for sharing course resources, testing online, communicating and collaborating, and managing student information. Faculty users of CMS packages are required not only to acquire new technical skills, but also to re-think the delivery of course content in this environment. In order to make this endeavor more beneficial for our faculty and students, the Innovative Technologies Collaborative (ITC) at the University of Tennessee, Knoxville, offers a program of support and training that includes instructor-led courses, web-based resources, e-mail and phone assistance, a users listserv, and focus group meetings. During this session ITC personnel will share the details of this support effort along with lessons learned thus far. Time will be allotted for group discussions on similar issues faced by other institutions.
Zheng Song Theme 7 Nanyang Technological University, Singapore; Singapore 'Java Applet in Distance Learning'	With the advent of Java applet technology in the recent years, it is very convenient to develop and deliver interactive teaching courseware on the World Wide Web. Java is designed to be "Write Once and Run Anywhere" owing to its platform-independence. In this paper, we introduce a new Java applet that can facilitate students in analyzing frequency response of analog circuits. It forms part of our research in methods to distance learning. By entering the web page through a web browser, students can edit/enter a schematic and sweep the components' values. The applet can then display the frequency response, show the matrix equations and illustrate the computation steps. Due to the security consideration, browser does not allow applets to save/read data to/from the local hard disk. We suggest a client/server socket communication to solve this problem. We also compare Java to other computer languages and discuss their advantages and shortcomings in Internet programming.
Kevin Smith Theme 7 University of Nebraska; USA 'Courses with CLASS: Web-Based High School Courses'	This session is a report on the work done at the University of Nebraska-Lincoln with a Star Schools grant-funded project called CLASS (Communication, Learning, and Assessment in a Student-centered System). The CLASS project is creating an accredited high school sequence for delivery on the World Wide Web. The courses we are creating are asynchronous web-based courses that students can take from their home, school, or learning center depending on their need. All of the courses are highly interactive with rich graphic environments that enhance the learning. At the present time there are 20 courses available for enrollment. To give you an idea of what the CLASS project has to offer and what kinds of things we are doing in our courses, we will give a demonstration of some of the courses and talk about the challenges of creating courses for this environment.
Fred Croop Theme 7 College Misericordia; USA 'Unifying the Enabling Technologies of Web-based Course Presentation'	While most web-based course presentation software gives the instructor discrete enabling technologies such as bulletin boards, chat rooms, white boards, web-based information centers, student presentation areas and video and audio communications, the technology fails, cognitively and pedagogically, to afford the instructor a clear means to link them together. Managing these links to unify a course needs to concern the instructor just as much as the presentation of the course content. If done efficiently and effectively, the unification of the enabling technologies offers a means to establish and enhance relationships among students who do not interact face to face and provide an intuitive, synergistic learning environment. This poster presentation provides a model for managing the enabling technologies of web-based instruction so that the course, as seen by the students, emerges as a seamless, unfied learning experience.
Jerald D. Cole Theme 7 New York Institute of Technology; USA 'Incorporating Streaming Video Into	This article illustrates how to incorporate streaming videos into instructional Webs. Streaming video is a relatively high quality/low bandwidth format suitable for asynchronous Web-based broadcast. The production system utilizes a digital video camera and digital capture card for pre-production, and Adobe Premiere and RealVideo Producer for post-production in

Instructional Webs'	streaming video format. Streaming video increases the sense of presence in distance learning via instructional Webs. Live links to streaming video presentations serve as exemplars.
Ali Jafari Theme 7 Indiana University Purdue University, Indianapolis, IUPUI; USA 'The Oncourse Project at Indiana University: Design, Development, and Implementation of an Enterprise Course Management System'	This presentation reports on the research and development of the Oncourse Project designed and implemented at all the campuses of Indiana University. Oncourse, through interfacing with the university legacy systems, dynamically creates a website for every course section offered at the University. Each course website features communication and collaboration tools including message board, e-mail, chat, announcement, grade book, class roster, library tools, and more as needed for teaching and learning. In addition to the dynamic creation of the websites, the Oncourse automatically creates a "profile" or a dynamic home page for every student, faculty and staff accessible through the use of university NT domain. Oncourse was totally designed and developed at the WebLab (now being called CyberLab) at Indiana University, IUPUI campus. This paper elaborates on both the conceptual and technical design of a contemporary teaching and learning enterprise system. In addition to the Oncourse, this paper report on the development of A New Global Environment for Learning, or ANGEL, being designed and developed at the IUPUI Cyberlab. The ANGEL includes new tools such as Intelligent Agents, Distributed Authentication, and Enterprise Information System. This presentation will benefit both technology administrators and faculty members who are interested in the selection and use of web-based teaching and learning course management environment. More information about the Oncourse is available at http://cyberlab.iupui..edu and http://Oncourse.iu.edu/

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Judy Barrett Litoff Theme 8 Bryant College; USA 'Using Technology to Foster Collaborative Learning at a Distance: The National Academy of Sciences of Belarus and Bryant College Connection' (See Special Sessions)	This session draws upon a five-year collaborative venture between Bryant College, Smithfield, RI, and the Information Technologies Center (ITC) of the National Academy of Sciences of Belarus in Minsk. Six scholars from Bryant and the ITC will collaboratively write a paper that describes the methodology and practices of the Collaborative Learning at a Distance Project between the two institutions. The paper will highlight the technological and cultural challenges encountered in providing collaborative learning opportunities to students at Bryant and in Belarus. The session will include a demonstration of the types of technology appropriate for collaborative learning across international boundaries with significantly different technological environments and requirements. Panelists will showcase the web-based courses they have developed and demonstrate how inexpensive technologies, such as internet video capture programs and virtual roundtable discussions via e-mail, promote collaborative learning across international boundaries. Panelists will also draw on lessons they learned while conducting a 1999 HESP summer School on Collaborative Distance Learning in Minsk.
Leon T. Hobbs, Sam Nichols, Stephanie B. Ash, Scott Lisenby -- Special Presentation -- Dothan City Schools; USA 'Technology in Technicolor with a Southern Accent'	Dothan, Alabama is an urban area with a population of approximately 65,000. It sits in the southeast corner of Alabama, 80 miles for the Florida Gulf Coast and 30 miles from Georgia. Although Dothan has major industries such as Michelin and Sony, the region is a predominately agricultural area. School enrollment as of January 1, 1999 was 9,058 students. The district has 19 schools: 11 elementary (five grades K-2, five grades 3-5 and one grades K-5), 4 middle schools (two grades 6-8 and one grades 6-7, and one grade 8), 2 high schools (grades 9-12), one technology center, and one alternative learning center. All schools have fully function LANS. Each school is connected to the central office and the transportation department with a WAN. This is a frame relay utilizing 128k and frame T1's. Every office, classroom, lab and media center have Internet access provided through the Alabama SuperComputer Authority in Huntsville, AL. This is a state grant that Dothan City has received. The following is an overview of the structure of the Dothan City Schools' presentation using the theme of a kaleidoscope. A multimedia presentation containing pictures and videos will enhance the speakers. As speakers and topics change the presentation will change as if turning a kaleidoscope to reveal changes in colors. Dr. Hobbs will open the presentation with an overviw of the Dothan area and school district demographics. As the kaleidoscope turns, Dr. Nichols will move the participants from a time in which Apple IIe computers dominated the classrooms and curriculum to a system connecting modern Pentium computers in offices, media centers labs and classrooms by a wide area network. Again the kaleidoscope turns to show students in the elementary and secondary schools utilizing technology in the learning process. The Director of Elementary Curriculum and the Director of Secondary Curriculum will provide curriculum integration techniques at the district level. The kaleidoscope will stop to focus on elementaray areas where teachers use Internet, e-mail and curriculum specific software in daily learning activities. It again turns to focus on middle schools with students and teachers in classrooms and labs. At the high school, the kaleidoscope stops to bring into focus one of the six 1998 Milken Award winners from Alabama.
Miika Marttanen Theme 8 University of Jyvaskyla; Finland 'Learning Environments for Studying Argumentation - Learning Effects of E-mail and Face-to-Face Study'	In a teaching experiment 16 face-to-face and ?? e-mail Finnish university students engaged in an argumentation course. The 19 students of the control group did not study argumentation. The course involved two lectures, exercises with argumentative texts, and face-to-face or e-mail seminar discussions based on these texts, free debate, role play, problem solving and panel discussion were the devices used in organizing the course. The level of the students' argumentation skills were measured before and after the course. The results indicated that the e-mail studies sharpened the students' skills in identifying the relevant grounds from an argumentative text and choosing the correct grounds from different

	alternatives, while the face-to-face students improved in putting forward counterargumentation. The control group did not improve in these skills. They study suggests that argumentation skills can be promoted by short term e-mail and face-to-face teaching, and that practising argumentation in different learning environments develops different kinds of argumentation skills.
Philip Crompton Theme 8 University of Stirling; United Kingdom 'Collaborative vs. Co-operative Learning in a Web-Based Environment'	This paper seeks to examine the results of research from an ODL course delivered by the Internet based on a collaborative learning environment. The course was totally web-based and the students were located in four different European countries who did not physically meet but were set a series of collaborative activities as part of the course. The work sought to identify patterns of social interaction and attempts to register social presence within the learning environment. We analysed the online conversations of learners, focusing on a classification of their interactions (Underwood, J. and G., 1999) in an attempt to distinguish key characteristics of co-operative and collaborative working. The work sought to identify those elements of discussion, which are associated with performance enhancement. The final part of the work attempts to examine these results against a Vygotskyian background of facilitated learning through peer interaction and how the social constructivist nature of the learning environment assisted in the learning process. The conclusion raises issues of whether we can evaluate learning through the analysis of a series of collaborative artefacts between learner and learner and learner and tutor or must we take greater account of the contexts underpinning these activities.
Brad Barrett Theme 8 Connect Center, Inc; USA 'Creating Flexible Networked Classrooms'	Educational institutions must prepare students to function in the post-graduate world. Business process and organization is shifting from individual tasks and structured hierarchies to collaborative teaming and employee empowerment. Schools today must provide students with the opportunity to become skilled and literate users of the technologies and organizational structures they will find in the workplace of the future. Today's business trends are making "the fixed office" an endangered species. Integrating technology into the classroom has frequently resulted in students being tethered to the classroom walls by power plugs and network connections, losing the flexibility of traditional, re-arrangeable classrooms. A new system, developed by Connect Center, Inc., provides a concealed, embedded grid of power and data access points throughout the room. Ubiquitous, flexible connectivity restores the configurability of the classroom, enabling ad hoc teaming and collaboration much like what the students will find in the new workplace.
Ann-Charlotte Markman Theme 8 Rosjoskolan; Sweden 'Design a Creative Interactive Learning Environment'	Our pupils are 7 to 12 years old. They are all used to working with PCs as a word processor and for practising spelling, math, etc. They use programs like MS/Word, PP and Publisher. They know how to scan a picture and they have their own e-mail addresses. We want to progress. Our challenge is to make it possible to develop interactive learning environments to support new ways of learning, to encourage and enhance discovery, creativity, thinking and expression. We now work with a Lego-Dacta program to challenge the children to build their own models and to control the model by computer. We work together with schools in England and Denmark for the children to: 1) work in groups, choose a method and solve a problem; 2) create a construction; 3) describe the solution in English; 4) evaluate the solution; 5) compare the solutions. In this project we will encourage new ways of thinking and learning in new domains.
Richard Pollard Theme 8 University of Idaho; USA 'Using Technology for Teacher Internships in the Next Millennium'	The national mandate to improve teacher training has provided the impetus for those charged with teacher preparation to explore the use of technology as a means of facilitating program renewal. In states featuring the majority of schools geographically-dispersed from the universities, technology would seem a most appropriate tool for creating a new teacher internship program. This presentation will examine a new approach to teacher training being piloted by the University of Idaho. It features a discussion of the use of technology to facilitate this innovative program wherein preservice students serve a year long internship in schools hundreds of miles away from the university. These preservice teachers will be able to take content-area and methods classes via interactive video and the internet. Collaboration will be fostered through the use of a web board featuring mentor K-12 teachers and university faculty. This presentation will address the crucial role technology plays in enhancing the teacher preparation

	program and the specifics of how technology is being used to strengthen teacher internships. It will provide a blueprint for instituting successful teacher internships in the next millennium.
Montse Guitert Catasus Theme 8 Open University of Catalunya; Spain 'Asynchronous Collaborative Learning: the Case of the UOC'	This work describes a pilot experience carried out by four professors from the Multimedia and Computer Science departments, four tutors and experts of instructional design and 250 students working collaboratively in the Virtual Campus of the Open University of Catalunya (UOC). Following an action research methodology, this experience aims to: better understand the organization and management difficulties encountered in asynchronous collaborative work, describe the traits of a course curriculum based on collaborative activities, specify the required initial conditions which enhance collaborative work, and develop a framework of collaborative learning in a Virtual Environment. The experience carried out so far, based on analysis of data gathered through student interviews, questionnaires, exchanged documents, journals and discussions, sheds light on the following aspects that promote effective asynchronous collaborative work in virtual environments: characteristics of effective learning teams, desired functionalities of the tools used, the tutor role, the students' attitudes, the nature of the collaborative learning activities, the learning skills, the different organization structures adopted for exchanging information, and the strategies and principles used for the individual and group work assessment.
Constance Pollard Theme 8 Boise State University; USA 'Creating a Technology-Rich Teaching Paradigm'	In order for colleges of education to succeed in using technology as a teaching and learning medium, the technology must be an intrinsic part of the vision of the teacher education program. Teaching in a technology-rich learning environment enables college instructors to model the use of technology and preservice teachers to develop a comfort level with the technology and feel confident about using it in their future classrooms. This presentation examines the role of teacher education preservice programs in providing technology expertise that extends beyond the mere training of computer applications to a focus on the use of technology to facilitate learning through a technology-rich teaching paradigm. Not only do the instructors of education courses need to model instructional technology, their students need hands-on activities that require them to actually use technology in planning, managing and delivering instruction. This presentation provides a model for implementing technology-based activities designed to enrich the curriculum and enhance learning. Preservice teachers need training, support and direction to be able to successfully incorporate technology in instruction.
Sandra A. Holmes Theme 8 Messiah College; USA 'Student Authors and Editors Build Multi-Grade Partnerships'	A fifth grade teacher initiated a cross grade editing project with a first grade teacher. Fifth grade students needed relevance for grammar and spelling kills and first grade students needed more process writing time. Thus, a partnership was born. First grade students brought their invented spelling stories to the computer lab. if lab time was not sufficient, the students collaborated one-on-one using the classroom computer. Fifth grade editors checked for spelling errors, grammatical errors, and encouraged expansion of ideas. The cycle has gone full circle - the students in the initial first grade class are currently the fifth grade editors. Writing projects included "The Big Snow," dental hygiene, and other topics. A video of fifth grade students sharing the challenges of being an editor, samples of first grade author books, attitudinal surveys, and how to set up a similar program in your school will be shared.
Mary Ann Zager Theme 8 Florida Gulf Coast University; USA 'Teaching Research Methods via the Internet: Accepting the Challenge and Making it Work'	Research methods and statistics courses have long held a unique position in social science curricula: one or both courses are part of the required curricula, and they are often the courses least clearly related to the students' major. Many of our students, however, see these as difficult required courses that don't have much to do with their chosen field of study. They have heard horror stories about how difficult (boring, etc.) the course is, and if there is any focus on statistics, students are likely to think of this as a "math" class. All of these challenges to effective teaching are exacerbated when teaching through distance. This paper presents one strategy of conveying difficult materials--using a combination of technological resources including web pages, message boards, e-mail, texts, software, and supplemental documents. The current strategy was developed from several semesters of on campus and distance delivery of a required research methods course in an undergraduate criminal justice program.

Marty Beech Theme 8 Florida State University; USA 'Electronic Support for Special Education Teachers'	An electronic support system for teachers has been developed by the Center for Performance Technology at Florida State University to support the implementation of a standards-based curriculum for students with disabilities in Florida. The first component of the system is a relational database of the standards, course descriptions, and state-adopted instructional resources available on a CD-ROM. A management system is included to help teachers individualize their instruction planning and record the progress of secondary students with disabilities. The second component is a web-based collaborative community for teachers to implement "Florida's Life Prep Curriculum for Special Diploma". Using the website, teachers can find and submit ideas for well-designed units and lessons to use with students with disabilities in grades 6-12. The website is being developed with and for teachers in school districts throughout Florida.
Sara Olin Zimmerman Theme 8 Appalachian State University; USA 'Thoughts on Technology Training: Creating Collaborative Learning Environments'	This study was designed to determine the effects of collaborative learning environments for teachers within schools to learn about technology and create new paradigms for education. Participants in this study were middle school teachers, school administrators, and professors. This model used telecommunications and multi-media as primary tools for formulating and communicating with others. Participation in social practices while learning technological skills was encouraged. Procedures for implementation of this model and results from its evaluation will be presented along with implications for the development of programs and future studies.
Idalia Sa-Chaves Theme 8 University of Aveiro; Portugal 'Multilevel Teacher Education, Supervision Systems & Collaborative Learning; Analysing Interaction Through Photographic Hypertext Representations'	Professional and personal education of teachers evolves within organisational models that represent greatly complex systems. These entail both the interface of conceptions, beliefs and cultures of their interlocutors, and the complex web that organises and ascribes meaning to the institutions, differentiating, epistlemologically, the dimensions of Teachers' Professional Knowledge. We aim to describe an approach to the multiple forms of collaborative learning, developed with/between schools (Alarcao & Sa-Chaves, 1994). This approach, based on Bronfenbrenner's model of human development (1979) stimulated the emergence of collaborative and reflective learning environments, constituting themselves into one of the main success factors at different levels of teacher education. Taking the life story of this system (last ten years), approaches and interactions will be photographically documented. These have been systematically developed (Sa-Chaves & Alarcao, 1998, 1999; Moreira, 1996; Alarcao & Moreira, 1993) along research paths of Visual Literacy Development, Professional Knowledge of Teachers (Shulman, 1986, 1987) and Cognitive Flexibility Theory (Spiro etal, 1987; Jacobson, 1994).
Leon T. Hobbs Theme 8 Dothan City Schools; USA 'Technology in Technicolor with a Southern Accent'	Dothan, Alabama is an urban area with a population of approximately 65,000. It sits in the southeast corner of Alabama, 80 miles for the Florida Gulf Coast and 30 miles from Georgia. Although Dothan has major industries such as Michelin and Sony, the region is a predominately agricultural area. School enrollment as of January 1, 1999 was 9,058 students. The district has 19 schools: 11 elementary (five grades K-2, five grades 3-5 and one grades K-5), 4 middle schools (two grades 6-8 and one grades 6-7, and one grade 8), 2 high schools (grades 9-12), one technology center, and one alternative learning center. All schools have fully function LANS. Each school is connected to the central office and the transportation department with a WAN. This is a frame relay utilizing 128k and frame T1's. Every office, classroom, lab and media center have Internet access provided through the Alabama SuperComputer Authority in Huntsville, AL. This is a state grant that Dothan City has received. The following is an overview of the structure of the Dothan City Schools' presentation using the theme of a kaleidoscope. A multimedia presentation containing pictures and videos will enhance the speakers. As speakers and topics change the presentation will change as if turning a kaleidoscope to reveal changes in colors. Dr. Hobbs will open the presentation with an overview of the Dothan area and school district demographics. As the kaleidoscope turns, Dr. Nichols will move the participants from a time in which Apple IIe computers dominated the classrooms and curriculum to a system connecting modern Pentium computers in offices, media centers labs and classrooms by a wide area network. Again the kaleidoscope turns to show students in the elementary and secondary schools utilizing technology in the learning process. The Director of Elementary Curriculum and the Director of Secondary Curriculum will provide curriculum

	integration techniques at the district level. The kaleidoscope will stop to focus on elementary areas where teachers use Internet, e-mail and curriculum specific software in daily learning activities. It again turns to focus on middle schools with students and teachers in classrooms and labs. At the high school, the kaleidoscope stops to bring into focus one of the six 1998 Milken Award winners from Alabama. Wanda Emblom will discuss "best practices" for the integration of technology in the high school area. Before leaving the infusion into curriculum, the focus turns to the Dothan Technology Center that received a grant from Cisco to become a Cisco Regional Training Center for students and teachers from other school districts. The kaleidoscope program will turn to a technical hue as the Director of Technology discusses the teacher-training program developed for both Dothan City Schools and the surrounding school districts. The presentation will conclude with the support of technology covering both technology services at the district level and the support team in each school. The final turn of the kaleidoscope will intertwine parts of the total presentation to show the composite picture of technology enhancing student learning. This final turn will also reveal plans for future expansion.
Marisol Gonzalez Lozano Theme 8 Instituto Tecnologico Autonomo de Mexico; Mexico 'Universities Towards the 21st Century: The Integration of Technology-Based Educational Models'	Based on various researches, we acknowledge there are no special models for distance education or computer-based education that can indeed satisfy the needs of both professors and students. It seems as we go deeper into the world of technology, the establishment of pedagogical models is left on a secondary position next to the endless technical possibilities. Tools are being built, systems programmed, Web sites created, but no communication among the student, the professor and the environment is being established. In this sense, a strategy designed to promote active participation and to create an apprentice community becomes necessary. Considering the above, the question is not "Which is the most suitable or better technology?" but "What is the most adequate way of integrating it?" It has become necessary to develop a media combination, which is appropriate to the student's and instructor's characteristics, the teaching targets, the environment, strategies and the availability of resources. Analyzing the aspects technology must contain to efficiently support education, and considering some of the main needs of students within the new educational model, we are aware that no technology on its own will be able to satisfy completely every aspect of the educational process. Nevertheless, by integrating different technologies and education models designed for each particular subject, the weaknesses of one of them should be fortified by another's strengths. The necessary technological outline for establishing a comprehensive education model must be based on the Internet, tutorial systems and/or multimedia tools, and books and/or printed media. Internet provides the communication structure between teacher and student. It allows access to sources and information for each subject, and it enables communication through chats and discussion groups among the participants. Tutorial systems allow students to have an interactive tool, with shorter response-time than the Internet, through animations, hypertext, and simulators. Finally books and printed media, specifically designed for the use of Tutorial systems, provide the student with additional aid in the use of both tools, while at the same time, provide the written traditional support. This paper seeks to introduce ITAM's current proposal to connect the different needs and profiles of students and professors, with the primary objective of implementing computer-based education, which empowers the abilities of the different participants in the learning process, while at the same time, integrates technologies and traditional education models.
Roger Von Holzen Theme 8 Northwest Missouri State University; USA 'Shifting the Online Course Paradigm'	In the rush to offer web-based courses, most colleges and universities have "thrown" curriculum materials out on the web and then announced to the world that they are offering web-based courses. In reality, though, most of these materials are glorified syllabi containing course outlines, reading assignments, and links to relevant web sites. Instead of being a paradigm shift, this is simply a reshuffling of the old correspondence courses. At Northwest Missouri State University's Center for Information Technology in Education (CITE), a concerted effort is being made to move web-based courses to the next level where a true change in the paradigm becomes evident. This presentation will focus on the attributes such as courses needed in order to produce such a change, such as short, descriptive online tutorials, open exams, portfolio assessment system, and student interaction. Examples of web-based curriculum produced under the

	auspices of CITE will be demonstrated.
Stan Silverman Theme 8 New York Institute of Technology; USA 'School Room to Home Room'	It is clear that students who are in rich technology environments are experiencing vastly enhanced learning experiences. While efforts have been mounted to provide funds to provide some degree equity in classrooms, it is by no means near enough to meet the needs. The treadmill of hardware and software upgrades further complicate this issue. While some schools are able to acquire the technology from grant programs they are unable to keep them at the "state of the art" so the learning advantage of the technology quickly diminishes in communities unable to sustain the platform. The advances in thin client technology allow us to look at the issue in a different way. By creating online educational portals and developing low cost thin client and network computing devices the students and teachers will be able to seamlessly move between school, library, after school program and home carrying with them all the educational software, tool software, multimedia and files.
Mildred Lovato Theme 8 Albuquerque TVI Community College; USA 'R2/D2: Relationship Based Retention/Dimensional Development'	Establishing meaningful relationships drives every aspect of the TECH Center, the nucleus for quality learning at Albuquerque TVI's Technologies Department. Programs include Electronics Technology, Manufacturing Technology, Computing Technology, Computer Animation, Architectural Engineer Drafting Technology, Design Drafting Engineering Technology, Web Technology, and Construction Management. The Achievement Coach for the department, in addition to overseeing the center, is available to provide initial needs assessment and counseling, direction, advice, and referrals for other services geared toward addressing the individual need(s) of the student. The staff includes a group of peer mentors, Technologies work-study students that are required to maintain a minimum GPA of 3.0. They are encouraged to initiate, develop, and complete individual projects that will enhance their learning experience while simultaneously contributing to the quality of services provided through the TECH Center. Also available are technical labs, course schedule information, direction, and support. A WORKFORCE MENTOR PROJECT geared toward first year Technologies students and professionals is also part of the comprehensive and collaborative approach. By providing a realistic view of the work environment, the mentor is able to impart valuable insight to the student, which will enable a smoother transition into the workforce. This paper outlines the creation of a multidimensional relationship based retention model that emphasizes the process of positive development by addressing several dynamics of human interaction.
Paul Wangemann Theme 8 Motorola University; USA 'How Youth and Adult Mentors Experience Problem based Learning in an Internet-based Shared Environment'	This paper describes experiences of youth and their adult mentors with authentic problem solving in an Internet-based Shared Environment. This initiative is known as Expeditions and the on-line system as iExpeditions. Key questions examined center on the extent and the means in which youth are able to engage in an Expedition. Taking into account the social context and support systems, parents' attitudes toward the iExpeditions project and youth's motivation for these on-line activites are examined. The design for the activities and collaboration of youth is described and contrasted to what actually occurred. In particular, the results of an active group of fourteen youth were analyzed as to why they were more engaged than others less active youth were. We describe four cases from this group to further explore this question. Our discussion summarizes youths' status as collaborators, various factors that affected youths' engagement, and suggestions as to what could be done to ensure effective on-line collaboration.
Mark Geary Theme 8 Seminole County Public Schools; USA 'The Jeopardy Template'	The use of the computer in the classroom is frequently limited to the capabilities of a word-processor. Even when the computers have Internet access, their use is still frequently limited to basic search procedures that can often be replicated (sometimes with better results) on a media center computer catalogue. This presentation shows how one can use the interactive hyperlinking features of PowerPoint 97 to create dynamic collaborative environments with teacher modifiable versions of a jeopardy type PowerPoint template. This presentation will demonstrate how the template can be modified to be used in a classroom setting, using as an example a template made for an Eighth grade Health class. In addition, the presentation will offer suggestions for a distance/distributed version of this template for intra-county collaborative assignments. A disk with a pre-made template will be distributed to the participants.
Troy Isaak	In an elementary education program, technology is used to develop and

Theme 8 Millersville University; USA 'harmony Elementary School: A Context For Collaborative Projects'	facilitate collaborative projects that include pre-service teachers, local and international K-5 students, in-service teachers and university faculty. A virtual elementary school web site that models an elementary school setting provides the connections among the participants in this project. This presentation examines the utilization of the virtual elementary school in the development and implementation of collaborative projects such as 1) developing content specific technology activities and projects for use in the elementary classroom, 2) linking pre-service teachers and K-5 students through e-mail to facilitate reading comprehension skills in younger students, 3) engaging in database activities that examine topics such as life in current and preceding generations, and 4) using e-mail to link local and international students for the purpose of developing language skills.
David K. Foster Theme 8 Messiah College; USA 'DNA Fingerprinting: A CD-ROM Simulation Allowing Students to be the Judge'	Real life CD-ROM simulations were used to: 1) expand students' perception "of ways of knowing"; 2) provide collaborative communication interactions; 3) foster reflective journaling, critical thinking, and higher order questions; 4) include alternate assessments such as open-ended critiques, e-mail questions, and reflective lab essays; 5) observe results of changes students imposed; and 6) collect/analyze data in a period of minutes as compared to weeks in a factual lab setting. By exploring the effects of variables, students learned key concepts and gained a better understanding of scientific processes through application. Students self selected teams for each lab challenge. Teams were presented with physical evidence (DNA samples from a victim, perpetrator and suspect) from randomly selected courtroom trials and a variety of DNA probes (RFLPs) to use as tools in the analysis. Based upon probe, results, frequency matches were employed to estimate the probability of the match, and determine innocence or guilt.
Scott P. Schaffer Theme 8 Florida State University; USA 'Development of a Distributed Learning Environment: The Plan, Design and Development'	The content of the paper is based on a development plan currently in design for the U.S. Navy in conjunction with a renown learning institute at a major state university. Leading research references (literature review) and case study ("best practice") references as supporting evidence for the results-oriented distributed learning environment will be presented. The paper describes a conceptual model for a distributed learning environment, including linkages of performance requirements and appropriate learning theories and models. This conceptual model is embedded in a system approach and reflects a learner-centered educational system. The emphasis will on a results-oriented performance model for optimal required outcomes. The model will be described in terms of a performance framework identified by both a needs assessment and needs analysis and comprised of four major subsystems, and the components of each subsystem, including key features and characteristics, functional requirements, and theoretical references.
Isabel Cabrita Theme 8 University of Aveiro; Portugal 'Collaborative Exploration of a Hypermedia Prototype'	Recently developed research (Cabrita, 1998) allowed us to assess the potencial advantages of a hypermedia prototype (Alves de Oliveira e Cabrita, 1997 e Cabrita, 1999a), designed and developed according to recent orientations for the teaching of Maths, in the acquisition of a complex model--direct proportionality (Cabrita e Alves de Oliveira, 1999b). Given that the curricular programs of Maths pursue objectives which are not exclusively within the area of knowledge, it was also our intent to infer the potencial of exploration of such prototype, collaboratively, in the development of values/attitudes and skills/aptitudes, a problem we intend to address in this paper.

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Theme 9 Abstracts

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Andrew J. Brovey Theme 9 Valdosta State University; USA 'Insure Class Participation with CMC'	During the Fall 1998 semester, I led an instructional technology graduate class known as ITED 7050 - Distance Education, taught via GSAMS (a sophisticated two-way videoconferencing system), e-mail, website and online discussion area. Newly developed during our university's conversion to the semester system, this course introduces students to selected distance learning technologies and their use in instructional delivery systems. Though the course employed a number of methodologies, I'll focus on just one here: insuring class participation through computer-mediated communication (CMC), specifically, an online discussion area and e-mail. Class participation can be defined as interaction centered on content. This interaction takes essentially three forms: (1) a single student actively considering course materials and activities, (2) two or more students interacting with each other about content, (3) a student or students interacting with the instructor about content. Student narratives from this online community confirm CMC as an efficient, effective and affective approach to learning.
Robert M. Colley Theme 9 Syracuse University Continuing Education; USA 'The Story So Far: Successes and Failures in the Creation of Online'	The presentation will give a brief overview of the relatively recent internet course initiative at Syracuse University, now in its third year. A relatively conservative institution, Syracuse has managed to develop an interesting variety of online credit courses not often found at other universities, in area such as low, creative writing, speech communications, architectural history, bioethics, human sexuality, entrepreneurship, textile design, foodservice management, engineering, children's book illustration, the sociology of evil, Canadian studies, and critical thinking. While the program is gaining momentum, a great deal of administrative effort has been devoted to overcoming significant barriers to the success of the initiative, including such things as the lack of institutional support, faculty inexperience and skepticism, software failures, and student frustration with registration, technical procedures and lack of structure. Discussion will include Syracuse's particular attempts to manage the tension between the ensuring of academic quality and the institutional pressure for new enrollment, and its approach to the complexities of marketing to students beyond the local region. Evaluation data and faculty impression of the comparative performance of online student will be provided.
Pamela A. Seay Theme 9 Florida Gulf Coast University; USA 'Engaging the Distant Learner: Interactivity Over the Internet'	Learning at a distance can present a wide range of challenges, especially when the learner has been accustomed to traditional teaching methods. Through the use of interactive assignments, a student can become a more focused internet-based learner. This paper discusses the challenges of distance education and some techniques designed to engage the distant learner. Using the experience of a variety of internet course presentations, it explores several successes (and some failures) in assignments and activities used to gain the focus and attention of the distant learner. The paper highlights examples of effective use of internet technology to illustrate alternative means of involving the student in the learning process.
John A. Gretes Theme 9 College of Education; USA 'Integrating Technology into the 5th Grade Core Curriculum: Does it Make a Difference?'	This paper reports the development, implementation and findings of a study conducted using more than 350 5th grade students to determine if the integration of technology into the core curriculum made a difference in student performance. The study addressed the validity and reliability of the technology assessment keyed to state technology competencies. Students were pre and post tested on the technology competencies to determine student gains. The technology test scores of students involved in the treatment were compared to the scores of students not involved in the treatment. Student end of grade test scores in reading and mathematics were compared over the one year treatment period. The paper also reports teacher and student qualitative data regarding their reactions to the project. Final results of the project will be provided to conference participants.
Jerald D. Cole Theme 9	This article describes a rubric in use at the New York Institute of Technology for evaluating the quality of televised distance learning

New York Institute of Technology; USA 'A Rubric for Evaluating the Quality of Televised Distance Learning Presentations'	presentations. The rubric consists of 6 major criteria and 18 minor criteria. The major criteria cover objectives of presentation, quality of video, vis-a-vis, and computer generated graphics, poise of the presenter and production assistant, and conformity to time constraints. Included are hyperlinks to streaming videos portraying exemplars.
Valerie C. Bryan Theme 9 Florida Atlantic University; USA 'Low-Cost Technology through WEBTV for High Success for Low-Level Learners'	Participants will view a web-based, competency-based program which uses low-cost WEBTV units to assist clients identified as deficient in areas of language/grammar, reading, or math skills, to access resources on the WWW for career enhancement, self-esteem, and lifelong-learning for themselves and their family. Materials developed for low-level readers will be showcased for adults, seniors, and children in family literacy programs and workforce readiness programs. The web-site that was developed to expand the services available to this special audience will also be ???????????? can't read rest of paper.
William Mangold Theme 9 University of Arkansas, Fayetteville; USA 'An Evaluation of a Freshman Block Registration and Mentoring Program'	In this paper we present an evaluation of a freshman block registration and mentoring program at the University of Arkansas. In an effort to improve retention, the University of Arkansas initiated a freshman block registration and mentoring program in the fall of 1994. In the paper we present an assessment of the effect of the program on retention and academic performance for successive cohorts from 1994 through 1998. We describe the nature of the program and discuss evaluative problems that result from our inability to use an experimental design. Academic performance and retention rates are used as outcome measures and are related to student and university characteristics. We present our evidence of a strong interaction between student ability and program success. Our analysis is based on event history models (follow back life tables and Cox Regression Models).
Valerie C. Bryan Theme 9 Florida Atlantic University; USA 'Accountability in the Virtual Classroom via Webet for Teacher Training'	Major changes in funding and legislation are currently measuring success of staff development by changes in teacher instructional behavior and the needs and outcomes of their students. More instruction is therefore results-oriented. Online training through a virtual classroom and Webet tool assists in addressing many of these issues. Session will demonstrate Webet: 1) Provides the needed instrumentation to document learner interests and applicability; 2) Allows equal access to training for all learners in service area; 3) Provides 2 1-hour accessibility to accommodate schedules; 4) Provides a centralized and consistent messages about an idea or an issue; 5) Offers the flexibility to select the training components the learner wishes to read and at the learners own pace; 6) Gives easy access to information through the use of "hot-links" to other web sites; 7) Can house listservs to get policies and regulations updates; 8) Offers the capability to network with other agencies through bulletin boards; 9) Assist developers in creating a course in fewer man-hours.
Elizabeth L. Pearman Theme 9 University of Northern Colorado; USA 'How do we Know? Using a Computerized Assessment to Measure Student Growth in Reading'	This session presents a computerized, individually administered preprimer to grade 6 reading assessment that takes approximately 5 to 10 minutes per student. The assessment can be administered a number of times during the school year without repeating a reading sample and results are available immediately. Results are archived and can be compared with previous results to determine growth. The analysis of student reading includes sight words, beginning, medial, and ending sounds, fluency, comprehension, retelling, and phonic analysis of student reading. Growth can be measured for individual students or groups and can be aggregated by teacher and grade level. Results can be used to plan individual group, or class instruction and shared with parents. The assessment is based on reading research and provides teachers and schools with objective data and information on their reading programs. The assessment program has been tested by teachers, is user friendly and requires minimal teacher training.
Marisol Gonzalez Lozano Theme 9 Instituto Tecnologico Autonomo de Mexico; Mexido 'The Pros and Cons of the Development of Tutorial Systems on CD and WWW'	This paper analyzes the results on the developing of the Tutorial Systems under two different technologies: CD and WWW. Through the results, timings, and related costs of the implementation of various systems on these technologies, this research summarizes the experiences and opinions of different institutions regarding their advantages and disadvantages for education purposes. The analysis covers a range going from the revision of cognitive models and learning motivation to economical and technical issues. The goal is to establish guidelines for the optimal use of either technology, and the way in

	which education institutions can develop interactive tutorial systems using both CD's - with an orientation towards multimedia incorporation - and WWW - for the communication and updating of materials. Along the process, it is necessary to try to create a hybrid technology that will make the most out of the above-mentioned technologies, while minimizing the cons with the help of the other one.

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Theme 10 Abstracts

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R. Theresia Litvay-Sardou Theme 10 LaGuardia Community College; USA 'Managing Technology in the Computer Classroom'	In the presentation I will explain how the creation of a new division, the division of Information Technology, contributed to the entire remodeling of computer technology at LaGuardia Community College. I would like to demonstrate how technology is being used to enhance the quality of teaching. I will show how some equipment is used in the computer laboratory and how it benefits students and faculty. Accomplishments: established a Faculty Network to provide e-mail and Internet access to all faculty and staff; established a Student Network which uses a Digital Alpha server to provide e-mail and Internet access to all registered students; created a Media Distribution and Presentation room; centralized student software applications; implemented a leasing system to upgrade computers for faculty members and computer laboratory classrooms; created a system to continuously offer softare application training workshops for faculty and staff; in some classrooms, installed a link system to allow the instructors to share his/her computer monitor with students and have students sharing between themselves. With all the acquisition of new equipment, upgrades, and training being offered to faculty and staff, LaGuardia is motivating faculty members to become computer literate. The computer laboratories are becoming more popular and many courses that did not meet in the computer room a year ago, are now utilizing the computer facilities at least for some hours during the program.
Ellen Cohn Theme 10 School of Health and Rehabilitation Science; USA 'Is School Really Open? A "Report Card" of Web Based Accessibility in High Education'	Educational institutions are increasingly web dependent. Course management software, e-mail, library systems, applications, registration, grade reports and advising require computer access. Inaccessible web pages deny users with visual and/or learning disabilities full access to the benefits of high education. Higher education web sites were analyzed via the CAST Bobby 3.1.1 validation tool. A majority of sites were inaccessible. A 4/2/99 analysis of 25 major universities revealed 19 inaccessible web sites. A 6/21/99 analysis of 76 pharmacy schools indicated 54 inaccessible sites. We will present a comprehensive "accessibility report card" for 1999 US News and World Reports College Rankings, by geographic region, tiers, and type of institution, as well as an audit of health related colleges expected to function as models of accessibility. Finally, the impact of the "diffusion" of accessibility ratings and remediation strategies will be presented for University of Pittsburg and AACP colleges of pharmacy web sites.
Sheila K. Barnes Theme 10 Northwestern Oklahoma State University; USA 'P.A.S.S. Port to Writing: Co-Teaching Students with Disabilities Using Technology'	At the end of this session, which will explore promising practices, methods, and assistive technology for assessment and programming, participants will be able to: (1) outline curriculum based assessment and programming for instruction in writing; (2) integrate technology directly into interactive instruction in writing; (3) ensure full participation of targeted students with disabilities in state-mandated general curriculum and assessment in written expression; (4) adapt and modify instruction and assessment using assistive technology and include these adaptations on Individual Education Programs (IEPs) of targeted students with disabilities; (5) identify methods of collaboratively teaching writing in general education settings. Ask any special educator to identify the one area students with disabilities have the most difficulty with and they will most likely respond "written expression". This is supported by research. Written expression is the achievement area that has qualified a large number of students for the IDEA category of "learning disabilities" - sometimes when no other discrepancies in achievement are evident. Difficulty in writing causes problems in all other academic subjects because writing is required in virtually every content area. This project focused on confronting this problem by responding to the challenge of training teachers to adopt promising practices, materials, and technology for assessment of written expression using educational and Assistive technology. The need to train teachers to adopt promising practices for assessment and programming in written expression based on current knowledge and research in evaluation and programming is two-fold. First,

	teachers need training in adopting curriculum based assessment and programming practices. Second, teachers need training in collaborative/cooperative teaching.
Marisol Gonzalez Lozano Theme 10 Instituto Tecnologico Autonomo de Mexico; Mexido 'Computer Assisted Education: An Internet Model'	Nowadays, most of the institutions using education systems over the Internet, are doing so without the establishment of technological architectures. Current development is based on pages and static files, which do not take into account any pedagogical considerations. This makes difficult the updating, managing and creation of virtual learning on the Internet. The purpose of this paper is to show the research and establishment of a dynamic technological architecture based on data bases, dynamic pages, pedagogical and structural considerations, which allow for the implementation of Educational Websites in different institutions in a quick, effective and low cost manner. This architecture shows an open and dynamic homogeneous technological platform based on technologies such as JAVA, ODBC, PERL, PL/SQL, CGI's and Dynamic HTML. The implementation of such architecture at ITAM has allowed having a dynamic management and development of education material on the Web like: on-line courseware and class guidelines.
Quentin T. Wells Theme 10 Salt Lake Community College; USA 'Internet Math for the Trades'	Knowledge of math through basic trigonometry is fundamental for vocational trades such as electricians, carpenters, machinists, plumbers, etc. Salt Lake Community College has introduced an Internet-based Math for the Trades course designed specifically for trades apprentices. This course is delivered statewide and provides access to high quality math instruction in both urban and rural areas. The instruction course is delivered and administered by WebAcademics software and features an extremely rich learning environment including on-line concept explanations, electronically graded exercises, forums, chat rooms, textbook, and more than 10 running hours of video instruction by a developmental math professor and a journeyman trades professional. This course represents a new level of quality in delivering essential math curriculum to non-traditional learners.
Boris Peltsverger Theme 10 Georgia Southwestern State University; USA 'Planning Components of Advisor Support System'	In this paper a planning component of a web based Advisor Support System is presented. This planning component pulls in all the resources needed for a successful sesson with a student during the advisement and allows creating an optimal sequence of courses for earlier graduation. Based upon that module, the second step of planning - an optimal resource allocation on a university level can be done. The paper discusses various distinct features of the system such as friendly user interface, dynamic data access, presentation of information like curriculum, mapping of grade report, course selection, pre-requisite checking, minimum grade requirement, preparing registration plan, checking graduation requirements, etc.
Marty Bray Theme 10 University of North Carolina at Charlotte; USA 'Web Accessibility of Special Education Program's Web Pages'	The purposes of this study were to evaluate the accessibility of university special education programs' home pages and discuss accessibility recommendations. Eighty-nine special education Web sites are evaluated for accessibility errors. Most (73%) special education home pages had accessibility problems, and the majority of these errors (71%) severely limited access for individuals with disabilities. The good news is that the majority (83%) of the erros can easily be corrected. Recommendations and methods for improving accessibility to the WWW for individuals with disabilities are discussed.
Linda O'Karma Theme 10 Region V Area Center for Educational Enhancement; USA 'Florida's Curriculum Planning Tool'	The State of Florida has taken a bold step in initiating the development of a lesson planning software tool designed to assist K-12 classroom teachers in the construction of lesson plans that are aligned to Florida's Curriculum Frameworks. The Curriculum Frameworks contain state mandated achievement benchmarks for all students in the State of Florida, K-12. The lesson planning software houses the database of benchmarks for each grade level, sample lesson plans and a lesson planning template. The Curriculum Planning Tool (CPT), can be accessed by teachers on Florida's Department of Education homepage, and serves as a model for adoption by other states looking for new initiatives to help teachers in the alignment of curriculum, instruction and assessment.
Ton Oudshoorn Theme 10 KPC Groep; Holland	

'Study Planning and Registration Software'	
Joe Parks Theme 10 California State University, Fresno; USA 'Community Technology and the Internet'	As we approach the new 21st Century, it is evident that the public school system has not fully utilized the concept of technology, the Internet, and community partnerships. The focus across America has been primarily directed at students with limited English speaking and writing abilities. However, one very important element concerning school reform efforts has received very little attention is community involvement in the K-12 system. One program might improve the learning process for K-12 students and communities, that are located in economically depressed rural areas, is the concept of a "Community Technology Center" that would provide technological knowledge and Internet access. Many of these parents have low academic abilities themselves, which prevents them from actively participating in the education of their children. A community technology center could provide educational opportunities for a general population of adults who have low academic achievement levels. In addition, the center could provide workshops that would assist community individuals in obtaining their GED diplomas, improve their English literacy skills, and learn how to use computer technology and the Internet for acquiring other services and benefits. In summary, a "Community Technology Center" would extend the formal educational process for adults in rural areas beyond the public school system, and enable parents to help their children in their academic endeavors. A community technology center enables the concrete establishment of a cohesive relationship between public school education and community pro-activism.

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Theme 11 Abstracts

Presenter / Title / Theme / Institution	Abstract
Workman Robert Theme 11 Southern Connecticut State University; USA 'Middle School Applications for Windows Based Digital Video Capture and Nonlinear Editing'	This paper will discuss full motion digital video capturing and editing on Window's PCs. Examples will be taken from middle school video projects that include a tour of the Louvre for use in a French language class; video essays about the Vietnam War and the civil rights movement; and a middle school activity film. Specific topics that will be discussed are camcorder requirements, video capture hardware, and video editing software.
Gary W. Tubb Theme 11 Hillsborough High School; USA 'Cultivating High School Female Interest in AP Ctt using browser Java Script'	
John F. Beaver Theme 11 Buffalo State College; USA 'Surfing Less, Learning More: Educational Models for Teaching with the Internet'	This panel session showcases a Worldwide Web site designed to facilitate elementary and secondary school teachers' educational use of the Internet. The well-organized portal site contains many links selected to illustrate efficient instructional models for using the Worldwide Web with students. The site has been successfully used by preservice and inservice educators in several American universities and during consulting visits to train teachers in Europe, Africa, and Latin America. The Worldwide Web site, "Educational Applications of the Internet", has links to many effective Internet lessons. The site includes links to help teachers examine 1) lessons in which the Internet is an add-on, 2) lessons in which the Internet is the instructional focus, and 3) lessons that are Internet based. The Web site also includes links that help teachers adopt WWW teaching approaches including: 1) student to student projects, 2) student to expert projects, 3) student to resources projects, and 4) student to motivating tasks.
Jerry P. Galloway Theme 11 Indiana University Northwest; USA 'Technology Integraton: Training, Education, Indoctrination'	There is, today, a new focus on an old problem: integrating technology into the classroom. Recent studies show that equipment is generally available, that "tool-mastery" courses for teachers are achieving literacy, but then that teachers still fail to use the computer in their own classes. There has been a call for a new approach in teacher training: to show teachers how to use computers in teaching, how to integrate technology into the classroom. This paper will present data with implications that are contrary to these usual solutions and will suggest a different explanation for the problem and, therefore, a different recommendation. This paper will contrast notions of "training" from "education" and will illustrate the flaws of simply showing teachers how. A more elaborate concept of adoption and indoctrination for teachers will be discussed as a means to successful integration.
Jiang B. Liu Theme 11 Bradley University; USA 'Teach Internet client/Server Computing Using JAVA Network Protocols'	Client/Server computing over the Internet has gained it's popularity in the last few years. It combines the advantages of the distributed client/server computing and the ubiquitous of the Internet delivery. Multi-tiered enterprise JAVA computing delivered on the Internet allowed organizations to quickly deploy their business applications to meet the increasing demand of on-line services. In this paper we will discuss how to teach this new technology using a three-tier client/server application implementation experiment. The purpose of this experiment is to compare different JAVA Network protocols in creating client/server applications on the Internet. JAVA Internet computing technologies included several networking protocols. In our implementations, we have developed a simple three-tier client/server application using JAVA sockets, JAVA RMI (Remote Method Invocation), and JAVA COBRA (Common Object Request Broker Architecture)/IDL (Interface Definition Language) respectively. The comparisons of these three network protocols concentrated mostly on the program design and Internet delivery issues. The results will definitely benefit the developers to choose the appropriate JAVA network protocol for their business applications.
Victoria Giordano	Teachers have been called on "to educate our youngsters to prepare

Theme 11 Barry University; USA 'Transforming Technology Training for Teachers'	them to live and work in a world transformed by new technologies, demographic shifts, and economic globalization" (U.S. Dept. of Education, OERI, 1993), requiring schools to consider their educational aims, new curricula, and different pedagogical practices. While billions of dollars are spent each to equip schools with appropriate technologies, the impact of the technologies is yet unclear (Edwards, 1997). Despite an average of one computer for every nine students, a substantial number of teachers report that they don't use computers regularly for instruction. Further, a majority of teachers report that they don't believe they are adequately prepared to use technology. This paper will present the findings of a study that engaged K-12 classroom teachers in a short course to teach them to successfully infuse Internet technologies into their regular classroom curriculum.
Dane Hughes Theme 11 College of Education; USA 'Computer Competence and the Pre-Service Teacher: Three Years of Program Revision and Technical Support'	Over the past three years the College of Education at the University of North Carolina at Charlotte has been involved in the planning, implementation, and evaluation of Computer Competencies for pre-service teachers. This project has involved training for students, faculty and staff, as well as adjustments to the curriculum in many for the areas of teacher preparation. This session will provide materials to conference participants that describe the process, products and evaluation used to increase technology skill levels, and to integrate computer technology into the teacher education curriculum. The session will focus on the technical support needed over the past three years to implement this project. This technical support includes hardware and software selection, installation, and maintenance. The technical support also includes training of faculty and staff as well as the scheduling of college-wide technology facilities. Examples of what has been learned including successful as well as unsuccessful techniques will be shared with conference participants.
Susan Rae Regan Theme 11 John Abbott College; Canada 'High Tech, High Touch: Romance in the Wired Classroom'	The collaborative (exciting, dynamic, noise) atmosphere in many wired classrooms stands in stark contrast to the silent, cold, passive paradigm of the traditional lecture hall. Our goal as technology-friendly teachers is to create an on-line global learning "community". A community is defined as a unified body, a partnership, of people with common interests interacting in fellowship. In bringing together our students to exercise their common interests in partnership and collaboration, and cooperation - the more sensual, less intellectual, passions may penetrate the classroom and leave us as teachers uncertain how to deal with such hitherto alien issues as on-line relationships and on-line crushes resulting in sexual harassment. Several of my students have journeyed overseas to visit on-line friends of the opposite sex and at least one such visit resulted in marriage. While we may not be called upon for a direct response to such events, it is important to situate them within the teaching/learning paradigm, even if only for our own reflective purposes.
John F. Beaver Theme 11 Buffalo State College; USA 'WebQuests: An Approach that uses the Internet Instructionally, not Recreationally'	This session features the use of WebQuests to help teachers use the Worldwide Web for instructional purposes. The session begins with an introduction and brief overview of WebQuest activities. Sample WebQuests designed for distinct content areas and different grade levels are showcased to provide participants a conceptual understanding of the activities. Next, the presenter examines the difficulties teachers encounter when trying to implement WebQuest activities in their classrooms. Often, students lack the requisite skills and background to benefit fully from these valuable internet activities. As a result, scaffolding activities that prepare teachers (and, later, their students) for successful Worldwide Web learning experiences are highly recommended. The presenter defines and briefly discusses the term scaffolding and its implications for educators. He shares activities used in a series of successful Internet training workshops for teachers that include an off-computer scaffolding activity that "deconstructs" a complex WebQuest into its component parts and then "reconstructs" it layer by layer.
Ann Barron Theme 11 University of South Florida; USA 'VITAL: A Successful Faculty Support System'	VITAL, the Virtual Instructional Team for the Advancement of Learning, offers a collaborative support system for faculty members who are interested in integrating technology into their on-campus courses or who wish to prepare course materials for distance learning initiatives. Interested faculty can seek assistance from these support systems for

	added expertise in instructional research, course development, computer programming, multi-media production, graphic arts, video production, and the management and integration of information. VITAL involves cross-campus collaboration among several campus entities in a manner that guides faculty to the training and/or instructional design services they need. This presentation will focus on the lessons learned in establishing, operating, and maintaining VITAL. Demonstrations of faculty projects will also be included.
Sal Majied Theme 11 Mitchell & Titus, LLP Education Consultants; USA 'Innovative Academic Management Solutions'	There are a range of educational tools that are designed to support both academic management and classroom management. This includes the ability to manage the full range of classroom activities using current client/server based solutions, including effectively managing lesson plans and mapping to appropriate educational standards. Some software tools have been designed to facilitate easy customization and integration into the classroom. In addition, there are emerging models for effective use of technology, which can be designed to ease both up-front implementation costs and the associated learning curve on the part of both teachers and administrators. As with any technology there are issues which have to be addressed in order to make an appropriate choice as well as making the most effective use of such tools. Mitchell & Titus, LLP Education Consultants will discuss the use of academic and curriculum management tools and issues related to the use of such technology.

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Theme 12 Abstracts

Presenter / Title / Theme / Institution	Abstract
Stan Silverman Theme 12 New York Institute of Technology; USA 'The Educational Enterprise Zone'	This presentation will show how schools, no matter what level of communications access, can connect and utilize powerful content from informal educational resources around the country. The Educational Enterprise Zone comprises well over 30 informal content providers including the Peace Corp., Museum of Modern Art (NYC), The Smithsonian Natural History, The National Parks Service, Liberty Science Center, The Philadelphia Fine Arts Museum, Museum of Television and Radio, and many more. Learn how teachers working with the museums have created content rich activities aligned to state and national standards and how these resources can be brought into your classrooms. The solutions to both the technology issues as well as the content issues will be presented. Participants will receive examples of activities and a guidebook for creation of their own Enterprise Zones.
Ann Barron Theme 12 University of South Florida; USA 'Teacher's Guide to the Holocaust: An Online Resource'	"A Teacher's Guide to the Holocaust" is a large, instructional Website with thousands of HTML pages. It was designed and developed by the staff of the Florida Center for Instructional Technology at the University of South Florida (USF) and graduate students in the USF Instructional Technology program. This presentation provides background information on the evolution of the site, design considerations, and development issues. The content of the "Teacher's Guide to the Holocaust" is divided into five major sections: Timeline, People, Arts, Teacher Resources, and Student Activities. Each section contains numerous photographs, images, documents, and relevant links. The Teacher's Guide currently receives thousands of hits per day on the Web, and it has won numerous online awards.
Sergey Sidorenko Theme 12 National Technical University of Ukraine, Kyiv Polytechnic Institute; Ukraine 'Demonstration of the First in Ukraine PC-Based Course "The Structure of Liquid"'	Development and implementation of PC-based University Courses become one of the principal ways of further development of DE in National Technical University of Ukraine "Kyiv Polytechnic Institute" (22 Faculties, 113 Departments, 200 Full Professors, 2000 Associated Professors, 28,000 students). The course SLACM is based on the authors' (S. Sidorenko, M. Beldus, A. Kholmskaya, etc.) Material Science Courses delivered students and includes the following parts: (1) The States of Matter; (2) Atomic Structure of Metals; (3) Electronic Properties of Metals; (4) The Structure of Molten and Amorphous Metals; (5) Bonding in Solids; (6) Surface Atomic Structure and Diffraction of Slow Electrons. The fragments of the University DE Course in General Physics will be demonstrated, too. The principles of organization and practical results of the implementation of ??????????????
Dale Reed Theme 12 Learning Sciences, Northwestern University; USA 'Intelligent Indexing'	Searching the Internet can result in an intractably large list of matches. Web indexing is not keeping pace with Internet growth, with the percent indexed dropping from 47% to 27% in the last year. This paper describes "Intelligent Indexing" where software tools written in Java allow Internet knowledge to be treated as a readily accessible extension of a user's local machine. There are two pieces to this work: 1) A Web Personal Information Manager (Web PIM) allows a user to locally create a searchable index of the "contents" of bookmarked pages; 2) A search assistant where a user's search results will be ordering according to a user's personalized "context." An individualized profile will be created using a combination of bookmark kewords from the Web PIM and a user profile questionnaire. This information can also be used for automatic query refinements. This work is sponsored by a NSF PFSMETE fellowship.
Elizabeth Newby Theme 12 Liverpool City Council; England 'The North West Learning Grid'	Since 1998, the National Grid for Learning has been "under construction" in the United Kingdom. As a national policy for education, funding has been used by 150 Local Education Authorities (LEAs) to develop the Grid in many diverse ways. At a regional level, ten Local Education Authorities in Northern England have committed resources to the development of the North West Learning Grid. A number of projects to advance software and content development through the authoring of electronic multimedia curriculum materials are now underway. These projects will be hosted on a secure Intranet accessible to teachers and children throughout the region.

	This paper will explore the development of one of these projects, a comparative coastline study written collaboratively by three geographically diverse LEAs. In addition to the standards and procedures which emerge from such a project, the paper will also consider emerging technical and strategic implications.
Chu Ryang Wie Theme 12 SUNY at Buffalo; USA 'Integrating Java Applet Courseware Components into Consumer Product Case-Study Modules'	There are increasing amounts of Java applets and multimedia modules for science and engineering education. The primary organization of these courseware components, available today, is mainly that of a traditional textbook style - table of contents with sections at varying levels. Another effective organizational approach, particularly for engineering education, is by organizing the courseware components into consumer-product case-study modules. This approach provides a nice hierarchical organization of the courseware components, a pedagogy naturally accompanying the organization, and an "object-oriented view" to the courseware system that are not easily achieved in other organizational approaches. This system-component approach of courseware components suits itself to learners from varying levels. For example, the top-level system or product applets are useful for learners from all levels including general non-technical public and upper-level High School students, while the deeper-lying component applets and materials applets are appropriate for R & D professionals and upper-level university students. We will discuss the organizational and pedagogical approaches of the consumer-product case-study modules of Java applets and other courseware components.
Chu Ryang Wie Theme 12 SUNY at Buffalo; USA 'Development of Write-Once Run-Anywhere Courseware Components'	The 21st Century higher education shall be enriched by a large variety of new educational objects such as Java applets, multimedia animations, interactive learning modules, and even learning games. Of these various objects, a particularly useful approach is the development and use of the dynamic, visual and interactive learning tools that are installation-free, unconstrained in space, and platform-neutral. The best candidate for this is the Java applets which can encapsulate and visually simulate various and abstract learning concepts and principles. We have been developing java applet visual simulation objects in the area of solid state materials and devices for the past four years. The target audience of these applets range from High School seniors, low-level and upper-level College students, and up to the practicing professionals of the Semiconductor industry. We shall show the usage statistics of the developed resource and the comments from students and educators around the world. From our experience of developing the courseware components, exclusively in java applets, we have found certain practices are especially effective for the student learning and for the educator's use. Namely, the visual arrangement of the screen for technical contents, supplementary materials, etc. We also have discovered that an effective development approach for the programming productivity and maintenance is the evolutionary approach where the applet components are developed incrementally within the object-oriented programming paradigm. We will discuss the pedagogical and development issues in this paper.
Cavanaugh Catherine Theme 12 Florida Center for Instructional Technology, College of Education; USA 'Standards and Instructional Tools via Web and CD'	This session presents an overview of a collaborative process between Pinellas School District (FL) and the Florida Center for Instructional Technology at the University of South Florida. The process resulted in the creation and distribution of the Student Expectations database to teachers in the district. The database was distributed on both CD-ROM and on a Web site. The product unites the district standards, state standards, lesson plans, resource materials, assessments, and parent information in a searchable database. This session will involve lessons learned and decisions made during the development process, along with samples of the CD and Web versions of the product. The perspectives of both developers and users will be included.

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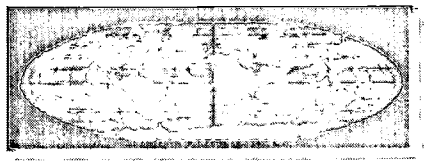
International Conference on Technology and Education



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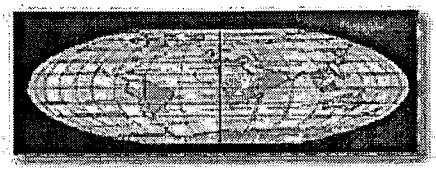

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Booker T. Washington is a unique institution in central Tampa. The school's goal is developing mature thinkers who are able to acquire and use knowledge as they work actively to integrate new information with what they already know. The school's teachers use the framework of global studies and world languages to provide students with both creative and critical thinking skills and strategies. Teachers and students collaborate and learn

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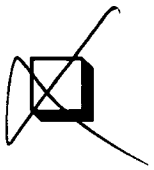

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