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Volume 2 Number 3 2005

DISTANCE LEARNING

...A Magazine for Leaders

ARTICLES

COLUMNS

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PURPOSE

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

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In Upcoming Issues

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Seven classic publications in the field of instructional technology are once again available. These seven are a must for professionals in the fields of instructional technology or distance education.

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The history of the field, *The Evolution of American Educational Technology*, by Paul Saettler is *the* basic reference for how the field has grown and become the driving force in education and training that it is today.

Three books on this list of classics, Ball and Barnes' *Research, Principles, and Practices in Visual Communications*, Chu and Schramm's *Learning from Television*, and Ofiesh and Meierhenry's *Trends in Programmed Instruction*, are the primary sources for research and design in instructional technology and distance education. Some claim, and they are probably correct, that much of what are considered "best practices' today can be traced directly back to the conclusions provided by these three extremely important monographs..

Robert Heinich's often quoted and rarely found classic, *Technology and the Management of Instruction*, is a masterpiece of writing and advice about the field that resonates strongly today. This monograph may be Heinich's best work.

With little doubt, the 20 years of Okoboji conferences set the stage and provided a platform for leadership development and intellectual growth in the field. The Okoboji conferences have been often mimicked but never duplicated. This summary of the 20 years of conferences by Lee Cochran, the driving force behind them, provides a comprehensive overview of the Okoboji experience

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Faculty Development Through Streaming Video

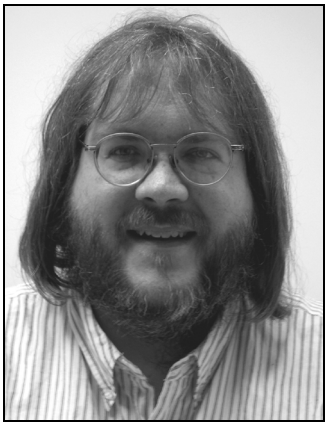
A New Delivery Medium for Training

Christopher Essex

College and university faculty face many demands on their time: research, teaching, service, committees, family, and other obligations. One of the major challenges encountered by instructional support personnel at colleges and universities is to get their training efforts entered into the faculty members' busy calendars. This article looks at a new option for delivering training in technology and pedagogy through streaming video and synchronized slides. The project described involves faculty members sharing their technology-related projects and instructional strategies with other faculty through online video, which could be viewed either live or at other times convenient to faculty members. Faculty response to the program is described.

Introduction

Instructional support staff at postsecondary institutions confront challenges in their efforts to deliver training to faculty members. The faculty members that they support face numerous demands on their time: teaching, research, conferences, office hours, and a seemingly endless number of meetings; not to mention family and social obligations. With each of these areas taking time out of faculty members' schedules, little is left for developing new technical and pedagogical skills and strategies.



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At our university, we have a large number of faculty in this situation. They are generally positive and enthusiastic about professional development, but find it difficult to find the time in their overextended calendars to attend workshops or even to come to our office for individual consultations. Instructional support staff constantly meet instructors in the halls who say, "I've been meaning to come to you to talk about a certain project, but I just haven't had the time." Because of this, staff members in our instructional support office have long been looking for new ways to deliver training to our faculty.

One day at noontime, I noted the large number of faculty members lined up in front of the snack cart in our building's atrium, purchasing their lunches. These faculty members were going to take a chicken sandwich or a salad back to their office to eat while sorting through e-mail, surfing the Web, or listening to online radio. It struck me that this might be an ideal opportunity to deliver some training to the faculty members.

A New Way to Reach Overextended Faculty

From this insight, I developed the idea for a series of workshops delivered through online streaming video. I envisioned faculty members

watching short, targeted video presentations while eating their lunches at their desks. The faculty all had Ethernet connections to their computers, along with sound cards and speakers, and Realvideo installed by default, so hardware and software on the receiving end would not be a problem. Regarding the broadcast side, there was a distance education room already set up with cameras and microphones, and a call to the streaming media people at our university computing services department was all that it took to arrange for the first video session.

What would the content of these streaming video broadcasts consist of? From past experience, I knew that faculty members often felt somewhat isolated, in that they seldom had the opportunity to learn about what other faculty members, especially outside of their departments, were doing in terms of pedagogical and technological innovations. I identified a number of faculty members that our staff had worked with and who were doing exciting things in their on-campus and online classrooms, and arranged a schedule of video sessions with them.

I chose every other Wednesday at noon for the live broadcast, with an archived version of the sessions available almost immediately afterwards. This way, if faculty members could not watch the live broadcast on Wednesday, it would still be available for them to view at a later time.

The upcoming broadcasts were advertised through our school's listserv, which went out to all faculty members. I also invited associate instructors (graduate students with teaching positions) through e-mail to tune in to the sessions. Also, individual faculty presenters notified their students and colleagues about the presentations, which gave us, at times, an international audience.

Presentation Format

The sessions were 30 to 45 minutes in length, so that the faculty member viewing the program would not have to devote his or her entire lunch hour to the session. I wanted to incorporate interaction from our faculty viewers, so I had an Internet-connected laptop operating at the site, so that a staff member could collect e-mailed questions as they came in. Instant messaging was considered as an option, also, but since many faculty members were unfamiliar with this type of software and would not have it on their desktops, I decided to go with e-mail, a delivery method that they were comfortable with and that did not require any new software. To encourage e-mail participation, free coffee mugs were given to anyone whose question was read on the air. On a couple of occasions, we had a live audience in the distance education studio, but most of the time, it was just the presenter, the host, and the technical support personnel.

The director of our office and the head of training for our school, both of whom have extensive experience in giving workshops and training sessions, alternated in the role of host for the broadcasts. The faculty members were encouraged to engage with the host in an informal discussion about their topic, rather than give a typical dry conference presentation. We encouraged them to use Powerpoint slides, but told them to limit the number that they presented. We didn't want the content of these presentations to be bound to getting through a large number of slides.

Presentation Content

One of the primary goals in developing this video series was to provide faculty with a venue in which they could share their pedagogical and technological skills and practices with each other. This sort of collegial discourse is often lacking at our universities, especially across departments, for several reasons. First, most of our faculty have little time, except for events like the yearly faculty retreat, to reflect on and share what they are doing in their classrooms. Another reason is that, in academia, this sort of discussion is often not considered scholarly activity, and thus is not as highly valued as it should be. Finally, some faculty may find it awkward to seek assistance in their teaching efforts, especially if they are, like our professors, in a school of education. Doesn't having a PhD in education make you an expert in teaching? They may feel that they shouldn't need any additional development in this area, and may be hesitant to appear in public, in front of their peers, at a face-to-face session. This new delivery method allows instructors to *lurk*—getting the information that they need without having to be seen doing so.

The tone of these online video broadcasts was collegial and informal, less like a lecture and more like the conversation that might happen between sessions at a professional conference, in which a faculty member shares his or her best practices with a colleague in a friendly manner. The host engaged the guest faculty member in conversation about his or her experiences related to the topic, and questions from the audience, either online or in person, were answered.

The topics of our initial series of online streaming video talk shows were:

- Web-based search strategies;
- Designing online course components;
- Creativity and technology in education;
- Plagiarism;
- Teaching with Web-based discussion forums;

- Web accessibility;
- Blended learning options; and
- Using simulations in teaching.

These topics were chosen both to highlight the research and teaching experiences of the faculty members being showcased, and to provide a range of topics that would be of interest to faculty members across departments in the school.

Technology Choices and Developments

I had the benefit of previous university investment in Internet and distance education technology when I planned the technical side of these presentations. When the new School of Education building was built, in 1998, distance education rooms were created with the latest in video networking technology, and the university has continued to upgrade the facilities. We were able to use one of the distance education rooms as the studio for our live Webcasts. This room had numerous microphones, video cameras, and large-screen monitors. There was a touch screen control panel for switching between cameras, the computer with the Powerpoint slides, a VHS tape player, and the document camera. During the live broadcast, the signal went out over a high-speed Polycom video network, and was captured by a downstream streaming server, which sent the program over the Internet for anyone with a current RealVideo player to access.

For the archived version of the sessions, at first I provided interested faculty with a Web page that included links to the Realvideo file and the related Powerpoint file. Faculty could view the video file using Realplayer and see the accompanying slides using Powerpoint. However, the lack of synchronization between the two programs made for a less-than-ideal replication of the presentation experience. I researched various options for presenting the two media together. There are any number of commercial systems, most of them targeting business clients, that offer this sort of online lecture hall or meeting room, among them Microsoft Presentation Broadcast, Real Presenter-One, Macromedia Breeze, Jet Stream Jet Manager, Intercall MShow, and sofTV.presenter. However, for technical and/or cost reasons, none met our needs. We were locked into two technical choices: Microsoft Powerpoint, as that was the presentation format familiar to faculty, and Realvideo, as that was the format supported by our university's streaming servers. We also had the additional constraint of minimal-to-no budget for the project. For these reasons, we chose to develop our own system, which we christened the Virtual Internet Presenter (VIP).

The VIP system is a frames-based system, with the Realvideo plug-in embedded in the top left frame, and the Powerpoint slides (converted to JPEG images) in the larger, right frame, covering roughly 75% of the window. The space under the video display is used to provide a listing of the slides. Clicking on any of the items on the listing will take you to that slide and move to that point in the Realvideo presentation. Similarly, as the presentation progresses, the current slide is designated by a triangle next to the slide name.

VIP was written by one of our programmers, Larry Campbell, using Perl (mod-Perl to be specific), Javascript, and VBScript. The program went through many iterations as we continually tested it and suggested refinements and additional features. We developed an administrative interface (Figure 1) for the system that allowed us to input the video files and Powerpoint slides easily, and to synchronize them. The interface was connected to a Web-enabled database that created an attractive and informative menu page (Figure 2) that listed the available videos and provided information about the topic and the presenter, including a thumbnail photograph. The system was built on the underpinnings of a Linux operating system, Apache Web server software, and a MySQL database. We chose this setup for security and reliability reasons, as well as the fact that the open-source software was free to use.

One major challenge in the development of the tool was to get it to work with the majority of Web browsers, including the various releases of Internet Explorer and Netscape. A further difficulty was getting the system to work with Apple Macintosh browsers, including Apple's own Safari. To date, this has not been fully accomplished. It is possible to view the presentations on Apple Macintosh computers running Safari, Internet Explorer, or Netscape, but the synchronization between the video and the Powerpoint presentation does not work, and it is necessary for the viewer to navigate through the slides manually. We hope to eventually fix this challenging problem.

The VIP logo was designed, in Flash and Realvideo versions, by Jung Won Hur, one of our office's graduate assistants. It is based on the countdown leader that is traditionally shown before 16mm and 35mm films are projected. Other than that, the graphic interface of the system is plain but functional. While no formal usability testing was conducted, the system is so simple that the end users have not had any complaints. The ease of use of the user interface is based on the fact that it relies on familiar technology—the Web browser and the Realvideo player. The vast majority of our faculty are comfortable with both.

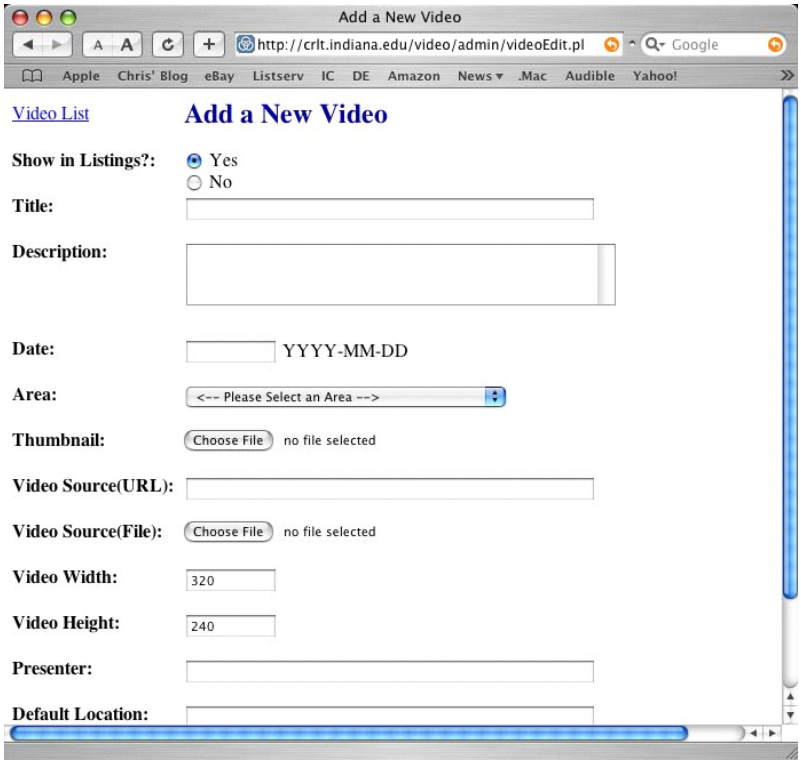

Figure 1. Administrative Interface (partial view)

Figure 2. Menu Screen (partial view)

We were fortunate that most of the viewers of the video would be working at their School of Education office workstations, with a known technical configuration. A few of our users needed to have Realplayer installed or updated to the latest version, but that was the only technical support required. We did receive some complaints of dropouts in sound or video due to network congestion or server load, but these were short-term and temporary problems. Sometimes it took a few moments for a presentation to get started, due to the way Realplayer buffers a certain portion of the file before starting to play.

Faculty Response

We were very pleased with our viewership for the series. Our school has just over 100 full-time faculty members, and our live broadcasts reached 20 to 80 viewers, depending on episode. The archived VIP versions of the presentations have had from 80 to almost 300 views. This can be compared with on-campus workshops, for which we are lucky to have 10 faculty members show up. And, while the primary audience for the presentations is our faculty, the Website is open to the world. The VIP system has had visits from Australia, Canada, Austria, the United Kingdom, Taiwan, Philippines, Korea, France, Japan, China, the Netherlands, Singapore, India, Spain, Turkey, Greece, Cyprus, Italy, Malaysia, New Zealand, Hong Kong, and Malaysia. These international numbers are not large (generally under 20 visits), but the series has not been advertised anywhere outside of our school (except for faculty members contacting their colleagues about the presentations). Overall, the VIP video system has streamed over 3,300 video sessions.

We have received many compliments on the quality of the series

from faculty and associate instructors, as well as from the administration. Faculty members have commented about how convenient it is, being able to view these training sessions at any time from their office or home computers. They also appreciated being able to randomly access any part of the presentations, and being able to repeat or skip sections. The fact that they can multitask—listening to the audio of the presentation while skimming through e-mail, eating lunch, and so forth—was also appreciated.

On feedback forms, we received comments such as "I would love to see all kinds of seminars and topics archived as this seminar was!" Another appreciated the fact that "it could be taken in the comfort of my office & at my convenience." The only complaints we received about the series were due to technical issues, as mentioned above, not about the content of the video presentations.

It is worth noting that since the VIP system worked so well for us in presenting this series of faculty development workshops, we have now broadened its use. We now use VIP to present archived versions of our technology training sessions, such as recent workshops on iLife and Dreamweaver, digital video production, and desktop publishing. The system is also being used to deliver colloquia for our online master's program in instructional technology. We are also presenting the Faculty Research Colloquium series through VIP. And recently a department was hiring a professor and had candidates give presentations that were broadcast through the system. We expect use of the system to continue to grow.

Further Developments

We plan to further develop the VIP system in several ways. The top priority is to ensure full Macintosh compatibility. While a minority of our faculty use Macs (only 22 of 112), we still want to be able to reach every faculty member with our training activities. We are hoping to find a programmer who is experienced in the OS X environment to help us with this issue.

Another area for further development is the administrative interface, which has basic functionality but lacks features such as the ability to view the slides that you are adding to the presentation in the same window as the video. It would also be useful to be able to input Powerpoint files directly, without having to convert them to image files.

VIP is also somewhat lacking in visual appeal and, more importantly, documentation. There has been preliminary talk about developing a commercial version of the tool but this is just speculation at the moment. Right now, we are focusing on meeting the needs of our local faculty members.

Conclusion

Based on our successful experiences with our program, I strongly recommend that other postsecondary instructional support offices consider streaming video and synchronized slides as a new option for delivery of professional development opportunities to their faculty. This delivery medium engages faculty where they are, at a convenient time, using technology that they are already familiar with. A program such as this also provides an ideal way for isolated and overextended faculty to share their technological and pedagogical innovations with each other.

"I strongly recommend that other postsecondary instructional support offices consider streaming video and synchronized slides as a new option for delivery of professional development opportunities to their faculty"

—Christopher Essex

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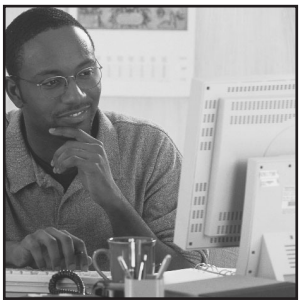

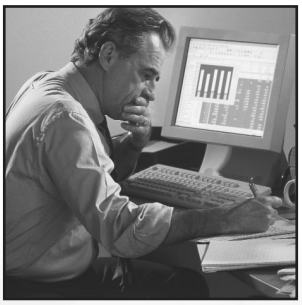

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Bringing life to learning

Second in a Series of Five Articles

Reference Services
Library Resources Come to the Desktop

Marsha L. Burmeister

Armed with an arsenal of encyclopedias, almanacs, dictionaries, handbooks, indexes, and databases that constitute the tools of the trade for the ready reference librarian, patrons can have their questions researched, sources identified, and answers provided via a visit to the reference desk at the local library. However, for distance learners and educators, alternative solutions are necessary. The purpose of this article is to identify two approaches to obtaining information traditionally the result of a trip to the library: the use of live Ask A Librarian reference services and the use of Web-based free reference sources. The advantages and challenges associated with each will be discussed and online resources that are available to reference researchers-at-a-distance will be shared.

The two approaches are both viable and are not mutually exclusive. There is much to be gained from live interaction with a librarian, but the vast array of Internet reference sources should not be forgotten. And, in many cases, these online materials are those accessed by *live* librarians.

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Synchronous, Real-time Reference Services

Synchronous, real-time reference is a hot topic in libraries (Kimmel & Heise, 2001). The process has many names, including real-time virtual reference service (VRS); or real-time, live-, or chat reference; and is also known as digital reference, online reference, electronic reference, and e-reference (Foley, 2002). Regardless of the name assigned to it, the purpose is the same: to extend service to patrons at the point of need and time of need (Trump & Tuttle, 2001). This is also another way to extend the variety of ways that patrons can ask questions (Maxey-Harris, 2003). Digital reference service is designed to remove the barriers of time and place, connecting patrons to librarians.

As O'Neill (1999) noted, "Libraries have traditionally responded to reference requests using the mail and later using technology including telephone, and, still later, fax, so e-mail is merely another vehicle to make services available" (para. 3). Real-time reference services are viewed as the next logical step in the integration of Internet or Web-based technologies. Lipow (1999) believed that, without the maintenance of reference services by librarians, "commercial interests like Microsoft [would] step in to fill the vacuum, furthering the privatization of library functions" (para. 6). Live chat brings the librarian to the user without having to disconnect from a telephone line being used for Internet access. In some libraries, patrons may risk losing their seat at a computer terminal if they physically go to the reference desk while in the library. Library patrons who are physically far removed from the library may find this definition of distance amusing. The capacity for real-time assistance online also enables distance learners to avoid long-distance telephone charges to call libraries without toll-free access numbers, to make reference services more inviting to young people and

others who enjoy chat, and to extend reference hours (Foley, 2002).

Two modes of delivery of real-time reference services tend to predominate. The first is the use of Internet chat using a chat client such as America Online or the purchase of Web-hosted venues such as LivePerson, DigiChat, or QuestionPoint. Subscription to QuestionPoint can be as much as $2,000 for individual institutions or less for members of consortia (Quint, 2002).

Microsoft's Netmeeting has also been used minimally for live reference services; the necessity to download the (free) program and the requirement for matching versions makes this less than optimal. The easiest venue is to outsource the chat; the patron is unaware of the provider and only focuses on the service. There are many software venues for the delivery of live reference services. These include, but are not limited to, Convey Systems, LiveHelper, Live Assistance, InstantService, CS-LIVE, and LivePerson [formerly known as HumanClick] (Eichler & Halperin, 2000; Kimmel & Heise, 2002), as well as QuestionPoint (Maxey-Harris, 2003; Quint, 2002) and America Online Instant Messenger (Foley, 2002).

Ask A Librarian LIVE uses software developed by eGain Communications Corporation and is distributed by Library Systems and Services Virtual Reference Service (Patrick & Matthews, 2002). The concept of ask a reference librarian services has become increasingly popular, initially via e-mail or Web form (Haines & Grodzinski, 1999). Sensitivity to the pressure felt by librarians to provide exact answers rapidly is important (Foley, 2002).

Features vary, but can (and sometimes should) include the ability to *push* screens, documents, and PowerPoint instructional modules to users in real time (Patrick & Matthews, 2002). Connectivity to a live librarian may be also enabled via a variety of technologies that can include CUSeeMe with video capability, a MOO (multi-user object oriented) environment (Trump & Tuttle, 2001), or chat technology for real-time interaction (Lipow, 1999). Connectivity choices may include the use of audio or video, slide shows, or form sharing (Trump & Tuttle, 2001).

Features are important in determining the advantages of live librarian products. These include the ability to chat, to push a page to the user and co-browse (real-time demonstration of searches or completion of a form), and application sharing (another way of escorting a patron through a process) (Kimmel & Heise, 2002). As with all online activities, issues related to connection speed/bandwidth take precedence over the types of interaction that are possible. Patrons (and librarians) must have speakers or headsets and a good microphone in order to participate with audio (voice) interaction. A Webcam is required for video and is subject to a frame rate that does not, at this time, permit smooth, full-motion video. The question can also be asked about the degree to which seeing a *talking head* adds to the experience; a photograph (.jpg file) of the librarian can serve, and perhaps more effectively.

The basic features of QuestionPoint include filing, tracking, and managing Web-delivered questions, as well as linking to library resources. Questions can be routed automatically to a particular subject area expert or to other libraries. As questions are answered, collection of these data enables development of a global knowledge base (Quint, 2002). While the Library of Congress was an early pioneer in the advent of live reference, they also have developed a strong structure to direct patrons to other means of getting information; due to what could easily be a high volume of activity, the Library of Congress has thorough *front pages* that clearly state what this live chat can and cannot do—and providing answers to student assignments is not one of the services.

LivePerson allows for seamless outsourcing of the live reference platform. Helpful features include caller logs, the ability to survey users for evaluation of the service, a default to e-mail when the system is not available, automatic messages to users during wait time (such as, "Just a moment, please" or "Thank you for waiting; I'll be with you momentarily"), and the ability to transfer calls to another librarian (Eichler & Halperin, 2000). From the standpoint of the patron, the interface must be user-friendly. These features would include minimum browser requirements; a clean, clear, and easy-to-use interface; the ability to use the system without downloading software or plug-ins; notice of the availability of a librarian, and an e-mail alternative when the service is not available (Kimmel & Heise, 2002).

Online Reference Sources—Direct to the Desktop

A remarkable number of ready reference resources are online and free to the public. One category of online references is meta-sites. These include RefDesk.com, Martindale's Reference Desk, the Conversion & Calculator Center, the Fugitive Fact File, and the Internet Public Library Ready Reference. Other categories include dictionaries, almanacs, encyclopedias, and U.S. government document sources. Examples of each category are listed here:

Metasites

RefDesk.com, "The Single Best Source For Facts"
http://www.refdesk.com/

This online reference desk is a busy page; there are many features and types of information presentation here. Search resources include Google, Yahoo!, MSN, and the Refdesk itself. There is quick search access to the One Look dictionary as well as *Merriam-Webster's Dictionary and Thesaurus*. Other sections include Site of the Day, Thought of the Day, and Word of the Day; a Current Events Topic; a comprehensive list of Daily Diversions; and pictures and potpourri. Quick-find resources, reference resources, facts-at-a-glance, and a search engine for facts are but a few more of the many items on this site. The content can be overwhelming; this is a great site to spend some time with to familiarize oneself with its information and entertainment value and to concentrate on the search features that can prove especially helpful.

Martindale's The Reference Desk
http://www.martindalecenter.com/

This is a treasure trove of interesting information. Twenty-three categories include the Language Center, Science Tables, Education, Chemistry Center, Electronic Media, International Travel, and others. A "Virtual" Medical Center (for people and pets) is also found here. There are over 45,000 sites representing over 250 countries, territories, and principalities within Martindale's Health Science Guide; Martindale's "The Reference Desk" and its Centers, Sections, and Subsections. Need a calculator? More than 18,680 are listed. Users will benefit from taking some time to explore this site; it is not searchable but well-organized within the categories.

Conversion & Calculator Center
http://www.convertit.com/Go/ConvertIt/

A variety of tools are located here, including measurement conversion, currency exchange rates, world time zones, reference information, and a variety of calculators (finance, date and time, math, geography [driving distance, flying time] and others). Beyond conversion and calculators, you will find lists here that may be helpful (such as a list of the states, their abbreviations, capitals, land and water area, and total area).

Fugitive Fact File
http://www.hclib.org/pub/search/fff_public.cfm

A product of the Hennepin County (Minnesota) Library System, this database brings information from many files together to assist patrons in locating hard-to-find and elusive information. All of the data and resources collected here have been used by library staff to answer reference questions. Searching can be done by keyword or by browsing the database alphabetically. Note that the Fugitive Fact File will not supply the information itself, but will provide specific information about the source where the information may be found.

Internet Public Library Ready Reference Section
http://www.ipl.org/ (choose Ready Reference link on the left menu)

From almanacs to trivia, this site offers a wonderful collection of references. It is fun to take some time to explore the references to Time & Weather. From Greenwich Mean Time to the official time in any U.S. time zone within one second, there are many wonderful resources to explore, including clocks, counters, and countdowns. There are links to the National Weather Service, River Watch, "Wild Weather," and other information. The Internet Public Library is a public service organization and a teaching/learning environment at the University of Michigan School of Information. The Ready Reference section of the Internet Public Library is but one small facet of a major site.

Dictionaries

Merriam-Webster Collegiate Dictionary & Thesaurus Online
http://www.m-w.com/

This easy-to-use interface has a space for you to type in the word of your choice. Search results for the dictionary include a list of related terms, the main entry word and variant(s) if present, a link to a sound file pronunciation, the function and etymology of the word, and definitions. The thesaurus search generates a list of synonyms, antonyms, contrasted words, idioms, and related words.

Roget's International Thesaurus of English Words and Phrases
http://www.bartleby.com/110/

Hosted by Bartleby, this site offers an updated version of *Roget's Thesaurus*, with 85,000 hyperlinked cross-references. Additionally, more than 2,900 proverbs and quotations from classic and modern authors illustrate the 1,000-plus entries. The Bartleby site is also handy for searching a variety of reference resources, including quotations.

Almanac, Yearbooks, Handbooks, & Directories

Information, Please (Infoplease)
http://www.infoplease.com/

Infoplease uses a variety of sources, including *TIME* magazine's Information Please Almanac. The site includes an atlas with maps and profiles of all 192 countries and the 50 United States. A dictionary is

available with a pronunciation guide, as is the sixth edition of the *Columbia Encyclopedia* (with 57,000 articles, from astrophysics to Zimbabwe). Infoplease is searchable, with a separate search available for biographies. Other interesting tools include the Periodic Table, a conversion tool, a perpetual calendar, and a history resource called Year by Year. There is a daily almanac with facts about "today" in history, birthdays, and the Word of the Day. Editor's favorites reflect current news or events, such as the Olympics in August 2004. All in all, a visit to this site for "all the knowledge you need" is a pleasant experience.

The Internet Movie Database (IMDb)
http://imdb.com/

This searchable site for the film enthusiast is the perfect place to find a list of Glenn Close films (as an actress, there are 51 listings in her filmography), to see the name of characters portrayed, and the list of the complete cast, plot synopsis, and more. The site also has information about current movies, upcoming DVD releases, and lists such as the IMDb Top 250 Films. Trivia and a Movie/TV Quote of the Day are also featured. For any and all questions related to movies, this site has the answers and according to the site is "visited by over 20 million movie lovers every month!"

Other resources in this category include RxList (http://www.rxlist.com/), the Statistical Abstract of the United States (http://www.census.gov/statab/www/), the Thomas Register of companies and products manufactured in North America (http://www.thomasregister.com/), and the CIA World Factbook (http://www.cia.gov/cia/publications/factbook/).

Encyclopedias

World Book Encyclopedia
http://www.worldbookonline.com/wb/Home

Easy to search, this online version of *World Book Encyclopedia* generates a list of articles related to the keyword. After selecting the appropriate article related to the search topic, the user can view the article about the keyword, a link to related photo(s), and a list of linked "see also" references. All words in the article are clickable and bring up a *World Book Dictionary* entry. The full article may be printed, e-mailed, or saved, and the entry includes a suggested format for bibliographic citation of the article. *World Book* also provides a Spanish encyclopedia and an online intermediate *Student Discovery Encyclopedia*.

Encyclopedia Britannica
http://www.britannica.com/

While paid membership is encouraged, there is much that is free from this site. An easy-to-use keyword search will yield two versions of articles, one free and one for members. The free article has good content, but is an abridged version of the complete article. However, each free article provides three citation strategies for referencing the content: MLA, APA and "Britannica style." Online features include the index, the ability to browse alphabetically and by subject, a world atlas, dictionary, and link to timelines. There are also *classic articles* from earlier editions; an article about conjuring, by Harry Houdini for the thirteenth edition (1926), is interesting (and free) reading.

Other encyclopedias are online; these include the *New Advent Catholic Encyclopedia*, the *Encyclopedia of Psychology* from the Oxford University Press, and the *Columbia Encyclopedia*. A quick Google search will locate the Web sites.

U.S. Government Document Sources

United States Census Bureau
http://www.census.gov/

Noting that the Census Bureau has been online for 10 years, there is much to explore and research on this site. Census 2000 is summarized and tabulated. Categories of data on this site include People, Business, Geography, Newsroom, At the Bureau, and "Special Topics" that include the 1930 Census and resources that are designed for teachers. The American Fact Finder section of the site includes a U.S. population clock and a link to real-time population clocks. Census data sets are available for download. A Kids' Corner provides fun facts about states and a quiz with choice of level (easy or hard).

THOMAS: Legislative Information on the Internet
http://thomas.loc.gov/

THOMAS was created in 1995 to make Federal legislative information freely available to the public. There are several databases available. These include: House Floor This Week, House Floor Now, and Quick Search of Text Bills. In terms of legislation, bill summaries and status, bill text, public laws by law number, and votes (including roll call results) are available. THOMAS is also the online home of the Congressional Record. You will find the most recent issue online, as well as previous editions dating from 1989. An index is provided, and there are Days-In-Session Calendars dating from 1978; calendars are browsable but not searchable. Additionally, THOMAS provides committee information, including reports, home pages, and listings of both House and Senate committees.

There is also a House and Senate Directory with comprehensive information about room assignments, telephone numbers, and committee assignments. The list of Senators has each name linked to his or her home page with directory information as well as other information from the Senator. Other items on this site include information about the legislative process, a summary of legislative activity, and a collection of historical documents, mainly from 1774 to 1789 (including background and descriptions). The Declaration of Independence and the Constitution are online here. For anyone seeking information about legislation, THOMAS fits the bill.

Uniform Crime Reports
http://www.fbi.gov/ucr/ucr.htm

The Uniform Crime Reporting (UCR) program has been maintained by the Federal Bureau of Investigation (FBI) since 1930. Data are provided by nearly 17,000 law enforcement agencies throughout the United States. Several annual publications are published here: *Crime in the United States, Hate Crime Statistics, Law Enforcement Officers Killed and Assaulted*, and other special studies, reports, and monographs. Most documents are in PDF (Portable Document Format); tables are in Microsoft Excel format. Information is also provided about the *National Incident-Based Reporting System,* and there is a Frequently Asked Questions section. These comprehensive materials are but one segment of the FBI site that includes the "Most Wanted" list.

While it is certainly easier to have someone look things up for us, there is satisfaction to be gained from hands-on reference research. One advantage to seeking information independently is that it lets one explore information discovered throughout the process and to reshape a query both in terms of its focus and scope. Being able to independently locate information can save time that may be required when asking a librarian to assist. Many of the resources have interesting and fun features that would otherwise be missed, thus making self-service reference searching a serendipitous experience.

A key disadvantage is that developing a sense of the types of resources that are online requires development of skills in searching and exploration. Experience is required in order to become familiar with the various resources. However, dictionaries, encyclopedias, calculators, and glossaries can be identified by using a search tool such as Google. Some reference sites contain so many resources that they can overwhelm rather than focus. Being able to identify an appropriate source can be challenging, but this skill can develop over time, especially for persons seeking consistent categories of information such as labor statistics. And, as with all searching, the use of appropriate keywords is crucial in order to generate a well-focused list of results.

Summary

Live library reference service online will thrive when it is impossible to ignore—so "in your face" that to not click to access a librarian will be a conscious choice (Lipow, 1999). The use of virtual reference strategies brings patrons and librarians to libraries without walls ("Live Chat," 2002). The ever-increasing number of high-quality reference sources online that are available to librarians and patrons alike can personalize the reference experience and make searching for information an increasingly independent process. Choices abound but, as Munro and Zeidman-Karplinski (2003) wrote, "It's not the years in your life that count so much as the life in your years" (p. 2). The use of virtual reference is yet another way to bring patrons (life) into reference work, adding a new dimension to distance library services and access to the Internet can make such assistance self-service, at the desktop.

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CHESt
An Educational Tool That Understands Students Questions

Serge Linckels and Christoph Meinel

Introduction

New technologies are used in many courses and for many occasions. Good teachers try to use the best tool and the best method to introduce or to treat difficult subjects by presenting the information in different ways: spoken words, written text, pictures, graphs, movies or by using interactive computer tools. It is a fact that students who discover the solution to a problem by themselves, for instance by searching information on the Web or by using a multimedia computer tool, understand and memorize the learnt subject matter better than if they simply listen to or read the information. In this sense, computer-aided learning, or e-learning, seems to become a more important and useful part in education.

In this article we present our *intelligent* e-learning tool that understands students' questions. First, we introduce our view of the advantages and disadvantages of e-learning and our vision of a perfect educational tool. Second, we present our solution CHESt, the Computer History Expert System, with its multimedia interface, the idea of splitting the knowledge in a large number of small clips and its semantic search engine. Then, we describe how the knowledge base is semantically described with RDF, the Resource Description Framework, by building a reservoir of CHESt vocabulary and by generating the CHESt dictionary and the RDF serialization. We also present briefly some technical details about the semantic search engine. Finally, ideas for future and related work are presented in the last section.

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Historical View

The e-learning vogue started in the mid 1980s as a promising application of new technologies and inventions like the compact disc (CD), the personal computer (PC) and better graphic adapters and displays (for example: CGA, Color Graphics Adapter). Soon, it was said that these novel computer tools would replace teachers, especially when several years later, the first online lessons were broadcast via the Internet. It is true that from those early visions, several real advantages for everyday education were born. Here are some examples:

For the student:

- The multimedia aspect and the attractive interfaces attract the student's attention.
- Courses are broadcast live or on demand over the Internet. Thus, students can review a missed lesson or an important topic before a test.

For the teacher:

- The teacher has the possibility to promote autonomous learning.
- Distant learning is possible without displacement (for teachers and even students).

Pitfalls in E-learning

However, many e-learning tools and solutions are the results of theoretical and scientific research rather than of practical, concrete, and founded needs in education. Consider the following two examples:

- A multimedia encyclopedia is a great tool for teachers to find information for preparing their courses. But students can only use few immediately. The information is often presented in a too-complicated language and there is simply too much information on one topic. There are no filter techniques to adapt the content to the skills of the user (for example: less information for a student, exhaustive information for a teacher). Often, search mechanisms are based on simple keyword searches that are not effective; for example, the user gets a large number of possible results.
- Many universities offer courses online, often streamed from a server. We will not discuss any performance or financial constraints; each lesson that has to be transmitted normally takes over an hour. Well, let us suppose that the student has to take into account a dozen of such lessons for a test. Even if he or she is searching for precise information, it is difficult and very time consuming to scan through all the possible streams to find the appropriate part.

Based on our teaching experience, we perceive the e-learning technologies as a complement to classical education and useful for special occasions. We do not agree that computer programs should become an equivalent substitution for teachers or classical methods. Students should primarily use e-learning tools at home, for example to review a certain difficult topic, to receive advanced or simplified information about a certain subject or to help them doing their homework. Otherwise, the abuse of computers and e-learning tools in classrooms will provide students with the misleading view that everything is so simple that it can be learned by *playing*. As already mentioned above, an occasion where an e-learning tool is pertinent and useful in school is when a new topic is introduced. Here, the teacher may decide to let the students discover this new topic by themselves in order to attract their interest.

A computer tool cannot explain a difficult topic better than a teacher can. It can only present the information in another form, maybe a clearer or more exhaustive one. But it can neither understand the student's real problem nor provide further and different explanations adapted to the student's sense of perception.

Furthermore, the interaction between machines and humans is still surprisingly complicated. Students often have problems to express themselves. Formulating their problem in a computer-understandable form seems not to simplify the problem. Clicking on some icons on the screen is certainly very simple, but doesn't allow the users to express themselves freely.

In direct consequence to the above-mentioned problems, the heavy use of computer tools in education is more time consuming than classical methods. For example, because Web-based search engines work with keywords, the resulting list of Websites is often very long and most entries are not really pertinent. Therefore, the student spends most of the time surfing on the Web searching for information but without clear and precise results at the end and without acquiring new knowledge about the initial subject. Furthermore, most students are slow in typing text or in correctly manipulating specific software. Thus, if they had to use conventional tools like books to search for information, they would have found the answer to their question faster than with a computer tool.

Our Vision

Our vision is to create an e-learning tool that should understand students' questions. The interaction with that tool should be as human as possible, maybe even by means of spoken words. The user should be able to freely formulate his or her question. The system understands his question and returns a precise answer in multimedia form. Here are some key features of our novel e-learning solution:

- The tool can be used as a complement to normal courses (in the classroom or at home).
- It does not require special hardware and can be used on any computer.
- No installing or configuration procedures are necessary.
- The answers are in a multimedia form.
- The answers are taken from a secure knowledge base.

- The knowledge base can be extended easily.
- The tool promotes independent learning.
- The student creates his or her own course content by assembling different multimedia answers.
- The interaction between the user and the system is very easy.
- The search for information is not limited to a simple keyword search.

On the basis of the overwhelming experiences of using Tele-TASK (Chen, Ma, Meinel, & Schillings, 2004; Ma, Schillings, Chen, & Meinel, 2004; Meinel & Schillings, 2002; Meinel, Schillings, & Walser, 2003) in university teaching, we started to investigate whether it can be used in (high) schools as well. Our research project started in 2003 in close collaboration with teachers, who tested our prototype in practice. Recent results and ideas were published in Linckels and Meinel (2005). We focused on one general context, namely computer history. The aim of project CHESt is to design an e-learning tool for computer history that allows pupils to easily find information by means of asking questions (see Figure 1). The prototype is based on the following features:

- Within CHESt, the knowledge is presented in multimedia form.
- The content of the knowledge base is split into a large number of small clips.
- A semantic search mechanism is used for information retrieval.

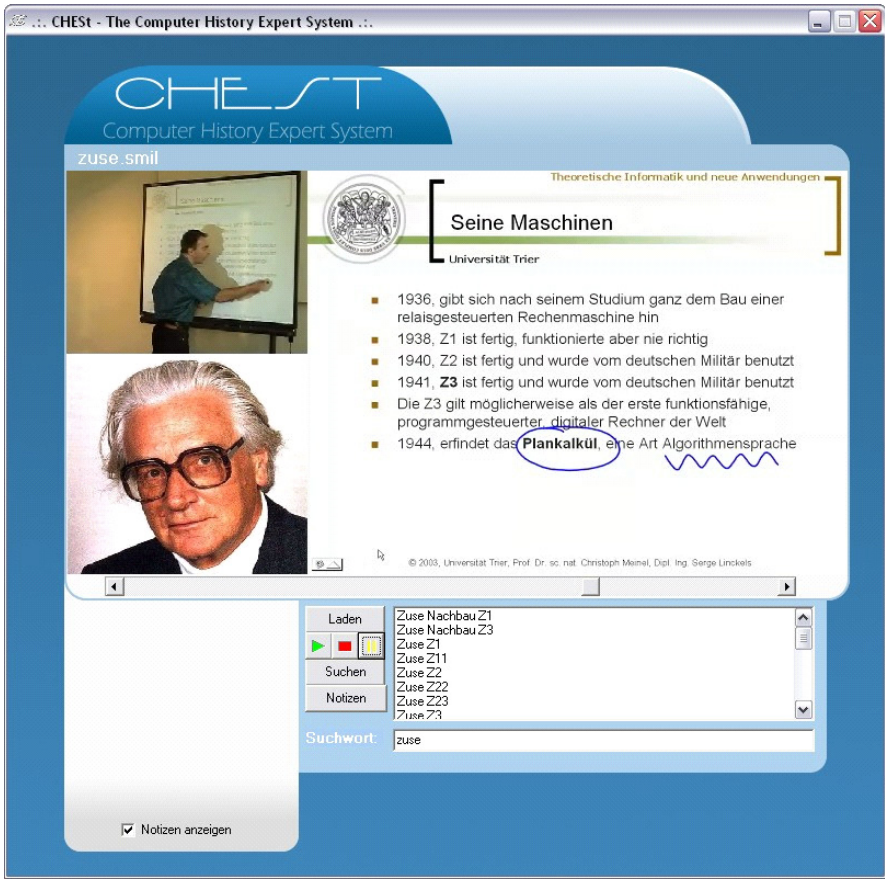

Figure 1. Screenshot of the prototype CHESt with a keyword semantic search on "zuse" with the question: "Who invented the Z3? The window shows a list of search results in the bottom right-hand corner (in the example, just one clip). Selecting a topic from this list will play the clip, like the one shown in this example, in which the teacher uses an interactive board. Added handwritten comments made by the teacher are integrated and applied in real time on the text (top right-hand window).

The Multimedia Interface

Today, kids are spoiled with all the wonderful and attractive interfaces of operating systems, applications, and games. New software without a graphical user interface in vogue is doomed to failure. That's exactly why students prefer Websites with colors, images, sound, and animations, rather than books as learning syllabuses. In fact, isn't it clearer and easier to read something that is illustrated with images, pictures, or drawings? Every person is different in his or her sense of perception. Some understand better if they hear the explanation by means of verbal communication, some need to write it down, others must see it in the form of text or a picture, and others again have to touch it. A good teaching tool must present the same information in different forms in order to activate as many senses as possible. The psychological foundations were proven by the work of Mayer, Gallini, and Sims (Mayer & Gallini, 1994; Mayer & Sims, 1994); information that is presented at the same time in different forms improves the understanding of the information.

The interface of our tool is basically organized in three windows (see Figure 2). The first window (video and audio) shows a teacher explaining something on the whiteboard. This is the student's common view in a classroom and should create a kind of virtual classroom atmosphere. Based on practical teaching experience we can confirm that students often take lessons where they

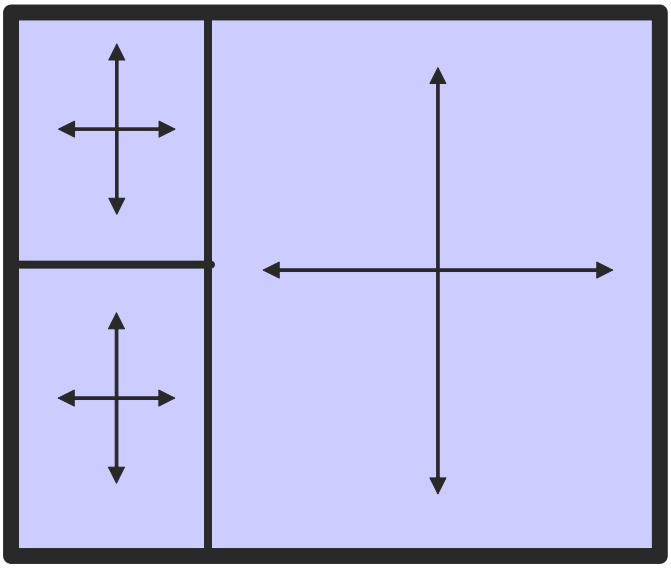

Figure 2. Schema of the CHESt user interface.

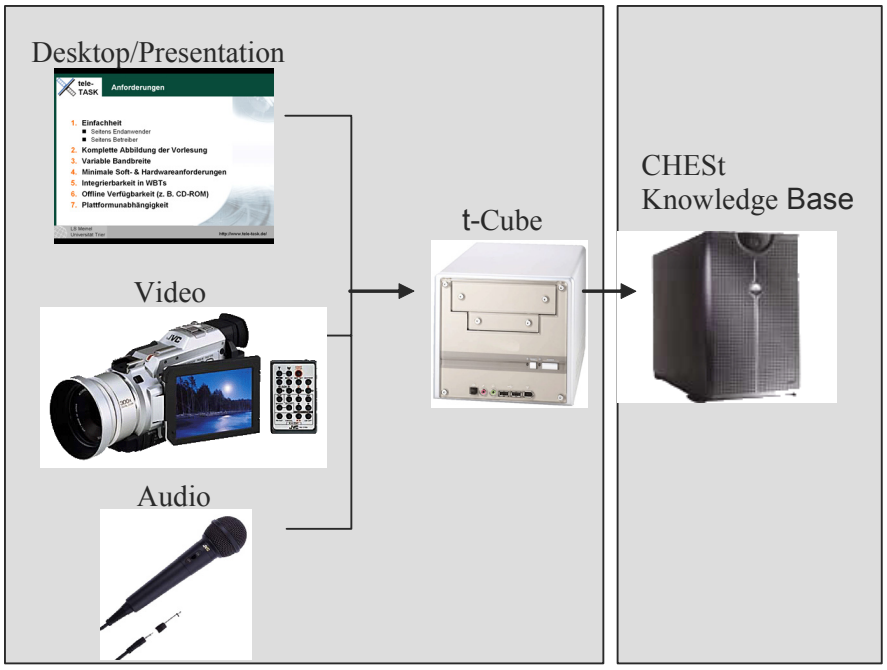

Figure 3. Tele-TASK architecture.

use a new computer tool or do research on the Web; for example, as a kind of game, without relation to the normal lessons. The video sequence should keep them concentrated on what they do and draw their attention to what the teacher is explaining.

The second window represents the usual blackboard. It is, in fact, a zoom on the whiteboard that the teacher uses in the video (first window). Although the blackboard is the most used medium in schools, it has many disadvantages, such as:

- It is impossible to represent pictures.
- It is difficult and time-consuming for the teacher to create a complex drawing.
- It is time-consuming for students to reproduce its content in their books.
- The content is not available for later lessons and must be reproduced.

The virtual blackboard in our tool has the following features:

- The teacher can use this area for an on-screen presentation (for example, PowerPoint).
- The teacher can add handwritten information to the smartboard, which is reproduced in this window both simultaneously and in exactly the same way.
- The teacher can also display the desktop of his or her connected laptop in order to explain a certain application, to show a Website, or to demonstrate the settings of the computer, and so on.

The third window can be used for any purpose. It can contain links to a photo gallery, hyperlinks to additional information on the Web, book references or just a single picture of the subject about which the teacher is speaking.

We used Tele-TASK (Chen et al., 2004; Ma et al., 2004; Meinel & Schillings, 2002; Meinel et al., 2003) to record the lessons in order to create one well-structured multimedia stream (see Figure 3). The result is a RealMedia file that can be played with any compatible software, such as the free RealOne Player (http://www.real.com/).

The Clip Approach

Essential in our concept is the length of the stored items in the

knowledge base; the duration of the video sequences. The younger the user, the shorter the time during which he or she will concentrate on the information displayed on the screen. Furthermore, we mentioned already in the introduction that it is not easy to find the appropriate information inside a large piece of data, such as an online lesson that lasts 90 minutes. Therefore, we divided all our multimedia data into small clips. The duration of each clip varies from several seconds to 3 to 4 minutes. Each clip documents one subject or a part of a subject. Together, all the clips of the knowledge base cover one large topic. In our prototype CHESt, we focused on one precise topic: computer history. We produced 300 clips about every important event in computer history. CHESt exists as standalone application (we managed to store the whole knowledge base with the application software on a single CD-ROM) and as online application. The latter uses a streaming server to transmit the clips to the user's browser.

Splitting a large topic like computer history into many small pieces is much easier than we assumed at the beginning. We are now convinced that most courses taught in schools or at universities can be divided into smaller atomic units in which each covers one precise subject. Teachers of different fields confirmed that this concept is not limited to computer science and that it could be used in their field too. For instance, in language courses, a teacher could record one clip per grammatical rule. Another concrete test was made in the field of biology, in which a teacher used our tool to explain the basic function of the heart. Further details would be explained in additional clips.

One more advantage of that clip approach is the simplicity of administration. If the tool does not cover a certain topic, a new clip can be recorded and added to the knowledge base. The intervention of a computer science expert is not necessary.

Finding the Right Clip

Having a large knowledge base with short multimedia clips is one thing; another thing is to find the right clip. The more clips you have, the better your knowledge base covers a certain topic, but the more difficult it is to find an appropriate clip. A first solution is of course to let the user browse through a table of contents in which all the clips are listed in categories, such as hardware/storage devices or people/still living, and so forth, and load the chosen clip. This possibility is offered in the standalone version of our tool, not in the online version for the moment. The main disadvantage is that there is no additional information about the content of the clip except for a short designation. Furthermore, this operation is time-consuming and not very effective, because the user has to search and maybe test different clips before finding the answer. An automated search would be better. At the moment, the prototype CHESt has only a keyword search. If the user enters "arpa," the system will list all clips about the ARPA and the ARPANET. The user then selects a clip from that list to be played. The main disadvantage is that the user must already give a part of the answer. For example, if you want to know who invented the first computer, you should enter keywords like "Zuse" or "Aiken." You cannot ask, "Who invented the computer?" Another problem is that, depending on the keyword, you will get a long list of possible results. Finally, even if a clip is about a certain topic, it must not necessarily be found from the keyword the user has entered; for example, the user enters "disk," but the matching keyword would be "floppy."

The most efficient search mechanism is to allow the user to enter a complete question. The tool should *understand* that question and give a small list of pertinent clips as answer or, even better, just one clip. Technical details about our semantic search engine are described in the next sections. This solution is also pedagogically welcomed because, in schools, students are forced to express themselves in complete sentences and not just with keywords. Most important is the fact that the interaction between the student and the tool takes place in a very human and simple way. An imaginable improvement would be a verbal communication in which the user could speak his question into a microphone.

Example of an All-day Application of CHESt

With the features described bellow, we could imagine that the student who is working with CHESt has his or her own virtual teacher. These teacher's answers are short and presented in an interesting multimedia form. The student can communicate with him or her in a very simple and human way by typing his question, or in a later improved version by means of verbal communication. Although CHESt will not replace every conventional lesson, we see it as a complement useful for certain occasions. It's up to the *real* teacher to decide for which lessons it is appropriate, such as:

- To introduce a new subject by letting the students discover new information for themselves.
- To use CHESt as a complement to find illustrations for a certain topic (for examples pictures of

old computers or computer pioneers).

The students could work in groups or alone. In fact, they create their own course content: the clips they consult. Depending on the kind of work, they can print a certain scene of a clip, copy snapshots into a text document or simply take notes. The teacher is sure that the information they get is correct and secure. Here a concrete scenario: "Hi students. Today we are working on computer history. Here is a list of interesting questions. You have 40 minutes to search for information before we discuss your answers together. Of course, use CHESt!"

- Who invented the computer? When?
- What is the Colossus?
- What is a transistor useful for?
- Explain the word FTP.
- Who sent the first e-mail?
- What was the size of the first hard disk?
- Who invented UNIX?

Describing the Meaning of the Clips

In the previous sections we described our prototype CHESt from a pedagogical view. The search of a certain clip, not by keywords, but by a freely formulated question, is one of the main necessary improvements. However, before the tool can even try to understand the user's question, it has to *know* what data are stored in the knowledge base. In other words, every clip must be described in a machine-readable form. Therefore, we have to add data to each clip to describe its meaning. Those kinds of data are called metadata. For this purpose we use the Resource Description Framework (RDF), introduced by the W3C in 1998 to build the Semantic Web (http://www.w3.org/RDF/). In principle, this is done once, at the moment when the clip is added to the knowledge base. However, the computer can assume a part of this task. The different steps are described below.

The CHESt RDF Vocabulary

With our concept of using short clips, we have the great advantage that we can describe the meaning of one clip with few metadata. We divided the CHESt knowledge base logically into two classes: clips that describe inventions (things) and clips that describe inventors (persons). Assertion: an invention was invented by one or more inventors. An invention and an inventor can be a resource (in our case: a clip) or a value (just textual information). Every resource is described with properties. An inventor has three properties (predicates): name (vCard:FN), year of birth (chest:year_birth) and year of death (chest:year_death); if still alive, this property is left blank. As can be seen, we used the W3C recommendation vCard namespace property "full name" (FN) (http://www.w3.org/TR/2001/NOTE-vcard-rdf-20010222/). The class invention is divided into a number of subclasses to better organize the different resources (see Figure 4). We used the "Dublin Core" (dc) namespace (http://dublincore.org) to describe an invention with the following properties (predicates): its description (dc:title), its date of first appearance (dc:date) and its creator (dc:creator). The complete CHESt RDF schema can be found at http://www.linckels.lu/chest/elements/1.1/. With these few elements we can semantically describe every clip.

Generating the CHESt Dictionary

The next step is to search inside every clip for metadata. For example, the clip that describes the calcu-

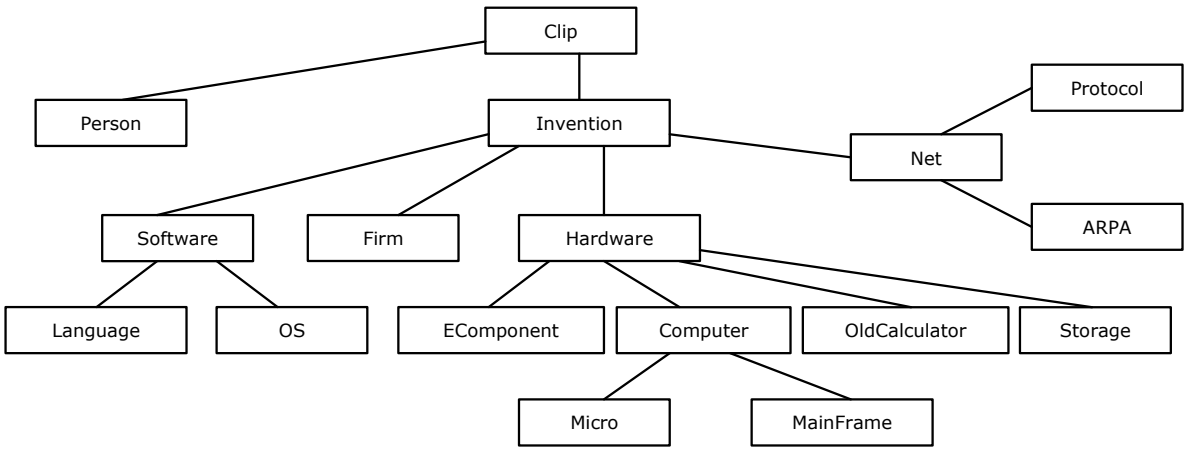

Figure 4. Class hierarchy of the CHESt RDF classes.

lator "ENIAC" should be scanned to find its description, the year it was first taken into service, and the name(s) of its creator(s). We tried to apply an approved approach in the field of computational linguistics: create a dictionary of synonyms for every CHESt RDF element (Carstensen et al., 2001; Manning & Schütze, 2003); in one column one will find the RDF elements and in the other column there is a list of natural language synonyms. For example, if we are scanning for dc:creator, we are searching for words like creator, builder, constructor, inventor, and so forth. For our prototype, we decided to consider only the textual data from the PowerPoint presentations and to ignore the teacher's audio information and his handwritten notes for example. With a special tool (Linckels, 2003) we are able to convert the PowerPoint documents into pure text files. Then the *stemming process* can begin. All nonwords (words that contain digits or special characters) and words with just one letter were eliminated from the generated text files because they have no semantic influence. All words are converted into lowercase and special characters are replaced by a space. Finally, a list of 20,640 remaining words was created from all 300 clips in the knowledge base. All were represented in a tree, in which every node represents one letter. The tree is built in less than a second. The words are read vertically from the top (root) down along the branches. This technique also eliminates all double words. Each node contains the number of words that end with that particular letter. There are 4,215 remaining unique words with an average length of 8.049 letters per word.

The dictionary of synonyms is built from that tree. The idea is to regroup words with similar spelling and thus with the same meaning (for example: build, built, builds). It is impossible to detect automatically all synonyms, because there are words that have a similar spelling, but not the same meaning (for example: consult, consume). The aim of the stemming process is to limit human intervention by proposing clusters of generated synonyms.

Why didn't we use an existing dictionary of synonyms, for example WordNet (http://www.cogsci. princeton.edu/~wn/)? For two reasons: first, by choosing an existing dictionary, CHESt would immediately be set to a certain language (English, German, French, etc.). Our solution is language independent, because it builds its dictionary from an existing content. Second, even if we still have 4,215 unique words to scan for synonyms and RDF elements, it is still much less than a complete dictionary with at least 200 times more words. Note, also, that the words listed in our dictionary are words that are used at least one time.

Generating the RDF Description

The final step consists of scanning through the clips (as text files) and searching for synonyms for the RDF elements (see previous section). In our case, 273 of the 300 clips were described automatically and without human interaction. In some clips, different concurrent synonyms were found. The most frequent example is the RDF synonym for dc:date, which represents the date of first public appearance of an invention. For different inventions, there was a date of planning, a date of starting the construction, and a date of launch. To solve this ambiguous problem, we programmed our tool so that, in case of concurrence, it chooses the second occurrence and protocols the problem in a log file. The final result is an RDF/XML serialization for each clip (see Figure 5). We used Jena (http://www.hpl. hp.com/semweb/) to generate the RDF serialization. Jena allows storage of the RDF metadata in a simple XML file, but it also supports several RDMS (for example, MySQL or Postgre-SQL).

```
<?xml version="1.0"?>
<rdf:RDF
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:dc="http://www.w3.org/2001/vcard-rdf/3.0#"
  xmlns:chest="http://www.linckels.lu/chest/elements/1.0/">
  <chest:Person rdf:about="http://sigma957.lte.lu:8080/ramgen/Archive/Zuse.rm">
    <vCard:FN>Konrad Zuse</vCard:FN>
    <chest:year_birth>1910</chest:year_birth>
    <chest:year_death>1995</chest:year_death>
  </chest:Person>
</rdf:RDF>
```

Figure 5. Example of a semantic description of a clip using RDF/XML and streaming access to the multimedia files. The clip is about the person "Konrad Zuse."

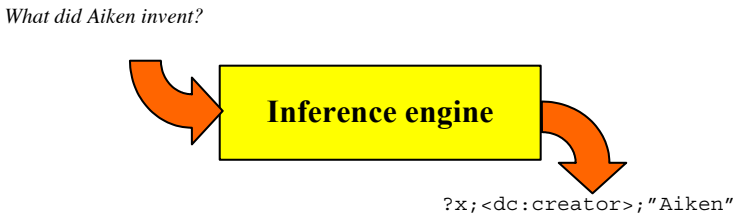

Figure 6. Principle of the inference engine that transforms a non-formula question into a well-formulated RDF query.

Understanding the User

The number of results (in CHESt a matching result is a clip) will be shorter and more pertinent with a semantic search than with a normal keyword search. Furthermore, the user must not enter a part of the answer in its question; for example, "Who invented the first computer" doesn't contain the name of the inventor. In fact, the name of the inventor is the information to find.

We now dispose of a well-formulated and semantically described knowledge base in RDF. To perform a semantic search, the question entered by the user must be transformed into RDF too, in order to have the same structure for the question and for the database (see Figure 6). The backbone of our semantic search is an inference engine which transforms a normal sentence (the user's question) into a well-formulated RDF query. We used RDQL (Miller, Seaborne, & Reggiori, 2002) to access our RDF knowledge base. Further details of this process are described in Linckels and Meinel (2005). For example: "What did Aiken invent?" should become:

```
select ?x WHERE (?x;<dc:creator>;"Aiken").
```

As described in the previous section, all the words in the dictionary are basically regrouped in two categories: words that are of semantic use (which are associated with an RDF element) and words without semantic use (which are not associated with an RDF element). It is clear that this dictionary can only be used in a precise context, which is computer history in our case. The user's question is also put in that same context for parsing; for example, if the users ask "Who invented penicillin?" the tool cannot give an answer because the question is outside the tool's context. Starting with these constraints, the transformation of a common formulated sentence into RDF can be resumed by saying that the system has to replace all semantically important words by the RDF corresponding elements and to throw unimportant words away. Of course, the shorter the questions, the better the results.

Since all RDF elements in the CHESt schema are defined either as {subject, object} or as {predicate} (see previous section), there is no doubt about the membership of the recognized RDF elements. Except chest:Person and chest:Invention (or one of its subclasses), all RDF elements are predicates. As we are dealing with questions, there should always be a missing part, normally the subject or the object. Remember the basic assertion: "An invention was invented by an inventor." Generally, members of the class chest:Person are objects, members of the class chest:Invention are subjects.

Conclusion and Outlook

Our primary aim is to create a tool or even a new method of teaching. The teacher is in the background and the student plays the role of an explorer. Therefore, it motivates the student because he or she can create his or her own course content. The information is presented in an interesting multimedia form. The system understands the questions of the user and gives efficient answers: there are no long searches for answers, but the requested answers are rendered in a concise form. Of course, a motivated student is a good student, and good students normally achieve better results. Thus, this tool is supposed to improve education.

The prototype CHESt covers the field of computer history, but by generalizing the knowledge base, it can be used in nearly every course in any school, college, or university. Its advantages are that it promotes independent learning. By adding clips from other fields (such as biology, electronics, etc.), CHESt could become more than just an expert system on computer history. Ideas are to use external and existing resources of information, rather than to record new clips for each subject. Another idea is to test how a RDF vocabulary can be associated automatically with an existing dictionary.

CHESt was tested at the Lycée Technique d'Esch/Alzette, a technical school in Luxembourg, at the beginning of 2005. Complete test results were published in Linckels and Meinel (in press). These experiments confirmed that CHESt is an effective e-learning tool that can be used as a complement to traditional courses. The presentation of knowl-

edge in the form of short multimedia clips, and the fast respond time were strongly appreciated by the students. However, we learned that our search engine must be improved in several ways. Current research aims to use linguistic preprocessing of the user's question in order to extract more semantic information. We also understood that it is not an easy task to use search engines as a didactical tool in schools. Users need training and domain knowledge before they are able to successfully use search engines for that topic. Finally, it seems that specific search engines must be developed for specific purposes: usage in school, specific domains, specific user groups, etc.

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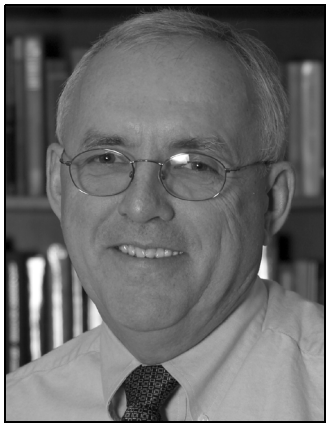
Online Course Development Made Easy—at Least Easier

David C. Pedersen

Faculty members accustomed to conducting face-to-face classes are often overwhelmed at the prospect of migrating those classes to a Web environment. Employing a systematic approach helps novice and experienced instructors create effective online courses efficiently. R2D5 is a systematic development approach that was proven effective in a prototype environment and is being used successfully in the real world by instructors to design and develop online courses.



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The Online Course Challenge

Face-to-face classroom instruction is a performance. There is usually a script or game plan, but the *action* relies on the give-and-take interaction between participants. Since the Web limits the timeliness and richness of discourse between participants, instruction on the Web changes from a performance to a product. In essence, instructors become developers of a product delivered via the computer, and learners become users of that product. This performance-to-product shift requires a significant change in approach to planning and developing courses, one that is foreign to those inexperienced in the process.

The Birth of R2D5

The R2D5 model was fashioned as a planning and development guide for a variety of online courses created in a prototype project to study issues related to online course development. Recognition of the performance-to-product shift suggested the need for a systematic approach based on other systematic processes such as the product development cycle, computer programming, rapid prototyping, and various instructional design models.

An Overview of R2D5

The R2D5 online course development process consists of five phases. Each phase requires explicit inputs, incorporates specific processes, and produces well-defined deliverables as outputs. At the conclusion of each phase, the deliverables from that phase are reviewed and revised before the next phase is begun. The review process for each phase and the participants who perform it are clearly defined by the model to produce optimum results. Using a systematic process increases efficiency and enhances quality while ensuring a focus on learner use of the end product.

The goal of the first phase (Dream) is to conceptualize the completed online course (see Figure 1). The Dream phase begins with a desire (or dictate) to develop a particular course or course components for the Web. The process consists of researching and reviewing potential approaches that might be incorporated into the finished course by looking at existing courses, talking to experienced practitioners, and reviewing the literature. The deliverable for the Dream phase is a

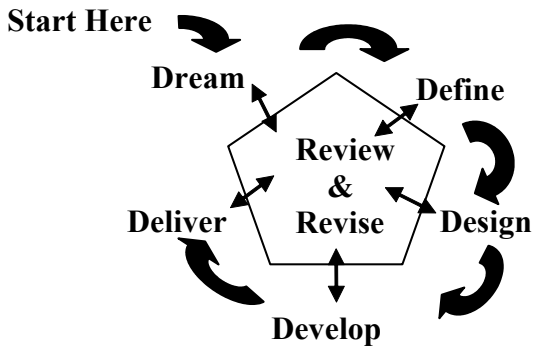


Figure 1.

course description containing a contemplated—but not crystallized—conceptualization of what the course site for the course might look like and what it might include. A team that includes subject matter experts, instructional designers, and Web developers with experience developing online courses conducts the review process for the Dream phase. The reviewers focus on both the requirements needed to produce the course as conceptualized and the feasibility of the various proposed approaches and components.

The Define phase focuses on specifics for the course. The process includes a content analysis, an audience analysis, a technology analysis, creating objectives, and an assessment plan. In addition to those items, the deliverables include a list of components that will be in the course and an organizational structure for the course. Once again, a team of experienced subject matter experts, instructional designers, and Web developers conduct the review. The subject matter expert(s) focus on the content while the instructional designers and Web developers continue to assess feasibility and requirement issues. From the product development perspective, attention is also given to the inclusion of elements that support learner use in an isolated environment.

The course begins to take shape in the Design phase. Using the specifics from the Define phase, various design architectures are created. Design architectures are sketches, storyboards, outlines, lists, diagrams, etc., used to plan and develop items for the course. The design process and deliverables differ according to the type of component to be developed. The review team is expanded to include target participants and the process focuses on the instructional effectiveness of the planned components.

Components are created and posted to the online course in the Develop phase. Using the architectures from the Design phase, existing materials are revised and new materials are created. The Develop phase deliverable is a completed online course that is reviewed by the team. Feedback from target participants is especially important at this phase.

The final phase is Delivery of the course. During this phase, the instructor manages the online course, monitors student participation, and collects course effectiveness data that are reviewed to determine revisions for future implementations of the course.

In addition to guiding novices through the course development process, R2D5 provides a structure for project management. The sequential list of tasks to be completed can be incorporated into a timeline. Responsibilities are clearly established, and the deliverables provide milestones for measuring progress.

More information about the R2D5 course development model can be found at http://edtech.erau.edu/activities/mentoring/r2d5.htm

Applying R2D5

In the prototype project, R2D5 was used to produce courses with significant amounts of multimedia and other highly engaging content and activities, as well as courses with minimal Web components. One prototype course was a highly interactive self-directed basic weather tutorial developed by a virtual team. Another course used the Web to facilitate learning activities designed around an existing textbook, collaboration, and supplemental Websites. More information about the Online Course Development Prototype Project can be found at http://edtech.erau.edu/activities/prototypes/

The R2D5 process has also been used in a mentoring program for instructors with no experience developing online course components. The model provided guidance for them as they worked through the development process for their first online course. More information about the eMentoring Project can be found at http://edtech.erau.edu/activities/mentoring/

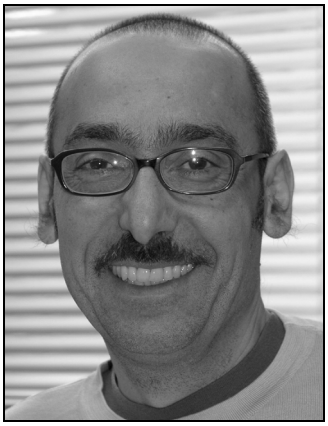
The R2D5 course development process has proven to be an effective tool for creating online courses efficiently. While it is particularly helpful to novices developing a totally online course, it is also useful for producing Web and non-Web components for a face-to-face course. Those facing the daunting task of creating online courses, or supporting those who do, will find the R2D5 course development model helpful.

Theories of Distance Education Meet Theories of Mediated (Mass) Communication

Saeid Roushanzamir

Introduction

Distance learning for higher education has its advocates (Pittinsky, 2003) and its detractors (Noble, 2003). Researchers, drawing primarily on psychological and educational research literatures, make impassioned arguments for and against institutionalizing distance learning. Undoubtedly, with increasingly rapid technological developments including hand-held, network, and personal hardware capable of processing huge amounts of data, and advances in creating virtual classrooms, the allure of delivering quality education cheaply and widely has attracted attention of educators, policymakers, corporate boards, and end-users.



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However, the implications of the models and theories of mediated communication that should inform the debate regarding distance education seem to have attracted little attention. This article describes the two dominant models of mediated (and mass) communication: an information theory/source-receiver model and a cultural, structuralist model. The mainstream conversation in education disciplines about distance learning presupposes an information theory/source-receiver model of communication. I discuss the origins and parameters of information theory/source-receiver communication models and describe how mainstream distance education theories presuppose this model. Next, I examine structural and cultural models of communication and suggest the role those models may play in developing efficacious ways in which to evaluate whether and when distance learning can best be implemented. My major thesis is that distance education scholarship must clarify its theoretical underpinnings if research findings are to be of use in making decisions of any sort about distance learning.

Theories of Mediated/ Mass Communication

In the post-World War II period, the dominant models offered by U.S. mass media researchers extended the linear effects model as proposed by early twentieth century researchers. The post-World War I generation of American scholars comprised a cohort that had fled the dire conditions in inter-war Europe. They were keenly aware that mass communication could be used to appeal to and to organize recently urbanized proletariat. Post-World War II researchers, living in a time of relative prosperity, argued that media effects would be tempered by variables that earlier scholars, in their reaction to fascism's mastery of mass communication, had neglected. Once scholars built in feedback loops or focused on audience choice, the huge direct effects model was challenged.

Be that as it may, common among most effects researchers remained the notion that mass communication is exemplified by a formula: a source produces messages that are in turn interpreted by audience members. Communication in

this formulation is "a process in which a source encodes and then transmits a message along a channel. This is received and decoded at its destination upon which it produces an effect." (O'Sullivan, Hartely, Saunders, Montgomery, & Fiske, 1994, p. 51). Among the assumptions of this model is that the channel (one site at which researchers can examine the process) will more or less efficiently transmit/transfer a message (content, another area for researchers to explore) that can be clearly and cleanly decoded by an audience (a third area of focus).

As effects researchers increasingly studied mass communication from the audience site, there seemed to be fewer effects that could be attributed to mass communication. Audiences were only idiosyncratically attentive to the intended meanings of messages (content) and sometimes highly erratic in terms of their attention to the media (producers) altogether. For example, the "uses and gratifications" approach to audience research asserts that the audience member's attentiveness is strictly "motivated and directed toward the gratification of certain individually experienced needs" (O'Sullivan et al., 1994, p. 325). What kinds of gratification can distance learning create for its communities? This question points to a research agenda with potential relevance for the field of distance education; however, it would require knowledge of mass communication research literature.

Concomitant with postwar peace was the emergence of new nations from the ruins of European empires. International mass communication scholars adapted general theories of mass communication to suggest that mass media could play a significant role in the modernization and development of nations around the world: on the African continent, in Asia, and elsewhere.

When the United Nations proclaimed the 1960s the decade of development, two eminent researchers, Daniel Lerner and Wilbur Schramm, had independently associated increased exposure to mass media with accelerated rates of development in traditional societies. Schramm endorsed Lerner's assertion that exposure to new communication technologies is highly correlated with a decline in fatalism and reliance on traditional authority and a concomitant rise of economic development indicators and political participation leading to development and democracy. Schramm went even further, suggesting that "the task of the mass media of information and the new media of education is to speed the long, slow social transformation required for … development" (Thussu, 2002, p. 57).

Following the lead of Lerner and Schramm, mass communication scholar Everett Rogers highlighted the role of mediated communication in his work on the *Diffusion of Innovations* (Rogers, 1995). He advanced a top-down model of communication in which innovations in education as well as other social practices, such as agricultural and governmental arrangements, are dependent on rising levels of media penetration and the identification of indigenous elites (innovators) to lead the economic, political, and social changes that are part and parcel of national development. Each of these researchers (Schramm, Lerner, and Rogers) thought of new media as neutral objects through which messages passed from producers to audiences. They adapted the more general theories of mass communication that highlighted the impact or effects of media on an individual's attitudes and behaviors to conduct research and recommend policies for developing countries. Their policy recommendations were based most often on the findings of surveys conducted by "various US-government-funded agencies and educational foundations" (in particular, the data collected in Asia and Latin America) (Thussu, 2002, p. 57). As development policies were interpreted and implemented around the world, the shortcomings as well as the implicitly Western bias of those policies were noted. But, in any case, the Schramm-Lerner-Rogers scholarship implicitly and explicitly identified mass media as tools for education.

Reaction to U.S.-led development policies turned into doubts about the efficacy of following a Western (European and American) template of development. Criticism of the information theory or the effects model of mass communication was spearheaded by Third World intellectuals such as Paulo Freire. Third World scholars were able to observe and experience the pragmatic impact of the applications of dominant mass communication theories on development programs—including educational ones. Freire's *Pedagogy of the Oppressed* (2000) proved highly influential, not only among Third World researchers but also worldwide. However despite the criticisms, mass communication media as tools for development and education were not simply rejected, nor were they seen a priori as tools of cultural imperialism. New theoretical approaches were proposed.

By the 1980s, an alternative paradigm had emerged in the field of mass media studies. Highlighting the differences of mass media as a form of production (i.e., different in kind from, for example, the production of cars) and recognizing ideology as itself a product (i.e., produced and reproduced), the new paradigm constituted a major break with traditional mass commu-

nication research. The structural ways in which race, class, gender, and nationality (among other variables) are inscribed as power relations were returned to the analytical tool kit of researchers. Concepts that held sway in mainstream research were questioned (for example, the notion that traditional and modern are bipolar opposites) or undermined (for example, denoting a nation as developing or developed), and other concepts were introduced (for example, using the concepts of center and periphery). No longer could technology and infrastructure be regarded as neutral; to the contrary, they were understood as the products of a specific historical moment inscribed with its politics, economics, and social and cultural specificities.

American mass media and communication scholarship is still dominated by the source-receiver model. The research focuses on the functionality of communication, assumptions which elide the problematics of who defines functionality; it tends to overemphasize consensus and veers away from accounts of conflict and change. And yet, especially among American media researchers concerned with global issues, and among European, U.K., and Latin American scholars, structural and cultural approaches provide relevant alternatives. One example of this different approach is the work of American cultural studies, which exemplifies the constructivist paradigm and which also highlights consensus-building through communication ritual (as opposed to the source-message-receiver model).

Research using structuralist/poststructuralist analysis focuses primarily on how social divisions are made meaningful and in particular on the hegemonic role of mass media and communication. It recognizes that the key organizing concepts such as class, race, and gender are historical realities and as such are always integral to research. Mass media technologies and infrastructures are interrogated rather than taken for granted. "The aim was to understand how culture (the social production of sense and consciousness) should be specified in itself and in relation to economics (production) and politics (social relations)" (O'Sullivan et al., 1994, p. 72). Furthermore, this model highlights the institutional and industrial conditions of ownership and production.

As the insistence on historically-specific media research that embraces the role of ideology suggests, cultural and structural media/mass communication research is overtly concerned with social justice and is purposefully engaged with social transformation. The concerns, the politics of the research, stand in contrast to the social scientific voice as removed, impartial, and objective. The perspective of cultural studies researchers overtly originates within the researched. That the scholars may then propose a radical transformation of current media practice, suggesting this alternative would be the site of a twenty-first century pubic sphere (i.e., "open and accessible to all … [and therefore] … a key component of modern, participatory, democratic life") is as much to say that an emerging social model must be tied to any progressive human endeavor, including distance learning (O'Sullivan et al., 1994, p. 251).

Distance Learning: Definitions and Models

In 1986, Desmond Keegan categorized theories of distance learning into three areas: theories of autonomy and independence (major contributors Charles Wedemeyer and Michael G. Moore), theory of industrialization (dominated by the work of Otto Peters), and theories of interaction and communication (major contributors Börje Holmberg and John Bääth). Garrison and Shale's model of distance education also seems to fit into category I of Keegan's chart, since their model is "focus[ed] on the functional basis of education first by placing the teaching and learning transaction at the core of distance education practice" (Garrison & Archer, 2000, p. 9). Keegan's categories do not delineate a linear progression in the advancement of theories of distance learning. Categories are grouped according to their main concepts. For example, Wedemeyer's work was developed during the 1960s and 1970s, and Moore's in the late 1970s and 1980s. However, in both cases, the emphasis is on learner independence and they are grouped together. Thus, it is quite possible to chart an intellectual narrative of definitions and models of distance learning and to infer theory or theories.

Keegan (1980) identified six dimensions of distance learning: separation between teacher and student; influence of an educational organization; use of media to connect teacher and student; two-way exchange of education; students perceived as individuals, not as groups; education as a form of industrialization (Gunawardena & McIsaac, 2004). Over the past 25 years some of those categories may seem obsolete. For example, the concept of students perceived as individuals (rather than as group) may no longer be relevant for distinguishing distance from face-to-face education. It can be argued that group work is easily accommodated into the most current technologies. "[T]he quasi-permanent absence of learning groups … need no longer apply. Groups of learners can cooperate although being geographically separated" (Holmberg, 2003, p. 80).

However, caution is advised in too quickly adapting theory to current technological developments or, for that matter, current pedagogical practice. Keegan's categories may still be suggestive as in the example of individual versus group orientation; the individuals and/or groups may be placed differently in space and/or time.

These six dimensions emerged from the period in which distance learning was closely and postively linked with issues of economic, political, and national development, especially by American teachers and scholars. However, by the latter 1970s, enthusiasms were replaced first by doubt and then sometimes by despair, as it became clear that even in highly developed countries such as the United States, Great Britain, and in other European countries, access to higher education was skewed away from rural areas and disadvantaged or marginalized populations, whether rural or urban. In the so-called Third World or developing countries, the term *peripheral* came to express access to education as well as participation in the global economy. Also, it was increasingly recognized that development was not always a national-level variable. Access to higher education through distance learning might penetrate to urbanized areas, where it was accessed primarily by developing nations' elites.

During the 1980s, and with the concomitant rapid expansion of communication technologies into everyday life, the appeal of distance learning received a new lease on life. It came to be seen not as simply a tool for reaching underdeveloped areas and peoples, but as part of the mainstream in higher education and in the corporate environment. For example, Charles Wedemeyer, as a leading proponent of distance learning, emphasized the individual freedoms that, he believed, distance learning confers. He advanced the argument that distance learning and newer technologies confer equal access, personal independence, and autonomy. Similarly, Wedemeyer's model proposes that a democracy of education for all people regardless of their gender, age, nationality, class, and place is the logical outcome of distance learning (Moore, 1991). Wedemeyer's approach assumes that teaching and learning are the prime movers of distance education; thus, he focuses on the pedagogical possibilities. However, Wedemeyer seems to ignore important structural components such as power and political economy.

Michael Moore rethinks the concept of distance, arguing that distance should be theorized as a multidimensional concept. He suggests that among these dimensions and, contrary to previous work, geographical distance is not the most important. Using the term "transactional distance," he proposes two major concepts within his theory of learning: structure and dialog. Moore defined structure as "a measure of an educational program's responsiveness to learners' individual needs" (Moore, as cited in Faust, 2004, Background section, para. 2). He defined dialog as "the extent to which, in any educational program, learner and educator are able to respond to each other" (Moore, as cited in Faust, 2004, Background section, para. 2). Put another way, structure refers to the design of the instructional program, while dialog refers to interaction through communication of the learner and the educator. In sum, Moore shifted the debate concerning distance learning by pushing it into the arena of pedagogical differences.

For Garrison and Shale, educational issues are the fundamental issues in the theory of distance education, regardless of separation of teacher and students. They attempt "to focus on the functional basis of education first by placing teaching and learning transaction at the core of distance education practice" (Garrison, 2000, p. 9). Garrison added the concept of "responsibility and control" into the theory of transactional learning. Control and responsibility give students a chance to shape their own educational outcome. "As students' knowledge and abilities develop, they can assume increased responsibility and control. Responsibility and control together will encourage students to assume ownership of their learning and education" (Garrison & Archer, 2000, p. 14)

In their most recent efforts, Garrison, Anderson, and Archer (2003) cite the differences of distance learning from face-to-face education by noting what they refer to as its new and powerful feature: the ability to "conduct collaborative learning regardless of time and place" (p. 113). This allows for a true "creat[ion of] a community of inquiry" based on three essential elements: "social presence, cognitive presence, and teaching presence" (p. 115). This "community of inquiry model," should, according to these authors, help provide the much-needed theoretical/research guidelines or parameters for the applications and practice of distance learning. As they noted, "The problem of the field of distance education is that we do not have the theoretical models and research to guide its practical application and fully imagine its potential and impact" (p. 124).

Exemplifying the category "theory of industrialization" is the work of Otto Peters (1983). Peters advanced a typology of difference, arguing that "distance education is quite distinct from traditional face-to-face education, and that it is different because it results from the 'industrialization' of teaching and learning" (Connell, 1998). For

Peters, the "objectification of the teaching process" is a result of the industrialization of distance learning. Distance education has shifted away from interpersonal communication, which is at the heart of the face-to-face education, to the "objectified, rationalized and technologically produced interaction" (Connell, 1998). Peters, drawing on Jurgen Habermas' (1971) conceptual differentiations between types of communication (i.e., "symbolically mediated interactions" [=traditional teaching] and "rational acting" [=distance learning]), proposed that distance learning generates human interactions that, in common with other industrial forms, are "objectivized, rationalized and technologically" functional (Connell, 1998).

Peters' work points to a general characteristic of the new form of teaching and learning, and it illuminates structural peculiarities and distinctions, and thus separates it sharply from all conventional forms of face-to-face instruction (Keegan, 1994). Traditional teaching, relying on face-to-face communication, generates relational communication. Peters' typology demonstrates that these two approaches differ at every level from the most fundamental assumptions about the roles of education and teaching and the impact of mediated and interpersonal communication, to the standards by which success can be measured. In particular, he highlights how communication is central to any consideration or comparison of educational approaches. Therefore, theories of communication are recognized as of primary relevance to theories and practices of education.

Peters (2003) emphasizes the importance of new information and communication media that brought digitalization into our daily lives and educational institutions. He asserts that there are historically distinct phases of distance education, and each phase has a unique form of teaching and learning behavior. The first generation of distance learning used the book as its main medium (over 100 years). The second generation, beginning in about 1970, retained the textbook and added the use of radio and television. The third (and current) generation is dominated by digitalization. It is characterized by the integration of multimedia technologies and the personal computer (PC). "The PC serves at the same time as a carrier, distribution, display, instruction, and interactive medium. In addition, it provides pedagogically useful services that traditional media are completely unable to do" (p. 88). The new media powerfully combine networks, and use servers, search engines, and expert systems. "This configuration integrates the new media, allowing the digital learning environment not only to determine the structure of the learning process but to reconstitute it" (p. 89).

The next category of distance education theories in Keegan's typology is theories of interaction and communication, of which Holmberg's research is an exemplification. The heart of Holmberg's distance theory is the concept of "Guided didactic conversation," which, he argues, is a "pervasive characteristic of distance education" (Garrison, 2000, p. 8).

"Guided didactic conversation … refer[s] to both real and simulated conversations, although the reliance is upon simulated conversation. As such the emphasis is very much on the content and conversational character of written pre-produced course package" (Garrison, 2000, p. 7). Holmberg himself came to regret his adoption of the term "guided didactic conversation"; he felt it was misunderstood, perceived as referring to a totalitarian approach to distance education. As Holmberg noted:

> Further, I used a somewhat unfortunate terminology. I referred to the conversational character of distance education as *didactic*, an adjective in many cases taken to indicate an authoritarian approach (the opposite of what was meant). Instead of *guided didactic conversation*, I now prefer the term *teaching-learning conversion*. (Holmberg, 2003, p. 79)

In any case, Holmberg's theory is an attempt to introduce and link the notions that teaching and communication are equally vital areas of concern when conducting research about the efficacy of distance education. However, despite Holmberg's revisions to his original formulation, his work has not yet been embraced by the field. For example, this comment is not atypical: "[W]hile Holmberg makes a great effort to place teaching at the core of his theory, his own structural assumptions and the central role of self-study learning packages limit teaching to one-way communication" (Garrison, 2000, p. 8).

Discussion and Conclusions

Every serious educator is aware of the importance of theory in teaching, learning, and research. Theory teaches us what we know. Theory also tells us what we do not know and guides us in our research. Theory points to where/how research can further advance a discipline, a professional practice, and public policy. As Moore (1991) noted, "research that is not grounded in theory is wasteful" (p. 2). Additionally, teaching (practicing) that is not grounded in theory is also wasteful. Practicing a theory can be a conscious and/or unconscious behavior. This article questions whether

staying within the boundaries of distance learning theory in teaching, learning, and research is sufficient to understand this aspect of educational practice. My contention is that attempting to explicate a theory of distance education without including theories of meditated communications is futile.

It is vital to realize that communication is an integral part of distance education. It follows that mass communication theories are as relevant as theories of education to understanding distance education. This project delineates two models of communication. One developed from information theory, the other from structuralism generally and critical cultural studies specifically. Education researchers, sometimes unknowingly, rely on models of communication that highlight processes and overvalue efficiency. Of the research outlined, only Peters' work seems to consider structural and critical cultural variables.

An important conclusion of my argument is that a structural and critical cultural theory of communication is a better alternative because it allows insights into communication as a process of negotiation and exchange of meanings that occur within the external economic and social formation (the context and lived experiences within which learning occurs). This model insists that agency cannot be limited to the source, message, and receiver, and that communication must be understood as the process of making meaning within structures of power and ideology. Once adopted, this model will in turn allow researchers to ask better questions that focus attention on what Peters calls the advantages of traditional teaching: emancipation and extension of dominance-free communication rather than simply an increase of the effectiveness of teaching system and geographical reach.

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"It follows that mass communication theories are as relevant as theories of education to understanding distance education."

—Saeid Roushanzamir

Flying Solo
Instructional Designer Finds Her Niche Online

Shirley Walrod

Ten years ago, as a graduate student in curriculum and instructional technology, I never dreamed I'd be teaching more online courses than face-to-face (f2f) courses this spring semester 2005. In fact, my first experience as an online instructor was only last semester. As an instructional designer at a medical university for 6 years, I helped many instructors add an online component to their courses or develop an online course from a f2f course. I even taught a module or two in a couple of those courses; however, the fall semester of 2004 was my first solo flight. I can only describe the experience as finally being allowed to fly the plane after teaching instrumentation for 6 years!

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As an adjunct instructor with a background in writing and teaching composition and a PhD in instructional technology, I took on an unusual mix of courses on my first flight. While teaching technical writing, business communications, and English composition f2f, I initiated my online career teaching another English composition course. A few weeks into the fall, I facilitated a Nova Southeastern University online graduate course, Applications of Distance Education Technology. These two classes were the North and South Poles of my online life, as most of the composition students were first-year community college students (two were dual-enrolled in high school and college), and the NSU distance education students were all in their dissertation stage.

What the two groups of students had in common were the number of adult students and WebCT. That's it. The NSU graduate students were seasoned distance learners and, because they had started together in a cluster, they all knew each other and had bonded long before I flew into the scene. The college freshmen knew no one (except for the dual-enrollees who attended the same high school); most had never taken an online course. On the other hand, most of the NSU students had worked in the field of instructional technology much longer than I. In those moments when I was flying blind, I remembered their vast experience and took comfort in the thought that most of my students could have taught the course themselves.

Now I truly knew the difference between a *sage on the stage* and a *guide by the side*. The course was handed to me neatly packaged with a syllabus, study guide, text, and video modules on CD-ROM. I scheduled and hosted the cluster chat sessions, administered and graded the exam over the materials, answered students' questions, monitored and contributed to the discussion board, commented on their video storyboards and made suggestions, empathized with them as they tried on a tight schedule to tape, edit, and produce a 10-minute video on a significant application of distance education, and encouraged them when the technology failed. Many times I used my experiences teaching the English composition class online as case studies for discussion. They validated my

thoughts and feelings about being an instructor in an online course, and I validated their insights into teaching and learning online. Just when I really thought some of the students needed me, the course was over; I reviewed their projects and awarded the final grade.

The online English composition class was a different story. Oh, I was still the guide on the side as much as I could be; however, students required a lot more direction. I encouraged group work via e-mail, chat, and phone, and I provided constant feedback to my students, who ranged in age from 17 to 55+, and in skills the gulf was just as wide. The class was intense and exhausting. Sometimes I'd open the discussion board to find 28 posts to read, the next day there were another 25 or more, and my email box was overflowing! Not only did I provide feedback, my students provided feedback to me and to fellow online students. We bonded early in the course. Their compositions made me laugh and cry and feel so proud as they revised and revised again to send me their best work. We discussed and wrote about important and current and classic issues that affect their lives. We posted them online to share with each other. We became a rhetorical community, and students learned to use rhetoric as they wrote to inform, to persuade, and to argue. Most of all, they challenged me to keep up with them. Their online portfolios told the story well; they were so proud of what they learned and what they accomplished, and how much they had grown as writers, as students, and as individuals. They loved me, and I loved them right back.

Then the semester ended: the airplane came to a sudden stop at the end of the runway. Day after day, I checked the NSU WebCT and the community college WebCT in hopes that someone might have added one last post. It was Christmas: snowflakes were falling, and I never felt so alone in my life!

On January 10, 2005, the intensity started all over again, this time with three online courses and only two f2f. I put up a new technical writing and business communications course on WebCT, revised my online English composition course, and started collecting bios, pictures, and Web pages of my new NSU cluster. I'm excited again! After all, I'm a seasoned pilot of online courses. I think I found my niche!

"The course was handed to me neatly packaged with a syllabus, study guide, text, and video modules on a CD-ROM."

—Shirley Walrod

Education's Global Reach

Russ Colbert

The University of Notre Dame, in South Bend, Indiana, has for 2 decades offered Executive MBAs and other graduate programs through its Executive Education program. But 8 years ago, with the local graduate market in decline, the university knew it had to diversify its offerings to turn around that trend.

It did so in large part through distance learning and now has a potential student reach of up to 3,000,000 people worldwide. Students hail from cities across the United States—from Toledo to Nashville, New York to Green Bay—and from countries worldwide, including Haiti, Costa Rica, Mexico, The Dominican Republic, Guatemala, The United Kingdom, China, and Chile.

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Key to the program's success was its decision 8 years ago to utilize sophisticated yet easy-to-use two-way video conferencing technology, enabling real-time interaction of students and professors from all over the globe. Notre Dame chose video conferencing products from Polycom to meet those needs and make these two-way video classes possible. Program heads also found in Polycom a solution that would not distract from teaching and would give students a valuable learning experience.

"The expectations of Polycom's products have so far exceeded our goals that we have stopped paying attention to the ROI figures and shifted to quality measurements," says Bill Brewster, director of Internal Programs and Executive Education. "Polycom has 100 percent up time and has provided everything we required in terms of ease of use, equipment quality, routine maintenance, and quick turnaround."

Notre Dame administrators credit Polycom for its contribution to their program's success. "Polycom's systems have played an integral role in expanding our Executive MBA program and enabled us to offer a meaningful and seamless education experience to a broader audience of adult students," says Leo Burke, associate dean and director of Executive Education at Notre Dame's Mendoza College of Business.

Technology That Works

Specifically, Notre Dame selected Polycom's ClassStation™ solutions, which are designed for teachers, by teachers, for use within any environment and any application, including remote classrooms. Polycom's two-way video conferencing technology enables Notre Dame to expand the classroom across the world, achieving more educational equity and diversifying its program.

Students and faculty interact through the technology, and faculty have used Polycom to bring guest speakers and industry leaders from around the world into their classrooms to compliment their courses, greatly enhancing the educational opportunities for students.

Notre Dame has also spread the use of the two-way video conferencing technology beyond the classroom, extending its beneficial reach into other areas of university life. For example, at the beginning of every school year, the CEO of one of Notre Dame's corporate clients presents the annual welcome address for students, discussing issues companies face and challenges executives are up against. One year he could not make the trip to South

Bend because of weather constraints. From his home office, Notre Dame used Polycom to connect him via video for the presentation and question-and-answer session. Ever since, videoconferencing has been his preferred method of delivery for this special presentation; it saves time and travel expenses and highlights the effective use of technology for which Notre Dame's Executive Education program has become known.

Far more typical of the use of Polycom, however, is the day-to-day student and faculty interaction. Students are able to attend class from a variety of locations based on their business needs. These students have the ability to interact not only with the faculty member during live classes but also with students at other locations in the system. These personal interactions create the impression of physical proximity when great geographical distances are reality. These interactions are lively and beneficial to all in bringing not only varying industry perspectives to the table but also varying geographical and cultural differences as well.

Looking Ahead

Notre Dame's Executive MBA program leaders are committed to providing students and staff with only high-quality, seamless technology. Because of their confidence in Polycom, they are expanding the use of video conferencing technology globally while also extending the program further in the nondegree arena by beginning to offer a variety of industry certificates.

As schools and universities embarking on similar tasks, Notre Dame administrators recommend a strong focus on ensuring that students and teachers are comfortable and that the technology effectively makes both feel like they are in a classroom—even if they are a continent away.

"Institutions looking to move into two-way video conferencing really need to hire someone with experience to integrate and choose quality vendors," Brewster says. "With a quality vendor and the extra effort, it has really made a difference."

Figure 1. Polycom two-way videoconferencing technology in a University of Notre Dame classroom.

Marketing Our Success

Ryan Watkins

Like many others, after watching television for years I had developed a rather mocking attitude about what it takes to be an entertaining television personality. After all, if the hosts of NBC's Today Show can get awards for journalism, then how hard can it be to convey your ideas, opinions, and biases to thousands of viewers while sitting in an air conditioned studio with the infamous green room just down the hall?

Much of this certainty, however, came to crashing halt last summer, when I was asked to be a guest on a national cable news show that would focus on e-learning for the 10-minute segment. Not only did I find communicating my answers more challenging than expected, but even the process of differentiating which questions were directed at me and which were directed to other guests (each located in different cities) was tricky for this novice.

But in this article I will avoid recalling the painful details of the episode, even if my mother still says that I looked great. What I do want to discuss is a *challenge* (of sorts) that another guest on the show submitted to those of us who are in the profession of distance education. Representing a corporate recruitment firm that specializes in placing college graduates in career positions at Fortune 500 companies, this guest questioned what distance educators and distance education programs have done to market the specialized skills of our graduates to the many corporations and organizations that would be potential employers.

As he pointed out through the discussion, the majority of human resource managers in today's top organizations are not graduates of distance education programs, nor do they have a history of knowingly hiring employees who have degrees from institutions offering courses online. As a result, their perceptions and attitudes regarding online degrees often result from misunderstandings of the institutions offering online courses and rumors about poor quality in online programs.

These misperceptions of many human resource managers consequently have tremendous impact on our profession as distance educators, including—but not limited to—the placement of graduates in top organization, promotion of graduates already in organizations, availability of tuition remission programs, new student recruitment, and even graduate salaries. All of this, at a time when many distance education programs and professionals are working to distinguish online degree programs from the diploma mills that are showing up on more Websites and spam messages every day.

While there are many ancillary discussions (and future Ends and Means articles) that will undoubtedly come from this brief discussion during my short-lived television appearance, I would like to first suggest two general fronts on which each of us can start to address this growing issue for our profession.

First, it is important that our online students and graduates feel confident in sharing their online experiences with the colleagues, coworkers, and future employers.

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Online courses and degrees should be of the quality that all students feel confident that their knowledge and skills have prepared them to be successful in their careers. As a result, it is up to distance educators to ensure the quality of our courses and to encourage students to share their online experiences with others.

At many institutions, there are no designations that differentiate online degrees from those received by on-campus students. While this may have been a positive development a decade ago, today it may be keeping the popularity and quality of many online degree programs under wraps instead of promoting their successes. After all, if employers are never aware that a skilled employee was the result of an online degree program, it is less likely that past stigmas of online graduates will fade away.

As a second step in combating misperceptions and promoting the quality of our graduates, distance education programs and professional groups should step up the marketing and communications of online education to current and potential employers, highlighting the tremendous successes and skills of our graduates. Currently, potential students are the primary audience for most marketing campaigns, while future employers are left without accurate information on the quality of online courses and degrees. In response, it is the growing responsibility of professional groups in our profession to use our combined resources in developing effective communication strategies targeting audiences beyond potential students.

By recognizing and addressing the perceptions (or misperceptions) that many human resource managers have of distance education, we can support the success of our students long after they leave our online classrooms. As distance educators, we should be encouraging our students to share their positive online experiences with their colleagues and working together to market the value of online graduates to the many organizations that may be their future employers.

Note: Any opinion, findings, and conclusion or recommendations expressed in this material are those of the author and do not necessarily reflect the view of the National Science Foundation.

Tech Monster in a Box

Craig Ullman

Innumerable technologies have been introduced into the schools, but few of them actually get used. Typically, the lack of use has been blamed on the technology itself ("It doesn't work when I do X") and sometimes that's true. The lack of use is often blamed on insufficient teacher training on the new technology or simple lack of teacher time, and sometimes that's true, too. But I think there's a larger reason involved: the perception that every new technology is actually an unspoken critique of the teacher's performance.

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New technologies are often introduced into the classroom to make up for perceived inadequacies in instruction: "Can't teach your students math? Just sit them down in front of a computer and watch the magic happen." How can teachers not feel that their abilities are being questioned? Of course, if the technology actually is very effective, that only makes it worse.

Even beyond this, many technologies, either explicitly or implicitly, are based on a different pedagogy than the teacher has been trained in, or his or her teaching has devolved to. In fact, many technologies use this as a selling point, and many administrators buy technology in a not-so-subtle attempt to force teachers to change their pedagogy.

I'm not suggesting teachers will actively oppose new technology they believe is effective; they often won't use it long enough for that to be demonstrated. I'm not even suggesting teacher opposition to new technology is always conscious; I'm sure many times it's not. It's always easy to convince yourself of all the reasons why not to do something.

Ultimately, it's all about power.

Think of classroom practice being the product of a three-way tug-of-war among teachers, students, and administrators. Any increase in leverage on one side is at the expense of one of the others. When the administration tries to change your behavior, exert some control over your classroom by introducing a new technology, the first thing you do—just like in a tug-of-war—is to dig in your heels. Inevitably, this kind of power struggle results in stasis, or someone winding up face down in the mud.

How do we get new technology to be seen as an ally of teachers and not as an enemy? The technology can be primped up to appear teacher-friendly, but that rarely convinces anybody. Rather, the decision to acquire the technology, and how to use it, has to come from the teachers themselves. If the teachers view the new technology as empowering rather than as a subtle rebuke, and if they are innovators, they're vastly more likely to actually use it.

However, giving teachers authority over new classroom technologies creates a different problem; the administrators will have to give up some leverage in their tug-of-war. But when you're playing a game, it's very hard not to get caught up in it; nor do you forget the fear that by giving an inch your opponent might take a mile.

But sometimes you have to give in order to get—or you'll end up face down in the mud, anyway.

Lessons for Practice
Instructional Design Strategies from Engineering Education

Kathy J. Schmidt

Due to a number of challenges, such as the emergence of a global economy, changing student demographics, current science on how people learn, low numbers of engineering graduates, and improved instructional technologies, engineering education is under scrutiny across the country. In the United States, only 5% of undergraduates earn engineering degrees. Conversely, China's current group of engineering undergraduates represents 40% of all graduates. Is this a trend we can positively address by enhancing our engineering education practices, or do we need to find ways to reach potential students with alternative delivery methods such as distance learning? Even if we do increase our numbers of graduates, will the marketplace be ready for them? While there are numerous efforts underway to help prepare students in the lower grades for the pipeline into higher education in engineering, science, or technology, I will address two of the challenges mentioned above (science of learning and instructional technologies) and how they can influence change in engineering education.

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Why should the United States Distance Learning Association and its members have interest in specifics about engineering education? Are there parallels to be drawn from a discipline-specific approach, or are there instructional issues relevant across the disciplines that are applicable to distance learning professionals? While there are "signature pedagogies" used to deliver engineering instruction (Schulman, 2005), engineering professors who employ instructional design strategies and base classroom activities on student outcomes are following the basic tenets of quality instruction. This commentary will not delve into specifics of engineering instruction such as design or laboratory classes, but will instead look at how the science of learning and instructional technologies are influencing engineering education practices.

Although engineering is a scientific discipline that is built on the study of scientific principles and methodology, it is really driven by the application of science to address the needs of society. This practical approach to knowledge can be seen in how engineering professors want to assess change in their classes and because they are theory-based thinkers; they review the scientific findings on pedagogy before they incorporate such practices into their teaching. Given that engineers use a systems approach, they are at least open to instruc-

tional design and a systematic approach to instruction. The use of a systematic approach to instruction provides a framework to analyze course components and methodology as well as the ability to complement pedagogical practice with technological capabilities.

Many view an engineering class as one in which a professor lectures (a chalk talk) and works derivations on the board while students dutifully take notes. This type of engineering class does exist, but take a look at the *Journal of Engineering Education* to see what trends and empirical evidence exist that promote more active learning environments. Colleges of engineering across the nation now support their own engineering teaching centers where learning scientists, instructional designers, and media specialists are readily available to help create instruction that meet the needs of today's students.

Many of these centers promote pedagogy based on the National Academy of Sciences book *How People Learn* (HPL) (Bransford, Brown, & Cocking, 2000) and its practical findings. Often, situational factors and lack of awareness of the research prevents any practical applications. While it is not easy to translate educational research into classroom practice, this is happening with HPL. Implementing research-based approaches requires well-designed curriculum, and often face-to-face instruction involves a fair amount of spontaneity. For example, the VaNTH (www.vanth.org) National Science Foundation funded effort has educators and engineers across multiple institutions working with industry to develop curricula and technologies to educate future bioengineers. This undertaking has created new technology-delivered resources as well as a concerted effort to assess, document, and publish educational research on these efforts.

Furthermore, HPL has been used to create a cycle or framework, coined the STAR.Legacy (Software Technology for Action and Reflection) cycle (Schwartz, Brophy, Xiaodong, & Bransford, 1999). This framework, which organizes student learning into typical phases of inquiry and makes learning visible, uses these four overlapping lenses:

- Learner-centered environments focus on the knowledge, skills, and attitudes that students bring to the learning situation;
- Knowledge-centered environments focus on content that is organized around big ideas or core concepts;
- Assessment-centered environments help students' thinking to become more visible so that both they and their teachers may assess and revise their understanding; and
- Community-centered environments capitalize on local expertise to create a sense of collaboration among students.

These four lenses influence curriculum development and instructional settings. Instructors create knowledge-centered settings by working with students' prior knowledge, skills, and cultural resources, and they create assessment-centered learning by providing for frequent assessments of student progress. Students need opportunities to bring what they know and their beliefs about school subjects in order to have learner-centered opportunities, and both instructors and students can maximize community resources to build community-centered learning that is motivational and collaborative.

There is little doubt that great teachers love their discipline and respect their students, and an emphasis such as the four lenses listed helps to promote an active and involved learning culture. Given today's technological tools, it is conceivable to address each of these research-based variables influencing instruction. Many engineering professors, just like their colleagues in other disciplines, arrive on campus schooled in content but not in how to teach. They may not intuitively recognize that the single most important thing they should know about their students is their prerequisite knowledge so that they can appropriately begin instruction or provide remediation, if needed.

The Web and its vast array of assessment and survey tools can facilitate gathering data on what students know and what skills they possess. Today's students are Web savvy and anticipate the use of the Web in instructional delivery. Finding out how students progress can be time-intensive, but in-class devices such as the Classroom Performance System (CPS) can be used to generate assessments and to promote interactions. CPS consists of student-operated remote controls and a receiver that records responses to questions by the instructor. The instructor can then display a histogram of student responses in order to decide how best to proceed, given students' understanding. Awareness of the development of students' ability to process and use information is a necessary step in order to actively assess learning in a classroom.

Learner-centered opportunities exist in classrooms where students are questioning and participating. Some refer to higher educational institutions as *ivory towers* where knowledge doesn't seep in from the outside, yet we know this limited view is damaging. In community-centered approaches, efforts are made to promote industry, other institutions of learning, as well as the citizenry in education. The use of instructional technologies facilitates breaking down barriers due to distance and time and, in many engineering classes, students are connecting with others via teleconferencing and the Web.

There are lessons learned from the field of instructional design that go beyond the fundamental principles of starting with instructional goals and student outcomes. From a practical standpoint, the following

instructional design suggestions can help engineering educators and those assisting them develop distance learning curricula:

- Know your students. Discover what knowledge your students bring with them and, in doing so, find out what misconceptions, if any, they have. Don't make assumptions about what they know, and use measures, such as pretests. In distance delivery, it is highly likely you will not be able to see expressions or looks of concern, and you need to have documented evidence of students' baseline knowledge.
- Make your thinking visible. You need to help students apply prior knowledge to new information. Talk through your reasoning process and share with them any pitfalls you experienced as you did your thinking. Pose thought questions for students and if you are using the Web, and make use of a discussion board to get students documenting their thinking and their questions.
- Communicate in multiple ways. If you are teaching at a distance, make yourself available via virtual office hours, the telephone, and email. Share with your students why you do what you do and be enthusiastic. With planning, your excitement in teaching can be evident, despite the distance.
- Analyze the content and look at the structure of knowledge. Is this material well-structured, so that certain instructional strategies work best? Learning tasks can be very different from each other in the kinds of cognitive effort needed, the learning conditions, and ways to assess understanding. For example, there are suggested procedures to teach procedural or declarative knowledge.
- Identify the big themes or the big picture for your students. When doing this, think of ways to visually display and organize substantial amounts of information. Concept maps can be created and then used as a roadmap for a course. Concept maps reveal the structural patterns in the material and can be used to display the text or lectures in a visual arrangement. Posting the concept map within a course Web site allows students to continually reference it and you can also display this visual in class as a reminder of where you have been and where you are going in the course.
- Find out what your students know. Use ongoing assessment in and out of the classroom. With online testing, students can be provided instant feedback and can take measures that are appropriately geared to their ability level. Make use of survey tools so that you can find out if the course and your teaching strategies are meeting students' needs.
- Teach more than content. Students who are taught how to learn (metacognitive skills) improve in content learning. Make students aware of their learning strategies and help them self-monitor the use of these strategies. By engaging students—for example, in summarizing, questioning, clarifying, and predicting—they will be motivated to learn and are more likely to retain what they've learned.
- Keep in mind that class time is thinking time. That means students are involved and doing more than note taking. Connecting to students who are learning via a computer or a video screen is challenging, but there are ways to do so. Ask questions that are specific (this may require you plan these in advance) and encourage students to come to class prepared and to work in small groups.
- Encourage peer-to-peer learning. Student learning is social and, given that class time is only a fraction of the time they'll spend on a course, they need opportunities to collaborate with each other. Even students at a distance can work with each other. Often, they can add a unique perspective and enrich the quality of interaction and discussion within a course.
- Keep your focus on your students. Teach from the vantage point that you are to provide students with new knowledge and skills. It isn't about what you teach, but what students will do with what they learn. Make sure that your distance learners have an opportunity to share their materials and to build upon others' understandings.

Engineers, by their very nature, are drawn to a scientific approach to instruction. They cannot, however, be expected to explore instructional science and design without guidance and support from those schooled in learning sciences. This meeting of the minds is ripe for the development of innovative and challenging instructional development. We do know more about how the mind functions and we are documenting what works when we incorporate cognitive science into instructional approaches. In the final analysis, will we be able to produce enough educated people to meet the needs of our high tech society? Time will tell.

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Teacher as Skeuomorph. Teacher as *What*?

Michael Simonson

John Howells' new book, *Management of Innovation and Technology* (2005) is not the easiest book to read. It is however, quite interesting. In the first chapter, he discusses skeuomorphs. A skeuomorph, in case you have forgotten, is an element of design that has lost its original function but is nevertheless retained. An example is the square on top of a Doric Column. Originally, columns were made of wood, so they were topped with a wooden square to distribute the stress. Marble and stone columns did not require this square but, for esthetic purposes, it was retained, thus becoming a skeuomorph. Other examples are watch pockets on jeans, plastic dinnerware made to look like stoneware (including the imperfections), and the consumer version of the Hummer, made to look like the original, but certainly not ready for the next war.

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In distance education, especially online instruction that is asynchronous, the role of the teacher is significantly different, even unrecognizable when compared to traditional classroom instruction. In classrooms, teachers present information, talk, draw on the board, demonstrate, and take apart; they *do it all*. The classroom teacher has a critical and necessary role. Without the teacher in the traditional classroom, teaching and learning—education—would not occur.

Conversely, in an asynchronous, online course the instructor does none of these traditional things. True, many of our instructional tools allow us to simulate the classroom and the functions of the classroom teacher, but it is not the same.

We have kept the teacher, but is the teacher's function really critical? If we look at the teacher's changing role superficially, as some do, one might conclude that teachers have no real purpose anymore; they are skeuomorphs.

Admittedly, the word is a little hard to deal with, but then so is the idea that teachers have lost their original function. However, if we are realistic, we recognize that teachers are becoming designers, organizers, motivators, and assessors, among other things; roles that teachers have long been advocating as vital to the education process, even more important than presenting.

And finally, recognizing that teaching as we have known it is losing its original function is an important—albeit first—step. As distance education leaders, we can take an important, positive role in identifying the new teacher.

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