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Those who bet print media will never become obsolete may want to rethink that wager. With the cultural shift from static print to dynamic digital media growing stronger every day, the demise of the printed page may come sooner than anyone expects.

by **Tricia Bisoux**

illustration by Derek Lea

When Vanderbilt University in Nashville, Tennessee, opened its first technology-enhanced classroom in 1989, complete with projector and computers at every seat, statistics professor Malcolm Getz was delighted. He could now integrate Excel spreadsheets directly into his course at Vanderbilt's Owen School of Management, rather than send students off to fend for themselves. Since then, Getz has developed new interactive components to his course, including adjustable diagrams, PDFs, sampling distributions, and simulation tools.

In the mid-1990s, publisher South-Western, part of the Thomson corporation, expressed interest in Getz's project and worked with its macromedia director to create a more stylized interface for Getz's materials. Today *eStat*, Getz's interactive digital textbook for accounting, incorporates 40 simulations and 500 spreadsheet problems, with navigation tools and links to glossaries and other content.

"With a digital textbook, it's quite easy for a student to deal with a data set comprising several hundred observations, figure out the variables, and evaluate the results. That's impossible to do outside the computer," says Getz.

Professors like Getz represent what Kurt Gerdenich, South-Western's director of technology, calls "digital evangelists"—those educators who are not only using digital content, but also creating fully interactive learning environments for their students.

"These are the people who are willing to change their lives to use these tools to the fullest extent," says Gerdenich.

At the moment, early adopters such as Getz are still in the minority. The use of digital content requires a completely new way of approaching the classroom—one that many educators aren't quite ready to embrace. Even so, the digital component of the educational materials market is growing, as more options become available and technology becomes more advanced, less expensive, and easier to use.

It's time for digital technology to come into its own, says Frank Moretti, executive director of the Columbia Center for New Media, Teaching, and Learning (CCNMTL) at Columbia University in New York. "The whole dot-com era was really a step backward for new technology because behind it was the assumption that instant success was possible in every field because of a theoretical decrease in overhead and increase of market size," says Moretti. Now that the dot-com fervor has been quelled, he says, people are ready to view interactive technologies with an objective eye and focus on the true value of the Internet as an informational resource.

More important, access to such an abundance of information is cultivating a public that's growing increasingly accustomed to navigating digital environments. Slowly but cer-

### **BizEd Goes Digital**

Although *BizEd* is primarily a print publication, it's not without a digital component. The content of all past *BizEd* articles are available in its online archives, which can be found at [www.aacsb.edu/publications/archives](http://www.aacsb.edu/publications/archives). But in an issue where we explore interactive digital media, it makes perfect sense to take our use of digital media one step further.

This month only, our readers can download the January/February issue of *BizEd* directly to their desktops. With the help of *BusinessWeek* and the California-based company Zinio, a searchable, interactive version of this issue of *BizEd* is available via e-mail. To receive the issue electronically, as well as a complimentary issue of *BusinessWeek Digital*, visit [www.resourcecenter.com/digital/bized](http://www.resourcecenter.com/digital/bized) and click the "Get It Now" button. That will install the Zinio Reader, which is necessary to view the content, to your computer.

Finally, set up a user name, e-mail address, and password in Zinio's secure environment. Readers' e-mail addresses will not be shared with outside companies. The digital conversion of *BizEd* will then be e-mailed directly to you. Enjoy!

tainly, the ways people teach, study, learn, research, write, and communicate are crossing over into the interactive age.

### Information Unlimited

In the November 10, 2003, issue of *Newsweek*, columnist Steven Levy noted that we are experiencing a “revolution made by possible by the digitalization of, well, everything.” The world was changed completely last October, he wrote, when Amazon.com announced its new “search inside the book” service. Amazon users can now enter a term into a search engine and retrieve all instances of that term in 120,000 books the company has scanned into its massive database—one that will continue to grow.

The purpose of the technology, of course, is to sell more books. The implications for learning and research, however, are astounding. “We are now on the threshold of a system by which all books are scanned—eventually including even hard-to-find, out-of-print volumes—with their contents instantly accessible,” Levy writes.

For Moretti of CCNMTL, that threshold has been already crossed. The Center is working closely with the university library to create a number of online, multimedia study environments (MSEs) on topics ranging from history to literature to sociology. An MSE on Salman Rushdie’s novel *Midnight’s*

*Children*, for example, includes large selections from the novel embedded with hyperlinks to related material. Videos feature viewpoints of Columbia faculty and include an hour-and-forty-minute long video of Rushdie himself discussing his work. Users also can view segments of the Royal Shakespeare Company’s play adaptation of the novel and access the library’s collection of materials on South Asian history to research the novel’s historical context.

The university’s library provides access to many texts in digital form, through MSEs and directly from its Web site. The searchable text of 10,000 books is available online, as well as the text of 96,000 early English texts printed between the years 1475 and 1700. Students and faculty also can access encyclopedia entries, dictionaries, and other reference tools. The library’s goal is to have its text, video, and audio collections completely digitized and accessible via the Web, says Moretti.

Columbia University’s vice president for information services and university librarian, James Neal, has been working to make the university’s vast library holdings digitally available. The task is Herculean but inevitable, Moretti believes. “James Neal is working to help people understand that libraries should no longer be immobilized collections that people have to penetrate. Instead, they should be dynam-

## It’s All About the Web

In 2000, Kris Nebel, director of admissions at the University of Michigan Business School in Ann Arbor, gave a presentation at the Graduate Admissions Conference about the school’s new CD-ROM viewbook. It was a new form of paperless marketing, Nebel told her audience.

Now, just three years later, the CD-ROM viewbook is no more, says Nebel. The University of Michigan Business School is moving its content to the Web. Now that nearly all students have access to the Internet, says Nebel, the Web is the perfect place for a full range of content designed to attract students. In the past, business schools used their sites mostly for short text-based descriptions of their programs and contact information, but business schools are now viewing their Web sites as a digital extension of their physical campuses.

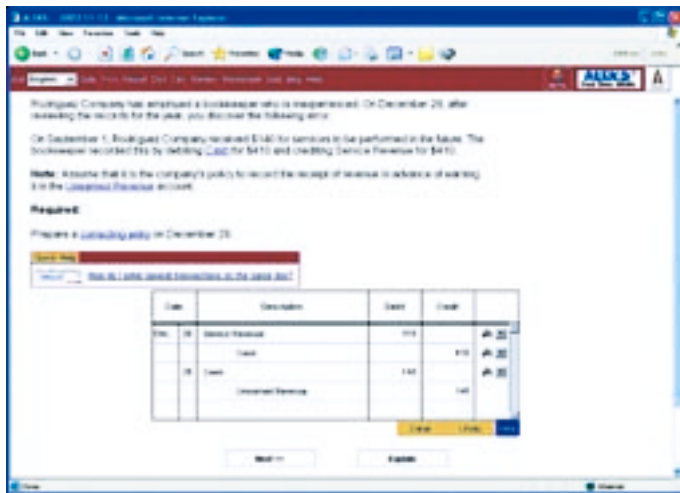
The Wharton School at the University of Pennsylvania in Philadelphia finds itself in a situation similar to the University of Michigan Business School’s. In 2002, the school won a Gold award from the Council for Advancement and Support

of Education (CASE) for its “innovative CD-ROM,” designed to replace its print viewbook for its MBA program altogether. The award committee called the CD “impressive,” “engaging,” “attractive,” and even “fun.”

And now, says Alex Brown, senior director of Wharton’s admissions office, it’s history. The school has dropped both its printed viewbook and its CD-ROM version altogether in favor of a significantly enhanced Web environment. The only printed item the school sends to prospective MBA students is a brief brochure that asks them to visit the Web site for more information.

Wharton’s redesigned site for its MBA program is a content-rich environment, where visitors can join in ongoing discussion groups and view video clips from students and faculty. When visitors view a page on a specific topic, the technology driving the site searches for the latest discussions on that topic and posts links to them at the side. Visitors also can read student diaries and return regularly to read new entries that relay students’ continuing experiences at the school.

Through the continuous addition of entries in the discussion groups and diaries, the site is largely self-updating and always evolving. This characteristic is called “active content,” explains Brown. “What we’ve tried to do is pull all of our



One of the newest products from McGraw-Hill/Irwin is ALEKS, Assessment and Learning in Knowledge Space, and it represents education's move into electronically based learning assessment tools. ALEKS for accounting (shown here) incorporates interactive quizzes that measure students' mastery of concepts—offering tutorials when needed—before moving them on to new material.

ic, accessible resources that provide a personalized search interface,” he says. “They should create a seamless food chain from the object of study to the deep-seated primary and secondary resources related to it. This level of access to information will become a matter of course.”

### A Boon to Assessment

Course management systems like eCollege, Blackboard, WebCT, and PageOut, and Web-based educational content available from companies like XanEdu have contributed significantly to higher education's growing comfort level with digital technology. By providing online access to hundreds of thousands of textbooks and journal articles and enabling faculty to customize course packages to suit individual courses, they have sparked an expectation of almost unlimited access to information.

That expectation, in fact, is driving the companies who provide educational materials to expand their databases even

media and content into this one space and integrate everything with a new look and interactivity. We want people on our Web site to build community, rather than view a promotional CD on the run.”

The fact that anyone, not just those affiliated with The Wharton School, can participate in the discussions is part of its appeal, he says. It enables potential students to enter the Wharton community before they even send in their applications by posting questions and interacting with current students.

For prospective students who may not have access to a computer—they might be in the Peace Corps or from a developing country—the University of Michigan and Wharton have contingency plans in place to work with them through other channels. But Nebel and Brown note that nearly all students now either own a computer or have access to a 56K dial-up connection. That, coupled with the new capabilities Web environments offer, makes the Web the perfect place to promote a school, providing an interactive environment that's second only to a campus visit, Brown says.

“The Web site is much more organic than a CD-ROM or printed catalog,” he adds. “As a result, it fosters community more effectively.”

further, to include access not only to previously published resources, but also same-day access to just-released news, data, and articles. For instance, CoursePacks, a product from XanEdu that gives faculty the ability to customize packets of materials to suit their individual courses, now include research engines that allow professors to add newly published articles on the fly.

“We now have three new research engine modules, including one for the MBA that is divided into 13 business disciplines. When professors add one of these modules to their CoursePacks, students can link to materials that are updated daily,” explains XanEdu's marketing manager Nan Gottfried. “If something breaks in the news and you want your students to read a *Wall Street Journal* article, you can add it immediately even if you purchased the CoursePack a month ago.”

But the true advantage of digital media lies in its potential use in learning assessment, says Bob Lynch, president of South-Western. Students and instructors are looking for tangible ways to measure progress in a course, he says. To meet that demand, the company has developed Web Tutor Advantage, which incorporates interactive quizzes. If students miss a question, they can link to content that explains the question and helps them master core concepts.

McGraw-Hill/Irwin, a division of McGraw-Hill Higher Education, is also using digital media to create new tools for assessment and learning, notes its president J.P. Lenney. One of its newest Web-based products, ALEKS (Assessment and Learning in Knowledge Spaces), integrates tutorial, assessment, and course management in a single learning tool. ALEKS uses assessment tools that utilize a type of artificial intelligence, Lenney explains.

Digitally based assessment tools such as ALEKS determine the individual course topics each student has mastered and those the student is prepared to learn. Students work on new material when they have achieved mastery of prerequisite material and receive tutorials in areas requiring extra practice. ALEKS is currently available for business statistics and business math, and will be offered in financial accounting later this year.

“ALEKS accelerates learning by building student confidence at the appropriate pace,” says Lenney. “It not only enables students to improve their skills quickly, but also helps faculty keep students engaged in a particular course.”

### Digital in the Mainstream

When the Web was in its nascent stages, much of the information it offered was disorganized and notoriously unreliable. Neither the Internet nor its users had developed the appropriate filters to qualify its content. In fact, most thought



The MBA primer and Web Tutor Advantage from South-Western/Thomson also focus on assessment. The MBA Primer is targeted to students just entering MBA programs and offers self-guided tutorials to bring them up to speed in quantitative areas such as accounting and finance. The Web Tutor Advantage, available for many of the company's courses, puts students through interactive quizzes, simulations, and reviews to help them prepare for exams.



A number of mainstream magazines have signed on to the service, in which readers need only perform a onetime download of the Zinio Reader software to be able to read and archive their magazines in digital form. Not surprisingly, many of the publications are technology-related, such as *Macworld* and *PC Magazine*. But a handful of other publications have also subscribed to the service, *BusinessWeek* among them.

The magazine launched *BusinessWeek Digital* last March, but it's just beginning to promote it aggressively to business schools, says Kenneth Eng, a senior marketing manager with *BusinessWeek*.

the Internet would become an incredible vehicle for commerce; few predicted it would primarily function as a vast repository of information.

But as sites for organizations such as the U.S. Library of Congress, WebMD, and countless online newspapers, journals, and magazines became more sophisticated, they helped tame a relatively feral informational environment and transform it into a valuable, navigable, all-inclusive resource. More important, the Internet is cultivating a public that's growing more proficient at navigating digital environments.

This cultural proficiency may already be evident in the capacity of today's teenagers to juggle text messaging, pop-up boxes, and hyperlinks simultaneously. In fact, where some see in the younger generation an inability to focus, Moretti of CCNMTL sees the evolution of a new cognitive capability. "People are developing the ability to operate within complex digital environments," Moretti says. "That development is a transition of culture and cognition." Eventually, everyone may not simply be accustomed to working within digital environments—they'll prefer those to the printed page.

To prepare for this possibility, print periodicals already are making preemptive strikes. Although magazines aren't prepared to abandon print form just yet, a handful are going beyond simply having a Web presence. Zinio, a company with locations in Brisbane, California, and New York City, has developed software that converts the content of magazines into a digital format, which is e-mailed to subscribers.

The digital publication's text, graphics, and advertising appear exactly as they do in the printed publication, but Zinio adds to that content interactive features that allow subscribers to search by keyword, annotate, and hyperlink to articles straight from the table of contents. Plus, customers can create a searchable archive of past issues on their personal computers, meaning they'll never have to contend with rifling through dusty stacks of old magazines again.

Business schools such as Purdue University's Krannert School of Management in West Lafayette, Indiana, and Merrimack College's Francis E. Girard School of Business and International Commerce in North Andover, Massachusetts, have been among the first to sign up their business students to receive *BusinessWeek* each week in their e-mail inboxes.

"These students have grown up with the digital medium and have become very comfortable with it," says Eng. "They like business news, but they aren't necessarily inclined to read it in print." Digital content puts many of them in their element, says Eng, where they can read content, search the issue by keyword, and hyperlink to company Web sites straight from the text.

"We know this product is really early in the game. Over time we're going to learn a lot more about how users interact with it," says Eng. "We're at the start of what I hope is a digital revolution."

Students at the Girard School receive their laptops with the Zinio Reader software already installed. In addition to subscribing students to the digital publication, the school uses textbooks with interactive components, including an accounting text with an accompanying DVD, created by Brigham Young University. Interactive text encourages real-time learning that is only possible through digital means, says Edward Popper, dean of the Girard School.

"Traditional case studies offer a sense of reliving business history, which can be incredibly useful. But they don't give you the same dynamic that interactive media offers," says Popper. "A couple of years ago, you couldn't say to students, 'Fleet Bank was acquired by Bank of America today. I would like a paper discussing the ramifications of that tomorrow morning.' The library didn't even have that copy of *BusinessWeek* yet. Now students can connect to the Internet and access timely data about what's going on today. That timeliness makes them much more aware of the dynamic of business."



Although XanEdu’s customized CoursePacks are still popular among its business education clients, the company also offers its MetaText digital textbooks equipped with keyword search capability, onboard dictionary, and hyperlinked tables of contents. Students can annotate or highlight material; instructors can incorporate links to Web sites directly into the textbook and update it as the course requires.

Educators are just beginning to discover how to react to students who are becoming more proficient receivers of digital information, Popper notes. The interactive environments at their disposal are a place to start. “The technology is not just serving as an analytical device,” he posits. “It’s serving as a gateway to information.”

### Awaiting the Right Device

Of course, as much as students enjoy learning in digital study environments, there are still limitations. Bandwidths on the Web still have not reached the point at which large amounts of streaming video are practical. Not to mention that no one has yet to introduce a device that truly suits onscreen reading.

“Our students seem to have every device under the sun. They have mobile phones and digital cameras—they even have phones that are cameras,” says Gerdenich of South-Western. “But technology has yet to introduce the right device for education. We have expensive laptops that are very powerful, but are not well-suited to displaying educational content. We have PDAs that are very portable, but are limited in delivering the applications that will benefit learning.”

Many e-book devices like the goReader, which *BizEd* featured in its January/February 2002 issue, have come and gone, having failed to win over the educational market. As introductory technology, their cost was often prohibitive, putting students in an either-or situation. When they can afford to buy *either* a \$800 electronic reader *or* a \$1,000 multifunctional laptop, the laptop will win out every time.

Tablet PCs are a step in the right direction, but they lack the screen resolution required to view large amounts of onscreen content comfortably. It’s only a matter of time, though, before a feasible device reaches the marketplace. To

serve education, it would likely have to be both e-book and Web browser with wireless capability. It would have a screen size and visual resolution conducive to viewing content, and be lightweight, durable, and portable with long battery life. And it would help if it cost less than \$200, Gerdenich says only half-jokingly. But when it comes, he says, “we’ll be able to make digital content really fly.”

### **The Digital Printing Press**

Like Getz of the Owen School, Suzanne Loker is another educator-cum-digital evangelist. A professor in the textile and apparel department at Cornell University in Ithaca, New York, Loker sought funding to create an online interactive textbook for her entrepreneurship course for fashion designers. At first, she supported the project through small academic grants. Eventually, she received an endowed professorship to pursue the project, making her the J. Thomas Clark Professor of Entrepreneurship and Personal Enterprise.

It took three years and the help of a Web designer for Loker to develop the current version of her interactive textbook, titled *Designers as Entrepreneurs*. Students navigate the book via hyperlinks and dropdown menus. Loker also incorporates video that she provides on CD-ROM to accommodate students who may not have high-speed access to the Web. The textbook has evolved as a series of small tasks over the years—the only way to tackle such a large and complex project, Loker emphasizes. The option isn’t for everyone, she admits, but for many educators interactive

environments may provide a better way for students to learn.

“There are pockets of people doing this in every discipline,” says Loker. “The real question is simple: Are you gaining anything from doing it this way? If it’s more efficient and accessible for the student, if there is some educational reason that students will learn better in this medium than another way, then professors should do it.”

As professors such as Loker and Getz have found, creating interactive textbooks from scratch is often a labor of love that not all educators are ready for. Although sales of digital textbooks are growing with vendors like South-Western, McGraw-Hill/Irwin, and XanEdu, they still represent a very small part of the educational market.

Still, Moretti of CCNMTL likens this moment in time to the years after Johann Gutenberg invented the printing press in the 15th century, when people were first exploring its significance. “People are still inventing uses for digital media,” he says. “The horizons of new media have just begun to be glimpsed.”

For students entering college classrooms in the upcoming years, search engines and hyperlinks might supercede bibliographies and indexes, while “search inside the book”-style technology could replace concordances. Although those who enjoy the experience of turning pages and browsing through the library stacks may mourn its coming, an interactive culture with seemingly unlimited access to information is on the way. And for many of those whose lives center on study and research, it can’t come too soon. 