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Telecommunications and New Learning Paradigms

Web Applications: Interactivity Arrives at the Virtual Campus
By Glen McCandless

One of the most vivid (and unpleasant) memories I have of my college days is standing in line for hours to drop and add classes. Just thinking about it makes sweat drip from my brow. The only thing worse was the stress of knowing I might not get the classes or professors I wanted!

Could it be that we've left those days behind? Has technology finally delivered on the promise of enhanced services for our academic communities? It looks that way.

According to the latest survey results reported in *Campus Computing*, the number of colleges and universities using Web applications to provide an array of services – course registration, admission forms, transcripts, distance learning, marketing, and financial aid – doubled between 1998 and 1999.

What exactly is a "Web application"? Forrester Research defines it as "transactive content applications which unite content, transactions, and personalization." Sounds quite different from the static content publishing environment that has characterized our college and university Web sites in the past – and it is.

Rising student and faculty expectations have driven the Web from being a place where documents are on display to a place where you actually do things. And as our expectations of the Web continue to expand, more elaborate Web applications are popping up on university campuses every day.

Why Web applications? Simply stated, ubiquitous Internet access and inexpensive browser-equipped PCs have made a host of interactive applications both affordable and accessible to the academic community. This new wave of open computing promises a high level of interoperability and extensibility that hides the ugliness of legacy hardware and database technology, and breathes new life into old technology.

Transforming Administrative Processes

Your campus development team can now create and deliver applications with easy-to-use graphical interfaces without the need for new or proprietary software on the desktop. This reduces the cost of application deployment and maintenance while minimizing the need for end-user training.

Just ask Dr. John Milam of The Curry School of Education at the University of Virginia. He's the author of the new book, [Webmaster: The Novel](#), and a recent article in *On The Horizon*, entitled, "The Data Warehouse Revolution on the Web." In both publications, Milam describes a real transformation we are experiencing in administrative processes in higher education, much of it due to exciting new Rapid Application Development (RAD) development tools like Cold Fusion, from Allaire Corporation.

Before joining the research faculty at UVa, Milam led the Institutional Research team at George Mason University that designed its Web-based data warehouse. It provides secure access to student, course, degree, human resource, facilities, faculty workload, financial, and departmental consumption/contribution data.

Other Web apps built at GMU allow student access to ratings of instruction results, provide financial analysts with dynamic budget workflow tracking, document university effectiveness with online assessment surveys, facilitate affirmative action reporting, and deliver facility management classroom utilization data and a new way to accommodate space requests. At UVa, Milam is now teaching students and future administrators how to put data on the Web.

Another Web applications evangelist is Garry Halstead, of the Frank Porter Graham Child Development Center at University of North Carolina, Chapel Hill. Two years ago, Garry was attending a meeting of the ACM SIGUCCS when he saw a demonstration that really made him think. The presentation, by Leonard White of UC Davis, was entitled, "Automating Information Overload: Linking Databases to the Web." White's ability to use Cold Fusion to put together a working Web app in less than 5 minutes caught Halstead's attention immediately.

Since then, Halstead has stayed busy developing a range of Web applications that have dramatically improved the way his own organization manages communications. Virtually every section of FPGCDC's Web site is automatically updated. This replaces the time consuming and cumbersome process of manually coding HTML pages, as faculty and staff of the center submit information and requests.

Now the center's many databases, including public relations, events, publications, and personnel, are mediated by a Web server which creates the HTML coded pages and displays them as fast as faculty and staff enter their information in a secure forms area of the site. The events calendar is one example of a tedious process that has been replaced by a dynamic Web application. Users can view events on a graphical map, enter key word searches to find events, or search by date. The information is accessible instantly as the person posting the information fills in the information form, and the key word indexing is updated on the fly.

Web Apps in the Curriculum

Developing Web applications that deliver student services and streamline communications processes are of great interest among IT professionals in higher education. And there is similar urgency to create applications that support collaborative learning and distance education. Around the country, there are many applications already in use that are natural progressions from posting static course information to allowing access to multimedia databases that support the syllabus.

You probably remember language lab. You stood in line to check out tapes, then waited to sit in a cubicle to don a set of headphones and do a language drill. At Princeton University you can forgo that inconvenience by visiting the virtual language lab on the Web. The physical limitations of the traditional language lab are gone. It doesn't matter how many students want to listen to the same "tape," because there are no tapes at all. The tapes have been digitized and are available from a Web server via streaming audio. And there's no waiting for a cubicle to sit in. Any student can do language lab, anywhere they want, any time they want. The result? Less staff to hire and manage, and less mechanical equipment to maintain. More importantly, the virtual language lab offers incredible convenience and accessibility.

At Vanderbilt University and George Washington University, over ten thousand students are taking over a thousand courses delivered with Prometheus, an advanced courseware application built for the Web. That's pretty exciting. But what's really amazing is how quickly it all happened. In late 1996, Bo Davis, the leader of GWU's Prometheus Development Team, was searching for a way to let GW's 3,000 full time and adjunct faculty build online courses quickly and easily. He needed courseware that would allow them to manage and deliver course content while enhancing interaction with their students.

Because none of the courseware packages on the market offered the simplicity that faculty needed, or the scalability that the entire university required to offer this service, GWU decided to invest in a development team to build a truly simple, robust, and scalable courseware application. This development team chose the RAD tool, Cold Fusion, to create its courseware engine.

One year later, Prometheus 1.0 debuted to an enthusiastic reception. Its popularity has grown exponentially through three versions, driven by ease-of-use and its ability to scale quickly to accommodate large numbers of courses and users. It also allows for local administration while it is centrally deployed. Because Prometheus is built on standard databases, Vanderbilt was able to easily integrate its unified login effort. Within three weeks of installation, Vandy faculty created 100 courses. In the first year of usage at GW, over 1,000 courses were developed.

Even non-technical faculty find it easy to interact with the Prometheus course-builder module, which dramatically simplifies the course creation and management process. Prometheus makes course management simple by allowing every feature to be enabled or disabled. This combines with a completely customizable interface to create a personal experience in every class. Courses can include not only multimedia curriculum content, but also provide an ideal online environment for live collaboration between faculty and students. Entire distance education degree programs are now offered by GWU through Prometheus.

One of the benefits of Web applications is the ability to personalize the interaction with the user. When a student signs on to the Web at UCLA, the Web page that appears provides announcements and course information that is relevant to them. The system interacts with the university databases to customize the information. It is easy to see how this service could be extended to include more interaction and give students even more control. Students could drop and add courses, rearrange their schedules, change their financial aid package, and so on. The idea is to allow students to use information, not just see it. At the same time, the university can lessen its dependence on staff to respond to these requests.

Beyond curriculum and administrative applications, the future clearly belongs to e-commerce. Today, relatively few campuses provide e-commerce services via their Web sites. According to the 1998 Campus Computing survey, only about 15% of universities do so, and the percentages are dramatically lower for 4-year and community colleges.

But given the tremendous growth in online shopping, and the potential for e-commerce to reduce costs and enhance a host of enterprise services, it is likely that this category of Web applications will surge in the future. After all, college students and faculty are more likely to buy goods and services online than the general population, and this growth trend is expected to continue whether higher education provides for it or not.

There is a question whether building infrastructure to deliver e-commerce makes sense for colleges and universities. It may be that outsourcing makes more sense for many of the services and goods offered to students and faculty on the Web, simply providing integration through institutionally run Web portals. In many cases, the service may be provided for free.

Take travel, for example. A lot of people at universities do a lot of traveling. Obviously a school could have its own travel department or travel agent, but it might make more sense to let a commercial Web-based service handle the arrangements for students and faculty at zero cost. The same is true for financial services. For schools, outsourcing the service can save money when compared to running businesses that are not part of the institution's core competency, or in cases where outside competition has made it impossible for operations to make money.

Already, faculties for distance education courses are encouraging students to use online stores to purchase books. It's efficient and cost-effective for students to shop for books or get reviews and information anytime, anywhere. It will be just a matter of time before schools get behind e-commerce in a broader way, realizing the benefits of expanding channels of distribution and new income streams.

With Web applications and a continued flow of more powerful development tools, technology is dramatically changing the landscape of higher education. Most campuses now have the essential network and infrastructure and new Web applications are coming on line daily to help reengineer old processes and banish the long lines and frustrations we once experienced on our college campuses.

These new applications will bring powerful capabilities for interactivity, course management, and learning assessment, and will create the ideal environment for distance learning. Collaboration among faculty and students will reach new heights. Web-centricity will provide new opportunities for research and teaching. And for those of us still on campus, Web applications might give us the achievements in academic productivity that have eluded us for years.

In closing, let's consider that Web applications will do much more than make the nightmarish drop/add procedure a thing of the past. Instead, Web applications will strengthen the growing view that information technology is a strategic investment, and one on which the future of higher education depends.

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