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Susan LaCour

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Most educators accept the premise that, in an ideal world, learning would be delivered in the manner and environment that best suit the needs and learning styles of individual learners. In the future, technologies like personalization, integration, and electronic portfolios will progress toward this ideal by broadening the learning universe.

These technologies will enable learners to have more control over how, where, and when they experience educational and professional development in pursuit of their individual goals. Learners of all ages and stages will be able to ask themselves, "Where am I now, and where do I want to go?" Their unique learning paths will blend different sources, including e-learning courses from virtual providers, e-learning courses from physical universities around the world, and on-campus courses at local community colleges. Learners also will be able to earn credit for their involvement with professional associations and for skills they acquire through employment and volunteer activities. Ideally, systems for standardizing and validating credit for all of these activities will develop, helping institutions and employers recognize and accept these credentials.

The foundation for this future, user-centric view of higher education is already in place today, built upon personalization, integration, and ePortfolio technologies.

Personalization and Integration in Higher Education Today

Personalization technology delivers information and resources that are tailored and pertinent to individual users. "Personalization," often used interchangeably with the term "customization," refers here to a "smart" digital campus that assesses what it knows about its users and then provides them with specific information, content, and layouts. This provision is usually accomplished through an enterprise portal that integrates various campus applications and leverages the vast data held in administrative systems.

The mechanics behind personalization are simple in concept, and its implementation is fairly straightforward—but it requires sophisticated technology to function at the highest level. Portal systems are built from the ground up to provide a personalization framework smart enough to link each user's attributes, such as enrollment or employment status, with the appropriate information and resources for that user. Varying the experience for each person based on his or her attributes, the portal also provides users with tools to proactively customize their experience to meet their own preferences. Highly personalized portal systems must be smart enough to keep track of these customizations on a user-by-user basis, which can amount to millions of different combinations of information, services, and access.

Integration platforms allow campuses to bring disparate systems, databases, and applications—including systems for course management and student services, databases for financial aid and alumni, and applications for housing and libraries—into one unified whole. Assisting institutions in leveraging common data and reducing system redundancies, integration technology provides user access to a host of services, information, and resources online through the portal. Because of these advantages, personalization and integration technologies have already proved popular in institutions of higher learning.

At SunGard SCT, nearly all of our customers have integrated their enterprise resource planning (ERP) systems and made the data and applications within them available to users via a portal. Many institutions have also integrated non-SCT applications—such as housing, parking, and library applications, as well as course management and other systems—to their ERPs to create a unified digital campus. Moreover,

integration is allowing institutions to share data with others *outside* the campus, such as other schools, third-party providers, and businesses. For example, today an institution can request prospective students' SAT scores (with their permission) from providers via e-mail, saving prospects the task of sending that information.

Although the enabling technology for personalization and integration is very sophisticated, it is not that difficult to implement. Much of the advanced portal functionality and underlying integration technology comes "out of the box." For example, an institution with average resources and IT sophistication can implement the SCT Luminis portal and integration technology within several months or even weeks.

One of our clients is the University of North Carolina at Charlotte (UNCC). This institution's personalization and integration portal, 49er Express, greets each student by name and displays the student's course schedule upon initial access. The portal then reminds the student of upcoming events and impending actions, such as the need to register for courses or pay tuition. Using a single logon, the student can access systems originating in various departments. An example of the benefits of integration coupled with the easy access of a portal, this system integrates what used to be stand-alone services and puts the user in the center. Because of this technology, students no longer have to visit different departments—physically or electronically—to obtain the services they need. Although UNCC had offered some Web-enabled student services for several years, the navigational ease provided by the portal has resulted in a 30% increase of user services.

A further use of personalization technology is targeted messaging, which allows institutions to "push" pertinent information to an individual or a select group of individuals. For example, UNCC's Student Health Services center targeted new freshmen in 2003 with a "get your immunization form turned in" message, resulting in increased traffic to that office. Another of our clients, Drexel University, uses personalization technology to send to its constituents—regardless of their location—time-sensitive information such as class cancellations, grades, financial aid awards, campus news, and other personalized announcements. During its testing phase in June 2002, DrexelOne Mobile, the university's wireless initiative, alerted a student employee who was scheduled to graduate in two days of a procedural hold placed on his records. Because the technology pushed this information to him instantly, he was able to address the issue in time to graduate with his class.

At Drexel and other institutions, security features make sure that only appropriate users can view and access personal information. Any system integrated through the portal is protected by a security structure that requires users to authenticate themselves based upon policies set forth by the institution. Data passed among systems is encrypted so that it is secure and private. Vendors continue to make advances in the areas of security and identity management to ensure that all of the information collected or transferred for an individual is valid, secure, and accessible only to appropriate users.

UNCC and Drexel understand that the mere expansion of resources and services available through an institution's portal does not meet the high expectations of students for service. Rather, these services and resources also must be personalized and relevant to each user, and the portal must push important information to each student. Otherwise, students might never find their way to resources that have the potential to enrich their academic and personal success.

Electronic Portfolios Today and in the Future

Now let us consider the power of personalization and integration technologies in conjunction with a complementary application: electronic portfolios. Today learners are using ePortfolios at institutions to store and present evidentiary files documenting their educational and professional growth. These portfolios can accommodate graphics, video, audio, and other electronic media as well as text-based information. During the educational experience, an individual and institution can use the ePortfolio as a repository for collecting and evaluating learning outcomes. Because ePortfolios can be centrally hosted (but are not limited to

centrally hosted services), they can be portable; thus learners can continue to build and make use of their portfolios outside institutional boundaries.

Learners are also using ePortfolios as evidence of competency when applying to graduate school or seeking employment. All of a student's work is stored in a controlled, secured, hosted environment. Security safeguards within the application allow the owner to control access; to make the online portfolio available to prospective employers or others, the owner simply sends the appropriate hyperlink to them by e-mail. In the future, individuals will expand the scope of electronic portfolios to document and communicate all of their performance achievements over a lifetime. To view a sample ePortfolio, click here.

Imagine a student soon to graduate from high school. He knows that he wants to attend a private university in the Northeast that offers programs in social work, counseling, and education, preferably one with an enrollment of fewer than 5,000 students. Today he can purchase a CD and search it with limited criteria—by enrollment, location, and program offerings. But this information alone does not tell the student where he is most likely to succeed. In the future, the process will be much more proactive. The student will release his electronic portfolio to universities that meet his defined criteria, thereby allowing those specific institutions to find him.

Meanwhile, admissions officers will have used Web recruiting and strategic enrollment management to identify the characteristics of prospects who perform well at their institutions. The officers will execute searches of available portfolios against the key criteria that they have identified for learner success. When the officers find a match, the institution will proactively contact the student to encourage him to apply; it will use communication that is tailored specifically to the student's interests and offer financial aid packages that yield greater returns on the institution's investment. Both parties benefit: The learner finds a good match for achieving his academic goals, and, in the long run, the university improves its retention rate and gains a successful graduate and satisfied alumnus. By having more information about and more insight into each other, an institution and prospect can make better fact-based decisions that result in success for both of them.

The potential uses of ePortfolios have already inspired critical endeavors. Batson considers how electronic portfolios could impact curricula and the certification of student work, and he argues that they "have a greater potential to alter higher education at its very core than any other technology application we've known thus far" (2002, paragraph 4). Organizations like the American Association for Higher Education and the National Learning Infrastructure Initiative have undertaken projects to identify challenges associated with electronic portfolios and to pave the way for further adoption.

Personalization and the ePortfolio in Government and Business

In the future, the adoption of personalization technologies and electronic portfolios will extend well beyond higher education to businesses, state governments, K-12 educational institutions, and others in the broader community. For example, the applications of these technologies could enable governments to distribute financial aid more wisely. Imagine that data indicate that a student with certain characteristics is more likely to succeed in the higher education environment if she attends a community college first. The student's financial aid award might be greater if she agrees to take this path. Personalization technologies thus could enable state entities to be more fiscally responsible while better serving their constituents.

Now let us apply these technologies to the corporate world. Suppose that a woman, Jennifer Smith, is looking for a new job. She has continually updated her ePortfolio to reflect her employment experience and professional affiliations. She logs on to a hosted site that gives her access to a national business directory, much like Monster.com. After identifying potential employers, she sends the appropriate hiring managers a secured link to her ePortfolio, without requiring them to request access privileges. The portfolio, compiled over a lifetime, provides current and prospective employers with a comprehensive view of Jennifer's skills, experiences, accomplishments, and credentials, all validated by the respective sponsors. (To offer such

validation, sponsors will have to agree upon and adopt a common set of definitions for standard competencies across various skill and knowledge categories.)

Meanwhile, corporations will be applying research and technology to identify the competencies that are essential for an employee to succeed in a given position. These traits might include demonstrated public speaking abilities, graphic design skills, persuasive writing skills, and involvement in a particular association. Employers will go online, search against the portfolios that have been made available on the hosted server, and then view those that match the criteria. They will be able to review video files, digital examples of graphic design, and sample documents that clearly convey each individual's skills. As an added benefit, the applicant will be able to see who has viewed her portfolio. Jennifer Smith and her future employer will have connected.

This future state is under way today in Europe. The European Institute for E-Learning is leading an initiative for all students to have a "transportable diploma supplement," which would contain an education overview and information on program qualifications, professional status, educational certification, and institutional affiliations. The European Centre for Higher Education also conducts research and exploration in this area. In the United States, Arthur E. Levine, president of Teachers College of Columbia University, has advocated the development of individualized learning technologies and documentation. He argues that our "nation will need to establish a central bureau that records each person's educational achievements—however and wherever they were gained—and that provides documentation. Such an educational passport, or portfolio, will record a student's lifetime educational history" (Levine 2000).

Challenges to the Future of Individualized Learning

Admittedly, there are impediments to achieving this vision. One technology challenge is the need for vendors to adopt standards that will enable more widespread application integration. As Clark and Shatkin argue, "The emergence of Web services technologies enhances the possibility of bringing divergent participants together; these technologies make the ad-hoc integration of data and computer applications invisible to users so that they can enjoy a more user-specific experience" (2003, paragraph 1 under "Development of CAM Resources").

There are nontechnology obstacles as well. A key challenge for institutions is overcoming the cultural mindset whereby departments and individuals act as silos, keeping information and control to themselves. A unified digital campus can break down these barriers, enabling communication throughout institutions.

In addition, there are obstacles to establishing accepted competencies for the widespread application and acceptance of ePortfolios. For example, higher education has not adopted a common set of definitions for standard competencies across various skill and knowledge categories. A logical extension of work already being done in K-12 and in business, this is also a complex task that requires input from many disciplines and adoption by diverse industries. Nevertheless, standard definitions must be developed to establish criteria for validating skills, experiences, accomplishments, and credentials and for communicating that information to employers and others outside of higher education. Similarly, businesses need to identify essential competencies that can predict employee success in a given position. Clark and Shatkin (2003) have already noted progress in these areas.

These challenges have inspired innovative initiatives because drivers such as the increasing use of technology and an understanding of its potential to improve service are so strong. "Technology" is no longer an isolated application limited to Fortune 500 companies. Instead, all of us use technology to some degree in our daily lives, and many of us are realizing the potential of emerging individualized learning technologies. Industry leaders are working today to exploit the potential of integration, personalization, and ePortfolio technologies to expand and enhance the learning experience and to contribute to an individual's success. In the future, when learners ask themselves, "Where am I now, and where do I want to go?" these three powerful technologies will provide them with access to the diverse sources and tools they need to expand their educations, document their learning, and achieve their individual goals.

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