Evolution of Web-based distance learning strategies

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Abstract
Strategies for implementing distance learning coursework have evolved and expanded with the growth and maturation of the World Wide Web. The requirements, advantages, and disadvantages of the most common strategies are compared and contrasted. Initially limited to individual efforts, software development has eased the burden of individual faculty and has opened up strategies for greater participation. Institutions attempting large-scale implementations, however, may find infrastructure requirements overwhelming. An emerging large-scale strategy involves an institutional partnership with a for-profit application service provider (ASP). The ASP specializes in total systems solutions for developing and delivering Web-based distance learning programs. Recent experiences at California State University, Fullerton, with an ASP are discussed.

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Introduction

The United States Distance Learning Association's (USDLA) Web site currently defines distance learning as, "the acquisition of knowledge and skills through mediated information and instruction" (United States Distance Learning Association, 2000). While not new, the growth of distance learning offerings has increased significantly over the past five years. Lewis *et al.* (1997), in a National Center of Education Statistics (NCES) report, stated that an estimated 25,730 distance education courses were offered by higher education institutions in academic year 1994-1995. The primary delivery modes were two-way, interactive video and one-way, pre-recorded video. Lewis *et al.* (1999), using the latest NCES survey, revealed that by academic year 1997-1998 this number jumped to 54,470. As an indication of the rapid change in delivery modes, the term "Internet-based technologies" was absent from the 1997 NCES survey and prominent in the 1999 NCES survey. The 1999 survey revealed that asynchronous and synchronous computer-based instruction were primary modes of instruction for some courses at 58 and 19 percent of institutions respectively. A major finding of the 199899 information technology survey of the National Association of State Universities and Land-Grant Colleges (NASULGC) (1999) was that two-thirds of NASULGC institutions reported collaborating with business/industry, government/communities, other higher education institutions, or other organizations on a "virtual university" or an IT-supported distance-learning project.

The rapid expansion of distance learning has placed pressure on faculty to deliver effective courses, although the efficacy of distance learning has not been proven conclusively. For instance, The Institiute for Higher Education Policy (1999) reports that there is a relative paucity of true, original research dedicated to explaining or predicting phenomena related to distance learning. In addition, they report that the overall quality of the original research is questionable and thereby renders many of the findings inconclusive. Faculty are still expected to jump on the distance learning bandwagon. A National Education Association (NEA) (2000) poll of more than 400 distance learning instructors indicated that more than half of distance learning faculty spend more hours on their distance learning course than traditional classes. In spite of this, 84 per cent do not get a corresponding reduction in workload, and 63 per cent are compensated for their distance learning course as if it were part of their normal course load. Berg (2000) supports this observation by concluding that there is a tendency towards treating distance learning courses as regular load for faculty and in not including a royalty structure in these agreements.

The need for faculty buy-in to distance learning is crucial. The NEA poll (2000) found that three-quarters of the respondents hold positive feelings about distance learning, compared to only 14 per cent who hold negative feelings. Still, it is necessary to assist the faculty in course development and delivery. The Campus Computing Project (1999) survey concluded that assisting faculty efforts "to integrate technology into instruction" remains the single most important information technology (IT) challenge confronting US colleges and universities over the next two to three years. This need is supported by "how-to" guides such as Boettcher and Conrad's (1999) *Faculty Guide for Moving Teaching and Learning to the Web* and Yoakam *et al.*'s (1999) *Distance Learning: A Guide to System Planning and Implementation*. Boettcher and Conrad provide faculty and administrators with a set

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of practical guidelines for implementing Web-based learning in post-secondary institutions. Yoakam *et al.* present a comprehensive look at three critical components of a distance learning system: technology systems, instructional systems, and management systems.

A key observation regarding these guides is the increased importance of institutional commitment. The financial investment in information technology, according to the NASULGC (1999), currently equals about 5 per cent of a member university's operating budget (with a maximum of about 11 per cent). Distance learning has evolved beyond simple delivery systems and into the business mainstream. Hanna (1998) identifies and classifies new organizational models that have emerged in the era of digital competition. These involve traditional universities, extended traditional universities and distance education/technology-based universities. Of particular interest is the emergence of university/industry strategic alliances. *Syllabus Magazine* (2000), in buyer's guide, lists 13 online course delivery and development tools that offer enterprise, or near enterprise solutions. Also listed are six Web development tools to assist in the creation of interactive Web sites.

These major implementation tools are only a few years old. They coincide with the growth of the Internet and the World Wide Web. This paper looks at how the Web-based strategies for distance education have evolved, from pioneering efforts less than ten years ago, to the current direction of large-scale implementations involving university/industry alliances. Insights are provided by examining the experiences at California State University, Fullerton. These observations are likely indicative of the trend and direction of Web-based distance learning.

Web-based distance learning implementation strategies

Multiple strategies exist for implementing distance learning coursework. Factors impacting these strategies include course development, course delivery, computer network connectivity, and the degree and quality of student and instructor support. Course delivery includes issues of remote student interaction with faculty via video, audio, computer, etc. Network connectivity deals with network configurations, transmission speeds, and other technical details. In this context support is related to both time concerns (e.g. is there someone there who can help me?) and technical issues (e.g. why can't I log in?). Table I classifies the "level" of effort invested in implementing a distance learning course. Each level requires the involvement of different participant resources; each would employ different course development processes; and each requires different degrees of technical infrastructure and support (connectivity and student support). Qualitative terms of low, medium, and high are used for each of these factors to provide a point of reference for total labor hours invested, level of technical complexity and organizational commitment.

The *ad hoc* development process typically entails the use of basic tools such as HTML editors (hyper-text markup language for Web pages), or more advanced software packages such as FrontPage, a Microsoft Web site creation and management tool. These tools became available when the Internet went graphical with the advent of browser technology circa 1995. Web page construction software has continued to improve in capabilities and user friendliness; archaic commands and editing are no longer needed. The category, Purchase/license/utilize course development systems includes the use of Web-based learning tools such as WebCT (http://www.Webct.com/) or Blackboard (http://www.blackboard.com/). These systems, developed around 1997 by faculty at the University of British Columbia and Cornell University respectively, enable non-technical instructors to produce online courses without much concern for the technical underpinnings of the systems. As well, they provide a self-contained and well-defined Web-based learning environment that developers using *ad hoc* processes would otherwise have to invent themselves. Both these tools were available to develop and deliver Web-based distance learning courses long before for-profit companies adopted them for distribution to a much broader higher education marketplace. In Fall 2000, Blackboard released an enterprise edition that serves as an application service provider (ASP).

The complete outsource development/ASP process evolves when institutions partner with for-profit companies (ASPs) for assistance in identifying the market, training their instructors, developing their courses, hosting their programs, evaluating their progress, and reporting on the status of the systems. An example of such a vendor is Connected Learning.Network (http://connectedlearning.net/). These companies are only a few years old (circa 1998), and fulfill an important and growing segment of the distance learning market.

Table I
Implementation strategy factors vs. level of effort

Factor	Level of effort: Low	Medium	High
Participant	Individual instructor	Team of instructors	Institution
Process (availability)	*Ad hoc* development (1995)	Purchase/license/utilize course development systems (1997)	Complete outsource development/ASP (1999)
Connectivity (availability)	Personal PC/server (1985)	Network (1989)	Full Web hosting (1996)
Student support	Class/office hours	9 to 5	24/7

The simplest level of connectivity has an instructor using his or her own desktop PC as a server. Bulletin boards and e-mail capability have existed on mainframes for decades. Using a PC as a server requires some degree of digital communication capability. Limited capabilities were available in the mid-1980s. The simplest level of student support results when an instructor is involved in all aspects of communication with students by being available at designated times for interactions, and perhaps communicating via e-mail. "Network" connectivity might involve a school server maintained by instructional staff during normal business hours. Widespread use local area networks emerged in the late 1980s. Student support would be available during business hours (typically 9a.m. to 5p.m.). The most sophisticated Connectivity involves a complete Web-hosted service that is maintained and administered on an around-the-clock basis by either an institution or an ASP vendor. Student support would then be available for 24 hours/day, and seven days/week (24/7). Mainframe support has historically been 24/7, whereas 24/7 on-line Internet support is relatively recent.

Selecting one level of effort option from each factor may identify basic implementation strategies. Of course, not every combination results in a feasible strategy. One infeasible option would be an individual instructor using *ad hoc* development with a network providing 24/7 support. Another infeasible option would be full institutional participation using a personal computer as a server. Some of the factors fit together naturally. For example, full Web hosting would normally be accompanied by 24/7 support; using a PC as a server would normally have limited support. By excluding the unnatural combinations, Table II provides five feasible implementation strategies.

Strategy 1 is typically associated with a pioneering instructor working alone. In strategy 2, the lone instructor learns of the availability of course development software/support and expands to a more secure/reliable network for connectivity and student support. For strategy 3, the individual instructor might convince colleagues of the potential of distance learning, and then develop courses collaboratively. These might be "core" courses, with many sections offered during the same semester/quarter. When an institution gets involved on a large scale, strategies 4 and 5 emerge. At this level, connectivity and student support must expand to a complete 24/7 environment. With strategy 4 the institution will likely need to offer some faculty support for development of courses as well as administration of ongoing courses. A mix of institutional and ASP faculty support accompanies strategy 5.

Table III lists some of the requirements, advantages, and disadvantages for the strategies defined in Table II; Table IV summarizes the general characteristics of these strategies. For example, with strategy 1 all aspects of course delivery rest with the individual faculty member. Not only does the instructor need to learn Web tools such as HTML or FrontPage and establish some sort of connectivity, but the instructor must also make informed choices regarding applications and modes of delivery. The intense learning curve does not guarantee a professional and educationally sound experience for the students. When the individual instructor moves on to strategy 2 there is less emphasis on the nuts and bolts of course development and connectivity, but there is still a learning curve for mastering the course development software. Some assistance for using school servers/networks is needed, and budget for licenses and other support must be obtained. If there is an expectation of evolving course offerings to an institutional level, another concern is the scalability of the developed courses and connectivity to a full Web-hosted environment. Strategy 3 is quite similar to strategy 2. A team of instructors developing a multi-section course will most likely gain from their collaborative efforts (but not

Table II
Feasible implementation strategies

Strategy	Participant	Process	Connectivity	Student support
1	Individual instructor	*Ad hoc* development	Personal PC/server	Class/office hours
2	Individual instructor	Purchase/license/ utilize course development systems	Network	9 to 5
3	Team of instructors	Purchase/license/ utilize course development systems	Network	9 to 5
4	Institution	Purchase/license/ utilize course development systems	Full Web hosting	24/7
5	Institution	Complete outsource development/ASP	Full Web hosting	24/7

Table III
Strategy requirements, advantages and disadvantages

Strategy	Requirements	Advantages	Disadvantages
1	Learn Web development tools; Web tool selection	Customization; forced learning for instructor	May not be: technically professional; educationally sound
2	Learning curve needed to utilize existing structures/ templates; host server selection	Produce online courses without much concern for the technical underpinnings of the systems	Site license may be required; scalability to institutional servers
3	Learning curve needed to utilize existing structures/ templates; host server selection, professional instructional design support for faculty?	Synergism; produce online courses without much concern for the technical underpinnings of the systems	Blind leading blind; site license may be required; scalability to institutional servers
4	Professional instructional design support for faculty; startup and maintenance funding; requires established information technology organization	Widespread usage; consistency; improved course design	Site license required; institutional servers needed; institutional commitment needed; budget constraints
5	Budget; instutional infrastructure	Full service provider; wide-spread usage; universal acceptance	Legal partnership required; institutional servers needed; who is in control?

always). Some institutional design support might be needed, necessitating the establishment of a faculty development organization with all the associated commitment and resource allocation issues that accompany such a step. Once strategy 4 is adopted, there has to have been a management decision to expand to the institutional level. Funding is needed for startup and maintenance; a professional information technology (IT) unit is needed; and faculty development support is essential. Course design and delivery consistency should improve, and overall participation will likely increase rapidly. The burden of providing full support, however, may overload an institution. At this point strategy 5 might be adopted. A formal agreement with an ASP is a natural transition, and many of the support issues are offloaded to the ASP. While participation might increase, there may be institutional concerns for quality control and whether or not the goals of the institution are being met.

Case study of distance learning implementation – California State University, Fullerton

California State University, Fullerton (CSUF), located in Southern California (near Disneyland) is one of 23 universities

Table IV
Summary of strategy characteristics

Strategy	General description	Overall comments
1	Individual initiative	Low budget and small scale; initial entry into distance learning
2	Individual effort using established professional course development tools	More flexibility and greater return on investment; software publisher hosting might be used; site license may be required
3	Group effort using established professional course development tools	Same as strategy 2 with added synergism
4	Institutional commitment to use and support established professional course development tools	Major institutional information technology infrastructure and budget needed; major acceptance/utilization; may become burdensome
5	Institutional partnership with outside vendor	End-to-end support; unlimited potential; requires careful oversight

in the California State University (CSU) system. There are approximately 27,000 enrolled undergraduates and 1,700 full, and part-time instructors. At CSUF in January 1997, there was not a single course or partial course being offered on the World Wide Web (WWW.) By November 1997, two early-adopter instructors had adopted strategy 1 (using FrontPage) and strategy 2 (using WebCT) to deliver supplemental course information on the WWW. At about the same time, the university underwent some minor reorganization wherein a new function, the Faculty Development Center (FDC) was created. The FDC's mission was twofold; first, to promote the use of effective technology in teaching and learning, and second, to promote the principles of assessment in student learning outcomes throughout the university.

In order to actualize the first mission, the FDC site-licensed WebCT and developed plans and programs to promote its use among faculty – strategy 4, described above. Within 12 months, the rate of adoption and use of WebCT exceeded the FDC's wildest expectations. A drawback to WebCT's increased adoption, however, was the perception of many instructors that the product was too complex for their needs. Accordingly, the FDC site-licensed Blackboard – a system that is more functionally limited but, at the same time, easier to learn and use. By the Fall 1999 semester, more than 300 instructors, using these tools, had built more than 400 course Web-based supplements to their courses.

By the Spring 2000, the demand for training and support for Web-based instruction began to soar. In a survey of faculty conducted at that time, more than 600 instructors had integrated Web-based technology into 720 courses, affecting almost 20,000 students! In order to capitalize on the popularity of Web-based instruction as well as on the economics of reaching physically remote learners, the Department of Nursing and the College of Business and Economics both approached the FDC for assistance in developing and delivering complete, multi-course, Web-based degree programs. These requirements were simply more than the FDC could handle with its relatively limited resources.

Rather than dismiss these opportunities, it seemed that it was time to adopt strategy 5, described above. That is, instead of attempting to develop and support this extensive set of needs internally, it was decided that perhaps it would be wiser to consider outsourcing the projects in their entirety (Tsichritzis, 1999). Thus, FDC began to investigate the availability of ASPs which specialized in total systems solutions for developing and delivering Web-based distance learning programs. Consequently, the company, Connected Learning.Network, was contacted to discuss the needs of these programs and to seek ways in which CL.N could provide turnkey solutions.

Since most of the students expected to enroll in the two Web-based CSUF degree programs would not be "regular" undergraduate students, a separate student administration system was required. This student administration system (for enrollment and fee collection) had to be consonant and not interfere with existing policies and procedures for student registration and fee collection. Also, since students enrolled in these programs would

be remote and not be required physically to visit the campus, it was essential for the courses to be instructionally sound and completely self-contained. Connected Learning.Network could provide the instructional design and support systems needed to address this population. It could help the institution develop the right type of programs to meet the needs of these unique populations. Furthermore, Connected Learning.Network could do all of this at an extremely competitive cost.

In order to test the viability of using an ASP, one of the authors worked with Connected Learning to develop two online undergraduate business courses. Through Spring, 2000, a College of Business and Economics course, MSIS310 Systems Analysis and Design, was converted from a Blackboard-supplemented traditional course, to a completely online course delivered by the Connected Learning system. During the Summer of 2000, another course, MSIS410 Internet Resources Management, was created using the same ASP resources. MSIS310 was delivered to two undergraduate classes in the Summer of 2000. MSIS410 will be delivered to a cohort of US Army engineering students enrolled in the University's MBA level, Information Resources Management Certificate Program. While it is not the purpose of this paper to report on those experiences, it is worth noting that the expectations of service provided by the ASP have, to date, been more than met. For instance, the day before the start of CSUF's first Summer Session fell on Memorial Day, a day where all campus services were unavailable. A problem necessitating a call from the instructor to the ASP 800 number support arose and immediately was resolved. On another occasion, the instructor sent the ASP computer files containing streaming audio, and the ASP support fine-tuned the sound quality in three days. As a final example, the instructor sent the ASP 12 online/annotated tests. Each test contained 30 separate items with links to answers and related material. Within five days, the ASP made the tests available online. In addition, the instructor noted that most student contacts were content related instead of support questions. It is unlikely that the same level of instructional support would be available from the university's own help desk.

Conclusions

The delivery of instruction via distance learning is becoming an increasingly popular alternative to traditional instruction. Initial Web-based implementation strategies relied on relatively low-level technology and the initiatives of individual faculty. As technical capabilities increased, software developers were able to provide more user-friendly interfaces and capabilities. These tools are somewhat complex and burdensome to deploy. Most recently, institutional partnerships with application service providers have emerged. These ASPs provide 24/7 support for both students and instructors. They also reduce the strain on the institutional information systems infrastructure. The experiences of California State University, Fullerton, described in this paper are not unique to that institution. Other institutions adopting Web-based learning technologies may benefit from the case study of CSUF's evolving implementation strategies.

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