ONLINE LEARNING IN HIGHER EDUCATION: NECESSARY AND SUFFICIENT CONDITIONS

CHER PING LIM
Nanyang Technological University, Singapore

ABSTRACT

The field of online learning is an ever-improving art and science. It has the potential of allowing students to access up-to-date information anywhere and anytime, promoting active and independent learning, and supporting communication between experts and novices. This paper aims to explore the necessary and sufficient conditions for successful integration of online learning in higher education. The paper first discusses the software, hardware and financial commitment necessary for online learning. It then emphasizes that the sufficient conditions for effective online learning is a paradigm shift in learning to build a learning culture, mediated by a strategic plan that integrates online learning to enculturate students to be lifelong learners.

The spectacular development of information and communication technologies (ICT) through the Internet has provided opportunities for students to explore the virtual world of information. It provides them with the tools to point and click their way around the world, visiting different places, collecting information, experiencing visual and auditory stimulants, communicating with others anywhere and anytime, taking a peek into the future, and extending their intellectual world beyond the walls of the campus. Higher education institutions are expected to acquire and integrate these network technologies to enculturate their students to be lifelong learners – to learn how to seek out new information, think critically and show initiative to meet up with the challenges of the fast-changing world.

Studies on online learning have shown that the Internet provides a springboard for successful enculturation of lifelong learning in higher education institutions [1, 2, 3, 4]. In this paper, online learning is defined as the asynchronous or/and synchronous facilitation of learning over the Internet to students' and faculty members' computers. Online learning has the potential of allowing students to access up-to-date information anywhere and anytime, promoting active and independent learning, and supporting communication between experts and novices [5]. Attracted by these opportunities, many education institutions have focused on the technological challenges of buying the right courseware, getting

enough bandwidth allocated to online learning, and obtaining state of the art online learning tools.

However, such hardware, software and financial commitments are only the necessary conditions for successful online learning. This is especially evident when we explore the four characteristics of online learning:

1. Online learning is about the learning processes mediated by network technologies;
2. Online learning is about making possible successful knowledge management to leverage upon the intellectual capital of the learning environment;
3. Online learning is about harnessing the strengths and addressing the weaknesses of network technologies to create a conducive learning environment;
4. Online learning is about providing the interactions among the students and their communities to build and share knowledge [6].

Internet technologies do not exist in isolation; they are interwoven with the rest of the tools, and participants in the learning environment. The strategies for successful online learning in education institutions must focus on the whole configuration of events, activities, contents, and interpersonal processes taking place in the context that online learning is carried out. The purpose of the paper is to identify and discuss the necessary and sufficient conditions for successful online learning in higher education. It first discusses the software, hardware and financial commitment necessary for successful online learning; followed by an exploration of the sufficient conditions for successful online learning that include a paradigm shift towards building a learning culture, mediated by a strategic plan that integrates online learning to enculturate students to be lifelong learners.

THE NECESSARY CONDITIONS FOR SUCCESSFUL ONLINE LEARNING

When considering the necessary conditions for successful online learning, higher education institutions are faced with the challenges of ensuring quality, access and cost efficiency [7]. Quality is an important issue for all educators and it includes the pedagogical strategies and established evaluative instruments to ensure the quality of learning. The issue of access poses the challenge of students' and faculty members' access to required technologies that include up-to-date computers, required software, the Internet, e-mail, and adequate bandwidth connections. In addition to technology access, successful online learning requires skill access by students and faculty members to effectively use the technology. Along with quality and access, the cost of delivery is also a sizeable issue. Delivery costs need to be clearly outlined so that efficient and effective plans are in place to anticipate hidden costs such as licensing, support services and maintenances.

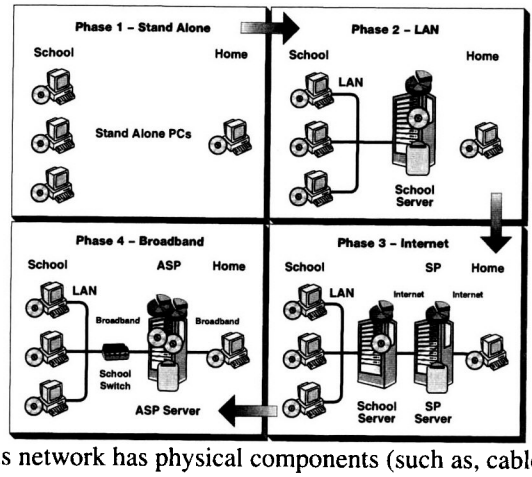
Basic Infrastructure to Deliver Online Learning

Keeping in mind the challenges of quality, access and cost efficiency, the basic infrastructure to deliver online learning include: (1) appropriate basic tech-

nologies of servers, wiring, LAN connections, computers and software; (2) computer support personnel; and (3) software licensing [7]. This basic infrastructure must serve the following characteristics of a good campus network [8] that satisfy the necessary conditions for successful online learning:

- The campus network reaches every place on campus where faculty members and students live, work and learn. These include offices, classrooms, lecture halls, laboratories, studios, libraries, student and faculty residences, and student activity areas.
- The campus network provides a seamless interface to on-campus Intranet and to off-campus locations and resources, such as the Internet. This also applies to a seamless interface between protocols used on Intranet and Internet. Sim (2003) identifies four phases of educational technology roadmap: Stand-alone, local area network (LAN), Internet and broadband (Figure 1) [9]. Eventually, the campus network should achieve phase 4.

FIGURE 1. FOUR PHASES OF THE EDUCATIONAL TECHNOLOGY ROADMAP



- The campus network has physical components (such as, cables, junction and termination boxes, fiber hubs, routers and wiring closets) that meet defined institutional standards, provide for modularity and expendability, and are well-documented and mapped.
- The campus network provides easy access from any connection point to all information pools, including the Internet, library resources, online courses, specialized departmental resources, electronic media collections, and institutional databases.
- All faculty and students use the network fluently as a natural and integral part of their communications and information exchange activities, as well as teaching and learning activities.
- The campus network is under a funding program in the institution that covers continual growth of the network and replacement of functionally obsolete equipment. The network management structure includes appropriate staffing, budgeting, control and security systems.
- The campus network is considered a strategic asset by the institution.

In order to equip themselves with the abovementioned basic infrastructure, education institutions need to commit themselves financially to three types of funds: capital funds, support funds and maintenance funds [8]. Capital funds are generally used for acquiring appropriate basic technologies of servers, wiring, computers and software. Support funds include the operating budget for the ongoing support of network components and services such as personnel costs, license fees, and Internet line charges. Maintenance funds are required to replace damaged worn out or functionally obsolete networking equipment. In the United States in 1998/99, the typical replacement cycle for computers was three to five years, for central servers three to four years, and for network electronics, five to six years [10]. Therefore, educational institutions must commit themselves to provide a regular, consistent, predictable source of funding, not just a one-time budget infusion to lay cables.

Developing Online Learning Materials

Course development for online learning is labor intensive. Cyrs (2000) claims that interviews with faculty staff members show that preparing a quality course for online delivery takes four to five times longer than does a traditional course [11]. In the case of online learning, faculty members normally begin working on the course material approximately three to six months in advance. If this planning and development do not occur, there is risk of producing low quality content with minimal student interaction and achievement. Even with the time of faculty members funded for development, it is unrealistic to expect them to do it all. According to Cyrs (2000), faculty members need the services of instructional designers, computing and technical services, training in hardware and software use, graphic design and editing, and help from content experts [11].

Development of courses in an online environment requires a blending of course content and technology expertise. Even if a learning and management system (LMS) that is template based is adopted, faculty members still need the support of instructional designers who facilitate technically and pedagogically the online learning course development. Economies of scale will exist once a faculty member who has experiences in online learning pedagogy and technology begin using his/her experiences to create subsequent courses. Scalability is especially noted in online learning development, whereby technologies are used to take over the mundane tasks. For example, by using a LMS package, a faculty member can rely on the technology for grading of tests, reporting of grades, and group announcements [7]. Moreover, as the number of online learning courses increases, software applications and efficiencies may become more notable. Most software companies provide financial incentives directly proportional to the number of licenses purchased. There are also other efficiencies that may be due to increased faculty members' and students' experiences with online learning.

McDonough, Strivens and Rada (1994, p. 336) state that the "... development of computer based training is often expensive in terms of both time and money and all researchers agree that to be viable it must achieve high student usage ... High student usage should still be possible if the courseware is easy to cus-

tomize and reuse elsewhere" [12]. This suggests that to develop a sustainable individualized interactive learning revolution, online learning materials have to be designed and developed to be transferable to other platforms. Without this ability, faculty members may be doomed to continuously re-develop their materials with each change in hardware and software platform or educational approaches [13].

THE SUFFICIENT CONDITIONS FOR SUCCESSFUL ONLINE LEARNING

After considering the necessary conditions for successful online learning, there is a need to formulate a strategic plan to build a learning culture within the education institution. This will constitute the sufficient conditions that include a shift in the paradigm of learning, mediated by a strategic plan that situates online learning to stimulate students to be lifelong learners.

Shifting the Paradigm of Learning to Build a Learning Culture in Education Institutions

Although the institution is the centre of change, Bennis (I 989, p. 147) points out that "the sociology of institutions is fundamentally antichange" [14]. Institutions carry with them long histories and habitualized ways of approaching new demands. For the case of Internet technologies in education institutions, they may be merely bolted-on to existing classroom teaching and learning activities, leaving the traditional curriculum, learning objectives, teaching strategies and student learning activities more or less intact. For example, from textbooks to online textbooks, or from Powerpoint presentations in class to Powerpoint presentation via the Internet (complete with audio and video). The learning medium may have changed, but the learning paradigm that the medium is situated in remains the same. The learning paradigm adopted by the Powerpoint presentations of certain concepts in the classroom may be a cognitivist one, where learning is associated with the transmission of knowledge. The same paradigm may be adopted when the same Powerpoint presentations are made available online.

Such situations are a common occurrence in higher education institutions. Faced with pressures to adopt online learning, administrators and faculty may deal with the situation in terms of the existing paradigm. Paradigms are well-accepted sets of rules that lay boundaries for our thinking, and provide a set of guidelines for problem solving within those boundaries. The existing paradigm may serve as a filter, preventing education institutions from experimenting with approaches that are contrary to prevailing wisdom [15]. Human beings have a tendency to maintain order and control in their lives that many will unconsciously alter innovations to fit into their existing ways of doing things.

Therefore, there must be a shift in the paradigm of learning in education institutions. Learning is a continuous, cultural process and not simply a series of lectures or tutorials. The basic idea is expressed in the 'general law of cultural development', where Vygotsky (1978, p. 57) proposes that cognitive function

appears "twice, or in two planes. First it appears on the social plane and then on the psychological plane. First it appears between people as an interpsychological category and then within the individual child (learner) as an intrapsychological category" [16]. Learning is the appropriation of a particular way of thinking (for example, thinking like a scientist or economist) where students learn through participation in joint activities [17]. It encompasses more than education and training; it includes broad-based experiences from interactions and exchanges among students and with teachers when undertaking a learning task or project.

Such a shift in paradigm ensures the openness of educational institutions and their participants to new ideas, as well as enables them to understand and accept the need and opportunity to change. With a shift in paradigm, educational institutions can then begin to build a learning culture; one that encourages knowledge generation and sharing, supports an atmosphere of learning from mistakes, and assures that what is learned is incorporated into future activities, decisions, and initiatives of the students. With such a culture in place, it is then more likely that online learning will be successfully carried out in educational institutions. Therefore, educational institutions need to design and carry out learning activities that reflect acceptance of and relevance to the students' world: Firstly, engage students in challenging yet personally meaningful problems. Secondly, embed basic skill 'instruction' in a broader and more authentic problem-solving context. And thirdly, draw on students' conceptual and cultural world of experiences [18].

Developing a Strategic Plan that Mediates the Shift in Paradigm Towards a Learning Culture

From the above discussion, it is clear that educational institutions need to view online learning as providing a unique opportunity to redefine themselves and their role to enculturate students to be lifelong learners. It is at the institutional level that programs are put into operation, changes get introduced, and policies get translated into programs and activities. The challenge for educational institutions then will be a willingness to consider the ways in which Internet technologies can provide better learning opportunities. In order to respond to this challenge, educational institutions need to develop a strategic plan that mediates the shift in paradigm towards a learning culture.

A strategic plan involves "the process by which the guiding members of an organization envision its future and develop the necessary procedures and operations to achieve that future" [19]. Envisioning is a process by which individuals or groups develop a vision of a future state for their organizations that is both sufficiently clear and powerful to arouse the actions necessary for that vision to become reality. For example, the vision statement of an educational institution, with respect to online learning, might be: "The integration of online learning in the educational institution supports the enculturation of students to be lifelong learners in a knowledge-based society." This vision has to be shared by all members of the institutional community. Successful envisioning breaks the existing paradigm by testing it and moving outside one's usual assumptions.

However, to avoid a misalignment between culture and vision, there is a need to conduct a culture audit. The culture audit is a focused effort that involves the simultaneous study of the educational institution's internal strengths and weaknesses that may positively or negatively affect the educational institution in its efforts to achieve the desired future [20]. It assesses the level of resistance to change, and whether it is spread uniformly throughout the institution or lies in pockets associated with specific faculty members' or students' characteristics and roles [21]. It will definitely be painful for some members of the educational institution, but it is a critical issue of strategic planning that must be tackled.

After the cultural audit, there is a need to develop a specific operational plan for each organizational element – namely organization, operations, human resources and financial. These unit plans that have been separately developed are then knitted together into a seamless whole [19]. The operational plan may incorporate re-engineering efforts, academic program changes and administrative support re-alignments. These action plans, grounded in a realistic assessment of the current state, with an equally acute vision of the future goals, become the new strategy and conceptual framework for the integration of online learning in the education institution.

For example, the cultural audit may serve as a platform that allows faculty members to re-examine both their roles and their students' roles in the classroom. By reflecting on their own strengths and weaknesses and their students', faculty members are then more likely to become fellow learners rather than authoritative experts, and guides rather than information dispensers in the online learning environment. While faculty members who prepare the online activities may determine what is learned, students have substantial control over the rate and style of learning. This cultivates a learning culture dominated by the search for explanation, justification and proof of various concepts and theories discussed.

With this shift, the faculty members' professional development needs have to be continually assessed. When there is professional development in the design of online learning environment, time to practice with and apply technologies, and opportunities to learn, share and collaborate with colleagues, faculty members are then more likely to integrate network technologies successfully into their courses. Therefore, an action plan for professional development and support of faculty members need to be in place within the overall strategic plan.

The success of the strategic plan depends on the creativity and energy to develop the plan, the courage and commitment to introduce it, and the persistence and thoroughness to see it through to its implementation. However, implementation is not the final phase of strategic planning; it is an ongoing process throughout the other phases. There is always a danger that education institutions may exhibit 'bureaucratic' tendencies that may undermine the very potential of Internet technologies to do old things differently and new things altogether [22]. Therefore, educational institutions must continually monitor both the internal and external environments that may threaten the successful implementation of their strategies.

CONCLUSION

This paper has discussed the necessary and sufficient conditions for successful online learning in educational institutions. The necessary conditions include the hardware, software and financial commitment to ensure a good campus network that will support online learning. The sufficient conditions highlight the need for a paradigm shift in learning to build a learning culture in educational institutions, mediated by a strategic plan. These two sets of conditions ensure the important alignment between strategy and Internet technologies grounded in the particular educational concerns of the institution. The conditions discussed here, however, are to be treated as tentative guides that provide issues for readers to think about the situations they are in.

I'll end this paper with the following quote: 'When the wind changes, the cynic complains about the wind; the idealist expects the wind to change; but the realist shifts the sail accordingly to optimize the potentials of the wind'. To enculturate our students to be lifelong learners requires us, in higher educational institutions, to be realists, who share the vision of taking up the unique opportunities of online learning and formulating successful online learning strategies for our educational institutions and society.

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Direct Reprint Requests to:
Cher Ping Lim
Learning Sciences and Technologies
Center For Research in Pedagogy and Practice
National Institute of Education
Nanyang Technological University
1 Nanyang Walk
Singapore 637616