THE BENEFITS AND LIMITATIONS OF E-LEARNING IN UNIVERSITIES*

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Abstract

This paper analyzes the current state and the problems associated with e-learning, in universities or other educational institutions. E-learning can meet the demands of people who want to learn and earn a degree/academic qualifications without the restrictions of time or distance. Improving information technology (IT), including internet and media instruments enables universities to provide opportunities to people who want to take e-learning courses. However, there also seem to be problems connected to e-learning. In fact, some universities are withdrawing from e-learning education and certain companies are also quitting the business. Competition among universities has been very severe. In some countries, for example Japan, e-learning is not so popular because of distance and/or language. Furthermore, in countries like Japan, people can go to universities easily without any time, language, or distance problems. For these reasons, teachers' quality and the quality of content of e-learning education seem to decrease according to some studies. This tells us that the future of e-learning is not necessarily bright.

1. Introduction

This paper analyzes the current situation and the benefits and problems associated with e-learning, mainly in universities. E-learning can meet the needs of individuals who want to learn and earn a degree or

other type of academic certification without being limited by time or distance. In the United States, the proportion of e-learning courses is as much as 63% (The Campus Computing Project, 2002); thus, many people are learning using this system. In other countries, there is strong movement toward introducing e-learning.

There also seem to be problems connected with e-learning. In fact, some universities are withdrawing from e-learning education, and some commercial companies and institutions are also quitting the business. In recent years, the competition among universities has been severe, so the fees are low. Many universities, if they have e-learning courses, provide them without regard for profit.

This paper is structured as follows. Section 2, which follows immediately, explores the current e-learning situation all over the world including cases from Japan. Section 3 presents advantages and disadvantages of e-learning and suggests some ways to make e-learning successful. Section 4 discusses problems associated with the development of e-learning systems. Finally, the conclusion summarizes briefly the issues explored and presents ideas about the next steps in developing e-learning environments that will maintain the benefits of the person-to-person contact of the traditional classroom while making higher education available to many more citizens here in Japan and worldwide.

2. Current Situation

Economy is changing all over the world in many and various fields, and the development of information technology (IT), or e-learning is a part of that change. There are a number of differences between the traditional economy and the situation we find ourselves in when we enter the e-economy. These differences, as described by Oblinger (2002), are shown in like Table 1.

Table 1 Traditional Economy and e-Economy

Traditional Economy	e-Economy
Stable, predictable	Free-for-all
Rely on geography	Movement
Protect market	Cannibalize market
Averse to failure	Failure is expected
Economies of scale	One-to-one
Positioning	Value migration
Long-range	Real-time-execution

Note) Oblinger (2002)

IT has changed our world dramatically. In the field of education, IT has provided us with a rich set of new tools. We use IT for visualization, simulation, communication and collaboration. It is indispensable not only for teaching but also for research and public service in universities and other educational institutions.

Many universities worldwide have introduced IT. Most often they use it because it provides for greater effectiveness and efficiency. For example, using IT allows us accurately and rapidly to tabulate experimental results. IT can also be used to create a competitive advantage or to expand markets. E-learning provides higher education with important opportunities for innovation in teaching and all aspects of communication. E-learning is the delivery of content via electronic media, including the Internet, Intranet, extranet, satellite broadcast, CD-ROM, and Video.

Overall, the demand for post-secondary education is predicted to grow in coming years. A large part of that demand may be met through distance learning because of the types of student involved (e.g., older students), the need for flexibility, and the lack of adequate physical facilities to match the growth of the traditional undergraduate university student populations (18 to 22 years of age). Many universities already need to

Table 2 E-learning Settings and Technologies

Format	Real-time examples	On-demand Examples
Lecture	Live streaming	Video on demand
Seminar	Teleconference or audio-conference	Bulletin board, e-mail, chat room
Cooperation among students	Teleconference or audio-conference	Bulletin board, e-mail, chat room
Individual learning		Web based training

serve more students than their facilities can accommodate. Yet, they need to expand access to meet the education and training needs of citizens and corporations as well as to provide education to the under-served population. They are also being challenged to rapidly adapt in a more competitive environment. In Japan, as in other countries, this expanded need for higher education is beginning to put pressure on universities to develop e-learning programs. The e-learning environment is fluid and ongoing. Not all the students have many ways of learning through individual study, cooperative work with other students, and direct contact with instructors. Learning experiences are not always available in both real-time and on-demand setting (Table 2).

In general, e-learning is predicted to grow. If one looks at some U.S. colleges and universities that have developed aggressive e-learning programs, the growth rates range from 200% (Penn State's World Campus) to 1,000% (University of Maryland's University College). The number of non-traditional providers is increasing as well. In 1999, there were more than 5,000 competitors offering every imaginable method of e-learning. No single competitor accounted for more than 5% of the market. In the past year, more than 100 e-learning portals entered the education market (Oblinger, 2002). Many business investors believe that education has tremendous profit potential.

Table 3 Japanese Situation in E-learning

	National University	State University	Private University	Junior College	Specialized High School	Total
Questionnaire Sent	98	62	446	480	62	1148
Answered	46	16	150	101	23	336
Doing e-learning	29 (63%)	3 (19%)	19 (13%)	0 (0%)	1 (4%)	52 (15%)
Plan to introduce e-learning	8 (17%)	1 (6%)	22 (15%)	14 (14%)	7 (30%)	52 (15%)
Not Planning e-learning	9 (20%)	12 (75%)	109 (73%)	87 (86%)	15 (65%)	232 (70%)

Note) Japan Distance Learning Association (2002)

There are several management formats for e-learning in universities. Oblinger (2002) lists them as extension programs in traditional universities, not-for-profit subsidiaries, for-profit-subsidiaries, and virtual universities[1]. In Japan, an investigation by the Japan Distance Learning Association (2002) showed that more than half of the national campuses were engaged in distance learning programs that involved the use of e-learning, whereas the numbers of other categories of institutions engaged in such programs were small (Table 3).

Over 60% of universities have introduced e-learning in the United States. The Nippon Keizai Shinbun (Japanese Newspaper) reports that 46.4% of Japanese know about e-learning, but only 5.7% have used it (Nippon Keizai Shinbun, 2002/11/26).

Finally, a review of the relevant reports indicates that the effectiveness of e-learning reaches almost the same level as that of face-to-face learning (Berry and Runyan, 1995). Berry (1995) reports that no studies published before 1995 showed significant differences between resident and distant learning's group. Reid (1996) notes that the teacher's attitude

toward using media IT influences the effectiveness of the class. Teachers in universities should not avoid using some IT, including e-learning, if such use improves effectiveness and efficiency.

3. Benefits and Limitations of E-learning

3-1 Merits

E-learning can meet the needs of individuals who want to learn and earn a degree or other academic qualifications without being limited by time or distance. Students can learn when and where they want to learn. Older persons, those with young children, and full-time workers also can access learning opportunities with well-known scholars (The Chronicle of Higher Education, 2002). Costs for travel, conference or workshop fees, hotels, and meals are reduced or eliminated completely for users and providers (Sanfovec, 2002). The pace of learning can be adjusted to fit the individual's needs and abilities. Some types of e-learning can be repeated again and again. E-learning can not only increase the profitability of universities but also increase the amount of intellectual resources available to society and the universities.

In all types of education courses, the student's studying conducted outside the classroom is very important for optimal learning: this includes both preparation before class sessions and studying after sessions. Unfortunately, many university-level-students, including those in Japan, do not spend the necessary hours of study outside the classroom. E-learning can promote better pre- and post-classroom study because teachers can check assignments done online at any time. Students can learn at their own pace and develop the habit of working outside a regular classroom setting. Moreover, students have the ability to repeat assignments and other types of work easily if they need such repetition to improve their learning.

Many current university students, especially young ones, are accustomed to multi-media formats. When they were born, color TV and audio tape players were common. More recently, CD-ROM, MD, and video on TV or DVD have been introduced. When these students were children, personal computers became common in the home. Using multi-media effectively, students can study efficiently and be motivated to study more. Teaching is important; however, willingness to study is also important, and e-learning promotes this by making it easy to fit study into daily routines. From now on, coaching instead of teaching will be important. Students must be leaner from now on. Students need to become more active participants in their own learning process. Media and e-learning will promote such a trend.

It is possible to incorporate video images into the lecture space by video streaming over an institution's internal network using MPEG1 or MPEG2. Lectures are recorded and made available on a server for the students to access whenever they wish. Additional work can be carried out providing the students with asynchronous access to web sites with additional information about the topics being covered in the lectures. Video streaming facilities are also available for the students to view lectures they have missed or for re-viewing. This combination of synchronous and asynchronous learning environments offers high flexibility and can be used successfully for campus learning as well as distance learning (Jameson, 2002). In addition, one expected advantage of video is that teaching staff has an opportunity to see how their lectures look to the students and as a result to improve the visual aids.

On the negative side, the e-learning environment can greatly diminish the interactive relationship between teachers and students. Millbank (1994) states that a good interactive relationship increases learning by 20% to 70%. Maxcy et al. (1994) points out that group work among students also improves learning. In large classes the degrees of interaction

between teacher and students and among students are generally low. However, by using e-learning effectively and wisely, teachers can achieve interactive relations with students that reach the same level as that found in traditional classes. And in large traditional classes, better interactive relationships can be achieved by using e-learning or some IT-related media

3-2 Limitations

There are challenges associated with e-learning. Preparation of e-learning materials by one teacher takes a lot of time and money. In some cases, teachers who want to use IT materials for classes are hampered because their universities have no network environment (e.g., LAN) or and have only low quality sending and receiving speed using Internet or Intranet, satellite, for example[2]. Some institutions have few or no staff members with sufficient knowledge of IT to help teachers learn how to use various systems. Intellectual rights are sometimes very important; however, again, an institution may have no one with the appropriate knowledge and information.

The birth rate in developed countries is decreasing. Especially in Japan, the number of applicants is decreasing in almost all universities. The competition between universities is intense. MIT (in the United States) offers e-learning classes abroad, for example, in Singapore, and the United Kingdom. Within 10 years, over 1,000 classes will be offered. It will be difficult for smaller universities that are not already in the e-learning market to compete internationally with the larger already established institutions. Further, in some countries, Japan, for example, e-learning is not very popular. In countries like Japan, students have easy access to universities without the problem of time or distance. E-learning courses, classes in English or other languages will not likely be popular unless they are language classes. Some universities have succeeded in e-

learning, Phoenix University is one example, and other universities can and must learn from such successes (Farrel, 2002, Live, 2002, Olsen, 2002). An excellent system that can adequately suit individual needs, will attract many students. A good infrastructure facilitating unified, coherent, and innovative national or regional system for educational and social reform is also necessary. This will reduce the costs associated with e-learning. Thus, although there have been successes, the overall worldwide environment around e-learning is not so bright for the near term.

4. Future of E-learning

E-learning has great potential as an educational tool if the challenges are effectively met in coming years. With e-learning, it is difficult to know the learner's responses, so a teacher can not easily pace the instruction to accommodate the learner's comprehension. Furthermore, discussion-style is very difficult in distance education. To address these issues, a web-based response system should be provided (Coldeway, 1987, Coldeway and Coldeway, 1987, Kinsner and Pear, 1979). For web-based instructions, resource identification, timeliness, author identification, information structure and design, navigation within the document, quality of the links, and copyright as well as usefulness to the instructional setting are all important[3].

Universities must support teachers. Professionally trained e-learning support personnel and proper facilities are necessary (Sherry, 1996). The rate of change in technology, including IT, is remarkable. Dependence on only one or a few persons will not be effective. Teams should be formed so that individuals from various disciplines can work effectively together, respecting each other's primary skills and educational focus. At the same time, the exchange of ideas among group members will help solve both organizational and technical problems that arise. Improving teachers'

ability to use media is also important. To help teachers improve their skills in using computers or other media instruments, teacher training in e-learning is vital.

Since interactive relationships are critical to the learning environment, the most difficult e-learning problem to be solved is how to set up an interactive dialogue between teacher and students and between the students themselves, especially when the students are at different sites and are not likely know each other. The National Institute of Multimedia Education conducted a survey to determine what educational leaders consider to be the benefits and challenges in using the internet to provide distance learning courses through websites and e-mail. Table 4 presents some of the useful findings from survey.

The problem is to find ways of improving the interactions between teacher and student in a real-time environment. The interactive 'chat' room is one solution to the problem of providing for such one-to-one-relationships. If use of a 'chat' room results in students also interacting with each other in the periods before and after the lecture that is a bonus.

Table 4 Needs and Challenges Associated with Internet-Based Distance Learning Courses

Statement about Need/Challenge	
Support of media expert is necessary	91.8%
Creating course content requires significant time	89.4%
Education activity will be promoted	75.7%
Up-to-date information can be conveyed	70.7%
Student/student and student/teacher exchange are possible	62.1%
Continuity in studying is possible	45.4%
Quality of education may be poor	27.1%
Cost for learners may be lower than traditional education costs	11.2%

Source) National Institute of Multimedia Education (2001)

Harvard University is famous for introducing such e-learning systems. When such systems are inevitable in the pre-class period as is done at Harvard University Law School, they can be very useful.

The course content of e-learning must be equivalent to that of the traditional courses. For Harvard University's life-time course, the content is the same as that in the real-time class. With the spread of IT networking, it has become possible to communicate across distance in ways compared to face-to-face communication.

It is important to identify the type of learner being served. There are, for example, life formulation learners, career enhancers, corporate learners, and life-fulfillment learners. These various constituencies have different needs that require different education approaches. Thus, for any one course plan, identification of the target audience and their goals is necessary.

Management system or platform should be made. They should play the roles for 'classroom' and management (score, presence, question, curriculum, management of contents). It must be attracted by a lot of users.

Feedback from students in e-learning situations is also important. Table 5 shows the results of circulated by the National Institute of Multimedia Education. Respondents were university or college students. The data indicate that learners did not use the available technologies ef-

Table 5 Internet Use for Courses

	2000	2001
Mail or web from office	72.4%	73.4%
Database of library	72.5%	75.2%
Report via e-mail	50.5%	47.0%
Questionnaire via e-mail or web	49.4%	46.0%
Discussion among students via web or mailing list	34.8%	31.0%
Contents on web	12.1%	14.3%

fectively and that use did not increase between 2000 and 2001.

Students need to be consulted for their opinions about lectures being delivered over networks and what features would make the lectures more interesting. Teachers need training on the "dos and don'ts" of teaching in front of a camera and on how to prepare their slides and PowerPoint presentations to maximize view ability, for example. Teaching skills for e-learning should be examined and learned by teachers and providers.

5. Conclusions

As e-learning spreads all over the world, Japan will be no exception, and the proliferation of e-learning offerings in Japan has been rapid in recent years. At present, when the Japanese economy is weak and considerable structural changes are necessary in society, the continuing education system must also undergo fundamental shifts (Shimizu, 2002). The situation is similar to a lot of developed countries all over the world. Companies can no longer afford jobs training systems that they have provided in the past. The time available for training during company work hours is decreasing. Thus, it now becomes the individual's responsibility to acquire the knowledge needed for employment and advancement. E-learning enables workers to study despite the obstacles.

The next horizon for e-learning will likely be an avalanche of high quality, virtual reality software for training in all types of scientific and engineering disciplines. Such software can be a great asset for training skilled workers who need to keep up with advances in their field. Multimedia formats such as virtual labs, virtual instruments, simulation software, and virtual participation in practical applications are becoming integrated into effective teaching in general and of Web-based courses in particular. This is the frontier for all types of e-learning scenarios, whether in the traditional classroom or through distance learning

courses.

Whatever the format of a course, the course content must be both interesting and valid, accurate and balanced. Course content should be consistent across types of IT formats, that is, whether the course is offered on-demand or in a real-time setting. Real-time delivery of distance learning has the same course content as a traditional face-to-face class. On-demand course uses both the www and VOD, and thus may be slightly different, but is important to standardize the contents as much as possible. In general, regional or national standards need to be developed for all types of e-learning, and such standards have not been introduced in Japan. It will take much effort, time, and expense to develop such standards.

Japanese universities are accredited and overseen by the Ministry of Education and Sciences. The accreditation standards are high and have prevented the rise of low quality institutions of higher education. The so-called 'degree mill' does not exist in Japan. Of course, the quality of education provided through e-learning must meet these standards. No method of reducing costs without decreasing the quality of education has been devised but is a very important key to success in e-learning. However, Tokyo University and other well-known universities in Japan have began to broadcast classes to Asia countries[1].

Information should be open. Universities should be also open, gather intellectual resources, and provide them to a wide audience. Most individuals hope for a college-level education. To respond to these current societal needs, the educational content and educational methods are under pressure to change. Digital communication technology, including the Internet and satellite systems, can give us all the information we need. Evaluation from outside is becoming common.

Finally, high-level political support is necessary to achieve excellence in e-learning opportunities (Latchem, 2002). An on-line social structure

that can underpin socio-economic and educational development is needed. Strong partnerships among government, educators and instructors, and the business sector are needed. The value of e-learning must be recognized not only by educational, political, and business leaders but also by the wider community.

Note

1. Companies enter this market: corporate universities, training companies, content distributors, and portals.
2. The network used is mainly 1.5 or 2 Mbps. The technology used to run the network is not a critical matter- the important characteristic of the network is the time delay between asking a question and receiving the answer. In my personal experience, as long as this remains less than a second, the technology performance is not a fundamental problem.
3. It is natural for teachers to communicate via Web sites. For example, Harvard University and MIT' web pages are impressive. Teachers provide contents of the class, video, collaborative animation tools, hypertext, diagnostic networks, discussion list, Q&A, lavatory, time schedules, and so on.
4. Except the United State's cases, see for example, Jung (2001), Light (1999), and Preston (2001).

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* Financial support from Aichi University is appreciated.