Learning in Cyberspace

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Abstract

This paper discusses research that has been conducted in relation to online learning websites. Initially, the current situation of Online Learning will be discussed. Results of the analysis of a number of Online Learning websites (such websites include both international and New Zealand websites) will then be discussed in depth. This paper will describe the basic requirements of Online Learning websites, and will provide the reader with website design principles, in order to assist in increasing the effectiveness of an Online Learning website. The benefits and drawbacks of the creation of, and use of an Online Learning environment will also be discussed. In the end of the paper, a few future trends of online learning will be indicated. This paper will provide the reader with a general overview of the current status of Online Learning.

1. Introduction

As one of the most significant technologies created during the last century, computer network has been changing people's lives dramatically. The way we live, we work, we entertain and even we think are likely changed by the spreading computer network. This paper is going to talk about another change made by computer network---the change on our way to learn.

The way in which our learning is conducted can be expected to be vastly different to that of our forbears. Such new technologies will have a dramatic impact on learning aspects such as where an individual learns, when they learn, and who will be assigned the role of the teacher. Recently, exponential growth of information becomes the driver for people to be a lifelong learner, continuously engaged in some form of learning activities. Therefore education becomes a lifelong process rather than being taken in a short period of time in the first twenty years of life.

In order to assist in the fulfillment of individuals new learning requirements, a new education strategy merged, that is online learning. Online Learning utilizes computing technologies to achieve educational goals. It provides people a much more flexible learning environment to learn what they want to learn with their own class schedule.

In order to harness the global trend towards Online learning, educational institutions and private corporations have and will continue to invest significant amounts of capital in online learning capabilities. It is estimated that the portion of online learning market devoted to technical André M. Everett

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training alone will grow from \$1.7 billion in 2000 to about \$5.3 billion in 2003 [1].

Whether these investments could get satisfactory payoff?

How we can improve the learning process so that the benefits can be sustained?

In order to provide explanation for such questions, this paper will discuss the findings of research that was conducted on existing online learning programs. The key elements of the implementation of an Online Learning system will then be discussed, taking into consideration the principles on how an Online Learning site should be built and managed.

2. Research Background

2.1 What is Online Learning?

Before this paper provides further discussion of the Online Study undertaken, it is felt necessary to clearly define what is indicated by the term "Online Learning", and the relationship that it has with other learning networks.

Online learning refers to all learning strategies, which Internet/Intranet as learning environment. use Computerworld magazine defines it as online learning is the delivery of remote training over the Internet or a corporate Intranet via a Web browser. The program which implements online learning is called online learning system. The network supporting online learning is called online learning network (OLN), which is "a system that enables students learning via the Internet. OLN facilitates interaction of professor-to-students, student-to-professor students-to-students communication and via asynchronous learning tools, including anvtime. anywhere learning or synchronous learning tools, i.e., real-time communication, or any combination of these two" [2].

A broader concept is online learning system (OLS), which includes learner, instructor, class, technological and system configuration, and management of OLN. Online learning systems can be mainly divided into two parts—synchronous and asynchronous online learning systems. Figure 1 shows a hierarchical relationship of different learning systems.



Figure 1: Different Learning Systems Hierarchy

2.2 History of Computers in Education

The popularity, the wide use of computer makes the merge of online learning. The use of computers during learning was first hypothesized approximately four decades ago. Such computer-based learning applications were referred to as computer-assisted instruction (CAI) or computer-based instruction (CBI). The main idea was that computers could provide individualized learning experiences, including interactive sequences consisting of problems or questions with appropriate feedback [3].

In the early stages of computer-assisted learning, the aforementioned idea was only used on some courseware within some specific course programs. Later, some CAI/CBI systems merged, like PLATO. Such integrated systems incorporated email and BBS functionality. Such functionality is currently widely utilized within Universities nowadays.

But the real bloom did not occur until the World Wide Web appeared in the early 1990. The Web makes it easier to create and access networked information. It also supports the collaboration of the major forms of learning interaction (email, chatting, threaded discussions, and conferencing). The form of computer assisted learning, that utilizes the Internet as its platform will now become the basis of this paper – referred to as "Online Learning".

2.3. Infrastructure Required for Online Learning Networks

It is obvious that an online learning system heavily involves the use of computer networks. Different forms of OLS may be built using computer networks from large-scale public networks such as the Internet to small local networks (LANs). For most institutions and organizations, LAN is the basis for their learning systems. In general, such LANs will also be connected to public networks, making differences in location transparent to individual users.

Connections to public networks are mainly dependent on moderns and existing telephone lines, whereas LAN connections are normally facilitated through the use of cable. School and college systems with many locations are likely to lease high-speed data communication lines using fiber optics or microwave transmission. Large corporations and government/military agencies utilize satellite technologies for data transmission and network communications. It is also possible (and increasingly common) for people to connect to public networks or LANs using wireless technologies.

Regardless of the underlying technologies of a network, a considerable technological infrastructure is always required, in order to develop, and support a given network. A network infrastructure is comprised of hardware, software and support personnel. It is thought that the hardware and software required to support an Online Learning system are no more complex than that required in a general-purpose computer.

With the rapid growth of computer industry and spreading use of computer in education, such infrastructures will not be a problem any longer. Nowadays, most countries are ready for adapting online learning as a new education strategy.

2.4 Literature Review

A number of studies have been conducted associated with online learning. Each study discusses the status of one given aspect of Online Learning. Studies performed include the following:

2.4.1 Online Professional Interactive Network: Virtual Professional Learning Communities for Teachers

Supported by different types of professional interactive network examples, this paper summarises the functions of professional learning networks, the way to achieve information for meeting the goals of working professionals and the reasons of using electronically mediated networks. Also it gives examples of teacher support networks in New Zealand and compares them with international counterparts.

2.4.2 Internet Use in Schools: Legal and Ethical Issues

Internet gives children and young people access to the same information as adults, which causes a series of legal and ethical problems. When schools decide to get Internet connection, it is very necessary to consider these issues and make the Internet exactly be used for educational purposes. This paper discusses these legal and ethical issues and gives suggestions for schools on how to use Internet to its best advantage.

2.4.3 Designing Web-Based Learning Environment

This paper discusses some questions and provides some resources as to how to design a website for an online learning program. It provides the procedure of website designing and implementation with the principles of online learning website design.

2.4.4 Toward a Value Framework for Online Learning Systems

This paper queries the student concerning the features of these systems that add value to their learning experience. A questionnaire is utilized for gathering student values associated with online learning systems and organization supporting these technologies. Results from the survey and a literature review are organized in a proposed value framework for online learning course effectiveness.

3. Web Site Analysis

The major research method in this paper is website analysis. In subsequent chapters, the research results are gotten from the analysis made in this chapter. After reviewing a number of Online Learning websites, it has become apparent that such sites should be categorized, and discussed independently. In the field of online learning, websites serve for the following multi-dimensional topics and sub-topics [4].

Higher Education K-12 Corporate Health Care Informal Learning (Museums, Communities, Homes) Government Military Training Professional Associations & Non-Profits In this paper, three main segments of online learning websites will be discussed in detail, including their unique features and an example will be provided as to a website that facilitates the defined category of Online Learning applications.

3.1 Online Learning Applications

3.1.1 Higher Education – University of Auckland

It is apparent that online learning methods are most extensively facilitated within Colleges and Universities. Due to the wide availability of computers, and the provision of basic computing education, within the Tertiary Education sector, Online Education can be widely implemented within their course offerings.

Currently, Online Courses offered by Tertiary Institutions rely on a web-based database for the storage of course materials and information (such as lecture notes, student grades, hyperlinks).

A relevant example within this category is Cecil (www.cecil.edu). Cecil can be viewed as the University of Auckland's Online Learning System. Students have the ability to access course materials, and course related information, from anywhere. Cecil provides a majority of the previously discussed online learning functions (namely, group email, a discussion forum, course information, and file downloading). Cecil accommodates all courses that are offered by the University of Auckland. The degree of utilization of Cecil appears to differ between departments and papers. Cecil also allows for the checking of coursework marks, and online testing functionality. It helps greatly for providing high quality education.

3.1.2 K-12 Education – The Global Lab (http://global.terc.edu)

For K-12 schools, online learning websites' major function is to provide an online library system. With the help of these online libraries, searches for books, journals, and other relevant sources of information become much easier. This indicates that schools are no longer constrained by the information contained within their limited number of textbooks, and library books.

Another popular application incorporated into Online Learning Systems within K-12 Schools, is the facilitation of collaborative projects. Collaborative projects may be implemented solely within one class, or spanning a number of schools. Students utilize the network to collect relevant information, and prepare documents in small-sized groups. A majority of such projects also require interaction with students at different schools (via email).

Other functions of OLS at this level include: linking to the outside world; storing curriculum resources and providing interaction.

An example of an implementation of an Online Learning System in Middle Schools is the Global Lab. The Global Lab is a large-scale science project that involves in excess of 100 schools internationally. Students within participating schools must agree to collect, and analyze data that relates to some aspect of their local environment. Such analysis results are then placed on the Global Site website, in order to allow for the determination of global trends in each given aspect.

3.1.3 Corporations – Cisco Network Academy (http://www.cisco.com/edu/academies)

Corporate training is the largest among online learning market segments. In early 2002, it was estimated that as many as 350 companies were marketing learning-management systems (usually server-based software), educational content or online learning hosting services. Investment was put into the U.S. online learning market at \$2.2 billion last year [5].

Information technologists who have an in-depth understanding of networks are in high demand and are likely to remain so in the future. As a result, a number of networking companies play a pivotal role in the provision of such training. Cisco Systems is an example of such an organization. Cisco provides training through the Cisco Networking Academy. This academy is comprised of high schools and colleges internationally, that have been authorized by Cisco to teach a four-semester course in networking that will be examined at the conclusion of the course. If an individual is successful in passing the Cisco examination, then they are considered to be a Cisco Certified Network Associate or Professional. This academy is partitioned into regional and local sites. The regional sites have responsibility for training, supporting, and quality control of the course offerings at the local sites.

The Cisco Networking Academy can be considered to be a relevant example of an industry-educational partnership, which is beneficial to all involved.

Also based on the self-assessment survey completed by 3,560 Cisco partners, the online training program has improved their productivity significantly. For example, 74 percent reported an improvement in the ability to sell or service clients and 76 percent said that customer satisfaction jumped 50 percent or more [5].

3.2 NZ Online Learning Websites

A large number of OLNs serve the purpose of the provision of additional resources for teachers, as well as allowing for the exchange of information, and utilization of new technologies. Like other countries, online learning has been developing fast in recent years. New Zealand Learning Network can be considered to be a relevant example of New Zealand online learning websites.

3.2.1 New Zealand Learning Network

http://education.otago.ac.nz/NZLNet/home.nclk

The New Zealand Learning Network was established in 1998 and is being continuously developed and maintained by the University of Otago School of Education. The purpose of this information, service, and discussion network is to provide an online teacher-centered resource that will support and assist New Zealand teachers in the process of integrating the Internet in the classroom. It does this by providing links with colleagues and other professionals locally and nationally, access to Internet information and resources for classroom use, and professional background material relevant to New Zealand teachers. Interaction online includes computer conferencing areas, online chat room, and news boards for posting of educational news.

The service facilities allow for contribution from members, in a number of ways. This includes the hosting of school web pages, and collaborative projects, organized by teachers, for other classes. Teachers are encouraged to contribute ideas to the site, and such ideas may be archived online. Members also have the ability to post news items of educational interest.

4. Results

4.1 Unique Features of Online Learning

Unlike any other training form, online learning promises to provide a single experience that accommodates the three distinct learning styles of auditory learners, visual learners, and kinesthetic learners [5]. By the advent and development of online learning more efficient training is provided to a globally dispersed audience. As Web-based training becomes a standard, publishing and distribution costs have been reduced.

Online learning also offers individualized education, which is impossible for print media. Under the wave of personalization, individualized learning form is more welcomed by adult learner and working people. Besides its individualized instruction, online learning can target specific needs. And by using learning style tests, online learning can locate and target individual learning preferences.

Additionally, synchronous online learning is self-paced. Advanced learners are allowed to speed through or skip instruction as needed.

In these ways, online learning can serve simultaneously for a maximum number of participants with a maximum range of learning styles, preferences, and needs.The experience and value of the visit; price, comfortable atmosphere, type of customer, friendly staff service and seating are the second set of elements that indicate a moderate increase to satisfaction. This indicates that customers are price sensitive so charging a premium is not an effective strategy, but yet customers still want a premium experience.

4.2 Basic Elements of Online Learning

Online learning requires some basic elements to support its functions. In the sequent paragraph, I will discuss such elements.

4.2.1 Email

Email is the foundation for all forms of online leaning and teaching. Indeed, it is quite possible to use nothing more than email in a course and still have a highly valuable leaning experience. Email is also a very cost-effective application in terms of computing and network resources required; it works with a minimum amount of equipment, software, and facilities. Furthermore, since web-based email is free, there is no need to purchase email software.

4.2.2 Threaded Discussion

Threaded Discussions are the second most commonly used element in online learning. It may also be referred to as asynchronous conferencing, a forum, or a bulletin board.

These systems work as: topics and subtopics are created, and people post messages under topics. Messages include the sender's name, a subject title for the message and the text of message. To read messages, an individual must select the topic of interest and choose the message available. Finally, a reply message can be posted below the topic.

4.2.3 Real-time Conferencing

Real-time conferencing covers any form of online synchronous interaction, the simplest form of Real-time conferencing is a chat session. A chat session enables participants to communicate with each other through the exchange of typed messages. Each participant has the ability to view the typed messages. Each message is preceded with the name of the message sender.

4.2.4 MUDs/MOOs

MUDs (multi-user domains) and MOOs (MUDs object-oriented) are an interesting category of real-time conferences used in some education settings. MUDs/MOOs

Allow many people to share a virtual world, usually set up as "rooms" containing objects that can be viewed or manipulated. People can interact with others by sending chat messages as well as performing simulated actions.

4.2.5 Desktop Video

The most advanced forms of real-time conferencing are desktop video systems. A desktop video system is mainly a chat system that uses video images instead of text messages. The video images (including audio) are captured by a small digital camera that is connected to the PC.

4.2.6 Audio-graphics

Audio graphics allows for audio interaction, and the sharing of graphical images, or applications. Conference participants have the ability to hear others comment, and view the graphical images or program screens.

4.2.7 Groupware

A relatively new category of software are groupware programs, which are specifically designed to facilitate group interaction. The MUD/MOO systems mentioned before are a specialized case of groupware for shared worlds..

4.3 Website Design Principles

When designing an online learning website, there are some principles needed to be followed:

4.3.1 Interactivity

One of the most important reasons for using the Internet as a learning environment is its capability to enhance interaction between teachers and students, and among students. In the online course, teachers can employ a range of synchronous and asynchronous tools in such a learning environment. The activities in such a learning environment should be interesting and stimulating.

4.3.2 Collaboration

All collaborative learning theory contends that human interaction is a vital ingredient to learning. Consideration of this is particularly crucial when designing online learning websites, realizing the potential of using web medium to isolate learners. With well-delivered synchronous distance education, and technology like message boards, chats, e-mail, and video-conferencing, this potential drawback can be reduced.

4.3.3 Social and Interpersonal Interaction

As the best environment for learning is a social setting, a Web-based course site should be designed to promote social and interpersonal interaction as well. The course website should be viewed as a virtual meeting place shared by all the students. Social interaction was a significant factor in contributing to knowledge construction in this environment.

4.3.4 User Control

In designing a user interface, we should follow Lai's five criteria [6]: easy to learn; easy to use; easy to remember; pleasant to use; and allowing for feelings of user ownership.

4.3.5 Structure and Management of the Learning Environment

A Web-based learning environment should be a flexible learning environment. A good management structure should include clear and explicit information on the assessment tasks, as well as just in time feedback on their assignments.

4.4 Benefits of Online Learning

By combining the new technology of the Internet with new thinking of how people learning, online learning brings a new era to traditional education. Some of the most outstanding benefits have been indicated [7].

4.4.1 Online Learning Lowers Costs

Despite appearances, online learning is often the most cost-effective way to deliver instruction (training) or information. It cuts travel expenses, reduces training time, and eliminates costs [8]. The elimination of costs associated with instructor's salaries, meeting room rentals, and student travel, lodging, and other infrastructures. When deployment is based on a sound business case, the significant startup investment can be quickly recovered through delivery savings.

4.4.2 Online Learning Enhances Business Responsiveness

Online learning can reach an unlimited number of people virtually simultaneously. This can be critical when business practice and capabilities are rapidly changing.

4.4.3 Messages are Consistent or Customized, Depending on Need

All can get the same content, presented in the same way. Meanwhile the programs can also be customized for different learning needs or different groups of people.

4.4.4 Content is More Timely and Dependable

Because it's web-based, online learning can be updated instantaneously, making the information more accurate and useful for a longer period of time.

4.4.5 Learning is 24/7

People can access online learning anywhere and any time. It's "just in time – any time" approach makes an organization's learning operations truly global.

4.4.6 No User "Ramp-Up" Time

With so many millions of people already on the Internet and comfortable with browser technology, learning to access online learning is quickly becoming a non-issue.

4.4.7 Universality

Online learning is Web-enabled and takes advantage of the universal Internet protocols and browsers. Concern over differences in platforms and operating systems is rapidly fading. Everyone on the Web can receive virtually the same material in the same format.

4.4.8 Builds Community

The Web enables people to build enduring communities of practice where they can come together to share knowledge and insight long after a training program ends. This can be a tremendous motivator for organizational learning.

4.4.9 Scalability

Online learning solutions are highly scalable. Programs can move from 10 participants to 100 or even 100,000 participants with little effort or incremental cost (as long as the infrastructure is in place).

4.4.10 Leverages the Corporate Investment in the Web

Executives are increasingly looking for ways to leverage their huge investment in corporate intranets. Online learning is emerging as one of those applications.

4.4.11 Provides an Increasingly Valuable Customer Service

Although not internally focused, a business e-commerce effort can be enhanced through the effective and engaging use of online learning that helps customers derive increased benefit form the site.

4.5 Drawbacks of Online Learning

Despite its benefits, online learning is still in its nascent stages. It does have limitations.

4.5.1 Technology Issues

This include whether the existing technology infrastructure can accomplish the training goals, whether additional tech expenditures can be accepted, and whether compatibility of all software and hardware can be achieved. For learners, these issues include commonly technophobia, unavailability of required technologies and inability of grasping the computer techniques.

4.5.2 Reduced Social and Cultural Interaction

The impersonality, over-dependence of computer techniques, suppression of communication mechanisms such as body language, and elimination of face-to-face communication are part of the potential disadvantage brought by the advances in communications technologies.

4.6 Summary

The pros and cons of online learning vary depending on their business goals, target audience and organizational infrastructure and culture. But it is apparent that online learning is rapidly growing as form of training delivery and it is clear that benefits to online learning will guarantee it a position in the overall learning strategies.

5. Future Trends

Online learning is the most rapid growing learning form in recent years. There was an evolution that technology-enabled learning and distance education changed to online learning. By now, more and more people agree that online earning is here to stay. So we need to examine some trends of this new learning strategy.

5.1 Online Learning as a Business Strategy

For smart companies, it's no longer a question of if, but when to use online learning. These organizations see online learning as a strategic solution that must be deployed to all employees. Enterprises consider online learning as a guarantee to increase sales effectiveness, improve organizational competency, and build rich customer relationships. Consequently, online learning will continue to be a part of organizational infrastructure, similar to email packages and other product suites used to increase staff productivity.

5.2 Blended Learning

This trend involves blended learning programs, designed to integrate online learning with traditional training methods to increase overall effectiveness. A single delivery method is no longer sufficient to handle new training needs. The construction of true blended learning programs pushes learning into a new age. Blended learning preserves the necessary consideration of how people learn while offers options for learning and can still produce measurable savings promised by online learning.

5.3 Moving from Discrete to Integrated Learning

There is an increased desire for a seamless transition from one learning activity to another. Rather than stand-alone learning activities, the trend is towards the integration of these activities. The trend is looking for seamless transitions from live group activities to individual exercises, from self-paced learning activities to synchronous instruction, from activities in smaller groups to activities in a larger learning community.

5.4 Online Learning Beyond the Corporation

Early adopters of online learning consisted mainly of corporations, which were trying to enhance face-to-face meetings, demonstrations, training classes, and lectures. Nowadays, government agencies, colleges, universities, and non-profit organizations are now followers. These organizations are using online learning to address their learning and communication needs, as well as expand their business opportunities.

6. Conclusion

Rapidly expanding network technologies increase the possibilities of online learning. It is, however, difficult to predict what technology will be the dominant driving force in online education delivery in the future. It is expected that, in this new century, tremendous advances in computers and networks will have dramatic effect of altering individuals' lives and the learning experience as well.

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