E–Learning Concepts and Development

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INTRODUCTION

Our society is gradually changing from information-based to knowledge-based. The Internet is transforming our workplace and the ways we work and learn. Wallace (2004) calls it a netcentric workplace, and the netcentric technologies bring a host of new tools and capabilities to workers, especially in the areas of information access, communication, and collaboration.

In recent years, we have seen an explosion of interest in e-learning, not only from the academic institutions but also from the commercial organizations. There are many activities, research, and development related to e-learning such as lifelong learning, self-directed learning, organizational learning, and virtual learning environment and virtual universities. The market for educational products and services is expanding rapidly especially in a global context.

The aim of this article is to explain the various concepts associated with e-learning: the stakeholders involved, the technology and related standards, and the products and services provided. The issues, challenges, and trends will also be explored and discussed.

BACKGROUND

The introduction of new technology changes the ways that teaching and learning can be conducted and affects the effectiveness of the process. There are four aspects related to the effectiveness of teaching and learning. They are time, place, delivery process, and the learning process.

From interactive video disc to computer-based training (CBT), the history of technology-based training is well over 30 years. With the introduction of the computer, traditional paper-based training materials became digitized. Packaged with other multimedia materials such as graphics and video, a CBT module can be produced, stored, and delivered as a CD-ROM to the desktop of the learner. However, CBT materials distributed on CD-ROMs cannot easily be updated and can quickly become out of date.

With the Internet, a new channel for delivery of content and communication is available for teaching and learning. Web-based training (WBT) starts to replace CBT. With Web-based learning materials, information can be updated on the server and made immediately available to every learner regardless of time and location (Khan, 2001). E-learning, online learning, e-content, mobile learning (m-learning), and learning management systems become popular terms.

Fallon and Brown (2003, p. 4) define e-learning as "any learning, training or education that is facilitated by the use of well-known and proven computer technologies, specifically networks based on Internet technology." Piskurich (2003b, p. 8) defines e-learning as: "Learning that uses computer networks or webs as the delivery or mediation mechanism. By this definition neither CD-ROM-based nor satellite-based delivery would be considered as e-learning." Rather, at the core of the e-learning evolution is the Internet.

From a technological perspective, the Internet serves two specific purposes: delivery and communication. In terms of delivery, instructional and learning materials can be packaged into learning content. Content providers such as publishers, universities, and knowledge institutes deliver the learning content to their learners via the Internet. Digital goods such as e-books and courseware can be delivered to learners regardless of time and location. Hence, just-in-time and on-demand learning are feasible. In terms of communication, instructors and learners using the Internet are able to communicate among themselves by means of e-mail, discussion forums, chat rooms, video conferences, instant messages, and so forth.

E-LEARNING CONCEPTS AND DEVELOPMENT

The E-Learning Ecosystem

E-learning is a complex field involving institutional, individual, technical, and social components. The e-learning ecosystem refers to the environment and the stakeholders involved in e-learning. Figure 1 shows an overview of the e-learning ecosystem and its components.

Within the e-learning ecosystem, there are infrastructures and platforms to support stakeholders in performing their roles required for teaching and learning such as administrator, learner, instructor, course designer, and

Figure 1. The e-learning ecosystem
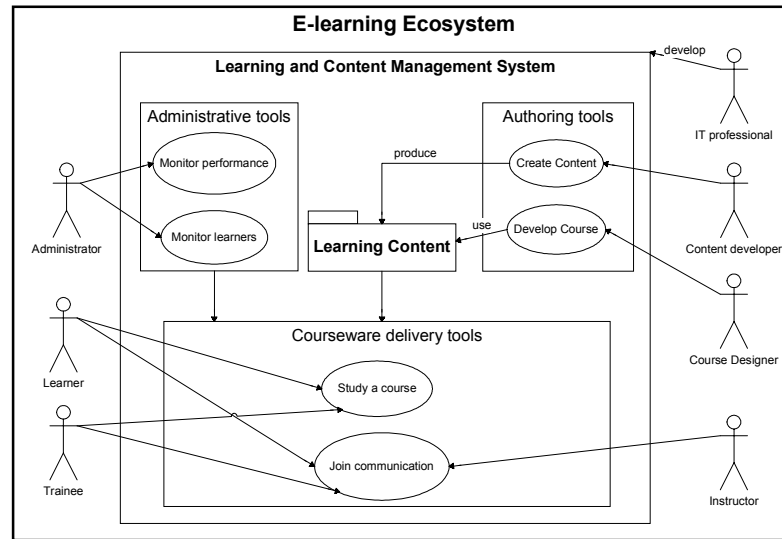
content developer. There are learners and trainees who are the primary consumers. There are instructors to help and guide the learners. There are experts and content providers to create and produce contents. There are educational specialists and course designers that develop courses and learning activities. There are administrators to track enrollments and success rates, and to assess and monitor the performance of the courses and the learners. There are IT professionals to develop and create applications to support content creation, delivery, administration, and management of the courses.

The state of the e-learning ecosystem is changing dynamically. The associated technologies are evolving rapidly. The demand for quality training and learning is increasing globally both in the commercial and educational sectors. The market for more digital learning content is expanding, and hence the business of content provider or publisher is growing. At the same time, there is another market for software developers to create authoring tools for content providers, as well as administrative and management tools for administrators and managers.

The primary goal is to enhance the effectiveness of e-learning. However, different stakeholders within the e-learning ecosystem have different perspectives and definitions of e-learning which emphasize different characteristics of e-learning. Different content providers produce and store digital learning content in a different format. Different vendors are developing different applications running on different platforms. Different learners have different personal experiences and learning styles in par-

ticipating e-learning courses. So, achieving effective e-learning is not a simple matter.

From a technological perspective, the main issues affecting effectiveness are reusability and interoperability of various components in different e-learning platforms. From the mangers' and administrators' perspective, the criteria for measuring effectiveness are cost, profit, enrollment, and success rate. From the learners' and educators' perspective, effective e-learning actually depends on how to achieve the desired learning goals.

Learning Object Standards

The core of the e-learning environment is the learning content. Creating educational materials to be used in e-learning courses requires considerable investment, as they are expensive to develop. Therefore, reuse of the educational materials is necessary to gain economic benefit (Littlejohn, 2003).

In software engineering, the object-oriented approach emphasizes creating program codes that are encapsulated in objects, which are reused by different computer programs. The term "learning object" reflects the reusability feature of objects. The idea is to split educational materials into small, independent, reusable learning objects. A learning object can be used in more than one educational activity. A learning object can be aggregated from other learning objects. Reusability of learning objects is the availability of learning objects for others to use (McGreal, 2004). Learning objects created by teachers, educators, and publishers would be stored in digital repositories. A course

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