

E-Learning Environment

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OVERVIEW OF E-LEARNING

Nowadays, the concept/system of *e-learning* (or *eLearning*) is widespread with the advent and prevalence of the Internet. Via the Internet, people can communicate with each other at anytime and from anywhere. People can also share, rebuild, stock, and reuse various kinds of information. Here, it is clear that e-learning gets citizenship in the educational society instead of CAI (computer-assisted instruction) and CMI (computer-managed instruction). As a response to society's advance, it is necessary to construct a new learning ecology, such as a learning organization or a learning community. To date, the need for an understanding of e-learning issues has not been met by a coherent set of principles for examining past work and plotting fruitful directions. Obviously, it would be difficult to document the many seeds sown now.

The e-learning environment is cataloged as follows (Okamoto, 2000):

- Individual learning environment with learning materials
- Group learning/collaborative learning environment with some shared tools/applications
- Classroom learning (lecturing)

This learning ecology has the mixed mode of either synchronous or asynchronous by using any teaching/learning contents and audio/visual devices, such as videoconference and other communications tools.

e-Learning is a learning/education/training style that uses information technologies. In the past, this type of learning/education/training was called various names, like "distance learning," "distance education," "cyber learning," "virtual learning," "Web-based training (WBT)," "Web-based learning (WBL)," "online learning," and so on. Nowadays, e-learning is innovated by using the latest information technologies, including WWW technology for e-learning course delivery, movie/speech compression technology for e-learning content production, and the learning technology standards (SC36,

2004), like LOM (learning object metadata), SCORM (shareable content object reference model), and collaborative technology, for keeping the interoperability of e-learning systems/contents/courses.

The main advantages of e-learning are, as is well known, from "to any place, at any time" attributes. Often, the free education aspect also appears, although much of the educational software offered today is not free, and many educational institutions offer e-learning programs at a price. Plain, text-based course materials are not enough anymore. The recent increases in bandwidth made more avenues of expression possible, images on the Internet are commonplace, soundtracks and videos are used with growing frequency, and other (multi- and mixed) media types evolved (animation, simulation, collaboration, etc.).

Before now, based on learner modeling, adaptation of teaching strategies and intelligent user adaptation in intelligent tutoring system (ITS) were developed. More recently, the field of adaptive hypermedia (De Bra et al., 1999) emerged, at the crossroads of hypertext/hypermedia and user modeling. Adaptive presentation of the educational material can mean one or more of the following: providing prerequisite, additional, or comparative explanations; conditionally including fragments and stretch-text; providing explanation variants; reordering information; etc. Adaptive navigation support can mean one or more of the following: direct guidance, sorting of links, links annotation (Brusilovsky, 1999), link hiding, link disabling, link removal, and map adaptation. Another main advantage of the Internet is that it favors collaborative work, which, in turn, favors learning (Dillenboug, 1999).

Moreover, we regard e-learning as meaningful self-development of an environment for lifelong learning. The recent technological changes are influencing our society, and people are asked to acquire new knowledge all the time. The opportunities to take education with high quality have to be provided for all sorts of people who have different backgrounds, different abilities and knowledge, and various needs. E-Learning is one answer to the rigidity of the present Web-based courses and courseware.

THE DESIGN OF AN E-LEARNING ENVIRONMENT

When we think modality of computerization on education, it is generally categorized as follows:

1. Self-study entity through electronic information media-based materials and courseware
2. Learning entity, with electronic information media (e.g., computer) as learning/problem-solving/representing/knowledge-transmitting tools
3. Learning entity about information and communication technology, social problems, etc.
4. Computerizing entity of education

The relationships among those entities should be compensated for mutually, and an e-learning cycle can be developed. The idea here is in line with building the environment for “anybody” to learn something from “anywhere” and at “anytime” in the e-society. There are two purposes for this expansion: on one hand to enlarge the study opportunity, and on the other, to develop people’s new competencies.

When we build an e-learning environment, at least three issues should be considered (Okamoto, 2000). The first is the pedagogical goal representing ability and knowledge as learning objectives. The second is the subject contents. The third is the learning forms, defined by seven learning environments:

1. Distance individual learning environment for mastery learning. This environment provides courseware for knowledge and skills acquisition, i.e., the typical e-learning course, such as WBT/VOD (video on demand) systems (Hui, 2000).
2. Distance individual learning environment for discovery learning using various search engines (VOD search and navigation mechanism).
3. Distance individual learning environment for problem-solving learning using simulations, such as ILE (interactive learning environment), and so on.
4. Videoconference system in the classroom environment for discussion, instructional presentation, questions and answers sessions, and telecommunications (Chen, 2001; Nieminen, 2001).
5. Collaborative learning environment for a small group or pairs using videoconferencing, some kind of communication tool, or various applications accompanied by a screen-shared viewer and learning log tracking mechanism.
6. Collaborative simulation learning environment for different learners performing different functions in a teamwork learning pattern, and as such, forming a

- special skill in the learner’s own domain, e.g., a collaborative activity within the jet plane’s cockpit.
7. Linkage and coordination among different organizations and areas, e.g., access the online school library, online museum, and so on.

In the establishment of e-learning environments, the most important idea is to start by defining the instructional goal and then classifying learning contents that are best equipped to build the learning environment. Moreover, the research on the method is required in order to build the asynchronous collaborative learning contents (Dryden, 2001). Further research directions should be placed on the study of the learning environment, with emphasis on the virtues of individualized learning and collaborative learning. In this case, transmission of real images and voice data is required. The fundamental environment components for e-learning systems include the whole information system related to e-learning environments. It consists of several management functions, such as curriculum and learning-materials management, learners’ profile and log-data management, LMS (learning management system) and LCMS (learning contents management system). In order to construct those educational management systems, we need, technologically, several data/file-processing modules, such as a distributed file system, synchronous data communications, and so on. If any applications and tools related to e-learning can be plugged in the core framework, we would build an integrated e-learning environment where learners can share and operate these software/data in real time. In addition, the total management system of e-learning is required in order to execute a real educational project or practice, which means research project management, learning schedule management, courseware development, and so on.

COLLABORATIVE LEARNING UNDER E-LEARNING ENVIRONMENT

Collaborative learning is a participants’ initiative learning form that has been stressed with the paradigm shift from the teaching side to the learning side in the current learning ecology. The objectives of collaborative learning are the effective and efficient group activity and the collaborative mutual interdependence relations within the group. In collaborative learning, each learner is submitted a subtask, and he or she is expected to accomplish it. As the result, the group goal and each learner’s learning goal would be achieved.

Distributed collaborative learning is a type of collaborative learning that can take place in the Internet environ-

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