DESIGN CHALLENGES, COMPUTER TECHNOLOGICAL SOLUTIONS AND FUTURE TRENDS IN DISTANCE LEARNING

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Abstract. The goal of this essay is to give an overview of distance learning. This is a very broad and interesting field, and it could be studied from many different perspectives. Here we focus on the different types of distance education, corresponding design challenges and technological solutions and present some examples of commercially available software systems. Finally, some future trends and possibilities are mentioned.

E-learning or distance learning is education where the instructor and students are geographically dispersed and technology is used to facilitate education. The main advantages of distance education are availability, reduced cost, flexibility and integration. Students are capable of taking their courses from their homes, often at their own pace and when they have time, without disruptions to their family life.

The powerful multimedia technology used in many distance courses allows real world simulations, instant feedback and active learning. The technologies used in distance education are often standard groupware technologies like videoconferencing, shared whiteboards and workspaces, chat and so on. The most popular technologies are asynchronous Internet instruction, two-way interactive video and one-way pre-recorded video. Electronic mail, chat, bulletin boards, computer resources on disks and CD, audio conferencing, asynchronous and synchronous communication between class participants, Internet have always been the common features for distance learning. The emergence of high-bandwidth computer technologies made two-way interactive real-time capabilities of audio and video, desktop conferencing and video available on demand in distance learning. More and more universities are now re-evaluating their traditional educational methods. At the same time the new technologies provide foundation for creation of new organizational forms.

There are many modes of distance education. Distance education can be classified as:
- Asynchronous
- Synchronous
- Independent
- Cohort
- Collaborative

Independent learning: student does not rely upon other students. Cohort learning: groups of individuals who move through a program of study. Collaborative learning: individuals within a cohort depend upon one another during a part of the learning activity.

Synchronous education means that communication and collaboration between teachers and students takes place across time and space. This kind of instruction is usually provided via Internet, Web-based classes, computer-based training or videotape. The instructor, if present, could be on video or online, human or software agent. Interaction with peer students is supported in many distance courses through for example mail, mail groups, bulletin boards, etc. Synchronous education tools support communication and collaboration at the same time. This type of instruction often involves use of videoconferencing or interactive distance learning (IDL) network. IDLN is a tool that allows the instructor to be seen and heard by the audience but the feedback is limited since the students can only communicate with him/her via typed messages. Other important tools for teacher-student and student-student

communication include application/screen sharing, whiteboard and collective web-browsing. In many cases both synchronous and asynchronous teaching modes are used during the different phases of a course. Students could schedule meeting face-to-face or online with the teacher or peers when needed and study the course material individually and asynchronously otherwise. This approach is adopted by for example Electronic Data Systems.

A central concept in asynchronous distance courses is computer-based training (CBT). This is a self-paced training including text, multimedia, audio, video, animation and graphics. Computer-based courses often include practice sessions, book marking and possibilities for progress tracking. There can be different degrees of interaction with the learner. CBT courses are often distributed on CD-ROM.

Another important concept is Web-based training. It is a very broad concept with no standard model. It could be CBT-course distributed over Web. It has certain advantages over traditional CBT, for example better updating of the online materials, greater accessibility and more advanced mechanisms for teacher-student interaction.

There are a number of supporting tools that are used complementary to the "main" technology. Examples are discussion groups, mailing lists and forum and discussion tools. E-mail and messaging can be used as a form of a correspondence class, but it is more appropriate as a supplement to class communication.

One of the simplest technological solutions in synchronous distance courses is audio conferencing by phone. It is easy to use and inexpensive, but the available phone lines do not always satisfy quality demands for conferences with multiple participants. Another possibility is audio conferencing by Internet, if bandwidth is good enough. To achieve sufficient quality it is necessary to use two telephone lines for bi-directional transmission, noise suppression and echo-cancellation mechanisms with others transmission technologies, it is necessary to establish communication protocols. Audio conferencing has a limited effectiveness and should be supported with visual material when used for a long period of time.

A well-known groupware technology, also used in distance learning, is electronic whiteboards/screen sharing. Examples are Microsoft NetMeeting, Data Board, SMART 2000.

To manage distance courses, special administration tools, Learning Management Systems are used. Databases are used for registration, billing, curriculum and access management and scores tracking. Examples of such systems are Training Server, UOL and Docent.

We witness the emergence of new computer technologies all the time, and we have all reasons to believe that the distant education concept will evolve and change. We can mention following tendencies in software and hardware development: more emphasis on handheld and wireless devices, to increase accessibility; next generation Internet with new applications and capability through greater bandwidth; browsers with greater communication and collaboration capabilities and other new products.

As we can see, the trends in distance education follow the general trends in organizational development: internalization, globalization and decentralization. Another interesting trend is the need to combine different technologies when designing a distance education course, to achieve greater flexibility and user satisfaction. This presents a greater challenge for the designer of the course.

Literature

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