A Survey of Distance Education Challenges and Technologies

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ABSTRACT

Distance education, e-learning, and virtual university are similar terms for a trend of modern education. It is an integration of information technologies, computer hardware systems, and communication tools, to support educational professionals in remote teaching. This paper presents an overview of distance education from the perspective of policy, people, and technology. A number of questions frequently asked in distance learning panel discussions are presented, with the suggested answers from the authors. The survey presented in this paper includes communication, intelligent, and educational technologies of distance education. Readers of this paper are academic researchers and engineers who are interested in new research issues of distance education, as well as educators and general participants who are seeking new solutions.

Keywords: distance learning, distance education, virtual university, cyber university, e-learning, virtual classroom, CAI, CBT, CSCW, intelligent tutoring, authoring system, multimedia presentation, video conferencing, communication.

HISTORY, TREND, AND ELEMENTS OF DISTANCE EDUCATION

With the growing popularity of multimedia and Internet technologies, distance education programs have become popular and thus the importance of the related technologies is realized by educational professionals and information technology researchers. However, distance education is not totally new. The use of

computer and information technologies in education has a long history. Ever since Thomas Edison predicted that motion pictures would replace textbooks for learning in 1922, the use of video was popular in training. Especially, in World War II, the U.S. Army used video tapes to train employees. Shortly after WW II, video technology and television were used for training and demonstration. In this period, instruction was broadcast in a single direction. There is no **interaction** between audiences and the instructor. However, the advantage is, the number of participants to the program can be larger than the traditional classroom setting, especially when satellite communication was integrated with video broadcasting. **Efficiency** of video training was the first reason for education to use modern technology. The use of computers follows video technology as the second phase of modern education. Computer-Based Training (CBT) and Computer-Assisted Instruction (CAI) use information technologies and educational theory to develop interactive software. The solution allows students to interact with their instructor (i.e., a computer) in a limited way. Mostly, CBT was limited to drill and practice. However, CBT and CAI were the first attempt to use computers for teaching, which enrich a new instruction delivery style – the **automation**. In spite of this advantage, CBT and CAI software had a problem in the 1970s and the 80s – lack of **stability**. In that stage, computer hardware, operating systems and system programs evolved dramatically and quickly. A CBT program is hardly used for several years due to the change of its supporting environments. Stability was a main consideration for computer-based modern education. Since the early 90s, the third period of modern education was stimulated

by the invention of multimedia and Internet technologies. Multimedia presentations such as CD-ROM titles for education, Web-based distance learning programs, and even on-line video conferencing based on ISDN, ADSL, and broadband communication channels became popular. With the new millennium and beyond, computer and communication technologies will be integrated with Contents (i.e., the integration of 3Cs). Distance education is certainly one of the potential activities relying on this integration. However, new technologies can be further investigated. For instance, real-time protocols, broadband and wireless communication technologies, multimedia streaming algorithms, intelligent tutoring, behavior analysis of students, copyright protection and authentication mechanisms, visual computing, and new learning models, as well as other issues of distance education still need researchers, engineers, and participants to work together, to make the third revolution stage of modern education successful. The *International Journal of Distance Education Technologies* (JDET) is a primary forum for disseminating practical solutions to the automation of open and distance learning. We hope the journal will look at some of these problems from the technology perspective, and contribute solutions to the third stage of modern education.

We begin with the presentation of categories of distance learning, which include distance-learning programs in conventional universities and virtual universities, as well as e-learning portals. Elements of distance learning–including policy, people, and technology needs toward the success of distance education– are also presented, followed by some highlights of challenge issues. We then collect 18 questions which were frequently

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