



## **Chapter I**

# **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 chapter 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 chapter includes communication, intelligent, and educational technologies of distance education. Readers of this*

*chapter 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 for new solutions.*

## History, Trend, and Elements of Distance Education

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With the growing popularity of multimedia and Internet technologies, distance education programs have become popular and thus, importance of the related technologies are 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 the World War II, the U.S. Army used video tapes to train employees. Shortly after WWII, video technology and television were used for training and demonstration. In this period, instruction was broadcasted 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 education, 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 '70s 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 as CD ROM titles for education, Web-based distance-learning programs, and even online 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

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