Abstract: In this work, we give an overview of state-of-the-art in distance learning and its recent evolution. Case studies of a few distance learning programs in developed as well as developing countries have been examined. Prospects of distance education in Saudi Arabia are also explored.

Keywords: Distance Education, Distance learning, Electronic education.

I. INTRODUCTION

The increasing need of education in contemporary society, the reduction of overall cost and study flexibility, together with the availability of powerful telecommunication and computer systems have fostered investigation and implementation of different types of technology-supported teaching and learning systems [1]. A large population of students in higher education increasingly encourages the decentralization of educational institutions. These decentralized units have to reach a critical mass in order to justify their educational existence economically, while maintaining excellence in their education. One way of satisfying these requirements is to utilize distance teaching wherever decentralized support in terms of teaching or economic resources are not sufficient [1].

In today’s era, distance education and distance education technologies are growing rapidly. The terms “distance education” and “distance learning” apply to a variety of programs, audiences, and media. Distance learning is a system and process that connects learners with distributed learning resources. While distance learning may take a wide variety of forms, it may be characterized by [3]:

1) separation of place and/or time between instructor and learner, among learners, and/or between learners and learning resources, and

2) interaction between the learner and the instructor, among learners and/or between learners and learning resources conducted through one or more media; use of electronic media is not necessarily required.

The growth of distance education has taken place at a rapid rate due to the following well known facts:

- Knowledge has become one of the most important economical forces.
- Knowledge is rapidly expanding and its life time is becoming increasingly shorter.
- The economical and social contexts have changed.
- Investing in the human resources seems to be the only way for a sustainable development.

Distance education seems to be one of the most appropriate and attractive means to address these changes.

This paper is organized as follows. In Section 2, a brief history of distance education is given. Section 3 describes the tools and techniques. Section 4 discusses some case studies in developed and developing countries. In Section 5, prospects of distance education in Saudi Arabia are discussed. Section 6 gives the conclusion.

II. HISTORY OF DISTANCE EDUCATION

There is a rich history of instructional media, from print to instructional television, to current interactive technologies. To understand the current status of distance education, a little review of its history is necessary. Schneider and Germann [4] synthesize the ideas of researchers (such as Nipper [5] and Moore and Kearsley [6]) who have categorized the evolution of distance education in three main generations of development.

- First generation: “correspondence study”, where students and teachers communicate with each other through the mail.
- Second generation: “multimedia distance teaching” [5] or “broadcast/teleconferencing” [6], where television and radio broadcasts are used by the students and teachers for communication.
- Third generation: “interactive, web-based instruction”[4], where the resources of the World Wide Web enhance communication, not only between students and teachers, but among students.

There is a long history for the first generation of distance education, at least back to 1883 in Sweden. In the United States, the idea was put to practice in the early 1890’s [2]. According to Schneider et al. [4], the speed of communication between teachers and students...
improved in second generation due to addition of radio and television broadcasts. However, the communication still remained one-way. The two-way interactive communication became possible in the third generation, with the advent of computer based technologies. Through these technologies, educators can provide effective and interactive courses that increase students' learning and application of the content material.

III. TOOLS AND TECHNOLOGIES

Although the old ways of delivering distance education with correspondance and radio/TV broadcasts are still in practice, computer based technologies are gaining immense popularity among both the educators and students. A wide range of options are available to distance educators, including both the traditional ways as well as the recent technologies. They fall into four major categories: [7]

1. Voice: Instructional audio tools include interactive technologies of telephone, and audioconferencing.

2. Video: Instructional video tools include still images as slides, pre-produced moving images (e.g., film, videotapes), and real-time moving images combined with audioconferencing (on-way or two-way video with two-way audio).

3. Data: Computers send and receive information electronically. For this reason, the term "data" is used to describe this broad category of instructional tools. Computer applications for distance education are varied and include:

   - Computer-assisted instruction (CAI), which uses the computer as a self-contained teaching machine to present individual lessons.
   - Computer-managed instruction (CMI), which uses the computer to organize instruction and track student record and progress. The instruction itself need not be delivered via a computer, although CAI is often combined with CMI.
   - Computer-mediated education (CME), which describes computer applications that facilitate the delivery of instruction, e.g., e-mail, fax, real-time computer conferencing, and World Wide Web applications.

4. Print: A foundational element of distance education programs and the basis from which all other delivery systems have evolved. Various print formats are available including: text books, study guides, workbooks, course syllabi, and case studies.

Having known about the technologies, a question arises "which technology is best?". The answer is "it depends". Although technology has a key role in the delivery of distance education, educators must focus themselves on the instructional outcomes, rather than the technology of delivery [7]. Effective distance education is dependent on the needs of students, the requirements of the content, and the constraints faced by the teacher as well as the student. Once these problems are addressed appropriately, adequate delivery system can be adopted. Figure 1 depicts the percentage of different delivery systems for distance education [1].

![Distance Learning Delivery Methods](image)

**Figure 1: Distance Learning Delivery Methods**

IV. CASE STUDIES

Developed Countries

Today, many countries in Europe and North America have well developed policies and programs for offering courses through distances. These include both synchronous and asynchronous means of teaching. Take for example USA. According to a statistical report of ‘National Center For Education’ [8], which comprises of a study of three years and was published in 1998, one-third of higher education institutions in USA offered distance education courses in 1995; another quarter planned to offer such courses in near future. Moreover, a much greater percentage of public than of private institutions offered distance education courses: 58 percent of public 2-year and 62 percent of public 4-year institutions offered distance education courses, compared with 2 percent of private 2-year and 12 percent of private 4-year institutions. In academic year 1994-95, an estimated 25,730 distance education courses with different catalog descriptions were offered by higher education institutions. As far as the technologies to deliver distance education courses are concerned, two-way interactive video and one-way prerecorded video were used to deliver distance courses by 57 percent and 52 percent respectively. About a quarter of the institutions used two-way audio with one-way video, and computer based technologies other than two-way online interactions during instruction (e.g. Internet). Apart from this, 14 percent or fewer institutions used other technologies. The survey also mentioned that a high number of education institutions offered distance education courses designed primarily for undergraduate and graduate students than for any other type of student. Eighty-one percent of institutions that offered distance education courses in fall 1995 reported offering distance educaton courses designed primarily for undergraduate students, and 34 percent
reported offering courses designed primarily for graduate students. Thirteen percent of institutions offered courses designed primarily for professional continuing education students, and 6 percent or fewer offered courses designed primarily for each of the following types of students: elementary/secondary, adult basic education, other continuing education students, and other types of students. [8]

Talking more about USA, National Technological University (NTU) and the Mind Extension University (ME/U) rely heavily on satellite television to distribute the courses of a group of participating conventional universities. NTU was founded in 1984 and it offers a wide range of advanced science and engineering courses using live, satellite-based narrowcast instructional television, sometimes backed up by e-mail. Some 45 technical universities in North America uplink to NTU’s transponder using compressed digital television and there are downlinks in these same universities as well as some 500 sites in high-tech companies and governmental agencies. Both degree courses and continuing education seminars are offered. NTU seeks to be fully global by the year 2000. A similar concept is employed by ME/U based on satellite and cable television, focusing mainly on technical and business courses, some of which allow interaction with the instructor and other students by telephone and/or e-mail. One such program of particular interest is the Educational Technology Leadership masters' degree program established in 1988 at George Washington University using ME/U to meet a growing need among education professionals to understand, manage, and use electronic educational technologies. The student body for this program is international. [9]

In Europe, the operation of EUROPACE is somewhat similar to that of NTU in the United States. EUROSTEP is an organization of institutions and companies active in the field of education and training which use multimedia and satellites for education and training across Europe. With its headquarter in Leiden, the Netherlands and a network of more than 700 registered receive sites, it was established in 1989. The programs range from vocational training to post graduate education, from informal adult education to programs for secondary schools. [9]

Continuing with Europe, let us take the case of UK, where Britain's Open University, headquartered in Milton Keynes outside London, has attained worldwide attention and recognition and many countries have developed their own open universities on this model. The British OU was founded in 1969 and is now the largest British university, employing a full-time staff of over 3000. Although the use of television is extensive, about 90 percent of the material used by the British OU is print-based. Face-to-face interaction with instructors in a large number of regional centers supplement print and televised materials. Through its Project LINK with the Russian space agency, British OU is active in Russia today, but it currently relies largely on print materials and video tapes as well as meeting with instructors. [9]

Developing Countries

The current trend of popularity of distance education is not limited to developed countries. The idea has now also got roots in developing countries, such as China. China's Central Radio and Television University (CRTVU) is an institution of higher education that operates directly under the State Education Commission. It runs multimedia distance higher education courses using radio, television, printed, and audiovisual teaching materials. Established in 1979, it now heads a modern distance education system comprising of CRTV, 43 Provincial, Autonomous Regional, and Municipal TV Universities (PRTVs), 654 branch schools at prefecture and city level, 1500 work stations at the county level, and more than 10,000 teaching classes that cover China's rural and urban areas. While the whole Chinese distance education system was initially centered on CRTVU using China Central Television's microwave network, it now makes use of a Chinese satellite capable of reaching all of China plus neighboring countries in Eastern, Central, and Southeast Asia. Having 146,000 entering students, 300,400 students matriculated, and 120,000 graduates in 1992, CRTVU is probably world's largest university. [9]

In Africa, distance education figures prominently among strategies to assist African countries escape from educational crisis. Africa has already made considerable use of distance education to extend access to formal education, although most public institutions have often been severely constrained by lack of finance and manpower. Case studies of Zambia, Kenya and Zimbabwe suggest that critical factors for effectiveness of distance education are the provision of adequate resources along with some other factors. It is expected that distance education will continue to be used to strengthen formal education by training primary teachers, extending access to secondary education and by providing high school education although, so far, few African countries have attempted degree level studies at a distance [10]. As a result of extensive research into distance education provision in Africa, the Nigerian National Comission for UNESCO has published in the current year the directory of distance education institutions in Africa. The directory lists 88 distance institutions from across Africa [11].

V. PROSPECTS OF DISTANCE EDUCATION IN SAUDI ARABIA

From the above discussion, it has become obvious that public interest in distance education is specially high in areas where the student population is widely distributed. This makes Saudi Arabia an ideal region for providing distance education. With still the high price of internet connectivity in the Gulf, it is a good area for the universities in the Kingdom in which they can invest
their resources and hence contribute to the spread of technical education in their vicinity. As the Saudization in all sectors of the economy is accelerating, matching capacities of the national workforce with the needs of the knowledge and information society is becoming a big challenge for the public and private sector [12]. The educational system is not changing at a pace fast enough to accommodate the new needs directly related to the rigors of global competition [12].

With the access to the Internet spreading very quickly in Saudi Arabia, organizations will look more towards a workforce that can make use of wealth of information, data, knowledge and best practices that the internet provides. Saudi Arabia has the best universities and colleges in the region, both in terms of faculty as well as the state-of-art equipment. Moreover, these institutions are spread around the country covering most of its area.

An important consideration while providing distance education is the electronic connectivity of the institution with the outside world and possibly other participating universities. As the universities in Saudi Arabia are interconnected together as well as with the outside world through the internet, they can organize distance learning programs in collaboration with one another with very little additional expenditure. In this way the students of these universities will be able to get in contact with the best of the faculty in different areas of study throughout the kingdom.

Another promising area of utilizing distance learning in Saudi Arabia is the education of common women, such as housewives. In most cases, it is not possible for them to enroll in regular programs offered at the universities due to their domestic responsibilities. They can however, get quality education through web-based courses at their own pace. The following points need to be considered in this regard. Firstly, the present bandwidth is insufficient to provide for the large variety of courses needed to attract this group. The universities in the country need to invest in this portion in order to provide quality education. Secondly, the pace of Arabization of computers should be increased so that distance learning is available to those housewives which have insufficient knowledge of English language.

Training for professional women in the Saudi labor force is also a strong potential area. Distance Education can achieve results in facilitating the participation of women, both young and mature in technological education, under the right conditions. The main forms of direct provision are bridging courses, allowing qualified women to update their knowledge and skills with a view to re-entry to the labor market; conversion courses, foundation programs allowing mature women and school leavers who have either left too early or made subject choices they wish to change; community-based programs providing basic technological education in a way which relates directly to women's traditional roles [14].

A pilot project under UNDP with internet based distance training for Saudi professional women has been proposed in 1999 [12,13]. The project proposal is representing an effort to empower professional women in Saudi Arabia with adequate skills and tools to perform better, to become more productive, and to grow professionally. It is now an established fact that the internet is an excellent medium for offering educational courses and material to well defined groups of students [12]. The main aim of the project is to establish an online facility initially in Riyadh in order to train Saudi professional women in the fields of executive level management, interpersonal skills, and information technology use and applications. Courses will be taught over and accessible through the internet and can be supported by CD-ROM material. A central classroom will be used to offer training sessions. The classroom will be equipped with 20 workstations and computers, allowing participation of 20 Saudi professional women who are already working either in managerial positions or are potential managers in different organiznaitions from both public and private sectors. The project will focus on equipping sites in three different locations around Saudi Arabia: Riyadh, Jeddah and Dammam. Organizations already established as training centres will be equipped with the necessary hardware and connections to offer on-line courses. The novelty of the program has several aspects: [12]

- **The teaching method**: utilizing the internet with its remote and interactive features.
- **Quality of instruction**: distance training and education programs allow access to the most qualified teachers worldwide without necessarily bringing them to Saudi Arabia.
- **The Content**: a collection of the best and most suitable materials available worldwide which would be adapted specifically for the Saudi program.
- **Linguistic diversity**: while initially offered in English, the materials will be translated and offered in Arabic, making them suitable for a wider audience both within and outside of Saudi Arabia.

The participants will be selected by a committee composed of representatives from UNDP, AGFUND, the Council of Chambers of Commerce, and other entities as appropriate. Upon completion of the course, trained women will have achieved a new set of skills to enhance their job performance, which will enable them to advance professionally within their companies and organizations. [12]

**VI. CONCLUSIONS**

Most of the developing countries are unable to provide even basic education to all segments of their population. The industrialized nations also cannot contain the ever-increasing costs of education and now face the increased demands for life-long continuing
education of the knowledge-based economy. Distance education is a logical solution to the imminent crisis in education the world over. In this paper, we have presented an overview of the state-of-the-art in distance education with case histories from several developed and developing countries. Prospects of distance learning programs in Saudi Arabia are also discussed with examples.

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