

Distance Education on the Net: A Model for Developing Countries

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ABSTRACT

In this paper we propose a distance education model for Turkish universities to accommodate more students in tertiary education. The model is based on the distance education that has successfully been employed at Charles Sturt University, Australia. We also discuss issues related to web based distance education such as assessment, use of communication technology and course materials to be developed. Benefits of partnership between industry and education institutions are highlighted.

Keywords: Distance Education, Open Learning, Web Based Learning, Internet, Anadolu University, Charles Sturt university, Atilim University, The Open Education Faculty, Turkey.

INTRODUCTION

In any teaching environment it is essential for the educator to be constantly aware of the need to match what we are teaching with whom we are teaching. As academics we must recognize the need to vary our approach and style, as our learners could be school leavers, mature age students, on campus and distance education students at tertiary institutions. The nature of teaching a course that is offered purely by distance education requires alternate approaches to fulfil the basics of face to face teaching such as student/instructor interaction. Distance education technologies are expanding at a rapid rate to make distance education a viable option for many tertiary institutions [1]. Distance education provides a non-contiguous communication between student and instructor, mediated by print or some form of technology [2].

Distance education instructional media evolved from print to instructional television, to current interactive technologies. The major drawback of radio and broadcast television for instruction is the lack of a two-way communications between instructor and student [3]. The current popular distance education media are computer based communication tools such as e-mail, bulletin board, web pages, tele-conferencing, video-conferencing. Distance education is common for all age students, especially in areas where student population is widely distributed. However, in some developing countries like Turkey the distance education can be implemented to accommodate more high school graduates in tertiary education.

A web based distance learning model, in general, can be depicted by an ER-diagram as shown in Figure 1 below where rectangular boxes represent entities (STUDENT, COURSE, and so on) and arcs represent the relationship between the entities.

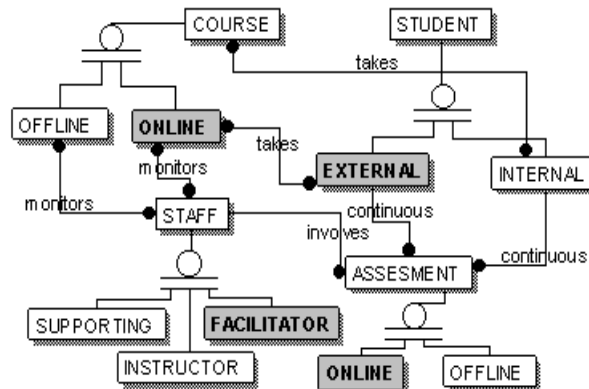


Figure 1 ER-Diagram for Teaching

A circle with a double bar underneath defines subtypes (children) of a parent entity type, e.g., ASSESMENT is either OFFLINE or ONLINE. This model, by employing on-line assessment, on-line courses, and course facilitators, incorporates distance learning (different time-different place) in addition to the traditional form of face to face education (same place, same time). In the figure, these additional entities of web based teaching are shown by gray boxes.

As a developing country with a relatively young population, education has the utmost priority for Turkey. According to the 1997 census, the population increase rate is 1.47% and 35% of the population live in the metropolitan areas whereas the 65% in the rural areas. The schooling rates are 99.7% for primary school, 69.3 for middle school, 53.4% for high school and 22.4% for higher education including open education. About 35% of the higher education population are in the Anadolu University distance education system.

The Ministry of National Education is responsible for all educational services in the country excluding the higher education. The Council of Higher Education is the planning, coordinating and policy making body for higher education. Formal education includes pre-school education, basic education, secondary education, and higher education. Basic education, which is extended from 5 to 8 years in 1997, forms the foundation of national education system. It is compulsory for every Turkish citizen from the age of six to the age of fourteen, regardless of sex, and is free-of-charge in state schools. The secondary education system can broadly classified as General High Schools, and Vocational and Technical High Schools. Higher education is defined as all post-secondary programs for a period of at least two years [4].

The system consists of universities (62 states and 19 private) and non-university institutions of higher education (such as police and military academies and colleges etc.). Each university consists of faculties and four-year schools, offering bachelor's level programs, and two year vocational schools offering pre-bachelor's (associate's) level programs of a strictly vocational nature.

Turkish Higher Educational System is facing difficulties to accommodate the large number of applicants to Turkish Universities for at least the last two decades. Higher Education Council (YOK) and Ministry of Education are investigating ways of improving the qualitative/quantitative aspects of educational service to high school graduates.

In this paper, we will look at the possibility of employing web based distance education at the universities with high reputations in order to increase the overall intake to the regular 4-year degree programs. In Section 2, we briefly discuss the entrance to Turkish universities. A

brief history of distance education in Turkey is presented in Section 2. In Section 4, we introduce the distance education model of Charles Sturt University (CSU), Australia, that can easily be adopted in high profile Turkish universities. In Section 5, we discuss a distance education model for Middle East Technical University, Turkey. Section 6 is devoted to industry and tertiary partnership to deliver state-of-art course materials, especially in information technology area. Conclusions are given in Section 7.

ENTRANCE TO UNIVERSITIES IN TURKEY

The students are accepted to Turkish Universities based on their standardized High School Grade averages and their success in passing the two stages of the entrance examinations (the second stage has been cancelled, effective from 1999). The first stage eliminates about half of the candidates. The applicants taking the second stage designate their preferences by providing a list of degree programs (up to 18 programs) just before leaving the second stage of the entrance examination.

Most of the unsuccessful students take the exam in the subsequent years. This system caused appearances of many private tutoring centers to prepare the students for the university entrance exams. The cost of attending to such a center is reasonably high. A considerable number of students do not have financial resources to attend to these centers. There is no scholarship available to attend to these centers, either. We believe that the majority of students attending to those centers would prefer to attend to a distance education program if a university with high reputations would offer the degree.

Each year, 81 public and private universities in Turkey and Turkish Republic of Northern Cyprus can roughly accommodate 248,120 graduates placed out of about 1,400,000 applicants according to statistics from 1999 university placement exams to the traditional universities and additionally, 166,195 of them placed to distance education programs in Anadolu University [5]. In public universities, students make a small contribution to the tuition fee, whereas in private universities yearly tuition fee is in the range US\$ 6000-US\$10,000. This is considered to be quite high with respect to the per capita income in Turkey (~US\$2600).

DISTANCE EDUCATION/OPEN LEARNING IN TURKEY

Although the distance education implementation in Turkey started in 1982, the discussions about distance education in general took place as early as 1927. This concept was thought to be beneficial in increasing the literacy rate among the citizens in Turkey [6]. In those years, the other countries had already initiated the education through correspondence by mail. Due to the common belief that people can not learn reading and writing without a teacher, the idea of distance education was not considered in Turkey until 1956.

Between the years 1927 and 1955 the distance education merely remained as an idea [7]. The first distance education project was initiated at the Research Institute of Bank and Trade Law, Faculty of Law, Ankara University in 1956. In this implementation, the bank employees were educated through correspondence by mail. In 1961, The Centre for Education through Letters was established as a sub-organisation of Ministry of Education, Turkey. This scheme targeted people who wish to complete his/her secondary education without attending courses. These attempts were extended in 1966. The establishment of Advanced Teacher Education School [8] followed it. Later on in 1975 and 1978 two attempts to establish an "Open University" was unsuccessful. In other words, in Turkey, "Education through Letters" (called in Turkish as being YAY-KUR) was implemented as a correspondence education. However, required efficiency and success were not attained.

Again in 1970's, Eskişehir Economics and Commercial Academy, The Institute for Education through Television became a pioneer in the distance education area. In 1981, a governmental campaign was started to reduce illiteracy rate in Turkey. In this attempt, television was an important education tool. The program achieved a considerable success

with a considerable increase in the literacy rate. In the same year, Turkish Higher Education Council provided an opportunity to implement distance education at Turkish Universities. After these pioneering years, we witnessed a well-planned, scientific and efficient approach to the distance education in Turkey. In November 1981, Anadolu University was given the mission to carry out distance education throughout the country. Consequently, Open Education Faculty (OEF) was organised and 29,479 students were initially enrolled in Economics and Business Administration programs. This program used various tools such as printed materials, television programs and face-to-face academic tutorials to reach distance education students. Later on these educational tools were extended to the use of video, computer, radio and newspaper.

Today Anadolu University with more than 450,000 active students are considered one of the ten mega universities of the world delivering undergraduate degree programs and other programs such as degree completion programs to Turkish people in Turkey, Northern Cyprus Turkish Republic and Europe. Anadolu University programs have been greatly expanded in recent years, although entry still remains competitive.

At the basic and secondary education levels Ministry of Education provides the distance education. Open High School (OHS) is a widespread secondary education program, which has been operating since 1992. OHS started education with 45,000 students and reached a student population of 90,000 in 1996. Now it accommodates more than 100,000 students. The purpose of the OHS is to allow traditional and non-traditional students, who for one reason or another have not completed secondary schools, with an opportunity to earn a high school diploma. The OHS curriculum is the same as for traditional high school students.

Benefits and perspectives of the OHS can be explained as follows:

- OHS students will not be experiencing difficulty in adapting to school environment
- by the use of automated testing services a reliable assessment will be provided
- the relationship between attendance and success will be removed
- lack of physical facilities such as buildings and teachers would not cause any deficiency in educational services
- the complexity of bureaucratic procedures will be reduced
- the limits of accommodation, nutrition, transportation will not be forced
- an equal-opportunity environment in education will be created
- the cultural and educational level of society will be increased
- students at secondary education level may find an opportunity to complete their credits by taking courses from OHS
- students may have an opportunity to have more courses according to their needs and interests.

OEF and OHS have discussed in many masters' thesis, articles, reports, and books. Many papers, reports and internal papers were presented at national and international seminars, symposiums and panels (For example, see [13], [14] and [15]).

Technologies used currently in Turkey to deliver distance education programs are typically one way and designed to reach masses. As Murphy states in [9] these technologies include specially designed textbooks and other printed materials including newsletter and bulletins, television and radio broadcasts. Technologies used in the Anadolu University Open Education system include videotapes, face to face lectures at local universities throughout the country. Multiple choice type examinations for both programs are offered in a variety of locations, usually in cities and larger towns.

In 1993, the services offered by OEF were re-organised. As a result of the re-organisation, Economics and Business Administration programs were expanded into Faculties of Management and Economics based on distance education method. Open Education Faculty

continued to give two-year associate degree education to its students. OEF is recently about to implement a distance education program utilising videoconference.

It seems that there is an increasing public awareness towards the distance education issues in Turkey in the recent years. Two international distance education symposiums were held in 1996 and 1998 respectively. Some universities started to employ distance education technologies to support conventional teaching. In 1996 Bilkent University has initiated some synchronous distance education courses via satellite. Middle East Technical University (METU) has started experimental distance education course via Internet in 1997. Istanbul Technical University established remote classrooms via a microwave link connecting two campuses that are in different locations in Istanbul. The same year with the initiative of the Council of Higher Education a project was conducted, by a group of researchers from different universities, on the analysis of nation-wide distance education alternatives [10]. Technical infrastructure, The National Academic Network (ULAK-NET), consists of the national high-speed backbone and the fast node connections. The users of ULAK-NET are the universities (state and foundation owned), R&D divisions and information and documentation centers of state and private organizations and prominent libraries around Turkey. ULAK-NET is an initiative of the Scientific and Technical Research Council of Turkey (TuBITAK) and strongly backed by Turkish Telecom. The Council of Higher Education has been preparing rules and regulations for the distance education based on computer and communication technologies [4].

In the following sections, we look at the possibility of employing web based distance education at the universities with high reputations in order to increase the overall intake to the regular 4-year degree programs. We consider the Middle East Technical University (METU), Ankara, as our model university. However, there are a number of universities in Turkey with similar facilities. METU is experiencing a web based Distance Learning certificate program (ideA) in Computer Engineering / Informatics [16]. A few number of lecturers at METU have already started to support their courses for the (internal) students with web pages.

A DISTANCE EDUCATION MODEL: CHARLES STURT UNIVERSITY

In this study, we develop a framework for extending the attempts done by METU for a more general educational set up. This framework will be based on the distance learning programs offered at Charles Sturt University (CSU), Australia, where almost every course offered has a web based electronic platform to support external as well as internal students.

It should be pointed out here that a web site for a course is an additional facility to the printed material supplied to every student. The on-line initiative at CSU aims to use new communication technologies [17]:

- to extend the benefits of improved communications to the majority of students; in particular, CSU aims to provide better communication between a student and his/her instructor, and amongst students themselves;
- to increase the range of administrative services available to students such as student records, the library and student services;
- to improve the timeliness of communication; and
- to increase student access to information resources.

All students enrolled in on-line supported courses will have received the following resources to help them get started [17]:

- the CSU on-line brochure, which provides information about connecting to the CSU network; and
- A leaflet explaining the features of an on-line supported course and how to use it.

As it is identified in [18] there are four components required for effective instruction:

- Information presentation
- Learner guidance
- Practice with feedback
- Learning assessment.

These four functions should be fulfilled for effective teaching whether it is web or classroom based. Internet based media can be introduced to support any or all of these elements of effective instruction.

We believe that far the most common use of Internet for educational purpose is to fulfil "information presentation" at the moment. Many instructors in higher education have been establishing a web site as information container to supplement classroom education with text such as course notes, assignments, pointers to external web sites and other media types such as graphics, videos. This trend is also true for METU. However, this approach is not suitable for distance education since learner guidance, practice with feedback and learning assessment are left to the classroom teaching. Thus, this approach can be interpreted as replacement for the course syllabus.

Internet can be used to support all four functions of effective instruction to deliver courses in distance mode. An instructor at CSU prepares an Internet-based course for (remote) students with the support of an instructional designer and a media developer. Information is presented using web pages embedded media files. Communication and collaborative tools like e-mail, discussion list, live chat and forums are used for "learner's guidance", dialogue and practice activities. The instructor also prepares self-instructional tutorials/practicals and follows up students' work for "feedback". An Internet application can be used to track student activity and assessment. Students can electronically submit their assignments and can write some tests on-line.

This approach is based on the tradition of classroom, collaborative education. The electronic environment attempts to mirror and enhance the classroom model. Some instructors also make available their power point classroom lecture notes on the web site for external students. CSU provides an on-line forum for instructors to discuss and to share their on-line teaching experience at http://online.csu.edu.au/wwwboards/Online_Trial

The advantage of the web based distance education over traditional distance education is that it alleviates some problems encountered by students of distance education [19] that internal students do not normally face them. Some of these problems are:

- absence of face to face contact, and isolation of students
- reluctance of students to contact instructors
- feeling of not belonging or being part of the university
- absence of collegiate atmosphere
- late delivery of mail packages
- inadequate feedback from instructors.

A carefully designed web based distance education provides tools to eliminate or alleviate some of the problems above. For example, students can access a "forum/bulletin board" to generate a collegiate atmosphere with their fellow students. In fact, the most popular and most used feature of web sites is the communication section for a number of courses. In particular, external students found access to instructors, the library and to other students to be very useful, and several commented on how it made them feel more involved with the course and the University [20].

The issue of equity is one of the hurdles on on-line teaching to overcome since not all students have on-line capabilities. Students can not be required to access the web and use its resources unless the requirement is a university policy. The Division of Planning and Development at CSU has conducted a survey of both internal and distance students to determine their access to computing resources and the Internet [9]. The survey was distributed to all, 19418, distance education students enrolling in CSU courses in Autumn 1999, that is, commencing and continuing students. 13760 students have replied to survey. The survey examined student access to computers both at their place of residence and elsewhere, seeking to determine computer specifications and in addition, access to the Internet. The results indicate that 9453 have Computers with Internet access; 3028 have computers with no Internet access; 685 have no computers; and the 594 have computers but Internet access information is not available. However, CSU, starting from year 2000, requires distance education students to have or access a PC with an Internet connection.

In conclusion, at CSU there is an external version of every course taught, mostly supported by its on-line version. The textbook used for internal and external students is the same except few exceptional cases. The textbook is supported by study guide and reading materials if necessary. Through the middle of each semester there are three weeks residential school break for internal students. During this period, majority of external students attends to full day classes/labs. The problems, which students might be facing from the course, are sorted out during residential schools. The assessment for external and internal students are usually the same or similar.

DISTANCE EDUCATION AT METU: A PROPOSAL

Currently, at METU, around 20,000 students at five faculties are enrolled in the undergraduate programs. About 3,000 students are admitted to the university each academic year. Since the language of instruction at METU is English, a preparatory class is to be attended by those who cannot achieve the required standards of proficiency tests of English. There are two main semesters with a 4-weeks break in between and an optional summer semester where students may enroll in at most two courses to make up their credit deficiencies and/or repeat the courses they failed in preceding semesters.

As mentioned earlier, only around %20 of the very large number of high school graduates can be admitted to the Turkish universities. The web technology, if utilized and developed according to the needs and requirements of the Turkish education system, will provide an additional environment for higher education. In this respect, we believe that METU with the existing resources and facilities (and many other Turkish universities with similar infrastructures) is a good candidate to model and implement a web based distance learning system that has been satisfactorily employed by CSU.

Readiness

Internal students at METU already have access to on-line course material in some subjects. The trend among the lecturers, now, is to reduce the face to face contact hours for those subjects. This, however, requires a change in the university regulations concerning teaching. Incorporating on-line course material such as self-tests, tutorials, and supplementary readings to the regular subjects would be an asset in designing web based courses at METU in the near future.

Assessment

Student evaluation will be based on examinations to be held periodically, and the results of on-line tests and homework submitted during the course of study. Mid-term examinations can be performed during the weekends, and the final examination during the semester break. Frequency of meaningful access to course site and on-line course participation (e-mail/chat frequency) should contribute to the final assessment.

Communication/Interaction/Attendance

Compulsory laboratory work in some courses (chemistry, physics, and so on) can be completed during the semester break. However, software simulations to some laboratory experiments should be designed and utilized by the student during the semester. Periodical campus meetings can be arranged for face-to-face communication and collaborative work. External students would need to have a chance to feel the campus atmosphere. Majority of the internal students (mostly faculty of engineering and architecture students) is off campus during the summer semester for the required (non-credit) summer training. This period can be fully utilized by the external students to take on-line courses because of the relaxed computing/laboratory, and accommodation facilities on the campus.

Learning Materials/Resources/Tools

Textbooks used for internal students can be used with some supplements relevant to Internet based learning. These include on-line tutorials, self-tests, and links to some related sites, videos, and CD recordings.

Facilities

For the students without any Internet access, common facilities should be set up within the campus and be kept operational 24 hours a day including weekends. Course tuition can be adjusted according to the Internet facility to be provided by the university. Course facilitators should be available for 1-1 communication (chat, telephone) at designated times.

Interactivity

It connects the student with the distance lecturer, facilitators, and their peers. Without interactivity distance education consists of the correspondence study model that represents an independent study. Interactivity can be in many different forums at METU environment. The Internet tools, telephone, residential schools and web-based tutorials are adequate to employ for interactivity.

Learner Support

Teaching assistants can visit some sites out of METU. Students may take trips to METU. Audio and video tele-conferences can be arranged.

The following table gives a list of distinctive features of a web-based distance learning program and availability at CSU, and in the proposed METU model. Note that the table is constructed according to the services that either they are already available or they can easily be provided with the current infrastructure at METU.

Table: 1
Comparing Facilities/Features Y=Yes, N=No.

Feature	CSU	METU
Learning Material		
On-line translation	N	Y
On-line dictionaries	Y	Y
On-line tutorials	Y	Y
On-line tests	Y	Y
(Printed) course material	Y	N
On-line course	Y	Y
material		
Communication Tools		
On-line feedback	Y	Y
e-mail	Y	Y
Forum for Instructors	Y	Y
Forum/Chat	Y	Y
Discussion list	Y	Y
On-line resources	Y	Y
On-line hw submission	Y	Y
Supporting staff availability	Y	N

Staff Training		Y	N
Center for Educational Technology		Y	N
Acceptance By examination		N	Y
Other (e.g. job experience)		Y	N
Assessment	On-line	Y	Y
	Off-line	Y	Y

The model proposed is still under development. As is stated in [3] the instructional development process for distance education, consisting of the traditional stages of design, development, evaluation, and revision. We mainly concentrated in designing stage of a distance education in this work. The further results will be stated elsewhere.

KEEPING YOUR WEB BASED INFORMATION CURRENT

As an academics, one of the challenging issues facing us today is to keep the information on the web current with minimum cost and effort. Putting a web-based subject on Internet is only a fractional part of the cost. Maintaining cost of such subjects current in some educational areas would be highly costly. A typical example of such an educational area might be information technology (IT) in which it is not unusual to revise some subjects in every second years. Therefore, it will be beneficial and cost effective for an educational institution to form an educational partnership with industry. Nowadays, it is possible to see many commercial companies, especially in IT area, offering short courses.

With the fast development of IT there is a great demand for up to date IT expertise and knowledge in coming years. One of the main missions of education institutes is to provide up to date professional IT education and support industries towards this aim. There is a big demand from industry for graduates who have up to date IT skills. Some big companies like Microsoft and Cisco have entered IT education market to deliver IT courses on their current products through commercial partners.

Those short courses are usually designed for people already working in an IT industry and delivered 3 to 5 days. It is an effective way to brush IT skills; however, the cost involved in is considerably higher.

An alternative cost effective way of delivering such courses is through tertiary institutes. These courses can be integrated to the normal curriculum of a tertiary institute. In this way, a strong link can be established between an education institute and leading commercial IT companies.

- **Students in IT departments have a great chance to develop skills on the state of art IT hardware and software products that are about to be adopted by IT industry.**
- **The courseware developed these commercial companies can be integrated into a tertiary curriculum with a little effort. Hence, it is a cost-effective way to develop a course material.**

A tertiary institution can establish a partnership with Microsoft through Authorised Academic Training Program (AATP). As an AATP partner, a tertiary institution may deliver the same courses delivered by commercial partners of Microsoft but in a longer period of time, typically in a semester. Such a course costs no more than any other course that students enrol. An additional benefit of enrolling AATP course is that if a student desires, he/she can obtain a prestigious Microsoft Certified Professional (MCP) or a Microsoft Certified System Engineering (MCSE) certificate by writing Microsoft exams. These certificates are well regarded by employers.

Another industry based educational partnership can be established through "Cisco Networking Academy Program". Cisco is the leading commercial company in networking hardware and software. In recent years Cisco is forming partnership with educational

institutions including high schools through its "Cisco Networking Academy Program". This program teaches students to design, build and maintain computer networks. This program operates with more than 6000 Academies in 107 countries. As it is in AATP program, students enrolled in "Cisco Networking Academy" based subjects can obtain a prestigious Cisco Certified Networking Associate (CCNA) certificate by writing Cisco exams after they completed these subjects.

We believe that Cisco Networking Academy Program forms a good example of delivering the courses in a mixed mode (internal and distance modes). The following is an excerpt from Cisco web page (http://www.cisco.com/warp/public/3/asiapac/academy/_program.html visited: 17 April 2001)

"Using Web technologies, the Cisco Networking Academy Program is also a valuable model for successful e-learning. Numerous online tools that empower Academies to manage all aspects of the program supplement web-based delivery of educational content. In addition to the networking curriculum, it provides online testing, student-performance tracking, and a Quality Assurance Plan".

Participation of institutions in AATP and Cisco Networking Academy Program helps their students to be donated much needed most up to date IT skills and knowledge.

CONCLUSIONS AND SUGGESTIONS

It is believed that, if organized, supported and managed properly, universities in Turkey with sufficient technological resources can offer web based Distance Learning programs to a large number of students in the majority of undergraduate programs. Consequently, the intake in the subsequent years would have been considerably increased to help in solving one of the most important problems the Turkish education system is facing right now.

To achieve this objective well-established universities such as METU need a new center, changes in regulations governing acceptance of students, and execution of courses.

Faculty training should start at an earlier stage of the project. Instructor's involvement in the design phase is crucial to the over all success of the distance learning program. Needless to say, accreditation of the web-based distance learning degree programs by the Higher Education Council (YÖK), and other governmental bodies of Turkey is necessary. Some of the required prerequisites for a successful execution of the program are listed below:

1. The establishment of a center for educational technology (CET)
 - to take an initiative in forming the infrastructure for web based distance education;
 - to inquire, manage, and update the technology required;
 - to train supporting staff (facilitators/teaching assistants);
 - to help in the design of web material/documentation;
 - to allocate resources.
2. New two-year degree programs in the existing vocational school to support CET to train/educate
 - web masters, web designers/developers;
 - technical staff for telecommunications/networking.
3. In addition to the existing computing facility, new computer multi-media laboratories for easy access to facilities provided by the web courses from within the campus.
4. Appointment of instructional designers to help lecturers in preparation of distance education materials.

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