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Message from the Editors

I am happy to announce that TOJDEL is the rapidly growing journal in the field of distance education with the support and qualified studies of international researchers all around the world. It is great pleasure for me to present current volume and issue of TOJDEL, October 2013 to the academic agenda. I would like to thank Editor and his delegation for the process of the publications. Further to this, I would like to thank authors who shared their valuable research papers to the academic world through TOJDEL. Upon the developments of the journal, it is significant to ensure quality by pointing out interdisciplinary papers, methodologies and context to be part of the journal scope. In this respect, we are pleased to get qualified research papers to share in the academic world for the next issues of TOJDEL

October 01, 2013

Prof. Dr. Aytekin İŞMAN

Editor in Chief

Dear TOJDEL Readers;

TOJDEL is an international journal that covers valuable research articles from international research agenda. On behalf of the editorial team, I am pleased to present new issue of TOJDEL which focuses on interdisciplinary view within its quality and development. Upon the TOJDEL scope, this issue covers different researches, methodologies and research contexts.

I would like to thank researchers and editorial team for their contributions to the academic agenda and the issue of TOJDEL.

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Comparison of Computer Assisted Language Learning Software before Investment

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ABSTRACT

Decreasing cost and increasing multimedia functions have made computers popular tool in education in the last decade. CALL refers to the Computer-Assisted Language Learning. Using CALL, students can individualize their studies and study at the pace they desire (Raschio, 1990). Also, advanced tracing and recording capability of CALL permit instructors to monitor their students' progress (Bland et al. 1990). However, availability of such features shows differences among CALLs. Not many comparative studies have been conducted to compare the CALL Software. The purpose of this study is to compare the features of two Computer-Assisted Language Learning software using qualitative research methodology. Students and instructors having experience in using CALL software at the Foreign Languages Compulsory Preparatory Program of a university participated in the study. Categories are used for the comparison based on the content analysis of data. Recommendations are made to the administrators of education institutions considering making such investment..

Keywords: *instructional technology, computer-assisted instruction, second language.*

INTRODUCTION

CALL refers to the Computer-Assisted Language Learning. It is a general term which covers computer applications used in second language acquisition (Chapelle, 1998). CALL provides numerous benefits for language acquisition process. Using CALL, students can individualize their studies and study at the pace they desire (Raschio, 1990). Also, advanced tracing and recording capability of CALL permits instructors to monitor their students' progress (Bland et al. 1990). However availability of such features shows differences among CALLs.

There have been a lot of improvements in CALL environments ever since they were first introduced. Besides, they are being used more widely than ever before as factors that inhibit their widespread use disappear. Dunkel (1987) points out that the start-up cost of the hardware, the skepticism concerning the effectiveness of computer assisted instruction and educational systems could prevent CALL software from being widely used. However, decreasing costs of software and hardware, new attitudes towards computer-assisted instruction and educational systems have recently boosted the use of such software. Yi-dong (2007) supports the same opinion and points out that CALL has become an effective tool to aid teaching and learning by constant advancements in hardware and software and an increase among both teachers and learners.

Besides, with the improvement of technology, the number of CALL environments available is increasing rapidly. Especially during recent years, there have been considerable improvements in the design and structure of CALL software. Coughlin (1990) states that the use of hypermedia systems which allow access to audio and video media controlled by a computer program has allowed CALL to become highly interactive.

The increase in the number of software available can bring about problems, too. Recently, it has become more difficult to decide on which CALL environment to use for specific groups of learners than it was a decade ago.

Identifying the effects of CALL activities on specific learners requires precise description of the interaction (or discourse) that occurs between learner and computer (Chapelle, 1990). Not many comparative studies have focused on this interaction to compare the CALL software. Besides, little about learner engagement in Web Based Language Learning has been known and documented yet (Son, 2007).

The purpose of this study is to compare the features of two Computer-Assisted Language Learning software using the qualitative research methodology. (Screenshots are provided in Appendix I) The secondary purpose of this study is to help universities and other education institutions decide which computer-assisted learning environment they should prefer. The study seeks answers to the following research questions:

1. What are the properties of the CALL environments Quartet Online (QO) and Longman English Interactive (LEI)?
2. What are the advantages and disadvantages of Quartet Online (QO) and Longman English Interactive (LEI) from the perspective of students and teachers?

METHOD

a) Participants

The participants were from the language school of a state university in the Black Sea region of Turkey. All the participants were chosen from those who had experience of using both software (QO and LEI) to obtain extensive information about the structure and efficiency of both CALL systems. The study has four participants, two of them are students and the others are instructors. The student participants were chosen among the ones who studied at the preparatory school for two years consecutively. They studied and had had experience with two different online learning environments. Their previous experience about learning English is presented in Table 1.

Table 1: The summary of the previous experience of the participants

Instructors' Experience	Students' Experience
Teaching experience between 6-10 years	There is foreknowledge
The instructors have had training	Prep school education for 2 years The students have no training on the software

b) Data Collection Process

The data collection process involved interviews with the participants, observation and document analysis on the software. The interviews with the students were carried out in the school library. They were asked to make comments on the interview questions. Similarly, the instructors were interviewed in their offices. All the interviews were recorded in sound files and then these sound files were transcribed for data analysis.

c) Data Analysis

After the interviews were transcribed, a descriptive qualitative analysis of the semi-structured interviews was carried out to identify the research questions. The most frequently repeated issues were chosen and these formed the categories. During the coding process, 11 categories were formed. The codes obtained from participants and their categories were written down in charts and presented in tables. Using the data obtained from the interviews, two CALL software were compared.

RESULTS

a) Structural Properties

i) Access and Fee

QO

Although QO can be distributed on World Wide Web, QO used in the school where the study was carried out was running on a local server only. Thus, the access was restricted within the local network. For this reason, the access was limited within only class hours. However, it should be kept in mind that the software can be used online. To gain access, school has to pay for a license annually, which varied according the number of students to use it.

LEI

On the other hand, LEI has internet based online access. The software is composed of four levels and the institution buys the required number of levels students are going to work on. A separate fee has to be paid for each level. The levels are loaded into students' accounts by entering the access key by their instructors. The institution pays the amount of money required for the access codes.

ii) Course Content and Exercises**QO**

QO works with web browsers such as Internet Explorer and has a standard page style which doesn't change through all levels and units exercises. There are 9 units, from Q1 to Q9, which accompany the coursebook used. Instructors can lock or unlock the units as they proceed in their courses. Every unit is composed of grammar, vocabulary, reading, listening and video exercises. At the end of each unit, an achievement test is provided for the revision of the subjects covered. The data obtained from the interviews about the content of QO is presented in Table 2.

Table 2: Content summary of QO

Grammar Exercises	Listening Exercises	Vocabulary Exercises	Reading Exercises
The subjects aren't parallel to the coursebook	The content is not rich	The levels are separated	Subjects do not draw attention
Focuses on memorising	Doesn't draw attention	There is a Turkish dictionary	Subjects are boring
There are exercises with mistakes	Not very satisfactory	The dictionary is not complete	Texts are long
Hard to understand	Not various	The words are difficult	Do not arouse interest to read
	Hard to understand	Not parallel to the coursebook	Same with Longman in quality
	Not very different from Longman	There are a lot of unknown words	The texts aren't up-to-date

LEI

LEI offers the students various exercises in web browser environment. The learning environment is composed of 4 levels. Levels are loaded into students accounts by entering their access codes by their instructors. Each level is composed of modules A, B and C. These modules can be shown or hidden by instructors as they proceed in their courses. These modules consist of exercises whose content is directly parallel to the coursebook. In each module, students can find grammar, vocabulary, reading, listening, speaking and writing exercises. Every level has three achievement tests and one level test which provide revision for the subjects covered. The writing exercises are sent to the instructors' accounts. Then, the instructor can check and grade students' writing. The data obtained from the interviews about the content of LEI is presented in Table 3.

Table 3: Content summary of LEI

Grammar Exercises	Listening Exercises	Vocabulary Exercises	Reading Exercises	Speaking Exercises	Writing Exercises
Satisfactory	There are many listening exercises	No Turkish dictionary	There are up-to-date subjects	Can't be tested in the lab	Activities are not efficient
Subjects are parallel to the coursebook	Exercises appeal to their aims well	Definitions are sometimes not understandable	Draws attention	There are technical problems	Example exercises are copied
There is enough revision	Parallel to the subjects	Teaches quite a lot of words	Advantageous	Could be beneficial	There is no chance to make use of creativity
Proceeds from simple to difficult	Draws attention	Teaches useful words	Subjects are enjoyable	The exercises must be improved	Written tasks can be assigned
Exercises are active	Very efficient	Uses vocabulary suitable for the subject	There is not much difference	There must be speaking exercises	
There are many types of questions	Beneficial	Proceeds from simple to complicated	Resembles to those in Quartet	The infrastructure must be improved	
	More enjoyable	Parallel to the course content	Of higher quality	No harm if it doesn't exist	
	Easy to understand	Beneficial		May not be efficient in the school lab	
	Subjects are linked to one another	Frequently-used vocabulary is taught			

iii) Communicative Features

QO has an efficient messaging feature. This system resembles to an e-mailing system. Instructors can send messages to students, or the entire class. With this feature, active communication can take place between students and instructors or among students. Homework and any kind of text can be posted with the messaging feature.

LEI has no messaging system, however, it is possible to communicate within the class and with the instructor. This can be possible by posting notes on the main page of each level. But the instructors can't send individual messages. On the other hand, instructors can post files on the main page of each level. These files can be downloaded and accessed by students. Besides, in writing exercises, teachers can correct students' mistakes and give feedback.

b) Advantages and Disadvantages of Quartet Online and Longman English Interactive

The data obtained from the interviews with the participants related with the advantages and disadvantages of QO and LEI were summarized in four categories and summarized in Tables 4 and 5.

Table 4: Opinions of the participants about QO

General Properties	Effect on Learning	Visual Content	Easiness of Use
The content of the program can be sabotaged by students	Exercises are insufficient	The content is not rich	The examples are very long
There are security flaws	Makes learning harder	There are a lot of videos	Very complicated
Exercises are very mechanical	Mechanical exercises	Boring	Not understandable
Exercises repeat themselves	Not very supportive	More difficult to understand	No access outside the lab
Very difficult	Not very effective	Not up-to-date	Not parallel to the coursebook
Less repetition of subjects			There is a messaging system
			More difficult
			Answers can be found out easily
			Can be learned in one week
			Simpler

Table 5: Opinions of the participants about LEI

General Properties	Effect on Learning	Visual Content	Easiness of Use
The program is secure	Satisfactory	More advantageous	Easy to use
The content is of high quality	Intensifier	Draws attention	Possible to access via internet
More advantageous	More instructive	More enjoyable	Easy to understand
The content is richer	Makes learning enjoyable	Aims to make the students enjoy the lesson	No messaging system
More attractive	More effective	More fluent	Can be learned in one or two lessons
There are many kinds of exercises	One-to-one revision	Richer and more realistic	Parallel to the coursebook
A very effective software	Easy to understand	There are enough exercises	Consists of different levels
Easy to understand	Very efficient		Can be learned within a week
More efficient	Able to teach well		Enjoyable
More enjoyable			Appeals to the level of students
More beneficial			It's easy to supervise the students
			Students can see their scores
			It's possible to write exercises
			It's easy to see student performance
			The order of course content can be changed

i) Advantages for Students**QO**

Though students didn't mention many advantages of QO, the fact that the page style is original and simple can be considered as an advantage. Once students learn how to use it, they can proceed easily. The software is not directly parallel to the course book. Though this was mentioned as a disadvantage by students, it can give them the opportunity to build up on what they learn within lessons where they use the course book.

QO provides a dictionary with Turkish definitions, which is useful for especially beginner students. One instructor's comment about this software is as follows: *"They could understand the words more easily as they could see the Turkish equivalents."*

LEI

The software has a web browser based interface which is very easy to use. The appearance and organization of pages attract the attention of students, thus it is enjoyable for them to study. The content is of high quality and directly parallel to the course book. It offers a rich content of exercises which proceed from simple to more challenging ones.

As the software is accessed via the internet, learning is not restricted within class hours. Students can access the courses from everywhere and continue studying. The instructors mentioned that *"thanks to internet access, students spent more time on the software, that they learned how to use it within very short time, in two or three days, since they had access at home"*. This can be considered as an important advantage for not only access from anywhere and anytime but also for the time spent on learning the program. As can be understood from the instructors' statement *"The students have purchased the license of the software and they can access it anywhere if they have internet access"*, the students will be able to learn English for two years whenever and wherever they want.

In terms of exercises, LEI has been found to be superior. It provides students with sufficient revision. As we can understand from the students' sentences *"It was definitely more efficient for me. I learned a lot of things about English"* On the other hand, it is quite easy to understand the exercises. This is understood from the sentence *"They focus on directly our understanding and are much better."*

ii) Advantages for Teachers**QO**

QO has a messaging system and this enables instructors to send instant messages to students and classes. It also has a dictionary with Turkish definitions. For this reason, instructors don't need to provide a lot of help about vocabulary. The software enables the instructors to monitor students' performance on exercises and see their scores.

On the other hand, it is possible to setup the software on a local server, and this makes the system more secure and makes it easier for instructors to watch what they are doing on computers in the lab. This feature also makes the software more economical because the institution pays a yearly fee to use the software, no additional access codes or fees are required.

LEI

Thanks to internet access, it is very easy to supervise the students, to see how much of the exercises they covered, how much time they spent on them and monitor their scores. Instructors can change the order of the modules if they want. This can enable them to customize their lessons according to what they teach in class. They can also hide or show modules when they want.

It was found out that LEI helps learning and makes teaching easier as it provides a lot of supplementary materials for lessons. The grammar exercises in LEI are designed in a high-quality and easy-to-understand way. On the other hand, when the exercises are observed closely, all participants pointed out that the course content were parallel to those in the course book, they are satisfactory and there is a sufficient amount of revision.

iii) Disadvantages for Students**QO**

It was emphasized by the students that QO could be boring since the appearance and page style were always the same. In addition, the content is quite repetitive and mechanical, which makes it difficult for students to keep attention on the exercises. The content is sometimes above the level of the students because it is not directly parallel to the course book. The texts in the software expose the students with totally new material with which they are not familiar. In the study, the software was being run on a local server, so studies were restricted within class hours.

It was emphasized that there weren't enough exercises in QO and they are mechanical and insufficient. Thus, it was claimed that the software doesn't have the expected effect on learning. The students summarise the situation as follows: *"...I don't think it has a very big effect on our learning."* *"It is not very effective."*

Also, it was found out that it is difficult for the students to understand the exercises since they are not clear enough. One of the participants stated that *"Yes, we didn't understand anything."* The instructors share the same opinion *"...no questions that aim at deep understanding had been designed."*

The participant students emphasized that *"the pictures and videos are boring"* Pictures, videos and page styles resemble to one another so QO does not seem to be drawing the students' attention, which makes students bored. Besides, it was observed that visual content was not up-to-date. One instructor stated that *"Visual content (pictures and videos) in QO is quite old-fashioned."*

LEI

Since there is no messaging system, students can't get in touch with their teachers or each other. The dictionary in the software provides only English definitions, so they can be difficult to understand. Besides, some instructions in exercises are complicated.

The writing exercises on LEI were found to be simple and not very useful because students could copy the example paragraphs. The exercises do not boost creativity because the subjects were a bit dull and limited.

iv) Disadvantages for Teachers

QO

Since the students think the content is mechanical and repetitious, they find it boring. For this reason, it can be difficult for teachers to keep the students' attention on the course. Teachers may need to provide students with a lot of help in the computer lab, because the exercises can be difficult for low-level learners. The content is not parallel to the course book, so students don't have the chance to practice the subjects they learn immediately in the lab after lessons. This means that more exercises may need to be done in class. Since the software was being run on a local server, the teachers didn't have the chance to follow the students' progress outside the school lab.

In terms of exercises, QO is not parallel to the coursebook. They are usually mechanical, so can be answered without much challenge. The sentence *"In Quartet, there was more memorisation"* summarizes the situation. The exercises could be done by memorising and the answers could easily be seen. For this reason, some students answered the questions after looking up the answers from other sources.

LEI

In order to use the program efficiently, a fast internet connection must be provided in laboratories, which requires sufficient infrastructure, meaning extra expenditure for institutions.

LEI has no messaging system, so it is impossible to get in touch with the students or the entire class. There is a note section on the main page in every level, but it is not being used effectively. The instructions in some exercises are difficult to understand, so teachers may need to provide help frequently.

Besides, there is no criteria for grading writing exercises, which can lead to differences in marking of the instructors.

CONCLUSION

As understood from the results of the qualitative data analysis and the comparative reviews of the two online learning environments, LEI has been found to be notably superior to QO in terms of quality of content, exercises and design. Both students and teachers supported that LEI is much more efficient and enjoyable.

The participants claim that LEI is superior to QO in terms of content. The student's sentence *"Those in Longman are better, how should I say?, clearer and more fluent."* summarizes the situation. Thus, it draws attention and is enjoyable to use. The students mention about the situation: *"I can definitely say it is more enjoyable."* It was also emphasized that it focuses on enabling the students to appreciate the lesson and do more exercises. Because the content is rich and the appearance is appealing in LEI, the students could find different things to do, so they didn't get bored. On the other hand, as can be understood from the statement *"Actually LEI is more up-to-date"*, the usage of materials that appeal to daily life draws the attention of students.

It was emphasized that LEI provides a wide range of reading, listening and vocabulary exercises all of which are effective and enjoyable. On the other hand, the exercises on QO were found to be mechanical and repetitive.

The participants also emphasized that the content of LEI is quite rich and up-to-date. Besides, it is supported very well with visual content. This clearly makes students more enthusiastic to study. Also, it was agreed by all participants that the exercises and content on this learning environment is directly parallel to the content of the coursebook. This means that computer lab studies conducted after grammar lessons can consolidate what the students have just learned. On the other hand, QO was found to be irrelevant to the content of its coursebook, and it was agreed that the visual content in this software was quite poor, which means that students may get bored because of lack of visual material and they have to adapt themselves to the content before beginning to learn, because it is different from their coursebook.

It was agreed by all participants that it is much easier to use LEI than to use QO. It takes very little time to learn it and use it effectively. So, it could be a good decision for students groups with little experience with computers.

Another important point is that LEI can be accessed via the Internet while QO is restricted within a local network. Thus, the duration during which students can study on LEI seems to be unlimited. Lessons don't have to be limited within class hours.

It is also clear that LEI is easier to use and access than QO. It has a much wider range of exercises than QO and it is directly parallel to the coursebook. The online lessons and exercises in LEI are visually well-supported, and up-to-date. Taking all these into consideration, administrators of education institutions trying to decide between these two environments can be advised to use LEI.

However, this doesn't mean that it is the best online learning environment. It should be kept in mind that the study is about only two language learning environments, so a more detailed analysis of the software should be made and other possible alternatives should be compared to it. In addition, the needs and language skills, as well as the purpose of English instruction should be considered before taking the final decision of investment.

DISCUSSION

As can be concluded from the opinions of both students and teachers, arousing interest and motivating students is one of the required qualities of computer assisted language learning software. Also, repetitions and old fashioned content in both the components and page formats must be avoided. As stated by Vinther (2005), software and hardware producers focus on human-computer interaction (HCI) in order to create better and more user-friendly products. By means of analysis of the learners, better software appealing to all varieties of learners should be produced.

Both students and teachers in the study support that online access to the software is necessary to facilitate more effective learning and learner monitoring. Online access has always been a vast field in CALL. This is because means of incorporating internet technologies into language teaching and learning will be quite challenging since the Internet is so vast and complex (Ying Ping, 2008). It has the greatest advantage of providing access unlimited by place and time. On the other hand, it can bring about security issues, such as students copying their work from certain sources or each other at home.

Another important aspect mentioned by the participants was that the material needed to be clear enough for the levels of the students to be understood. The content and instructions must be easy to understand since students may not be able to get help from instructors as they study at home on online software. If possible, correction and feedback strategies should be put in practice in CALL software (Wei, 2008).

In the light of all findings obtained from this study, it can clearly be understood that the decision making process for computer assisted language learning software is not one-sided. That is, it would be inappropriate for instructors to make decisions without knowing the needs of their students. It is necessary to understand our students and know their learning strategies before we can reach them better (Raschio, 1990). In order to know our students well, careful observation is necessary, thus, progress can be made toward successful matching of students and lessons (Dunkel, 1987). Also, it is necessary to know CALL software well in order to choose the appropriate software for a certain student group. This study aims to help decision makers about CALL software about their comparison and decision making process.

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Comparison of Quality of Service of Distance Education at Universities

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ABSTRACT

The difference between the distance education and the formal education system is to provide different requirements, expectations and environments the provision of training opportunities to people. In this way, there is a huge population that has an opportunity to get distance education. Increase of service sector firms and gain more profit by providing service to their customers have made the concept of quality of service more crucial today. This study seeks to compare the service quality between the universities.

Keywords: *Distance education, service quality, Servqual.*

INTRODUCTION

While on the one hand developments and changes as the result of globalization have significant impacts on people's lives, needs and desires; on the other hand they influence the understanding and form of how these needs are met. Educational service is one of service fields at the most critical point of the service sector. Because, people who will work in their professional fields in the future are trained through education. In this respect, improving the quality of service of higher education at universities serves to the purpose of integrating people to society as individuals providing the highest benefit in the fields that they are trained for.

In the twenty-first century, with the explosion of information, it has been seen that the need for education of all communities has increased. The need for education has provided the development of new educational technologies and new methods of education and training, and these ultimately developed new technologies and different methods combined and gradually changed the education. Traditional educational institutions are not able to meet increasing demand for education. Emerging education gap is increasing every day. This requirement has pushed societies to search for alternatives to the traditional education, and the "distance education" concept has emerged. The most important reasons for this change in education are the increasing number of students, education demand of different masses of students, former students, and people's attempts to meet the educational needs because of that business and working have lead to life-long learning.

The concept of service is defined by Grönroos "an activity or series of activities which are more or less abstract and provide solutions to customer problems that occur during the encounter of customer with physical resources of the goods or systems of the staff serving or providing the service". (Göktolga and Ozkan, 2011, p.66). This definition focuses on the interaction dimension of the service. Concrete elements that impact and contribute to the interaction dimension of the service are involved in the process. Skinner service is also called as abstract works which are created by individuals and machines through people and tools, which provide direct benefit to the customers (Okumuş and Asil, 2007, p.8). Zeithaml and Bitner define services in its simplest definition as movements, processes, and performance (Karaca, 2011, p.69).

The concept of quality is defined by Deming as "customer judgment about the product or service produced by

the business" (Deming, 1998, p.137), and by Crosby (1979) as the "degree of compliance of a product with the requirements" Definition of quality specified in the TSE standards is as follows: the sum of the features of a product or service based on the determined or probable needs. Defining the quality of service includes two perspectives as internal and external. According to the internal perspective, the quality of service is defined within the framework of customer perceptions, expectations, attitudes and satisfaction (Sachdev and Verma, 2004, p.97). The quality of service is to give an excellent service to meet customer expectations. In another definition for the quality of service, the quality of service is defined as completely meeting customer expectations or exceeding those expectations.

When the quality of service is examined in terms of customer expectations and perceptions, it can be defined as a comparison between customer expectations and perceptions (Parasuraman, Zeithaml and Berry, 1985, p.42). Customer interprets the quality by herself/himself detecting many factors, and compares the services that she/he received and expected.

The purpose of research

The purpose of this research is to provide students, customers of educational institutions as one of the leading institutions in the service sector, to assess the quality of the service they receive. It will be tried to detect whether or not there are differences in the quality of service of education service provided by similar higher education institutions that include distance education programs in Turkey. It is aimed that ideas emerging from the evaluation of obtained results shall contribute to improving the quality of higher education services.

MATERIALS AND METHOD

While several methods and equipment have been developed to measure the quality until today, in the research project designed to measure the quality of service of e-mba programs provided in distance education programs, survey is applied as a method, and SERVQUAL is applied as a method of assessment. SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry (1994), is a model accepted and applied extensively to measure the quality of service. In this model, "perceived service quality" statement is used instead of the quality of service. Perceived service is the result of a comparison between customer expectations prior to receiving the service (expected service) and the actual experience of service s/he benefited, and it is evaluated as the degree and direction of the difference between customer expectations and the perceived performance. And expectations refer to customer wishes and desires for the service. And the relations between the expected service and perceived service are as follows: When expected service is greater than perceived service, the perceived quality is far from satisfactory, and an unaccepted level of quality will come into being. When expected service is equal to perceived service, the perceived quality will be satisfactory. When expected service is smaller than perceived service, perceived quality will be higher than the satisfactory and the ideal level of quality will come into being (Parasuraman, Zeithaml and Berry, 1985, pp.48-49). This model includes the differences between approach and practices of businesses providing the service and expectations of customers benefiting the service, and sources of these differences.

There are a total of 10 dimensions that determine the quality of service. Then, Parasuraman, Zeithaml and Berry (1991), assessing surveys that they applied through factor analysis and reducing the ten dimensions that determine the quality of service to five dimensions, developed a questionnaire which is a service of quality measurement tool and they called it as Servqual. These five dimensions in the survey consist of tangibles, reliability, responsiveness, credibility (ability, courtesy, credibility and security), and empathy (accessibility, communication, and customer understanding).

The questionnaire used in the study consists of a prior knowledge word addressed to respondents, 22 Likert-type questions measuring expectations and perceptions, and questions reflecting the demographic characteristics of the participants. In the first section of the study, 22 variables representing 5 dimensions (reliability, responsiveness, credibility, empathy, tangibles), which will help to understand the general expectations of students for the education that they receive, are adapted according to characteristics of the distance education.

Perceptions constitute the second part of the model. In this section, all of 22 variables that will measure the assessments of students about the universities providing distance education are compared. All in all, if the service received meets the expectations or is above expectations, it is concluded that the service is in good quality. Otherwise, the situation that the service received is below expectations comes into being, and there is a feeling of dissatisfaction. For this reason, SERVQUAL model is also called as gap analysis model.

In Turkey, distance education at universities include undergraduate, graduate, degree completion, post-

graduate and applications as post-graduate. In recent years, the number of distance education students has increased significantly. Therefore, in order to use this potential, many universities have started to focus on distance education programs. Today, there are 156 universities (54 of which are private universities) in Turkey.

The number of universities providing distance education with an E-MBA program in Turkey is 21. However, this number includes universities which will be newly opened, newly accept students, and do not have students at the moment. These universities: Anadolu University, Ankara University, Ataturk University, Bahcesehir University, Beykent University, Çukurova University, Ege University, Fatih University, Gazi University, Ankara University, Isik University, Istanbul Aydın University, Istanbul Bilgi University, Istanbul University, Karadeniz Technical University, Maltepe University, Mersin University, On Dokuz Mayıs University, Sakarya University, Süleyman Demirel University and Zirve University.

The research population consists of students studying in the universities with an e-MBA program. 21 universities with an e-MBA Education Program have been identified; however the questionnaire designed within this research has been applied to five universities with e-mba program in distance education by taking into account of the difficulty and time limit to reach all of these. The sample group of the study consists of all students of 5 universities selected from universities providing e-mba education through random sampling. The names of these five universities included in the study are not given in accordance with their privacy requirements, and referred to as 1-2-3-4-5. Simple random sampling is a method sampling selected units by giving an equal chance of being selected to each sampling selection. Here, purpose of giving an equal probability to each sampling is to select each sampling from sample space with equal probability (Gegez, 2005, p.189). All of the students attending distance education e-mba programs in these five universities were included in the sampling. All students within the scope of the research were informed about the study, and were requested to participate in the study online. Each student was given the right to participate in the Internet survey with a user name and password assigned to her/him. Total of 463 students entered the system during the period of study.

The data obtained from this study was transferred to Microsoft Excel and SPSS 18.0 program in order to make the calculation and analysis. In the research, specific calculations and statistical analyzes used in SERVQUAL model were performed in SPSS system.

RESEARCH FINDINGS AND COMMENTS

In order to determine the internal consistency of applied SERVQUAL scale, reliability analysis was performed and alpha coefficients were determined. As well as descriptive statistics such as analysis frequency tables, cross tabulations, and average, t-test and ANOVA were used for comparison of scores of quality of service according to demographic characteristics of the participants and universities in which they have their education. In ANOVA analysis applied to determine whether or not levels of quality of service were different than each other in terms of demographic characteristics and universities, Levene test was used to test the homogeneity between the groups, and Tukey post hoc test was used to determine between which groups the difference are. If it is decided that there is no homogeneity between the groups as the result of Levene test, Welch test was used and evaluated instead of ANOVA test (Kurtuluş, 2004). Which of these analyses is used was stated in the tables. The findings obtained by questionnaire, were evaluated by unique calculation method of SERVQUAL method, and analyzed by statistical methods.

FINDINGS OF RELIABILITY ANALYSIS

For reliability analysis of research Cronbach's alpha model was used. Cronbach's alpha model is the one used for measuring internal consistency, it is an indicator of to what extent all the items in a scale can successfully measure any dimension. (George and Mallery, 2001, p. 209).

Reliability analysis comes to the front to gauge inter-closeness degree of questions when calculation is made by summing the values of answers to certain numbers of questions. This is also called as internal consistency. Alpha is a standard change mean and varies between 0 and 1 in social researches, alpha value of 0,70 is accepted as adequate for reliability. (Hair, Tatham, Anderson and Black, 1988, p.88)

Table 1: Reliability Coefficient

	Expectation	Perception
Cronbach α		
Total scale	0,947	0,959
Tangibles	0,887	0,812
Reliability	0,791	0,873
Responsiveness	0,841	0,886
Credibility	0,857	0,873
Empathy	0,843	0,907

For in this study reliability values of scales and sub-dimensions are at acceptable levels, t-tests, variation and SERVQUAL analyses were proceeded for testing research hypotheses.

RESULTS

34,1% of total participants was female and 65,9% were male, while 50,5% participants were married and 40,5% single. Initially students from age group between 21-30 with 60,7% and then age group between 31- 40 with 33,7% were enlisted. These two age groups (between 21-40) make up 94,4% of whole participation. Distribution of the professional sectors that e-MBA service quality measurement study participants work, is like this: 14,3% is in Banking , 8,4% in Health, 8% in Service, 7,3% in Informatics, 6,9% in Education, 5,6% in Construction while of them 27,6% serves as engineer, 16,4% as manager, 12,7% as banker, 6,3% as accountant. Almost all of the participatory e-MBA students (96,8%) resides in Turkey. In this distribution striking point is that participation from Afghanistan with 1,3% was the highest one among the participation ratios from abroad. When participation by city is examined, it is seen that the most participation was from Istanbul with 50,5%, and then comes Bursa with 7,3%, Ankara with 6,3%, Kocaeli with 5,2%, Izmir with 4,3%, Sakarya with 3,7% and Balikesir with 1,7%.

Table 2: Weighted SERVQUAL Scores Table for University 1

University 1				
	N	Weightless Average Gaps	Weighted Average Gaps	t
Tangibles	-,1644	,2304	5,708	000
Reliability	-,2525	,3343	6,043	000
Responsiveness	-,2327	,2899	6,421	000
Credibility	-,2013	,3324	4,844	000
Empathy	-,1809	,2110	6,860	000
TOTAL GAPS	-1,02			
SERVQUAL SCORE	-0,204	,1940	8,507	000

*Servqual Score= Sum of the servqual scores (-1,02) / number of dimensions (5)

In order to investigate the difference between perceived service and desired service is different from zero for every dimension to perform t-tests for university 1's college students . The results of the t- tests is p(sig)=0,00 that means statically significant.

The differences between perceived services and desired services of students receiving education at University-1 for each dimension were found statistically significant. While the dimension where expectations of students at University-1 have not been met most is Reliability, it is followed respectively by Responsiveness, Credibility, Empathy and Tangibles.

Table 3: Weighted SERVQUAL Scores Table for University 2

University 2				
	Mean	Std. Deviation	t	p(sig)
Tangibles	-,2047	,3105	4,661	000
Reliability	-,1808	,1963	6,511	000
Responsiveness	-,1079	,1541	4,950	000
Credibility	-,1529	,1959	5,518	000
Empathy	-,1649	,1659	7,029	000
TOTAL GAPS	-0,8			
SERVQUAL SCORE	-0,16	,1396	8,214	000

* Servqual Score = Sum of the servqual scores (-0,8) / number of dimensions (5)

In order to investigate the difference between perceived service and desired service is different from zero for every dimension to perform t-tests for university 1's college students . The results of the t- tests is p(sig)=0,00 that means statically significant.

The differences between perceived services and desired services of students receiving education at University-2 for each dimension were found statistically significant. While the dimension where expectations of students at University-2 have not been met most is Tangibles, it is followed respectively by Reliability, Empathy, Credibility, and Responsiveness dimensions.

Table 4: Weighted SERVQUAL Scores Table for University 3

University 3				
	Mean	Std. Deviation	t	F (sig)
Tangibles	-,0863	,1571	-3,105	,004
Reliability	-,0514	,1907	-1,526	,137
Responsiveness	-,0938	,2295	-2,313	,028
Credibility	-,0119	,1514	-,444	,660
Empathy	-,0995	,1991	-2,827	,008
TOTAL GAPS	-0,34			
SERVQUAL SCORE	-0,068	,1333	-2,909	,007

* Servqual Score = Sum of the servqual scores (-1,02) number of dimensions (5)

While the differences between perceived services and desired services of students receiving education at University-3 for each dimension were found statistically significant, the differences in the dimensions of Reliability and Credibility were found insignificant, that is close to zero. While the dimension where expectations of students at University-3 have not been met most is Empathy, it is followed respectively by Responsiveness and Tangibles.

Table 5: Weighted SERVQUAL Scores Table for University 4

University 4				
	Mean	Std. Deviation	t	F (sig)
Tangibles	-,1388	,1749	-9,079	000
Reliability	-,2170	,2830	-8,779	000
Responsiveness	-,1930	,2410	-9,163	000
Credibility	-,1628	,2484	-7,503	000
Empathy	-,1580	,1902	-9,504	000
TOTAL GAPS	-0,87			
SERVQUAL SCORE	-0,174	,1619	-12,294	000

* Servqual Score = Sum of the servqual scores (-1,02) / number of dimensions (5)

In order to investigate the difference between perceived service and desired service is different from zero for every dimension to perform t-tests for university 4's college students . The results of the t- tests is p(sig)=0,00 that means statically significant.

The differences between perceived services and desired services of students receiving education at University-4 for each dimension were found statistically significant. While the dimension where expectations of students at University-4 have not been met most is Reliability, it is followed respectively by Responsiveness, Credibility, Empathy, and Tangibles.

Table 6: Weighted SERVQUAL Scores Table for University 5

University 5				
	Mean	Std. Deviation	t	F (sig)
Tangibles	-,1217	,1730	-9,595	000
Reliability	-,1313	,2429	-7,375	000
Responsiveness	-,1781	,2466	-9,851	000
Credibility	-,1124	,1879	-8,154	000
Empathy	-,1462	,2023	-9,857	000
TOTAL GAPS	-0,69			
SERVQUAL SCORE	-0,138	,1616	-11,639	000

* Servqual Score = Sum of the servqual scores (-1,02) // number of dimensions (5)

In order to investigate the difference between perceived service and desired service is different from zero for every dimension to perform t-tests for university 4's college students. The results of the t- tests is $p(\text{sig})=0,00$ that means statically significant.

The differences between perceived services and desired services of students receiving education at University-5 for each dimension were found statistically significant. While the dimension where expectations of students at University-4 have not been met most is Responsiveness, it is followed respectively by Empathy, Reliability, Tangibles, and Credibility.

Comparison of Differences Between Universities Dimensions

Differences in service quality between universities are investigated by analysis of variance. According to the assumptions of analysis of variance, compared groups variances should be equal.

Table 7: Tests for homogeneity of variances Results Table

	Levene Statistic	df1	df2	Sig.
Tangibles	2,411	4	458	,048*
Reliability	3,139	4	458	,015*
Responsiveness	2,596	4	458	,036*
Credibility	4,396	4	458	,002*
Empathy	1,072	4	458	,370**
Servqual	2,310	4	458	,057**

*Welch test is to be made
way-anova is to be made

**One-

According to the test results, tangibles, reliability, responsiveness and credibility's dimensions of the servqual score are not homogeneous between universities, empathy and the total servqual scores are found homogeneous. Based on these results, Welch test and total empathy scores are used to investigate the differences because first four dimensions are not met the one way variance assumption. One way variance test is used to find total servqual scores.

Table 8: Research on Differences Between Means with Welch Test

		Statistic	df1	df2	Sig.
Tangibles	Welch	1,859	4	125,826	,122
Reliability	Welch	5,846	4	135,012	,000*
Responsiveness	Welch	3,869	4	134,354	,005*
Credibility	Welch	6,340	4	131,988	,000*

* significant at $p=0,01$ level

The groups identified differences in size according to the welch test results in order to find which dimension is different between universities is used Dunnet T3 test, one-way analysis of variance and Tukey HSD test.

Table 9: Investigation of differences between means with ANOVA.

		Sum of squares	df	Mean square	F	Sig.
Empathy	Between Groups	,160	4	,040	1,040	,386
	Within Groups	17,661	458	,039		
	Total	17,821	462			
Servqual	Between Groups	,511	4	,128	4,830	,001*
	Within Groups	12,121	458	,026		
	Total	12,632	462			

* significant at p=0,01 level

Although there was no differences tangibles and empathy dimensions of the total servqual scores in E MBA programs, there was a significant statically differences credibility, responsiveness and reliability of the total servqual scores in eMBA programs.

Table10: The difference between Universities according to the Quality dimensions of Service

		UNIVERSITY				
Service quality dimension		University-1	University-2	University-3	University-4	University-5
Tangibles	University-1					
	University-2					
	University-3					
	University-4					
	University-5					
Reliability	University-1					
	University-2					
	University-3	*	*		*	
	University-4					
	University-5					
Responsive ness	University-1					
	University-2	*				
	University-3					
	University-4					
	University-5					
		University-1	University-2	University-3	University-4	University-5
	University-1					

		University-1	University-2	University-3	University-4	University-5
Credibility	University-2					
	University-3	*	*		*	*
	University-4					
	University-5					
Empathy	University-1					
	University-2					
	University-3					
	University-4					
	University-5					
Servqual	University-1					
	University-2					
	University-3	*			*	
	University-4					
	University-5	*				

* significant differences at $p=0,05$ level

With t-tests, the total calculated SERVQUAL scores for the quality of service of the five universities were found to be different from zero. When the differences of service dimensions between universities are evaluated:

In tangibles dimension, while according to the students expectations are not fulfilled at all universities, in terms of the scores of quality of service, sufficient evidence has not been discovered to say that there is a difference between the universities.

In terms of the scores of quality of service in reliability dimension; students of University-3 are different than students of University-1, University-2 and University-4. University-3 meets its students' expectations for reliability more than University-1, University-2 and University-4. Sufficient evidence has not been discovered to make any comparison between University-3 and University-5 and other each of other universities. So there is no difference in terms of reliability.

In terms of the scores of quality of service in responsiveness dimension; students of University-2 are different than students of University-1. University-2 meets its students' expectations for responsiveness more than University-1. Sufficient evidence has not been discovered to make any comparison between each of other universities. So there is no difference in terms of responsiveness.

In terms of the scores of quality of service in credibility dimension; students of University-3 are different than other universities. University-3 meets its students' expectations for credibility more than other four universities. Sufficient evidence has not been discovered to make any comparison between each of other universities. So there is no difference in terms of credibility.

While in empathy dimension expectations are not met in all the universities, sufficient evidence has not been discovered to say that there is a difference between the universities in terms of quality of service.

Table 11: According to the universities Dimensions of the Weighted Servqual Scores

	University-1		University -2		University -3		University -4		University -5	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Tangibles	,1644	,2304	,2047	,3105	,0863	,1571	,1388	1,749	,1217	1,730
Reliability	,2525	,3343	,1808	,1963	,0514	,1907	,2170	2,830	,1313	2,429
Responsiveness	,2327	,2899	,1079	,1541	,0938	,2295	,1930	2,410	,1781	2,466
Credibility	,2013	,3324	,1529	,1959	,0119	,1514	,1628	2,484	,1124	1,879
Empathy	,1809	,2110	,1649	,1659	,0995	,1991	,1580	1,902	,1462	2,023
Sum of the servqual scores	-1,02		-0,8		-0,34		-0,87		-0,69	
Servqual Score *	0,204		-0,16		0,068		0,174		0,138	

* Servqual Score = Sum of the servqual scores / number of dimensions (5)

In terms of the total service quality scores (SERVQUAL score): University-3 students differ from the University-1 and University-4. University-3 meets the expectations of students more than University-1 and University-4. In terms of the total service quality scores (SERVQUAL score): University-5 students differ from the University-1. University-5 meets the expectations of students more than University-1. In terms of the total service quality scores (SERVQUAL score): Statistically sufficient evidence has not been discovered to make any comparison between University-2 and the other universities students. Similarly, statistically sufficient evidence has not been discovered to make any comparison between University-5, University-3 and University-4; University-4 and University-1.

CONCLUSIONS

Information technologies which have lead all organizations to re-arrange their organizational has become one of the indispensable tools in the educational sector in the course of time. Computer and communications technologies which were used as support tools in education services in 90's, today appears to be as media through which all of the elements of the education service are provided. One of these media is the internet-based distance learning model. Internet-based distance learning model is applied in order to fulfill two basic objectives. The first of these is to provide support services to traditional education programs, and the second is to provide educational programs entirely over the network. In this context, the Internet-based distance learning is considered to be one of the most effective and appropriate means to meet the education requirements in the current period.

Through distance education, students are offered baccalaureate, master's, doctoral degrees as well as various certifications with an education for an academic degree at universities in the various countries without going to those countries. The method which is most frequently encountered in the literature on the measurement of the quality of service and which is the most reliable in terms of structure and internal consistency is Servqual method emerging as a marketing research tool. Owing to Servqual method, which dimension of the quality of service is affected and to which extent the overall quality of service is changed by innovation and changes in the structure of the services offered by businesses can be measured. And this can guide to make such vital and high cost decisions to be made as to which extent the innovation and change can be or can not be applied.

When low quality is determined as the result of the measurement, how much of this is from which dimension must be examined and improvement should be started from the proposition with the lowest quality. And in order to

improve the issues addressed in the propositions, service delivery must be approached customer-oriented, and necessary arrangements should be made. Thus, quality of the service of the perceived service will be increased by raising the scores awarded to perception propositions.

The quality of service of distance education implemented in the education sector were examined in five dimensions as tangibles, reliability, responsiveness, credibility and empathy. Without taking universities providing education into consideration, for five dimensions determining the quality of service and the overall quality of service dimension, differences between expectations of students receiving education and perceived service quality were analyzed. The differences of scores given by students for the expected service and the expected service were statistically found significant for each dimension.

When partial SERVQUAL scores of dimensions are examined, while expected service are not met for students in all of the five dimensions affecting the quality of service at universities with e-mba education, the dimension with the most dissatisfaction is Responsiveness and it is respectively followed by Reliability, Empathy, Concrete features and Credibility. It can be said that the perceptions of the students are below their expectations. According to the survey, averages of all the expectations are higher than perceptions. It is found that expectations of participants in the research are not met and there is a dissatisfaction. It stands out that this difference is prominent particularly in variables of Responsiveness dimension. According to these results, it can be easily said that overall perceptions remained below overall expectations, and a there is a general dissatisfaction.

Whether or not there was a statistically significant relationship between demographic characteristics of the students and the quality of service that they perceived was investigated. And as demographic factors, age, marital status, income level and gender were examined. As a result of the test, no statistically significant relationship between perceived service of quality and income level, marital status and age was found.

Total SERVQUAL scores of the quality of service of E-MBA students do not differ from each other according to the gender. Only in the "Tangibles" dimension of Tangibles, reliability, responsiveness, credibility and empathy dimensions, a difference in the perception of the quality of service has been identified according to the gender, and that women were less satisfied than men has been determined.

While there is no difference in the dimensions of the quality of service at universities providing E-MBA education according to marital status, age, and income level of the students; differences in dimension of tangibles according to the gender have been identified. Satisfaction of women is less than men's in the dimension of tangibles. In order to increase the satisfaction, female students may be lead to fill out a detailed questionnaire, and what they expect from tangibles can be learned. In addition to this, by judging propositions in the dimension of tangibles, distance education portal can be arranged, and by providing the most recent resources in the library and access to these resources from library, level of satisfaction can be increased. Distance education web pages should be kept constantly up to date; they must be remarkable and understandable. In addition to this, a secure environment in distance education portal must be provided by universities.

The differences between perceived services and desired services of students receiving education at University-1 for each dimension were found statistically significant. While the dimension where expectations of students at University-1 have not been met most is Reliability, it is followed respectively by Responsiveness, Credibility, Empathy and Tangibles. In this case, by examining sub-propositions particularly starting from the dimension of reliability and by making necessary improvements, expectations of students can be met. Application-oriented studies should be focused on. A competitive environment with degrees, encourage and reward should be provided to the students. The opportunity to interact with each other and with the faculty members should be provided to the students. Also elective courses should be included in the programs.

The differences between perceived services and desired services of students receiving education at University-2 for each dimension were found statistically significant. While the dimension where expectations of students at University-2 have not been met most is Tangibles, it is followed respectively by Reliability, Empathy, Credibility, and Responsiveness dimensions. In this case, by examining sub-propositions particularly starting from the dimension of tangibles and by making necessary improvements, expectations of students can be met. Distance education portal can be arranged, the most recent resources should be available in the library and access to these resources from library should be provided. Distance education web pages should be kept constantly up to date; they must be remarkable and understandable. In addition to this, a secure environment in distance education portal must be provided by universities.

While the differences between perceived services and desired services of students receiving education at University-3 for each dimension were found statistically significant, the differences in the dimensions of Reliability and Credibility were found insignificant, that is close to zero. While the dimension where expectations of students at University-3 have not been met most is Empathy, it is followed respectively by Responsiveness and Tangibles. In this

case, by examining sub-propositions particularly starting from the dimension of empathy and by making necessary improvements, expectations of students can be met. Consultants should help the student to complete the program without any problems for the duration of education and students should be informed about the business opportunities created by the certificate/diploma that they receive at end of the program.

The differences between perceived services and desired services of students receiving education at University-4 for each dimension were found statistically significant. While the dimension where expectations of students at University-4 have not been met most is Reliability, it is followed respectively by Responsiveness, Credibility, Empathy, and Tangibles. In this case, by examining sub-propositions particularly starting from the dimension of reliability and by making necessary improvements, expectations of students can be met. In courses, application-oriented studies should be focused on. A competitive environment with degrees, encourage and reward should be provided to the students. The opportunity to interact with each other and with the faculty members should be provided to the students. Also elective courses should be included in the programs.

The differences between perceived services and desired services of students receiving education at University-5 for each dimension were found statistically significant. While the dimension where expectations of students at University-4 have not been met most is Responsiveness, it is followed respectively by Empathy, Reliability, Tangibles, and Credibility. In this case, by examining sub-propositions particularly starting from the dimension of responsiveness and by making necessary improvements, expectations of students can be met. Faculty members should provide to students every consulting service about the University and the program, and should be available to students. Administrative staff should deal with in person. The library staff should have the ability to meet demands and needs of the student.

While no difference was found between the scores of the quality of service of universities in terms of tangibles and empathy according to the students of E-MBA programs, statistically significant differences were found between the scores of the quality of service of credibility and overall quality of service (SERVQUAL score). Features such as the Internet, web page, education portal and their security which constitute tangibles are becoming features of first priority and providing a competitive advantage for any sector through advancing technological capabilities. Since almost identical facilities are available at universities, it is an expected situation that there may be a difference between them in terms of the dimension of tangibles.

While expectations of students at all university have not been met in the dimension of tangibles, sufficient evidence has not been discovered to say that there is a difference between the universities in terms of quality of service. This result does not alter the fact that universities need a certain period of time since their establishment in order to make up their deficiencies and to provide a good education. Universities established at first with a large number of deficiencies reduce their deficiencies gradually within the course of time with the increase in the number of their students and experiences.

As for the score of the quality of service of the dimension of Reliability; the expectations of the students of the University-3 is different than the expectations of the students of University-1, of University-2, and of University-4. The dimension of Reliability is an indication of whether or not the administrative structure of the university providing the service has been created. The dimension of Reliability is also about activities such as doing jobs in time and as promised, and that faculty member do their jobs properly. University-3 meets expectations of students for reliability more than students of University-1, of University-2, and of University-4. Sufficient evidence has not been discovered to make any comparison between University-3 and University-5, and between each of other universities. That is, it can be said that there is no difference in terms of reliability.

As for the score of the quality of service of the dimension of Responsiveness; the expectations of the students of the University-2 is different than the expectations of the students of University-1. This dimension reveals the importance of teaching staff for good quality of educational to be provided by the schools. The dimension of responsiveness includes criteria such as efforts of faculty members to improve students' knowledge and skills, to be exemplary to the students; to deal with the students' problems, and to find answers for questions put to them at every opportunity. University-2 meets expectations of its students for responsiveness more than University-1. Sufficient evidence has not been discovered to make any comparison between other universities for responsiveness. That is, there is no difference in terms of responsiveness.

As for the score of the quality of service of the dimension of Credibility; the expectations of students of University-3 are different than those of students of other universities. University-3 meets expectations of its students for credibility more than other four universities. Sufficient evidence has not been discovered to make any comparison between each of other universities. That is, there is no difference in terms of credibility.

While in the dimension of Empathy expectations of students of all universities are not met; sufficient evidence has not been discovered to say that there is a difference between universities in terms of the score of the quality of

service. Propositions that faculty members should help for the careers of students and advice them, that consultants should help the student to complete the program without any problems, that students should be informed about the business opportunities created by the certificate/diploma that they receive at end of the program are within the dimension of empathy.

According to these results, it is seen that the overall perceptions has remained below the overall expectations, and there has been a general dissatisfaction. In this case, it is clear that in order to increase the quality of services, and thus to increase student satisfaction, first of all the dimension of responsiveness should be displayed sensitivity. It should be followed respectively by dimensions of Reliability, Empathy, Tangibles and Credibility. In this case, by examining sub-propositions particularly starting from the dimension of responsiveness and by making necessary improvements, expectations of students can be met. Faculty members should provide to students every consulting service about the University and the program, and should be available to students. Administrative staff should deal with in person. The library staff should have the ability to meet demands and needs of the student In addition, propositions for the dimension of reliability should be handled. A competitive environment with degrees, encourage and reward should be provided to the students. The opportunity to interact with each other and with the faculty members should be provided to the students. Also elective courses should be included in the programs. By examining propositions for the dimension of Empathy, which is ranked as the third in the order of importance, improvements should be done in the practice. In accordance with this, faculty members should guide students for their careers. Consultants should help the student to complete the program without any problems, and students should be informed about the business opportunities created by the certificate/diploma that they receive at end of the program. The dimension which is ranked 4th is the dimension of Tangibles. According to this dimension, distance education portal should be arranged, the most recent resources should be available in the library and access to these resources from library should be provided. Distance education web pages should be kept constantly up to date; they must be remarkable and understandable. In addition to this, a secure environment in distance education portal must be provided by universities. The last dimension to meet the expectations of students is the dimension of credibility. By examining sub-propositions of the dimension of credibility, and by making necessary improvements, expectations of students can be met.

The demands and needs of students are critical to the design of educational systems and to improving in the following years. Identifying the expectations of the students from higher education, measuring the quality of the service they receive through the eyes of students, will be one of the most important elements that the higher education institutions should take into account to develop their quality management system. The authorities of the universities should examine the causes and consequences of assessments of the students, and produce solutions for their negative assessments. These assessments should be continuously repeated at regular intervals, and to what extent applied solutions are realized should be followed. This and similar studies should be continuously and regularly conducted in all universities, and they can be used as an important tool to enhance the quality of education in universities.

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Improving Distance Education System: Problems and Solutions from the Perspective of Lecturers

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ABSTRACT

The modern Internet-based distance education is steadily moving forward, and has attracted more and more people's attention and gradually showed strong development momentum. The aim of this study is to assess the existing distance education practices at Sakarya University's eMBA program in terms of pros and cons as well as evaluate problems encountered by the lecturers. Also, we have discussed the possibility of solutions to the problems from the lecturers' perspective. The aim of this study is to assess the existing distance education practices at Sakarya University's eMBA program in terms of pros and cons as well as evaluate problems encountered by the lecturers. Also, we have discussed the possibility of solutions to the problems from the lecturers' perspective.

Keywords: *Distance Education, Lecturers, Problems of Distance Education Systems.*

INTRODUCTION

In which we live the "Information Age", technological improvements strikingly affect every area of our lives. These effects occur not only in the changes of making the life easier such as increased availability of transportation and communications, but also in the learning processes and learning methods which have a critical role in the development of individuals. Two most important improvements offered by technological developments are the computer and internet usage. The effectiveness of the learning process is increased and expected to continue increasing by using these two tools together. In addition, computer and internet usage have started a paradigmatic transformation in the education systems. Concepts such as web-based education, virtual class, and distance education have entered into the education and academic world along with technological improvements. These new approaches by their nature should be considered in a different perspective from the traditional face-to-face education. Otherwise, failures in implementation and deviations in achieving the desired targets of the educational plans may occur.

Compared with the traditional face-to-face educational environment, distance education system provides advantages to students such as open-education, flexibility and ease of sharing. In this system, firstly the time is no longer a constraint. Students are able to attend classes by choosing from the alternatives of the time zones. They can reach to educational resources and information comfortably independent from the location. In other words, system provides equality of opportunity for students. Students can find an effective sharing environment with both educators and other students different from the face-to-face education with the help of interactive feature of the system.

All the advantages offered by the distance education system to be effective, the system should be designed in the most appropriate form. There are studies in the domestic and foreign literature in order to question the performance of the system and analyze the problems (Glennie, 2006, Andresen, 2009, Rovaive Downey, 2010, Güneş, 2009, Guohonget al., 2012). In reviewing the literature it's seen that educator perspective and studies investigating the system are limited in the studies investigating problems related to distance education system. In this context, this study focuses on the educator perspective that has a critical role in the distance education and determining, analyzing and developing solutions of the problems. The study mainly looks for the answer to "How are the problems identified

by educators in the distance education system?”. In this context, taking into account the perspectives of the educators, sub-questions are listed as below:

- What are the problems associated with the management in the distance education system?
- What are the problems that occur depending on students' attitudes?
- What are the problems that occur depending on educators' attitudes?
- What are the problems that occur in relation to technical and infrastructure?
- What are the problems associated with the course contents and materials?

METHODOLOGY

In order to find an answer to the question in the context of research, a focus group is designed with the lecturers of Sakarya University e-Business Master's Degree Program. The reason for selecting the focus group study as a data collecting method is to benefit from the advantages of both observation and in-depth interviews (Altunışık et al., 2012). 6 lecturers have participated in the focus group meeting. The lecturing periods of these academic staff have varied between 5-10 years in this distance education program. The meeting has taken 2.5 hours. The interviews during the meeting have been recorded with the permission of the lecturers. Names of the lecturers have been hidden and given a code to each. Demographic characteristics of the participants can be seen from the Table 1.

Table 1. Demographic Attributes of Participants

Topic Thought	Gender	ID*	Prof.Dr.	Assistant Prof. Dr.	Lecture time (year)
Operation	M	L1			10
Research	M	L2	X	X	10
Marketing					
Management	F	L3	X		8
Management	F	L4		X	5
Accounting	M	L5	X		9
MIS	M	L6	X		8

The participants are from the Business Administration field which includes the departments of Production Management and Marketing, Management and Organization, Accounting and Management Information Systems. Two of the lecturers are Assistant Professors and four of them Professors. In addition, two of them are women. Sound recordings which have been made during the focus group meeting have been evaluated by the authors of the study and a distance education expert from Sakarya University. The data obtained have been analyzed by the content analysis approach. Conceptual codes and themes are associated by determining and the data are interpreted within the framework of an inductive analysis with the quotations.

FINDINGS

The problems of the system have been identified in sub-titles within the framework of the perspectives and opinions of the distance education system lecturers. These are:

Problems and Solutions Related to Distance Education Program Planning

- 1) Inefficient management: The basic functions of management are planning, organizing, directing, coordinating, and controlling. The implementation of the management functions successfully has a critical importance in order to provide more quality education programs to students. Problems caused by inefficient management applications are stated as follows:

“..... the first year and the following years the program was successful. Students and lecturers were pleased the system. Directors opened new programs unplanned based on this success but in parallel with this nothing done to revise the system. Thus, managing the system became more difficult and the productivity of the education decreased.” (the lecturer coded L1).

Institutional support of the organization and managing effectively directly affects the operation of the system in the success of distance education system. There is a close relationship between the success and

performance of the lecturers and efficiency of the management. Yeung (2002) highlights the importance of total quality management applications in the educator-student relationship in his study which is about the development of an effective quality assurance model in web-based distance education.

- 2) Timing errors: One of the most important advantages of the system is the flexible course hours. However, from time to time the errors in the determination of course hours affect the students' involvement and their level of interest negatively:

"The determination of course hours is very important for the students' involvement and interest. The majority of our students are working and usually for private sector. For this reason, involvement and interest are low in the courses started at 7.00 pm. The courses from 8.00 to 10.00 pm are the most productive ones" (the lecturer coded L3).

On the other hand, various programs associated with the topics of students' private lives reduce the involvement on certain days of the week. Therefore, this condition decreases the effectiveness of education.

"I gave an elective lecture last semester; I did the course depending on the program on Monday night at 09:00- 10:00. Although there are considerable students choosing the course, the attendance to course was very low because of the live broadcasting of national league."(the lecturer coded L6).

- 3) Undeveloped of the procedures to solve the crisis or bottleneck situations: The emergence of crises and problems in the operation of any system may occur at any time. Problems associated with technical trouble may arise because of the nature of distance education systems' web-based structure. In case of the problems like this experienced and can not be resolved, the course may be canceled. For this reason, the presence of one skilled technical staff at any moment during the course is critical to ensure the continuity of the course.

"..... I also had a similar problem in the first semester of the program. Students were not able to use microphone and camera at the same time because of the nature of the system. I wanted to give all students an access to the microphone at the same time, but the system was locked and unable to continue the course. I couldn't solve the problem at that time because of the absence of a technical support."(the lecturer coded L4).

Problems Associated With Students And Suggestions

- 1) The problems that occur depending on the students' attitudes: As a general trend by the lecturers, students are disinterested to both face to face and distance education courses. This may be a different research. In this study, it has been tried to determine the students' attitudes towards distance education system. Attitudes are the form of expression of positive or negative assessments about objects, people or events (Schifmann and Kanuk, 2000). Attitudes are the determinants of behaviors (Tutar, 2012). Attitudes developed by individuals towards the object are decisive in the emergence of behaviors. According to the assessments of the lecturers, students believe that distance education system is easier than traditional face to face education.

"..... students say that distance education system is easier compared to face to face education and can pass the courses by working less....." (the lecturer coded L5).

The most important advantage provided by distance education system is to facilitate students' access to information. However, this may lead to be perceived as a simple and easy education model by students compared to face to face education. In other words, students may develop negative attitudes towards the system.

The applications of technological developments in the field of education increase the effectiveness of teaching. This process is a process of change and it's important for individuals to implement by understanding of exchange and its requirements in order to reach their goals. One of the roles of the lecturer is to be a control mechanism for students in traditional education systems. In Turkey's traditional education

system, there is the principle of lecturer's control on students and reminder their duties and responsibilities from primary education up to secondary education. Students exhibit attitudes that parallel to this understanding for teachers by depending on the habits. However, self-discipline (developing an internal control mechanism) is important to success in the distance education system.

"..... students grown in secondary schools in Turkey learn generally with the mechanism of "external-based control". In other words, students want teachers to follow them all the time and control whether they fulfill the requirements of the courses. However, these kinds of students fail in the distance education system. Students should have the "internal-based control" mechanism in the distance education system. They should fulfill the responsibilities about the course in order to improve themselves better and learn the best way."(the lecturer coded L3).

- 2) The reluctance of the students to proceed with the course: Students' "disinterest" to courses and "reluctance" to involvement have been expressed by almost all lecturers participated the focus group.

"..... As you know, virtual lessons are made in our distance education program. In addition, videos and pdf files that include weekly lectures are accessible to students. In other words, the system is designed as synchronous and asynchronous. This can be seen as an advantage for students, but they may think it's not so necessary to attend the lecture because of the presence of the videos and files. For this reason, the attendance is becoming less. Therefore, students may miss the discussions on the issue during the lesson. To eliminate this situation, I think it would be appropriate to continue the lessons with the help of a decision after testing the system as synchronous and asynchronous....."(the lecturer coded L6).

- 3) Deficient communication among students: The implementation of effective interpersonal communication is critical to achieve goals in the activities as a group. In case of the implementation of educational activities efficiently, communications to be open among students, sharing of the assessments about the lecture process and gains, and last the delivery of the feedbacks to the lecturers have a direct impact on the performance of the program. However, opinions presented in the focus group meeting can not create an efficient communication environment and affect this program's success negatively.

"..... students have very poor communications among each other. In my quantitative lesson, I say that if you don't understand anything let me know or send an e-mail after the discussion among you. No voice is coming to my ears. They don't communicate with each other and don't turn back to me" (the lecturer coded L2).

Problems Associated With Lecturers And Suggestions

- 1) The attitudes of lecturers towards distance education system
- 2) The attitudes and behaviors of lecturers towards students
- 3) The reluctance of lecturers

The effectiveness of the distance education system requires a point of view different from the traditional face to face education system. This is a process of change. Perception of this change by lecturers like students and develop attitudes towards this is important. In this context, it's possible to consider the attitudes of lecturers under two headings: attitudes towards distance education and students. The performance of the system will further increase when the lecturers are aware of the difference between virtual class and traditional class and they use the course materials by preparing with the appropriate content. However, the system performance decreases in the case of the opposite situation.

Students and lecturers are unable to come face to face with each other in the distance education system and this can lead to lack of communication from time to time. However, the system has non face to face mechanisms and means inherently. When parties increase their abilities to use these tools the effectiveness of education will also increase.

Problems Associated With Technical Characteristics And Infrastructure, And Suggestions

- 1) Deficiency of training: Distance education system is a system that increases the effectiveness when users have knowledge about technological innovations and improve the ability to use them. Therefore, at the beginning of educational programs orientation is a requirement for students and lecturers in order to understand how to use the system's technological capabilities. Otherwise, problems may occur.

“The program had been continuing for 5 years when I started to lecture. Login password and some basic information were reported to me via e-mail. No information was given apart from that. I tried to learn the system and its features by asking to system managers and other lecturers in my department. This is a deficiency. I also asked students about this and got similar responses. I think a guide or a manual should be definitely published.....” (the lecturer coded L2).

- 2) Problems associated with software: Software engineers have developed many different presentations for distance education applications. These software programs have several superior or weak properties among themselves. One of the most important deficiencies of the program which is the subject of this study is experienced during the attendance to courses. If several students want to attend the course in video and audio, software problems arise. This situation negatively affects the processing of the course in an efficient manner. A discussion atmosphere doesn't occur between the lecturer and the students particularly in verbal courses because of the absence of mutual interaction.

“I want to launch virtual discussion topics from time to time during the lectures. After determining the topic I want to get students to the course with video and sound. I can not get more than one student at the same time. We are getting off the subject while trying to get students one by one. Most of the time, I can not get any students to the course and I explain the subject. After a while I feel like lecturing against the wall. The efficiency is decreasing.....” (the lecturer coded L4).

- 3) The absence of required equipments of the students and not to use them: It is very important to be ready for required equipment and tools in order to use technology effectively. One of the most important advantages of distance education programs is virtual courses. Students can attend courses from home or anywhere with an internet connection. However, unless they have a camera or microphone they attend the course just as a listener. In this case, the effectiveness of the program decreases.

“The absence of required equipments is a major problem as well as the reluctance of students in the virtual courses. When I wanted to invite the students to course I sent an audio connection via microphone. I get responses such as “I don't have a camera or microphone, lecturer”. They don't really have or just find an excuse not to attend.....” (the lecturer coded L1).

- 4) The problems associated with internet connection: There are intermittent connection problems because of the different standard of internet infrastructure services across Turkey. In such cases, the effective processing of virtual courses is becoming impossible.
- 5) Lack of technical support: As mentioned in inefficient management heading, the absence of technical personnel during the virtual courses may occur troubles in terms of preventing potential problems.

Problems Associated With Course Contents And Materials, And Suggestions

- 1) Usage of course contents again and again without updating: The course contents as video files are not updated in distance education system because of the careless approaches of management and lecturers. There are lecturers using the same videos and course materials about four and five years. For this reason, outdated course contents make the students reluctant in case of following the courses.

“.....Unfortunately there are lecturers don't update the course contents for years. They relax themselves by thinking to discuss the current topics during the virtual classes. However, this causes a poor

quality of education and negative student attitudes towards the system.....” (the lecturer coded L1).

- 2) Usage of unsuitable and insufficient teaching materials: Distance education system has specialized applications and tools towards verbal and numerical courses. Applications such as smart boards allow lecturers to practice one to one and solve the problems, and allow students to follow the courses as live in especially quantitative courses with the advantages of technology. Similarly, a discussion atmosphere can be created for verbal courses by using features such as forums page. Furthermore, additional readings or case studies related to the course can easily be installed to the system. Of course lecturers are in a key position in case of the usage of these tools and increasing of the course's effectiveness. If lecturers perform well in case of implementation of the tools, the performance of students' attendance will increase. Thus, the course will be more effective.
- 3) Low relationship/complementarity between materials: There are three ready applications for students to follow the courses in Sakarya University Distance Education System which is the subject of this study: virtual live classes, recording of virtual classes and videos of lecturers have been made before. Alignment and relationship of the course materials used for these three applications are very important to demonstrate a complementary presentation of the course in order to make the course more effective.
- 4) Usage of simple course contents/low attractiveness: Course contents of the distance education system should be updated and prepared in an attractive way for students in today's condition which is the fastest and easiest way to access to information. This has an important potential to increase the gains of students and prevent the reluctance towards lectures.

“..... it is very important to prepare the course contents properly in order to increase the effectiveness of the course and attract students. The interest of students increase suddenly and they demand a camera and microphone to express their comments when discussing the current economic news after transferring the theoretical part of the course. Visual materials such as a photo or video are highly effective attracting the attention of the students.....” (the lecturer coded L2).

It is a requirement that courses should be prepared from the marketing perspective to make them attractive for students. The idea of “best course contents are prepared by the lecturer” is an inadequate overview. If lecturers and experts in web page design and applications work together the results will be better. It becomes a necessity that team preparing materials in distance education systems should be from the design experts (Hakkâri et al., 2008). This topic also has a strategic importance for the program to obtain an advantage over competitors in terms of efficiency.

CONCLUSION AND EVALUATION

Technological developments and applications in the field of education increase the possibilities of individuals to access and use the information. Usage of computers and web-based applications in education (reduction of inequality of opportunity) provides many advantages to individuals such as efficient usage of educational resources, maintaining the balance of supply and demand, and enhancing the performance of education. It is important to detect critical points in distance education system in order to evaluate these advantages in the best way and to avoid problems during the application. In the light of the findings obtained from the methodology of this study can be listed below:

- 1) Preparation of plans for the purpose: A successful planning is the first step for success of the distance education programs and operation of the process. Otherwise, a structure left to its own devices will occur and it will be difficult to achieve the goals such an environment.

- 2) Preparation of a distance education guide: The preparation of a guide includes system principles and operations in the form of a handbook is a requirement. The guide will help parties (lecturers, educators, system managers etc.) to reach the solution quickly in case of possible problems.
- 3) Continuous monitoring and updating of the programs: For minimizing the problems in distance education systems, the presence of continuous monitoring mechanism provides to solve problems more quickly as well as prevent the growth of problems bigger.
- 4) Developing programs to increase students' motivation: Programs should be developed to enhance the attendance of students to courses. Grades of the students who attended the course can be increased to a certain extent as a simple step. In the context of technological applications, usage of interesting videos or animations in course materials, or encouraging students to prepare them is expected to create a positive impact on the motivation.
- 5) Developing *Change Management* programs: Nowadays, the concept of change affects all aspects of life. Individual or organizational change can be summarized as efforts to adapt to the current environment. An individual or organization can sustain its growth and development if it adapts to new formations in the current environment. In this context, development of change management programs which consider the web-based technological innovations has a key role in improving the performance of the system.

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Solar Powered Digital Equipments for Distance Learning In Developing Countries

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ABSTRACT

Digital equipment and devices have become most essential tools for disseminating knowledge in educational institutions. The use of such equipment has now become more effective with the inclusion of contents available in the Internet. All of these tools and means have created a great opportunity for spreading teaching and learning in distance educational mode. But for a developing country, the main hindrances for spreading distance education are the cost of the equipment and availability of Internet access over all parts of the country. A research has been carried out on how the cost of useful digital gadgets and their accessories can be brought down to an affordable price and how the access to the Internet can be made easy for the students in general. This paper starts with the description of the challenges for reaching the objectives and then it explains how they are overcome by different indigenous technical solutions. Moreover, work on how the power requirement for the commonly used digital equipment has been minimized is reported in the paper. Finally it shows the techniques of applying solar power to supply the energy requirement for the gadgets to be used for distance learning. This has made a breakthrough in education sector for a vast community in developing countries.

Keywords: *Multimedia classroom, hybrid projector, distance learning.*

INTRODUCTION

ICT refers to technologies that provide access to information through telecommunications (Selamat et. al., 2011). Uses of tools to integrate ICTs into everyday classroom learning provide students with increased exposure to technologies and e-content. The World Summit on the Information Society (WSIS) held in Geneva in 2003 identified two targets in its Plan of Action which are directly related to education (WSIS, 2003).

- to connect universities, colleges, secondary schools and primary schools with ICTs
- to adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances.

Although there has been quite a good penetration of cell phones and Internet access devices even in the rural areas in Bangladesh, there is almost no use of ICT and digital devices as a teaching and learning aid. Classrooms in Bangladesh usually use blackboards and text-books and very little has changed over the century in how the lecture is delivered. Teacher standing in front of the students delivers her lecture and use blackboards and chalk to explain the topic. The same is true for most of the developing countries in the world.

Multimedia projector projects documents and computer images onto a projection screen so that the image is displayed to an entire classroom. It can help teaching subjects, such as science or geography, easier by showing slides or video of actual hands-on experiments or maps. It allows the teacher to interact with the material along with the

students, or model her teaching in a way that effectively communicates the lesson to the students. The teaching materials can be developed by experts far away from the classroom and the teacher who is actually delivering the lesson can access it via Internet directly or download onto a USB device, which can then be inserted into the laptop and projected using the multimedia projector. But the lack of electricity in rural areas of developing countries has made its use expensive and difficult. Alternative sources of power are not feasible since digital projectors typically consume a lot of electricity.

This paper reports the design and development of a low cost, very low powered hybrid projector as a stand-alone or as a part to a laptop based teaching tool. The hybrid projector incorporates OHP technologies and is powered by solar PV panel so that it can be used at rural and remote locations having no electric power supply. Because of the low initial cost, long life, locally maintainability at low costs, ease of handling and the use of solar power to run the device, it would be very attractive for the developing countries as a classroom teaching tool.

Bangladesh Education Scenario

Bangladesh is the most densely populated country in the world with a population nearing 160 million. Demographically this is a young nation with population aged between 0-25 years covering almost 35% of the total population (Bangladesh Bureau of Statistics, 2012). This is reflected in the number of education institutions and the number of students and teachers. There are a total of 114,114 institutions with 30,752,756 students and 867,764 teachers in the country. Table 1 (Bangladesh Bureau of Educational Information and Statistics, 2012) presents the details of the type of educational institution, number of students and number teacher along with the teacher-student ratio (TSR) in each category.

Table 1: Number of institution, student and teacher by type of education (2011)

Type of Education	No. of Institution	No. of Teacher	No. of Student	Teacher Student Ratio
Primary Education	78,685	395,281	16,957,894	43
School Education	19,070	223,555	7,510,218	34
College Education	3,475	95,620	2,915,851	30
Religious Education	9,330	107,177	2,197,877	21
Professional	282	4,752	70,998	15
Teacher Education	209	2,622	38,691	15
Technical-vocational	2,981	22,919	506,556	22
University	82	15,838	554,671	35

Being a developing country with a very low per capita income of 848 USD (Bangladesh Bureau of Statistics, 2012), Bangladesh is yet to provide quality education to all. Although the curriculum has been modified, particularly during the last decade, the classrooms are almost unchanged over the century. Students sit in benches facing the teacher while she delivers her lecture using chalk and blackboard and text books.

Recently, the government has taken up a project to establish multimedia classroom in schools (Minges et. al., 2011). Ministry of Education and Ministry of Primary and Mass Education are implementing the project under the Access to Information (A2I) Programme of Prime Minister's Office. Under the first phase of the project each of 23,000 primary and secondary schools will have a multimedia classroom at a cost of 1,800 USD within 2013. The classroom will have a laptop, a multimedia projector and Internet connection. A training program for teachers to develop content for the multimedia classroom is also part of the project. Considering the total number of primary and secondary school of 97,755 the first phase of the project covers about one third of the schools.

The biggest draw back of the project is that the multimedia classrooms depend on grid electricity to operate. The average power requirement for a multimedia classroom comprising of a computer and a projector is almost 300W. In Bangladesh, 28% of the population lives in urban areas (UNICEF, The State of the World's Children 2012: Children in an Urban World, 2012). All of the urban areas in Bangladesh have electricity supply. Till date, electricity has reached about 60% of the population of which 28% is represented by the urban population and 32% represented by rural population. That is, more than 55% of the rural population is without any electricity connection. Moreover, the

total generation is lacking behind the demand. The average load shedding in Bangladesh during the summer period is in excess of 10% of the demand. In 1 June 2012, the maximum generation was 5520 MW against a demand of 6500 MW (Bangladesh Power Development Board, 2012). The amount of load shed for the day was 980 MW, that is, 15% of the demand. The rural areas suffer the most due to load shed. Since the electricity demand in rural areas is far less than the urban areas, a 15% load shedding covers more than 30% of the rural area. As such, it is obvious that large number of rural schools that have electricity connection in fact do not have electricity due to load shedding. Without electricity multimedia classrooms will be useless. Also, the students in rural areas without electricity connection can never have access to the multimedia classroom.

The second draw back of the project is that the initial cost and maintenance of the system. As per costing of the project each set costs USD 1,800 per classroom which is quite high for Bangladesh. Without government help, very few schools can afford to have a multimedia classroom of their own. Maintenance of the projector is a big issue. Manufacturers provide a warranty of 1,000 hours for the projector bulb which is just about the average life of the bulb. Considering five lectures per day to be provided by the multimedia classroom in a secondary school (one for every class from class 6 to class 10), and 200 working days in a year, a projector will need to replace its bulb every year on an average. Replacing a bulb is very costly and so within one and half years schools having multimedia classroom will face financial burden.

Current Projector Technologies

Based on the mechanisms used to compose the image multimedia projectors can be broadly categorized into two technologies, digital light processing (DLP) or liquid crystal display (LCD). DLP technology uses an optical semiconductor, known as the digital micro-mirror device, or DMD chip to recreate source material. LCD projectors contain three separate LCD glass panels, one for red, green, and blue components of the image signal being transferred to the projector. As the light passes through the LCD panels, individual pixels can be opened to allow light to pass or closed to block the light. This activity modulates the light and produces the image that is projected onto the screen. Both of these technologies require complex driving circuits and their cost at this stage is prohibitive for the development of low cost multimedia projector.

The overhead projector (OHP) has been in use in classrooms across the world for almost half a century. The technology is simple, yet very effective. It has a light in the bottom with lenses and mirrors that project the image of a transparency placed on top of the projector box. The lamp is of high power and a cooling fan is necessary to prevent the lamp from melting from its own heat. Since the OHP cannot project image or video from a computer it fails to take the advantages of development and advancements of ICTs achieved during the last two decades.

In terms of power consumed, the DLP or three LCD based multimedia projector and the OHP are prohibitive for use in developing countries where access to electricity is yet to cross the halfway mark.

The Hybrid Projector

A. Initial design

The target was to develop a projector in such a way that the educational institutes both in urban and rural areas can use it. So, there are few points that we have to consider as design constraints. They are:

- a) Low power consumption so that solar power can be used as source of energy.
- b) The projector can be used both in overhead mode and multimedia mode so that if the laptop and/or Internet connection goes wrong it can be switched from multimedia mode to overhead mode.
- c) The cost of the projector should be as low as possible so that an institution in rural areas can use it.

Based on the above assumptions, we took an overhead projector as a base of our development. First of all, we concentrated on the power consumption. We found that it uses two high power projection lamps which can be used alternately. The power consumption is 250W and it requires ac supply. Since our target was to use solar power as source of energy, we decided to replace with dc LED lamp having low power consumption. The only constraint in choosing LED lamp was the lumen equivalency. After many experiments, we decided for 12V, 32W conical type high durable LED lamp. After measuring the lumen output we found its equivalence with the original projection lamp. With the chosen lamp we run the OHP continuously for 12 hours and for several days, it did not caused any problem. Since we have to have provision for dual source, both ac and dc, we developed an adapter suitable for the lamp. There was a change over switch for making the source effective from ac to dc or vice versa.

The next step of the design was to convert the OHP into a multimedia projector. This portion was not as easy

as we thought. Our idea was to use an LCD screen on top of the overhead glass. But, finding a suitable LCD module was a difficult job for us. Since in Bangladesh stand alone LCD panel is not available, we started with removing screen from laptop and desktop monitors. We tried with panel from Lenovo and also from Dell pc/laptop. Initial experiments were failures because the LCD was not as transparent as expected. Finally we used LCD panel from Samsung desktop flat screen monitor. Its transparency level is much better than the previous ones.

With the LCD panel along with its control circuitry we fitted the assembly on top of the glass of the OHP. The video port is made exposed so that laptop can be connected. With the signals from the laptop the video output is transmitted to the LCD panel and since the panel is placed on top of the OHP, it is projected on the large screen. The content, whatever is displayed on the laptop screen, can now be projected in larger shape, fulfilling the requirement of multimedia projector.

B. Final design

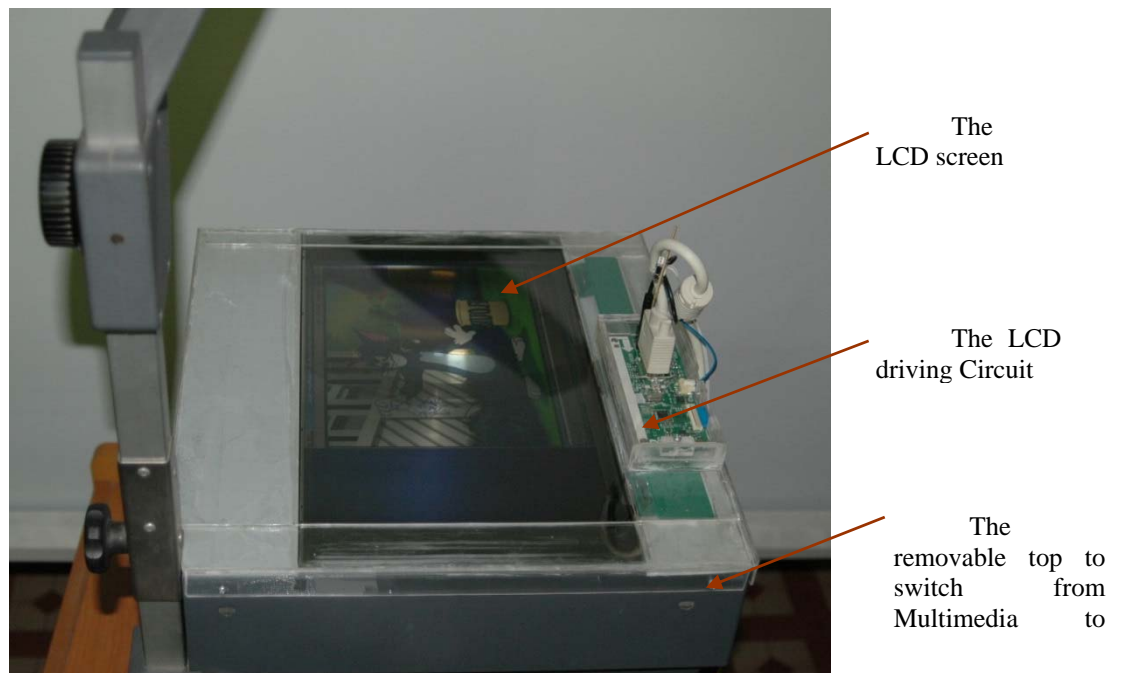


Figure 1: A prototype of the developed hybrid projector

The photograph of final prototype version of the hybrid projector is shown in Figure 1. As evident from the picture the projector is made by converting an Overhead Projector. A focused LED is used as the light source in the projector. Its consumption is measured to be 18W. The laptop used is a very tiny one having a power consumption of 44W only. In total the power requirement was 62W. The set was run using a 100W solar panel. The panel charges a battery under a charge controller and the battery supplies the requisite power for the laptop-projector set. The main modification is made by placing a LCD screen over the glass top of the OHP. The photograph shows also the placement of the video control circuit for the panel. For visibility, in prototype version, it is placed on top of the projector. But in commercial design it will be placed at one of its sides. The other important feature is visible from the photograph is that the top addition, i.e. the LCD panel assembly is detachable so that when it is removed the projector the unit can be used in its OHP mode. For example if the laptop is malfunctioning or the Internet connection can not be accessed, the multimedia mode of projection can not be used. As this hybrid projector can be used either of the modes, it can be switched from one to another.

C. Future developments

There are few issues that need to be addressed in future so as to convert the prototype version into commercial version. The total assembly of LCD panel and its controlling circuit should be manufactured by a LCD panel manufacturer suiting our requirement. First, the transparency level has to be high in comparison with that in the presently available LCD panel. Secondly the video control circuit should be robust and housed in a single assembly of the whole set up. Thirdly, the screen size should commensurate with the OHP's glass size. The other issues that need

to be addressed are: (a) Integration of solar charging system and battery within the OHP. (b) Choice of LED lamp and its changing provision and (c) robustness of the detachable part of the LCD assembly.

Cost Comparison

The development cost of the final design of hybrid projector system including the laptop, solar PV panel and battery with components procured from the local market is about 600 USD. Compared to the cost of the multimedia projector system currently being supplied to the schools under the aforementioned government project, excluding teacher's training, the cost of the developed system is less than 50% of that of the project. The battery may need to be replaced once in every three years. Almost no lamp replacement will be required for the developed system. Whereas, during the same period of time, the conventional multimedia projector will require 2 to 3 times lamp replacement costing on the average 125 USD per replacement. Considering all the facts stated, the "multimedia classroom project" cost, if our developed system was used, would be USD 13.8 million, whereas the present project cost is USD 28.4 million. It means that there would be a clear saving of USD 14.6 million.

CONCLUSIONS

A hybrid projector powered by solar PV panel is conceptualized and developed in the laboratory. A prototype version of the projection system has been experimented both in OHP and multimedia mode of projection. Starting from the concept up to its prototyping, step by step development process has been elaborated. The projection system has been proved to be satisfactory in either of the modes. The solar PV system is also tested in average condition of sunlight. Its use has proved to be satisfactory.

Finally, a cost comparison is made between the hybrid and conventional multimedia projector system for use in multimedia classrooms. It is shown that hybrid system will not only provide convenience to all kind of use but also it is cheaper than the conventional multimedia projector. Moreover, being solar powered, it saves energy and ensures availability of power to schools that do not have an electricity connection or suffers frequent load shedding.

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