STUDENT PERCEPTIONS ON LEARNING BY DESIGN METHOD IN WEB-BASED LEARNING ENVIRONMENT: A CASE STUDY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

EVRİM AKMAN

IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
COMPUTER EDUCATION AND INSTRUCTIONAL TECHNOLOGY

APRIL 2010

Approval of the thesis:

STUDENT PERCEPTIONS ON LEARNING BY DESIGN METHOD IN WEB-BASED LEARNING ENVIRONMENT: A CASE STUDY

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ABSTRACT

STUDENT PERCEPTIONS ON LEARNING BY DESIGN METHOD IN WEB-BASED LEARNING ENVIRONMENT: A CASE STUDY

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April 2010, 88 pages

The purpose of this study was to investigate the perceptions of students in an implementation of "Learning by Design" method through a web based learning environment. The information gathered from the students enrolled in the undergraduate course; "Foundations of Distance Education" in 2009 Summer School and 2009-2010 Fall Semesters was evaluated.

The course was given in blended form, i.e. face to face lessons and online instructional activities were performed together. In the web based part of the course, several educational modules of an open source learning management system (LMS), such as quizzes, forums, lesson pages, wiki pages, mail interface etc. were used. The students were responsible for implementing an educational course site on the LMS platform, using the course curriculum applications.

Within the scope of this thesis, the perceptions of the students about course-related projects, and online and classroom activities were investigated through interviews and questionnaires. The academic development of students was also

considered in the study. Additionally, several informal interviews were also done with the instructor of the course in order to investigate his perceptions about the conduct of the course. Questionnaire results have been analyzed quantitatively and face to face interview results have been analyzed qualitatively.

Both quantitative and qualitative data indicated that the students' perceptions about how the course was conducted and the learning by design activities were generally positive. Especially the project work, which was assigned as a requisite of the learning by design method, was pointed out as a positive factor in students' learning of the subject matter both in the questionnaires and in the face to face interviews. Another important finding of the interview and questionnaire results was that the communication between the instructor and the students contributed positively to not only learning the course content but the quality of the projects as well. As an outcome of this study, many important factors, which lead to successful results in implementation of learning by design method in a web based environment, have been identified. These results are presented in detail in the 'Discussion and Recommendations' section.

Keywords: Learning by Design, Moodle, Learning Management System, Web Based Instruction, Project Based Learning, Blended Learning, Online Learning, and Student Perceptions.

ÖZ

AĞ TEMELLİ ÖĞRENME ORTAMINDA TASARIM YOLUYLA ÖĞRENME METODU İLE İLGİLİ ÖĞRENCİ ALGILARI: BİR DURUM ÇALIŞMASI

Akman, Evrim

Yüksek Lisans, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü

Tez Yöneticisi: Öğr. Gör. Dr. Hasan KARAASLAN

Nisan 2010, 88 sayfa

Bu çalışmanın amacı, tasarlayarak öğrenme metodunun web temelli bir öğrenim sisteminde uygulanması ile ilgili öğrenci algılarını incelemekdir. Bunun için 2009 Yaz Okulunda ve 2009-2010 Güz döneminde "Uzaktan Eğitimin Temelleri" dersine kayıtlı öğrencilerden elde edilen bilgiler değerlendirilmiştir.

Ders, sınıf içi etkinliklerle çevrimiçi eğitim araçlarının birlikte yürütüldüğü harmanlanmış eğitim metodu ile verilmiştir. Dersin ağ ortamında anlık sınav, forum, ve benzeri çeşitli eğitim modüllerini bünyesinde barındıran açık kaynak kodlu bir öğrenme yönetim sistemi kullanılmıştır. isimli öğrenme yönetim sistem yazılımı kullanılmıştır. Eğitim dönemi sürecinde öğrencilerin dersin müfredatında öğrenilenleri uygulamaları için yine aynı öğrenme yönetim sistemi altyapısı üzerinde bir eğitim projesi tasarlamaları istenmiştir.

Bu tez kapsamında öğrencilerin dersle ilgili projelerle çevrim içi ve sınıf içi etkinliklere ilişkin algılamaları yüz yüze görüşmelerle ve anketlerle araştırılmıştır. Öğrencilerin akademik gelişimleri de bu çalışmada göz önüne alınmıştır. Ek olarak dersin öğretmeni ile dersin içeriği ile ilgili izlenimlerini almak üzere gayriresmi görüşmeler gerçekleştirilmiştir. Anket sonuçları niceliksel olarak, yüzyüze görüşmeler ise niteliksel yollarla analiz edilmiştir.

Hem nitel hem de nicel veriler öğrencilerin dersin veriliş biçimi ve tasarım yolu ile öğrenme konusundaki algılarının genel olarak olumlu olduğunu göstermektedir. Özellikle tasarım yoluyla öğrenmenin gereği olarak kendilerine verilen proje ödevinin öğrencilerin dersi öğrenmelerine olumlu katkı sağladığı hem anket hem de yüzyüze görüşmelerde belirtilmiştir. Öğretmenle öğrenci arasındaki iletişimin sadece dersin öğrenilmesinde değil, öğrenci projelerinin niteliğine de olumlu katkı sağladığı anket ve yüzyüze görüşmelerin bir başka önemli bulgusudur.

Çalışma sonucunda tasarım yoluyla öğrenme metodunun ağ temelli bir eğitim ortamında uygulamasında başarılı sonuçlar sağlayan önemli pek çok etken tespit edilmiş, bunlar değerlendirme bölümünde sunulmuştur.

Anahtar Kelimeler: Tasarım yoluyla öğrenme, Moodle, Öğrenme Yönetim Sistemi, ağ temelli öğrenim, çevrimiçi öğrenme, proje temelli öğrenme, harmanlanmış eğitim, çevrimiçi öğrenme, öğrenci algıları.

This thesis is dedicated to my family

ACKNOWLEDGEMENTS

First and foremost I present my sincerest appreciation to my supervisor, Dr. Hasan Karaaslan, who has supported me throughout my thesis with his patience and knowledge.

I would like to thank to Assist. Prof. Dr. Cengiz Savaş Aşkun for his valuable suggestions, comments and technical support during the study.

I would like to express my special thanks to examination committee members Assoc. Prof. Dr. Yasemin Gülbahar, Prof. Dr. Yaşar Özden and Dr. Ömer Delialioğlu for their valuable suggestions and comments.

I thank the students who completed questionnaires and participated in the interviews for this study. Ultimately their participation made this study possible.

I am grateful to my co-workers in Computer Center for their tolerant and supportive friendships. I wish to thank all my friends for all their continuing encouragement and patience.

Last but not least, I would like to express my heartfelt thanks and love to my husband and son for their great support and patience during my academic studies. Especially my son always asked whether he could help me so that I would have time to play with him instead of writing thesis. This thesis could not be completed without their support.

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ABBREVIATIONS

CEIT: Department of Computer Education and Instructional Technology

GPA: Grade Point Average

LMS: Learning Management System(s)

LBD: Learning by Design

CHAPTER 1

INTRODUCTION

1.1. Background of the Study

The use of technology in education is continuously making progress, following the progress of communication technology. With the advent of the Internet, the concept of web based learning has taken its place in the realm of education. Especially, web based education with which we come across as a distance education model is based on students' receiving the instructional material via web tools.

The first examples of web based instruction are limited to placing the course materials on the web and providing limited means of interaction for the students. In fact, in the early examples of web based instruction, instructor needed to be an expert not only on the subject matter of the course, but also on the web based tools. However with the development of the Internet technologies, the use of synchronous and asynchronous communication devices made further advancements of the educational models possible.

As in all educational activities, the instructor and the student are the two basic elements of the web based instruction. In an effective educational model, teacher's capability of producing and developing the course related materials, synchronous and asynchronous tools is as important as students' learning the material satisfactorily.

The progress of web based tools which are used to develop course material by the instructor increases the effectiveness of the instruction. The growth of new technologies such as Learning Management Systems (LMS) in web based

environments increased the possibilities for instruction oriented communication.

Through the use of learning management systems, the instructor could arrange the course content and realize curriculum planning. Furthermore, by using the various evaluation tools such as quizzes, online exams, assignment tools, many conveniences in the process of student evaluation are offered (Altun, Gülbahar and Madran, 2008).

Web based education has been developed not only by the progress of the internet technology, but also by the use of dedicated educational models. The development of and research on web based environment is based on cognitive theory (Alonso et. al, 2005). In some cases traditional educational environment may also be required beside distance education, so that the subject matter can be better understood. The combination of distance education systems with traditional face to face instruction is called “Blended Learning”. Distance education models have become an alternative to traditional education because of different student needs or other factors such as time and location independency etc. In a semester, social communication is needed not only for face to face interaction, but also to increase student motivation.

Aside from communication and interaction, another factor necessary for effectiveness of education is the development of an educational model, which would increase the effectiveness of learning. It’s not enough to understand and learn a subject. When a subject is learned, it should be used.

Whether it be over the web or with the traditional method, the applications which would help the students to reinforce the subject are as important as the presentation of the subject by the instructor. Especially in instructor education, there are different models which are being used to reinforce the subject which is taught. Project Based Learning (PBL), Case Based Reasoning, Learning by Design can be considered as important means to reinforce the subject through its application. Learning by design is the outcome of the constructionist theory

that attributes importance to learning through creating, programming, or participating in other forms of designing (Han and Bhattacharya, 2001).

1.2. Purpose of the study

The case course of the study, Foundations of Distance Education, was a course which was given in an open source learning management system called Moodle. The course was conducted by using learning by design method and blended model.

In this study, students' perceptions on the conduct of this course were investigated. The effects of students' knowledge sharing in preparation of their course materials, and their use of various internet tools existing in web based learning environment of the course on learning was also studied.

It is expected that, the outcomes obtained in this study could provide insight for the courses which are being and which could be offered in similar environments. Experiences regarding the application of learning by design in a course which is given by using LMS supported blended system is also believed to provide important information about the implementation of learning by design method.

1.3. Research Questions

This study was designed to answer the following questions:

1) What are students' perceptions about their learning in this course which is given through the web and face to face lessons?
2) What are students' perceptions about the instructor's delivering the subject matter?
3) What are students' perceptions about web based learning environment?
4) What are students' perceptions about the process of completing the project aspect of learning by design method?

1.4. Significance of the Study

In web based education, the contribution of the progress in communication technologies cannot be denied. This progress made it possible to apply different instructional strategies in the structuring of the course.

As a result of this study, the followings are tried to be accomplished:

1. The applicability of learning by design could be evaluated for the courses which are given online.
2. The course content and the other tools related to the course could be developed such that the students' grasp of the subject matter would be improved.
3. Insight could be gained on whether the presented assignments and communication means help reinforcing the subject which had been taught or not.

In this case study of an undergraduate course given in web based learning environment, important information could be presented to those who tries to develop similar learning management systems. In this study, each module of the learning management system software was not studied separately. However, it is believed that feedback from the students could be used to evaluate the effectiveness of these tools. In this manner, the existing systems could be improved and light would be shed on the development of different instruction oriented systems.

The information obtained in this study on the students' perceptions could provide guidance for the instructor about the course content and the use of the system. The outcomes of this study will make the followings possible:

1. In the future offerings of the same course, the course could be re-organized according to students' needs.
2. In the preparation process of similar types of courses under different learning management system environments, they could be organized according to students' needs.

3. For the courses which will be given in the future using learning by design method, arrangements could be made to eliminate probable weaknesses.

1.5. Definition of Terms

Asynchronous Communication

The two parties of communication interact without time dependence. The most frequently used online asynchronous communication tool is e-mail. Forums, discussion boards, blog and wiki pages, e-list programs can also be considered as important means of asynchronous communication tools (Moore and Kearsley 1996).

Blended Learning

Blended learning is a combination of traditional, face to face instruction and distance learning systems. Different combinations of synchronous and/or asynchronous communication tools, and face to face instructional sessions may be used (Bonk and Graham 2006).

Constructivism

Constructivism is a theory of learning, declaring that the knowledge is not what the instructor states, but what the learner constructs in his/her mind. The role of the instructor in this learning process is being a facilitator. Knowledge is constructed based on personal experiences of the learner and reconstructed from the learners' previous knowledge (Ackermann, 2001).

Constructionism

Constructionism is an educational strategy using the constructivist theory, which states that knowledge is not what the instructor taught but what the learner understand and constructed in his/her mind. Additionally,

constructionism also claims that constructing knowledge in mind happens in a situation where the learner is willfully occupied in constructing an object and share the period of construction with other students and instructors (Papert and Harel, 1991).

Distance Education

Distance education is an education system that tutor and learner are not present at the same location and at the same time. Instruction is performed via synchronous and/or asynchronous communication tools such as e-mails, forums, audio/video conferencing tools etc. (Moore and Kearsley, 1996).

Learning by Design

Design is defined as "*A graphic representation, especially a detailed plan for construction or manufacture*" according to The American Heritage Dictionary. In a broader sense, design can be regarded as the process of preparing necessary plans and procedures for a task to be accomplished or a product to be produced. Learning by design is based on the premise that the process of design is very conducive to learning. In learning by design, the learners take on the role of designer. As they create objects/artifacts or are involved in developing computer programs the outcomes are not only the product or programs which have been designed but the "learning" accomplished as a result of this design process as well. Both the product and the learning are valued in learning by design (Han and Bhattacharya, 2001).

Learning Managements System

Learning Management System is a web based software application that automates the administration and reporting of course content for instructors, so that the instructor can create, update, store and deliver when necessary any instructional material on the web. The instructor does not necessarily need to know html or other web programming languages. Instructors can create not

only educational data but also are able to create/evaluate online quizzes, assignments, exams etc. via the learning management system (Meerts, 2003, Simonson, 2007).

Moodle

The word Moodle is an acronym for "Modular Object-Oriented Dynamic Learning Environment". Moodle is an open source web based software package to create, update and deliver online courses and other instructional communication tools. Since it has a modular structure, programmers can also script additional modules for different educational purposes.

Synchronous Communication

The two parties of communication, lecturer and student in this study, interact at the same time. The most frequently used online synchronous communication tool is chat, but audio/video conferencing tools can be considered as well (Moore and Kearsley, 1996).

Traditional Education

In this study, what is meant by "traditional education" is the classical face to face instruction process which takes place in the classroom between the students and the instructor (Moore and Kearsley, 1996).

Web Based Education

An educational model using web based tools, such as web pages, blogs, forum etc. to develop instructional interaction. It can be considered as the most intense form of online education that uses streaming videos and the more advanced functionalities available in educational software and where there is no actual face to face contact between the teacher and the student (Lynch and Lynch, 2003).

CHAPTER 2

LITERATURE REVIEW

In this chapter, a brief survey of recent literature related to constructivism and constructionism, blended learning, learning by design and web based education is presented.

With this literature survey, it is attempted to

- introduce more thoroughly the basic concepts related to these subjects as they appear in the literature and
- give some selected recent studies on these subjects, so that the historical development and the current state of the knowledge in this area as well as important findings and results are presented to the reader.

This literature survey has also been useful to acquire necessary information about the instruments used in this thesis such as preparation and evaluation of questionnaires, statistical analysis, interview techniques etc. Articles and other publications which are reviewed in the forthcoming sections are categorized according to the subjects listed above. The contribution of this thesis to current literature is also addressed at the end of this chapter.

2.1. Blended Learning

Blended learning is briefly defined as a mixing of different learning environments and combination of several communication opportunities to increase the quality of learning (Bonk and Graham, 2006). To be more specific, in the term blended learning; blending of face to face learning environment with computer mediated instruction techniques which is an important component of distance education is being meant.

Burham and Seamons (1987) have suggested that the instructional strategies appear to impact the actual process of learning for each adult interacting with the material. As Elliot Masie (2002), an e-learning expert, says “People are not single-method learners!” Recent research studies on computer mediated instruction indicate that; integrating online technologies to instruction makes access to information easier but does not have a positive effect on students’ learning.

It is realized that, distance education had some pedagogical disadvantages, such as limited chance to reinforce and less interaction compared to face to face instruction. In face to face learning, contrary to online learning systems, students have a chance to interact with the instructor. Yet in many circumstances, face to face learning has also some disadvantages. Time and location constraint is the main problem in face to face learning. In a face to face learning environment not only the subject to be taught but also the instructor is limited in time and location. This is a factor decreasing the quality of education (Moore and Kearsley, 1996).

The combination of these two instructional methods, which were completely separate methods in the past, in a common educational area occurred due to some necessities. Figure 2.1 shows the convergence of traditional and computer mediated learning environment and progress of blended learning.

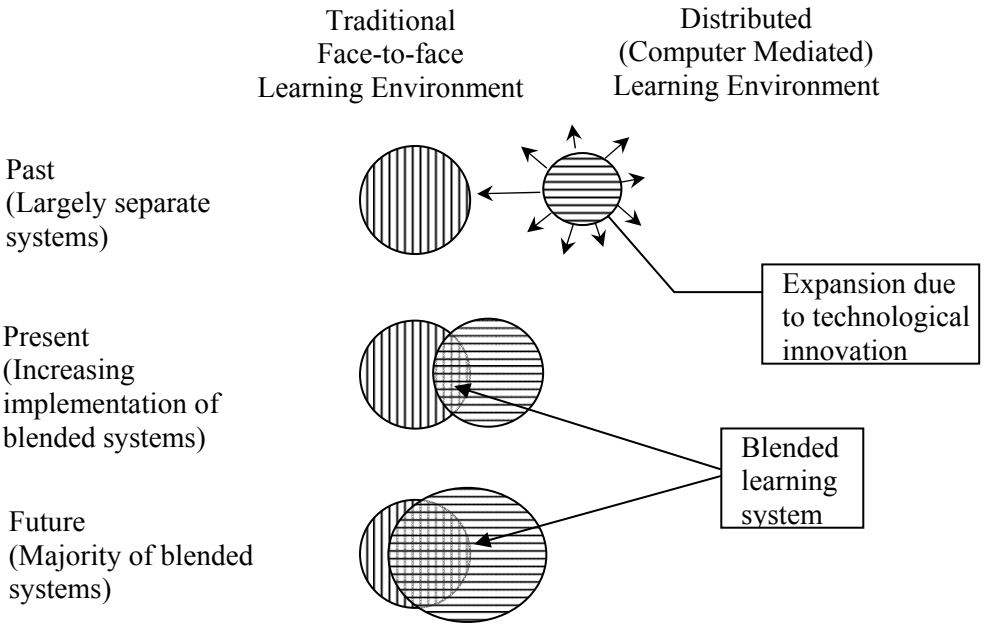


Figure 2.1 Progressive Convergence of Traditional and Computer Mediated Learning Environments
(Bonk and Graham, 2006).

Blended learning systems aim to combine the strengths of the instructional methods. Delialioğlu and Yıldırım (2008) stated that the most important purpose of designing a blended instructional model is to maximize benefits of both face to face and online modes of instruction. Osguthorpe and Graham (2003) identified six main reasons because of which educators possibly choose to design or use blended learning system:

1. Pedagogical richness
2. Access to knowledge
3. Social interaction
4. Personal Agency
5. Cost Effectiveness
6. Ease of revision

Bonk and Graham (2006) stated the challenges relevant to designing blended learning systems.

1. Role of live interaction
2. Role of learner choice and self regulation
3. Models for support and training

4. Finding balance between innovation and production
5. Cultural adaptation
6. Dealing with the digital divide

In some recent studies (Ersoy, 2003) (Delialioğlu, 2004) (Connors, 2006) about blended instructional design, it was found that there was no significant difference in terms of the students' perception on learning between the blended and traditional learning.

2.2. Learning by Design

Constructivist learning approach regards each learner as a unique individual. The role of instructor is a facilitator rather than a teacher. Following this idea of instruction brings new and different educational methods

According to the constructivist view point, learners are actively occupied in making their own meaning, and teaching with that approach focuses on students' further attainments based on what they have already known. For an efficient instruction in a constructivist approach, teacher needs to be a learner and a researcher as well as being an instructor, in order to help students in this process by continuously making necessary adjustments in a given teaching situation (Dougiamas, 1988).

Together with constructivism, various education methods and student centered instructional strategies have been developed. These methods which, in essence, make the students to internalize knowledge may contain different applications but they also have some similarities. Active learning methods, learning by teaching, project based learning, problem based learning, case based reasoning, learning by design are some of them. Enkenberg (2001) stated that the acquisition of knowledge and participation are the two major metaphors guiding thinking about and relevant instruction. The methods of instruction such as learning by design, problem-based learning, and case-based teaching give much emphasis to participation into learning.

Learning and teaching by design can be explained as a collaboration of the learner and the instructor during the construction of a product and developing the knowledge on the subject. Stefanova et. al. (2007) explained the benefits accrued from active learning methods, similar to learning by design method, in importing certain skills related to information and communication technologies.

- Working on a specific situation helps learners build project working skills: Learners are able to identify, formulate and plan the tasks; they can divide the project into subtasks and report the progress of the subtask.
- Researching a specific situation enhance learners' information skills: Learners are able to collect and process suitable information properly in order to reach a preset goal
- Working in small groups during the research contributes to building team working skills**:** learners can communicate internally/externally, give/receive feedback, resolve conflicts, support the team loyalty, and take responsibility.
- Presenting the results produced during the process of active learning give a chance to learners to practice their presentation skills: Select, order and present information, structure and build a report, make correct citations, design written, oral and online presentation, select and use multimedia, etc..

According to Han and Bhattacharya (2001) learning by design, emerges from the constructionist theory, highlights the value of learning during creating, programming, or participating in other forms of designing. When a learner designs an artifact related to the subject to be learned, s/he develops a rich context for learning. Not only the design and learning process but also the designed outcome is valued by means of learning by design method.

The literature in general, refers to the studies on K12 level students, but in this study learning by design is applied to university students. Georgia Institute of Technology applies learning by design method as a project-based inquiry approach to science for middle school students. It is maintained that being a part of scientific projects is much better than memorizing formulas and definitions.

In Figure 2.1 Learning by Design Cycle is shown. This cycle describes schematically how learning by design method works. The Learning by Design Cycle consists of two important components of learning from design activities – 1) design/redesign (application) and 2) investigation.

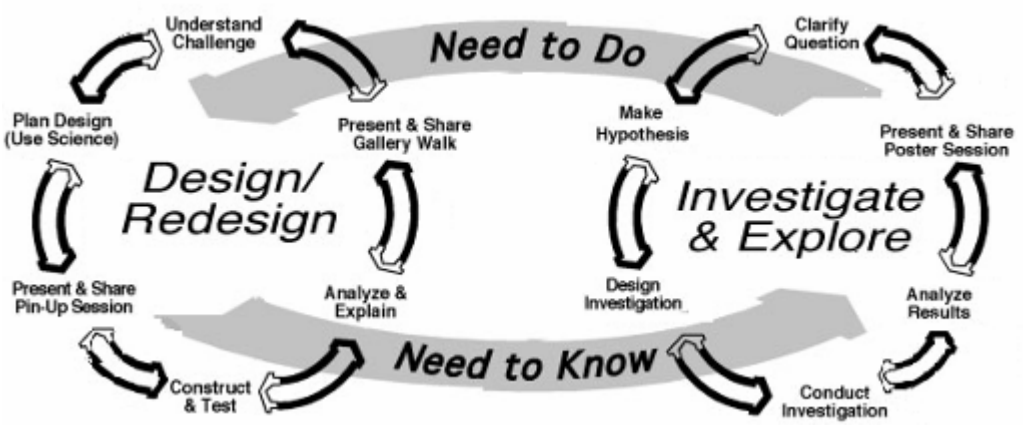


Figure 2.1 Learning by Design Cycle,
http://www.cc.gatech.edu/projects/lbd/cycle.html

Placed within each of these components are a variety of practical and reflective activities and public presentations aimed at helping students interpret their experiences (in ways that will allow them to identify what they are learning and connect their actions with their goals). Together, the two focus a learning cycle, where the steps in the learning cycle are performed through activities specific to investigating and designing.

Balasubramanian and Wilson (2007), describe the students and the instructors as co-creators of knowledge in learning by design applications.
Balasubramanian presented a study of a “Learning by Design” application to

the middle school students in a science classroom in his article. The findings of the study verify that creating an artifact related to subject improves the students' understanding and enhances the knowledge on the subject. The increase in the students' motivation is another profit of this method of instruction. Learning by design is defined as "an evidence-based instructional intervention that is grounded in cognitive and neuroscience theories on learning and motivation" (Bransford et. al., 2000, cited in Balasubramanian, Frieler and Asp 2007).

Students in learning by design classroom meet a challenge about the subject to be learned and they are assigned to design an artifact. It may be, in a science class for example, a self-powered car that can go a certain distance over a certain terrain (Kolodner et al, 1998). During the design process class members develop designs, build prototypes, gather performance data and use other resources to provide justification for refining their designs, and iteratively investigate, redesign, test, and analyze the results of their ideas (Hoolbrook and Kolodner, 2000).

When various studies and articles are reviewed, the activities in learning by design method seem to be classroom activities. The most important elements of learning by design method are instructor-student interaction and student-student interaction, so that student can keep on the design-redesign iteration. In our study, both peer-interaction and student-instructor interaction has been mostly performed via online tools.

Han and Bhattacharya (2001) stated the strategies and application examples of learning by design as in the following Table 2.2.

Table 2.2 Strategies and Implementation Examples of Learning by Design

Strategies	**Implementation Examples**	
1. Clear expectations from day one	• Handouts • Explanation • Discussion session	• Web page • Clarification of questions embedded in the course
2. Inform participants of implicit and explicit objectives and how they will be evaluated	• Discussion following pre-test • Handouts • Web page	• Question/answer sessions • Collaboratively determined evaluation criteria
3. Learner should be an active builder of knowledge	• Brainstorming • Group discussions • Games • Decision making	• Learner has a choice of topic • Learner has a choice of context • Investigative tasks
4. Instructor should take on the role of a facilitator, motivator	• Scaffold learners' activities • Challenge learners • Assign open-ended design tasks	• Balance scaffolding, challenging learners and assignment of tasks • Reinforce concepts, confront misconceptions
5. Tasks given should allow learners to design and construct an artifact that can be shared.	Design tasks can include but are not limited to: • Educational software • Educational games • Web sites, PowerPoint presentations	
6. Provide rich and varied feedback for the designers/learners	• Agreeing on a rubric initially • Self evaluation through reflection • Journals • Progress reports • Class discussion • Short paper	• Peer evaluation • Portfolio: progress report • Piloting to target audience • Piloting to subject matter experts • Feedback by observing student interaction and participation

2.3. Web Based Education

Along with the concept of education, learning environments have also been changed and developed in time. This change mostly bears upon changing educational philosophies. Traditional education approach depended on the fact that a teacher is delivering the subject matter to a student. In the transmission of knowledge the teacher was regarded as the sole agent and the act of learning was thought to be a mere transmission of knowledge (Seels and Richney, 1994).

Web based education is a concept that includes not only a content delivery method, but also a broader learning environment for communication between learners and teachers, including interaction, assessment tools, and class management functions (McCormack and Jones, 1998). These can include formal LMS, such as Moodle, Sakai, and BlackBoard or be created as a web site without an integrated communication component (using separate e-mail or chat functions) and separate grade books, etc. In Figure 2.2 main characteristics of e-learning are stated.

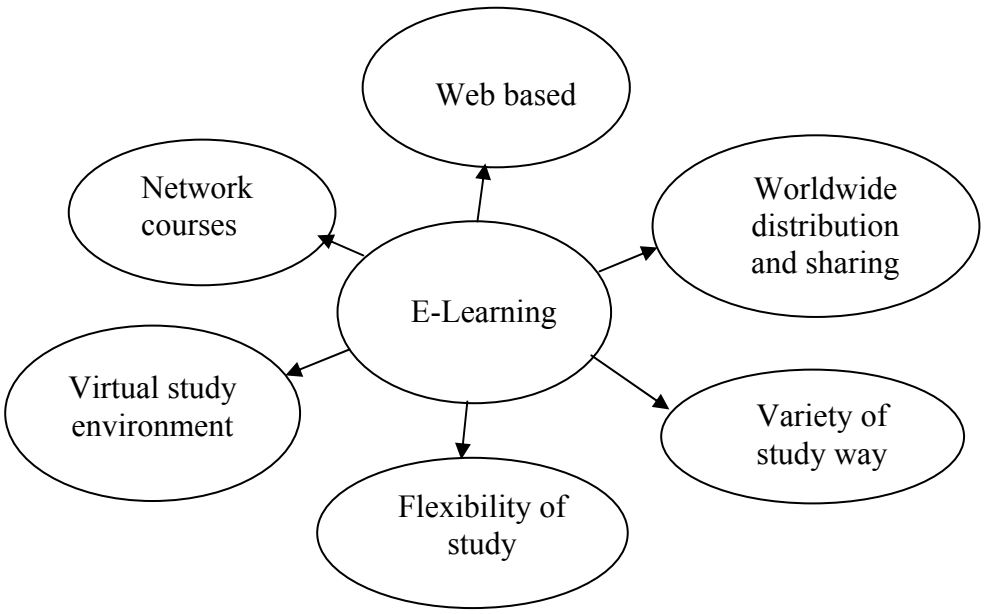


Figure 2.2 Characteristics of E-Learning
(Liu and Wang 2009)

Creating interaction in a web based learning environment is a very important issue which helps to increase the quality of education. Moore and Kearsley (1996) categorized three types of interaction in a distance education design:

1. Learner-content interaction: Refers to the interaction which the student conducted with the subject matter which is presented for the study. Learners construct knowledge through a process of accepting new understanding into their cognitive formations.
2. Learner-instructor interaction: Refers to the support, assistance, and counseling that the instructor provides to the learner in helping them to construct new understanding of the content. The instructor serves as an expert who plans the instruction to arouse students' interests and to motivate their participation in the learning process. Sutton (2001) also added that, the interaction between the learner and the instructor can vary in terms of the number of the audience in accordance to the instructor's method of giving information that is from presenting information to a group of students to the one-on-one interaction with an individual student.
3. Learner-learner interaction: Refers to the interaction between the learner and the other learners. The interaction can occur either in group studies or in individual studies. This is very important in the process of application and evaluation of new knowledge as the learner's peers serve as a criterion for his understanding.

Hillman, Wills and Gunewardena (1994, cited in Chen 2001) defined a fourth type of instruction for web based learning environments, namely;

4. Learner-interface interaction: Refers to the interaction between the learner and the technological medium. Through the technological medium learner can interact with the content, instructor, and other learners.

Soo and Bonk (1998) also added another type of interaction, namely;

- Learner-self interaction: Refers to the learners' expression on the subject of the content, learning development and his/her latest understanding. It is

confirmed by many educators that developing skills of self regulation in an effort to make the learner an independent and self directed learner is an important aim of instruction.

In order to increase the effectiveness of online instruction, the course should be designed in such a way that student interaction should be maximized for all interaction types. Web based learning environments provide more means of activity for the student compared to the conventional education systems when they are designed as "learner centered". This serves as a stimulating factor for the student to use different tools. As a result, the student finds the opportunity to develop himself by submitting quizzes, joining forums, or doing research with web based tools for an assignment (Fredericksen, et.al, 2000).

2.3.1. Learning Management System

Learning Management System (LMS) can be defined as collected works of e-learning tools obtainable through a shared administrative interface. A LMS can be considered as the platform in which online courses or online components of courses are assembled and used from (Nichols, 2003). In Figure 2.3 the participants of a LMS are shown schematically in an online instruction process.

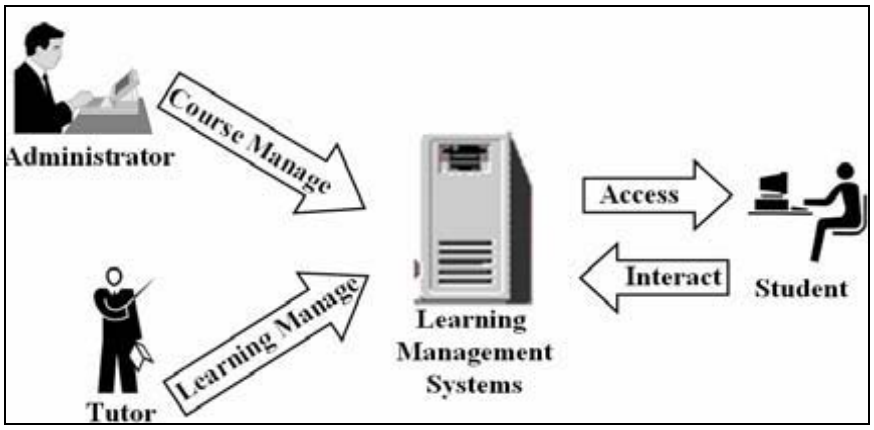


Figure 2.3 Participants in a Learning Management System (Fachada, Lima and Ferreira, 2006)

E-learning is a kind of education supported by several Internet based technologies, such as e-mail, forums and mailing lists. There are two major methods of instruction during e-learning process; these are presentation of the content and facilitating the educational process (Nichols, 2003).

Forums are very important and useful tools in facilitating educational process. Teo and Webster (2008) describe the online discussion boards as the most beneficial tools in a virtual learning environment. Forums as a discussion board are more advantageous compared to a static web page since they allow students to interact both with other students and the instructor of the course. Different perspectives on the subjects are presented in these interactions so that learners are able to expand their understandings on the subject.

The efficiency of the asynchronous interaction depends on the delay time during the interactions as well as the content of the interaction. In some cases, in a synchronous communication; face-to-face conversation, chat etc, the parties of communication may not be able to respond efficiently, or there may be risks of misconceptions on the subject talked about. Especially in the instructor-student interaction, late response can cause the subject not to be understood efficiently.

There are several LMS softwares, either commercial or open source. ATutor, Moodle, Sakai, OLAT are some examples of open source LMS softwares. On the other hand BlackBoard, CCNet, ThinkingCap, WebCT are commercial software examples. Open source softwares appear to be more advantageous than commercial ones because they are free and it is possible to modify them according to one's needs. On security and similar issues, many patches and/or support for add-ons can be found in the world of open source software.

Moodle is provided as open source software under the GNU Public License. GNU Public License means, users are allowed to copy, use and modify the open source software provided that they agree to provide the source to others; not modify or remove the original license and copyrights; and apply this same license to any derivative work (http://www.gnu.org/licenses/gpl.html).

According to Moodle official web site (http://moodle.org) any one that uses Moodle is a Moodler. Moodle was first released in 2002 (Moodle 1.0) and was developed as an educationally sound alternative to Blackboard by Martin Dougiamas of Curtin University. Dougiamas (2000) stated that design and development of Moodle is guided by social constructivist pedagogy with an emphasis on tools that promote collaboration and self evaluation. In Figure 2.4, Diagram of effective relationships between the roles as teacher and researcher, course software, the course and students are stated.

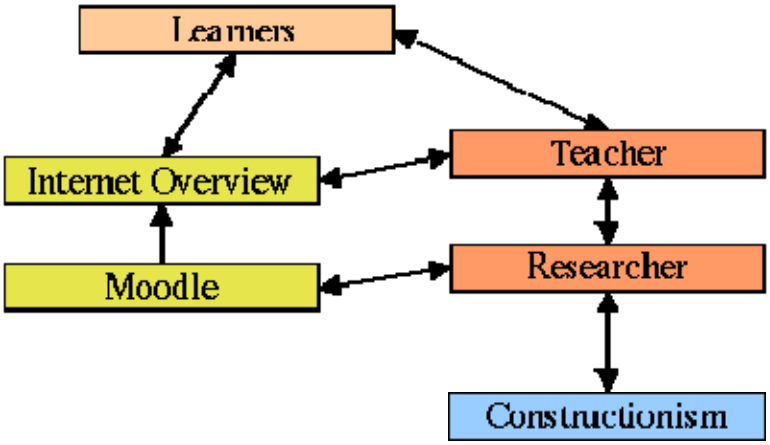


Figure 2.4 Interaction Schema of Moodle
(Dougiamas, 2000)

Corich (2005) compared Moodle with another LMS, "Blackboard". He stated the results of the comparison from the perspective of an instructor who published his courses in Blackboard. According to his study and experiences in both LMS he stated that he would recommend Moodle for the users who have no experience with other e-learning software. He also addressed the technical and administrative risks of migration of the courses from one LMS to another.

As this brief literature review reveals, there are not many studies which address learner's perceptions about learning by design applications in blended learning environments. This study is believed to expand the existing literature in this direction.

CHAPTER 3

METHODOLOGY

This section provides details on the research questions, the design of the study, the subjects, general information about the undergraduate course of the case study, the instruments of the research, the data collection and data analysis procedures. Lastly the limitations of the research are presented.

3.1. Research Questions

The main purpose of the study is to find out the students' perceptions about a course given by using a LMS and examine the effect of "learning by design" method on learning. The following questions were asked during the study and the gathered information is evaluated.

1) What are students' perceptions about their learning in this course which is given through the web and also through face to face lessons?
2) What are students' perceptions about the instructor's way of delivering the course?
3) What are students' perceptions about the web based learning environment?
4) What are students' perceptions about the process of completing the project according to learning by design method?

3.2. Design of the Study

The purpose of this study is to collect reliable data and to provide clear interpretation that can be added to the educational research literature about students' perceptions with respect to learning by design method and implementation of this instructional method on a web based learning environment.

This study is designed as a descriptive case study since the focus is on an undergraduate course given in 2009 Summer School and 2009-2010 Fall Semesters at Middle East Technical University.

Case study is a way of evaluating social data in a specific perspective for the purpose of viewing social reality. It studies a social group entirely (Best and Khan, 1993). Case study is also known as a triangulated research study (Tellis, 1997). Triangulation can happen by combining several data collection methodologies, such as interview, open ended survey, multi-scale questionnaires etc. The efficiency of triangulation rests on the premise that the inadequacy in each single method will be compensated by the counter-balancing strength of another (Rohner, 1977, cited in Jick, 1979).

In this study, both qualitative and quantitative data were collected from the students. Mixing two data collection methodologies eliminates the weaknesses of each research method. Collecting different kinds of data bearing on the same phenomenon improves the accuracy of the judgments (Jick, 1979).

Babbie (1983, 1992, cited in Bloland, 1992, Casebeer and Verhoef, 1997) defines quantitative research as "*the numerical representation and manipulation of observations for the purpose of describing and explaining the phenomena that those observations reflect*", and qualitative research as "*the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships*".

Quantitative data was collected through an online questionnaire (See Appendix B). The questionnaire consists of two main parts. The first part contains demographic questions and the second part contains 4 sets of 5-scale likert type questions. The aim of likert type questions was to obtain a picture of perceptions on the method of instruction, the interaction with the instructor, blended course and the web based learning environment of the course.

Qualitative data of the study was collected after the collection of quantitative data by interviewing volunteer students The aim of the interviews in a qualitative research was to gain access to ideas, thoughts, emotions, etc., that researcher

could not readily identify through an online questionnaire. By conducting interviews, detailed information was obtained from the students on the influences of the project, web interface and modules of the course on students' learning.

3.3. Participants of the Study

The participants of the study were the students of CEIT 321 Course who enrolled 2009 Summer School and 2009-2010 Fall semester offerings. Since filling the questionnaire was not compulsory, not all of the enrolled students participated in the quantitative part of the study. For the interviews, the interviewees were selected using convenience sampling. Convenience sampling depends on choosing groups or individuals that are conveniently available and agreeable to take part in the study (Onwuegbuzie and Collins, 2007).

The numerical details about participants of the study are given below:

- Total number of registered students to the course in 2009 Summer School was 100 (50, in the 1st and 50 in the 2nd sections). The majority of students were Computer Engineering students (52 of 100 students). The rest of the students were distributed among the following departments: 37 Computer Education and Instructional Technology (CEIT), 4 Elementary Mathematical Education, 3 Business and Administration, 2 Economy, 1 Petroleum and Natural Gas Engineering, 1 Sociology student.
- The number of registered students to the course in 2009-2010 Fall Semester was 23. Being a regular course, all students were 3rd year CEIT students.

Gender and department distribution of the participants are shown in Figure 3.1 and Figure 3.2

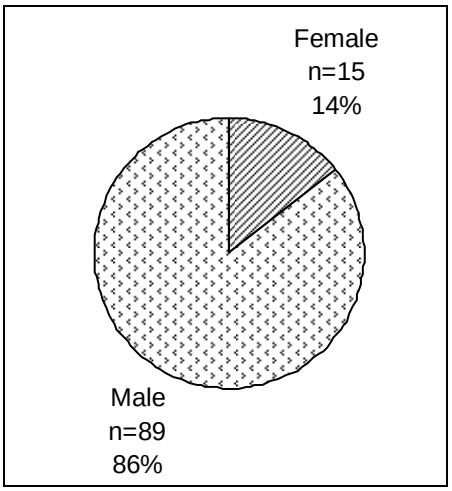


Figure 3.1 Gender Distributions of the Participants

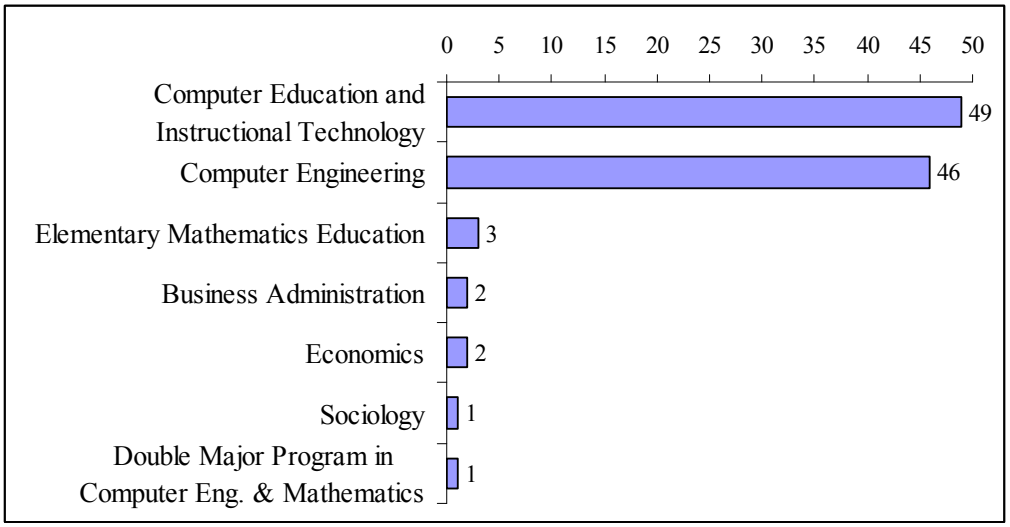


Figure 3.2 Department Distributions of the Participants

- 83 of the enrolled students of 2009 Summer School and 21 of the enrolled students in 2009-2010 Fall Semester participated in the online questionnaire.
- 7 students from summer school and 5 students from fall semester participated in the interview voluntarily.

3.4. Description of the course

The course, CEIT 321 Foundations of Distance Education, was given as a blended course; including web based instructional activities together with classroom activities once a week. The course is offered both in summer school and fall semester each year. Whereas it is a must course for CEIT students, it is a non departmental elective course for non-CEIT students. Being a regular course for CEIT students, the majority of students in the fall semester were in the CEIT department. On the other hand, in summer school, the number of non-CEIT students was greater than CEIT students. Students' departmental distribution of the course is given in the previous section. Since it has no prerequisite course, CEIT students could enroll in the course not only in their 3rd year but also in their 2nd or 4th years if their schedule was suitable.

The course has had a specific text book, "Teaching and Learning at a Distance" (Simonson, Smeldino, Albright, Zvacek). On the web site, there was a variety of recommended online reading materials. The materials were available on the web site and beside; weekly content and recommendations were also presented to student. Students were reading the recommended material, so that, they have had a chance to attend the face to face lecture better prepared.

Briefly, at the end of the course, it was expected that students would be able to

- Apply their instructional knowledge on internet based tools,
- construct and present a course by using distance education tools,
- apply an instructional design effectively for using different types of communication media,
- describe and apply different methods of evaluation techniques in a web based instructional media,
- be active in the application of new distance education tools.

Since the blended learning method was used in the course, once a week classroom meetings were performed in both courses in addition to the web

based learning environment. Especially, theoretical part of the course was presented in traditional course activities. Each week, another course related subject was discussed during the class session.

In web based learning environment of the course, there were static and dynamic web based instructional tools. The students were able to attend forums, upload assignments, attend quizzes and construct their distance education project by using web based learning environment of the course. Each week, the instructor uploaded lesson content of that week to the web site, by using the interface of the learning management system of the course.

3.4.1. The Method of Instruction

The method of the instruction was "Learning by Design". Most important components of learning by design is to state the course objectives and expectations from the students clearly from day one and guide the learners regularly while they try to accomplish a mission or prepare the project which they are expect to create (Han, Bhattacharya, 2001). For this reason the main components are stated in the first classroom session and these are also repeated in the online part of the course during the semester. Additionally, the instructor reminded that the projects should be prepared and he also reminded the project report dates regularly. He gave advices for each specific project and he also gave general advices applicable to all projects.

At the beginning of the semester, the students were informed about the objectives of the course, the method of instruction and expected activities related to the course. According to learning by design method, the role of instructor is a moderator or facilitator whereas the learner should be active when building his/her own knowledge. The transformation from information to knowledge is the result of a process in which the student must be active.

The students were also informed that the course content is available on course web site and they were supposed to design a course interface on the same

platform. Because of this requirement, the students were expected to have computer skills at least at an intermediate level.

The students were free to choose the subject of their educational project. On announced dates, a certain phase of the project of each student or group was presented in a specified area for each project in the course web site, so that according to the feedback from the instructor, the students have had a chance to develop their project.

While the students prepare their distance education projects, they use the web space under their management, under the course web site platform. Students login to the course web site and are able to navigate their own project area in the role of "Editing Teacher". In this area they prepare their own distance education pages and e-learning tools by using what they learned in the course.

As a matter of fact, "learning by design" method requires that each student or project group should have an individual area where they have the opportunity to apply and present what they have learned in the course. Students are expected to link what they have learned in the course to the projects in this area.

In this study, the implementations of the course "Foundations of Distance Education" both in Summer School and in Fall Semester are considered. Summer school has lasted six weeks. The students were asked to comply with the following schedules. In the first week, project topics are determined by students and accordingly project areas for each group or individual student are assigned by the instructor in the web based learning environment. From 2nd through 4th weeks, projects are prepared; in the 5th week projects were submitted. In the fall semester, project preparation process took a longer time. Projects were assigned between 2nd and 3rd weeks and completed projects were submitted in the 11th and 12th weeks of the semester.

In the figures below the screenshots of two weeks of one of the projects are presented as an example. In Figure 3.3, the introduction part of the course

called “HTML Code Tutorial” is presented. Similar to the LMS of the course, the same navigation links are present in this course web site. In Figure 3.4 the screenshot of 3rd week part of the course is shown.

Figure 3.3 A screenshot of an example of the projects

Figure 3.4 A screenshot of an example of the projects

3.4.2. The Course Web Site

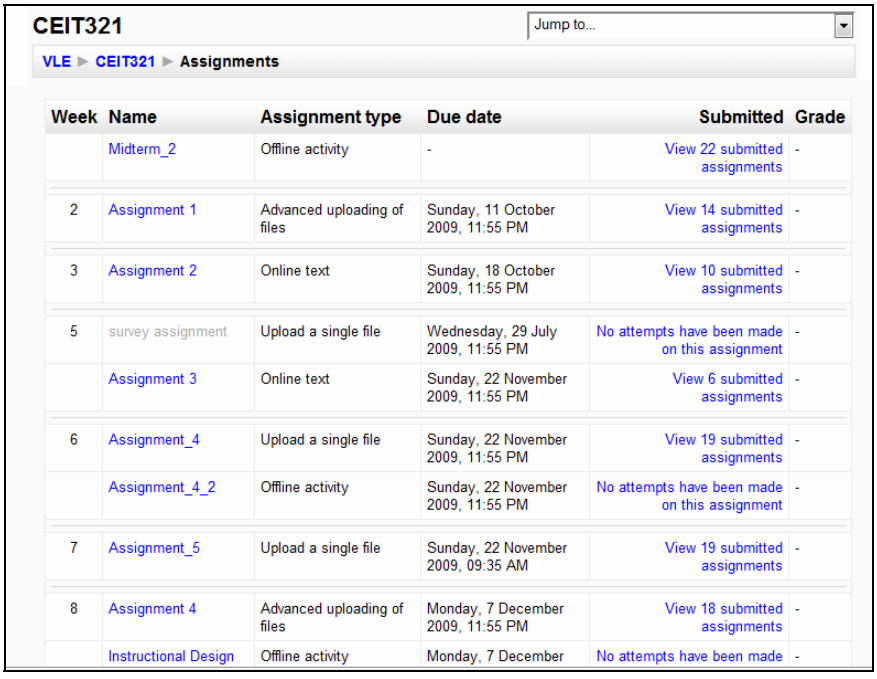
The web site of the course is constructed in Moodle, which is a freeware open source LMS. The users are able to create their online learning tools, develop their own web based learning environment and host their online educational tools. With different additional free features of this LMS, different kinds of synchronous and asynchronous text based communication tools and evaluation modules could be used in an educational period.

Using the learning management system software, an instructor does not only present a web based course, but also is able to create different communication areas such as Wiki pages, Forums, Polls etc, so that the students can share and develop their knowledge on the subject. The result of all these features is that, users can develop a very active learning environment.

The students, enrolled to an online course presented in LMS platform, can also act as an instructor and create their own LMS platform in the same area. This feature of the LMS of the course allows the use of "Learning by Design" method in an online educational environment.

All activities in the course web site are being logged by the learning management system of the course and easily served to the instructor when needed. Students' any logged activities such as submitting an assignment or participating in the forums and viewed pages can also be used in evaluation. In Figure 3.3 students' submitted assignments can be seen in course's web page.

The assignment page, forum interface, and a sample quiz page can be seen in the following Figures 3.5, 3.6 and 3.7



CEIT321 Jump to...

VLE ▶ CEIT321 ▶ Assignments

Week	Name	Assignment type	Due date	Submitted	Grade
	Midterm_2	Offline activity	-	View 22 submitted assignments	-
2	Assignment 1	Advanced uploading of files	Sunday, 11 October 2009, 11:55 PM	View 14 submitted assignments	-
3	Assignment 2	Online text	Sunday, 18 October 2009, 11:55 PM	View 10 submitted assignments	-
5	survey assignment	Upload a single file	Wednesday, 29 July 2009, 11:55 PM	No attempts have been made on this assignment	-
	Assignment 3	Online text	Sunday, 22 November 2009, 11:55 PM	View 6 submitted assignments	-
6	Assignment_4	Upload a single file	Sunday, 22 November 2009, 11:55 PM	View 19 submitted assignments	-
	Assignment_4_2	Offline activity	Sunday, 22 November 2009, 11:55 PM	No attempts have been made on this assignment	-
7	Assignment_5	Upload a single file	Sunday, 22 November 2009, 09:35 AM	View 19 submitted assignments	-
8	Assignment 4	Advanced uploading of files	Monday, 7 December 2009, 11:55 PM	View 18 submitted assignments	-
	Instructional Design	Offline activity	Monday, 7 December	No attempts have been made	-

Figure 3.5 Assignment Page of the Course Web Site

In Figure 3.4. a part of one of the forum topics is shown. Students can either reply one of the existing forums, or start another Distance Education related discussion in forum interface.

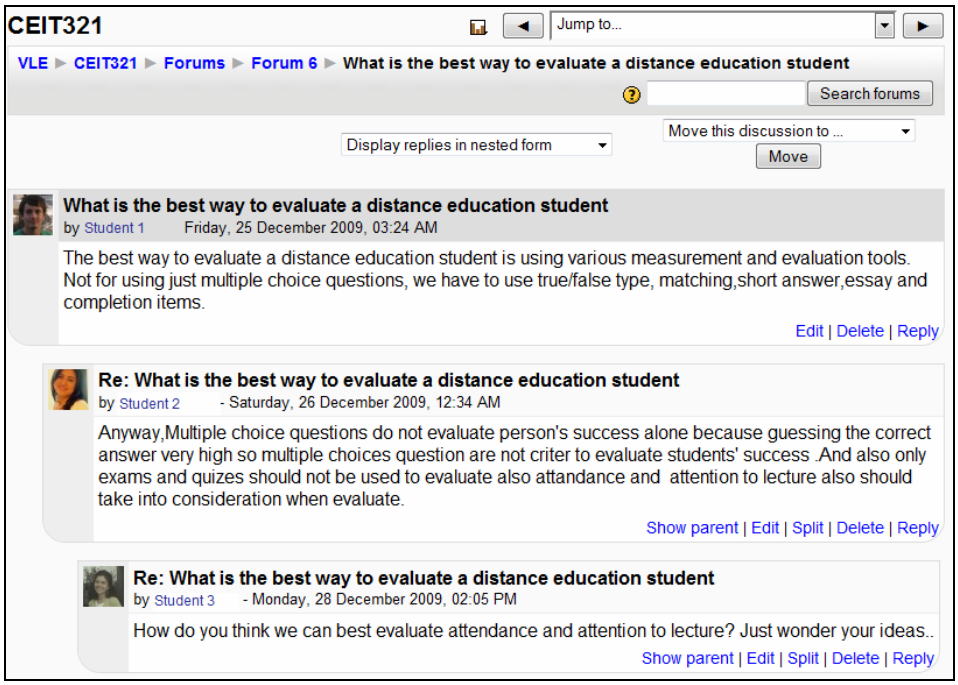


Figure 3.6 A Sample View of Forum

The instructor announced and submitted quizzes during the semester. Students had to answer the quiz questions in limited time period.

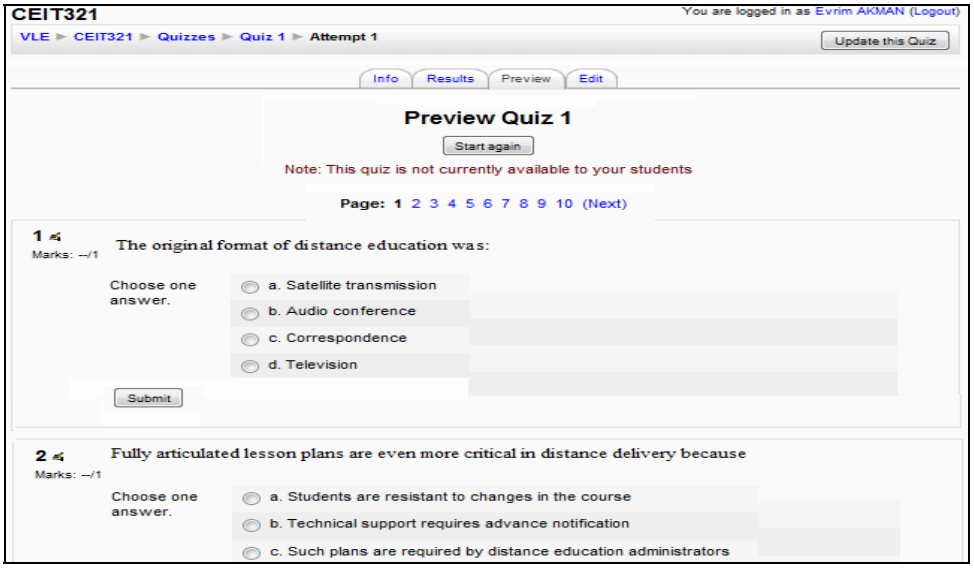


Figure 3.7 A Part of One of the Quizzes in the Course Web Site

3.4.3. Evaluation and Grading Strategies

In this course the students are evaluated in a number of ways. These are attendance, online participation in communication tools of LMS of the course, midterms, participating in course activities, quizzes and the term project. The distribution of evaluation and grading scores is listed on Table 3.1

Table 3.1 Distribution of Grading Percentages in the Course

Measurement	Points	Percentages (%)
Project	300 Points	30%
Final	150 Points	15%
Attendance and Participation	150 Points	10%
Midterm	100 Points	10%
Forum	100 Points	10%
Quizzes	100 Points	10%
Assignments	100 Points	10%
Course activities	50 Points	5%
Total	1000 Points	100%

The process of evaluation of activities in the LMS of the course could be done by using existing log tools.

Figure 3.6 shows a schematic view of this evaluation system. The LMS of the course logs all the student activities, done through the web interface. Visited pages, submitted quizzes, participated in and started forum topics, project updates are some examples of these activities.

By using the feedback obtained from these activities, development of the course content as well as guiding of the students regarding their project preparation becomes possible. Again these logs are used for the general evaluation at the end of the semester.

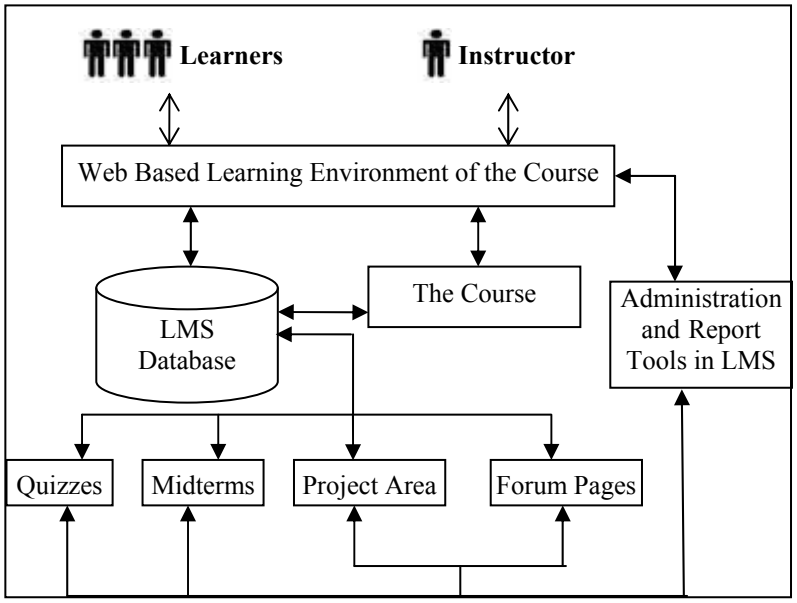


Figure 3.8 Schematic View of the Learning Environment of the Course Adapted from the article written by Huang, Chu and Guan, 2007

3.5. Data Collection Instruments

In this study, quantitative data is collected from the participants by an online questionnaire which could be accessed through the web site of the course. In addition to this quantitative data, in order to see the students' perceptions on "Learning by Design" implementations more clearly, face to face interviews are made with 12 volunteer students. Hence qualitative data is collected. Out of these 12 students, 7 of them were enrolled in the Summer School and 5 of them were enrolled in the Fall Semester class. The purpose of the interview is to get more detailed information about students perceptions on the term project, they prepared.

3.5.1. Evaluation of Student Perception of Courses

The items of the questionnaire are adapted from Gürbüz (2004) and Çetiz (2006). Gürbüz studied the perceptions of students and instructor in an online course, whereas Çetiz studied the perceptions of students and instructor in a blended course. The novel attribute of the current study is that it considers not only a blended or an online course but also includes implementation of

"Learning by Design". Hence in this study the questionnaire is developed in order to investigate the students' perception on learning by design approach. The items in the questionnaire were in English, and prepared according to the previous researches in this field. The questionnaire was checked by two specialists in CEIT department and found to be valid and then delivered to the students.

The questionnaire is divided into 5 parts. The first part of the questionnaire contains 13 questions to obtain demographic information from the students. In this part, students' gender, high school type, department, living arrangements, whether they took a web based course before or not, familiarity with course management system, level of computer knowledge, preference of access to internet and their reason to take an online course were inquired.

The following four sets contain questions to extract the opinions about the course. Each part has a different theme. They are; related to the course, the instructor, the learning management system of the course and modules of the software and the project. Five-point scale Likert Type questions are used in this part of the questionnaire. Students selected the proper choice according to their own opinion. These choices were as follows; 1 represented strongly disagree, 2 represented disagree, 3 was neutral, 4 was agree and finally 5 was strongly agree.

3.5.2. Interview with the Students About the Course Project

It is believed that the questionnaire gives useful information about student perceptions. But in order to gain a deeper insight about the educational tool which the students prepared as a course project as a part of learning by design method, a semi-structured interview is also conducted. An interview guide consisting of 10 questions is prepared (See Appendix B) so that all project related opinions of the students could be questioned. The interview questions were checked by two experts in CEIT department and found valid.

3.6. Data Collection Procedures

The course CEIT 321 is offered both in 2009 Summer School and in 2009-2010 Fall Semesters. The questionnaire is conducted at the end of each semester for the two student groups taking the course at different times. The questionnaire is delivered online, via web. Since filling the questionnaire is not compulsory, not all of the students responded to the questionnaire.

Before filling the questions, students are informed about the study and the effect of their presence in this study. They are also informed about the privacy of the results. They are informed that the findings obtained from the study will not be evaluated on a personal basis for the participants, and the results will not be used elsewhere except within the scope of this study (See Appendix A).

At the end of the fall semester of academic year 2009-2010, an interview has been made with 12 volunteer students. An interview guide containing 10 questions has been prepared. The language of the interview was Turkish except for one attendant. The most important reason for the interview language to be Turkish is that the students could express their opinions on the course conduct and learning by design method better in their native language. Since the interview consisted of open ended questions, native language is preferred also to prevent any misconceptions. An additional benefit of this choice of language was that students felt more comfortable during the interview and they answered the questions more easily.

Interviews were conducted at the student room at CEIT. Duration of the interview was 6-12 minutes. At the beginning of the interview, students who participated in the interview were informed about the questions, method of interviews and the study. They were also informed about the ethical issues about the study including privacy of the interview. Questions were shown before the interview, students were asked whether they agreed to answer the questions and asked whether they accepted their interview to be recorded. They were also informed that they could end the interview any time they wished.

After the acceptance, the responses to the interview questions were recorded by a digital recorder.

3.7. Data Analysis

To analyze quantitative data "Descriptive Statistic with SPSS for Windows 11.5" is used. Descriptive statistics as a statistical procedure are used to summarize, organize and simplify the collected data (Gravetter and Wallnau 1996). At the end of descriptive statistical study, researcher is able to view the data as a meaningful and manageable entity instead of many numbers.

In quantitative analysis, the questions were grouped in relevance when asked to the students; the mean of the overall data is calculated. With 5 levels of perception, the interval for breaking the range in measuring each variable is calculated as follows:

$$(5-1)/5 = 0.8$$

This means items with mean scores falling in the range;
5.00 – 4.20 are considered as at strongly agree level,
4.19 – 3.40 are considered as at agree level,
3.39 – 2.60 are considered as at neutral level,
2.59 – 1.80 are considered as at disagree level,
1.79 – 1.00 are considered as at strongly disagree level.

The items of the questionnaire were grouped by 8 categories concerning students' perceptions with respect to the blended learning, course content and method of instruction, instructor's way of giving the course and guidance during the process of project, team interaction, and the LMS. See the Appendix C for these question groups.

For the qualitative data analysis, students' answers to the interview questions, recorded in the interview process, were transcribed in a word processing program word by word. Analysis of the qualitative data consists of three progressive action, data reduction, data display and conclusion drawing

processes (Miles and Huberman, 1994). Data reduction can be defined briefly as simplifying and abstracting the data in written fields.

The researcher reduced the irrelevant content of the transcribed data so that the rest of the data seemed more meaningful to analyze. In the following step, themes are identified and organized according to the major ideas of questions in order to display data. Since the same interview guide is applied to each student, the responses from the students were relevant to the subject and easily compared in terms of dedicated themes. The consequences of themes were reviewed with respect to the research questions in order to permit conclusion drawing.

3.8. Assumptions of the Study

The following assumptions were made in this study:

- The interviewee would respond the interview questions honestly.
- The participants would fill the questionnaires accurately.
- The data were collected and recorded acceptably.
- The participants' comprehension of English was sufficient to understand and respond the questions in the questionnaire, since it was prepared in English.

3.9. Limitations of the Study

The following limitations were recognized through out the study:

- This research is limited to the reliability of the instruments used in the research.
- Since it was a case study, the findings and the conclusions found from the study were limited to this resarch case. So, the results found could be different for different courses designed by different instructors.
- The validity of the study was limited to the honesty of participants' responses, to the data collection instruments used and the biases of the

interviewer.

- The quantitative data was collected two times in a year, in Fall Semester and in Summer School. Some of the conditions students encountered were different. The responses of the students are limited to the conditions the students faced in these semesters.
- The validity of the students' responses with respect to the questionnaire was limited by students' proficiency in understanding English since the questionnaire was delivered in English.

CHAPTER 4

RESULTS

In this chapter, demographic and statistical results of the questionnaire and the outcomes of the interview made with students are presented.

4.1. Demographic Data

The first part of the questionnaire is prepared to gather demographic data about the participants of the study. The questionnaire contains 13 items including gender, student living arrangement, high school type, cumulative GPA (Grade Point Average), computer ownership, computer knowledge level, knowledge level of the learning management system of the course, the place that students' primarily used to access the course web site, the students' previous online course experience, the students' attendance percentage to the classroom sessions, the students' participation percentage in the online tools of the course, and their reason to take the course.

The questionnaire is filled by a total of 104 participants, 83 of whom were the students in 2009 Summer School and the rest of whom were in 2009-2010 Fall Semester. The participants were composed of 14.4% female and 85.6% male students (number of female and male students is 15 and 89 respectively). 92.2% of the students had a cumulative GPA greater than 2.00, the rest, i.e. 7.8% of the students had a cumulative GPA below 2.00. The mode value is "2.00 - 2.99". In other words, 68% of the students who filled the questionnaire had a cumulative GPA between 2.00 and 2.99.

47.1% of the students were from Computer Education and Instructional Technology (CEIT) and 44.2% of them were from Computer Engineering. The rest of the students, i.e. 8.7% of them, were distributed among other

departments. All of the non-CEIT students were enrolled to the course in 2009 Summer School as an elective course.

The high school types of the students graduated is also asked to the participants and 103 of 104 students answered this question. 40.8% of the students (42 of 103 students) were graduated from Anatolian High School, 36.9% of the students were graduated from Vocational High School (38 of 103 students). 9.7% of students were graduated from general high school and the rest were graduated from miscellaneous high schools.

In Table 4.1 the summary of the frequencies and percentages of the demographic data of the students, regarding gender, cumulative GPA, department, the type of high school are given.

Table 4.1 Distribution of Gender, Cumulative GPA, Departments, High School Types of Students

VARIABLE	FREQUENCY	PERCENTAGE
Gender (n:104)		
Male	89	85.6
Female	15	14.4
Cumulative GPA (n:103)		
1.00 – 1.99	8	7.8
2.00 – 2.99	70	67.9
3.00 – 4.00	25	24.3
Departments (n:104)		
Computer Education and Instructional Technology	49	47.1
Computer Engineering	46	44.2
Elementary Mathematics Education	3	2.9
Business Administration	2	1.9
Economics	2	1.9
Sociology	1	1.0
Double Major Program in Computer Eng. & Mathematics	1	1.0
High School Type (n:103)		
Anatolian High School	42	40.8
Vocational School	35	34.0
General High School	10	9.7
Science High School	8	7.8
Private School	5	4.9
Anatolian Vocational High School	3	2.9

In demographic part of the questionnaire participants are also asked whether they have a computer, and their level of computer and LMS knowledge. Except for 4 students, all of the students have their own computers (96.1% of all). 96% of the students stated their computer knowledge level as intermediate and above. To explain in detail 38.6% of students (39 of 101) stated their computer knowledge level as advanced and 35.6% (36 of 101) stated as upper intermediate. 21.8% of the students defined their computer knowledge level as intermediate, where 4% of them stated their computer knowledge level as elementary or beginner level. The summary of the numerical data for the related items computer ownership and knowledge level of computer and LMS is shown in Table 4.2.

Table 4.2 Distribution of Computer and LMS Related Responses of Students.

VARIABLE	FREQUENCY	PERCENTAGE
Computer Ownership (n:103)		
Yes	99	96.1
No	4	3.9
Computer Knowledge (n:101)		
Advanced	39	38.6
Upper Intermediate	36	35.6
Intermediate	22	21.8
Elementary	3	3.0
Novice	1	1.0
LMS Knowledge (n:104)		
Advanced	14	13.5
Upper Intermediate	31	29.8
Intermediate	39	37.5
Elementary	17	16.3
Novice	3	2.9

Knowledge level of the LMS is quite different from the knowledge level of computer. Nearly half of the students (43.3%) mentioned their LMS knowledge level as advanced or upper intermediate. 37.5% of students stated their LMS knowledge level as intermediate, totally 19.2% stated their knowledge as elementary or beginner level. The correspondence of LMS knowledge and Computer knowledge is shown in the Table 4.3.

Table 4.3 Frequency Table of the Students' Computer Knowledge Related to the LMS Knowledge.

		Computer Knowledge (n:101)[1]				
		Novice	Elementary	Intermediate	Upper Intermediate	Advanced
LMS Knowledge	Novice	1			1	
	Elementary		2	8	6	1
	Intermediate		1	8	16	14
	Upper Intermediate			6	9	15
	Advanced				4	9

According to the questionnaire results, 69.2% of the students (72 of 104 students) live off campus. 45 students live off campus with roommates and 25 live with family. 30.8% of the students live in campus dormitories.

More than half of the students, 51.9%, prefer to access the course web site from their homes whereas quarter of them, 25%, prefer accessing the course web site from their dormitory room. In other words, 25 of 32 students, living in dormitory, prefer to access course web site from their room. 44 of 59 students, living off campus, prefer to access course web site from their own home.

[1] Number of participants who answered the question about computer knowledge is 101. This correspondence table is constructed according to the participants who filled the question about their computer knowledge.

The frequencies and percentages of the demographic data of the students' living arrangements and preference of accessing the course web site are summarized in Table 4.4. The relative frequency table of "Students' Living Arrangements" and "Preference of Accessing to Course Web Site" is given in Table 4.5.

Table 4.4 Distribution of Student Living Arrangement and Preference of Access to Course Web Site of Students

VARIABLE	FREQUENCY	PERCENTAGE
Students' Living Arrangements (n:104)		
Live off campus with roommates	45	43.3
Live in Campus Dormitory	32	30.8
Live with Family	25	24.0
Live off campus alone	2	1.9
Preference of access to Course Web Site (n:104)		
In my home/apartment	54	51.9
In my room in Dormitory	26	25.0
Any where in Campus via Laptop Computer	17	17.3
Computer Lab in Departments	4	3.8
Computer Lab in Dormitories	2	1.9

Table 4.5 Frequency Table of the Students' Living Arrangement Related to Preference of Access to Course Web Site.

		Students' Living Arrangements (n:104)			
		Live with Family	Live in Campus Dormitory	Live off campus with roommates	Live off campus alone
Preference of Access to Course Web Site	Computer Lab in Departments	1	1	2	
	Computer Lab in Dormitories	1	1		
	In my room in Dormitory		25	1	
	In my home/apartment	19	2	31	2
	Any where in Campus via Laptop Computer	4	3	11	

The question about previous online course experience is answered by 100 students. Majority of them, 68% of all, (68 of 100), have not taken any online course before. 14% of them mentioned that they enrolled 1 online course before, and the rest, that is, 18 students appeared to have registered 2 or more online courses according to the questionnaire results.

The question about the reason for taking this particular course is answered by 91 participants. Nearly half of the answers stated the scheduling flexibility of attending online classes as the main reason to take an online course.

Students' percentage of attendance to the courses and participation level in the online tools of the course web site is also questioned. For 63.9% of the participants, participation level in online tools was between 75% and 100%. Attendance to face to face lessons was also very high. For 70.6% of the participants, attendance level was between 75% and 100%. In Table 4.6, the frequency and percentage of the questionnaire results about students' online course experience, reason to take online course, attendance and participation level are given.

Table 4.6 Distribution of the Students' Online Course Related Responses

VARIABLE	FREQUENCY	PERCENTAGE
Students' Previous Online Course Experience (n:100)		
None	68	68.0
1	14	14.0
2	8	8.0
3-4	7	7.0
5 and more	3	3.0
Students' Course Attendance Level (n:102)		
75% - 100%	72	70.6
50% - 75%	20	19.6
25% - 50%	9	8.8
Less than 25%	1	1.0
Students' Participation Level in the online tools of the course web site (n:97)		
75% - 100%	62	63.9
50% - 75%	22	22.7
25% - 50%	8	8.2
Less than 25%	5	5.2
Reason to take this online course (n:91)		
Prefer the scheduling flexibility of attending OL classes	42	46.2
Prefer to learn online	40	44.0
Other	9	9.9

Students mentioned two main reasons for not attending to face to face lectures. The first reason was that, the morning sessions began too early. The second reason was that they could study better at home.

4.2. Students' Questionnaire Results

Questionnaire results are analyzed under eight main categories. These are students' perceptions about:

- blended course,
- course content and method of instruction,
- instructor's way of delivering the course,
- instructor's guidance about the project according to learning by design method,
- team interaction during the preparation of the project,
- communication tools of the LMS,
- usage of the LMS,
- evaluation tools of the LMS

4.2.1. Blended Course

Students' perceptions with respect to the blended course are analyzed in items 1, 2, 3, 4 and 8. The subscale mean for this category is 4.21. Overall, the perceptions of the students about blended course are positive. Percentages and means about these items are shown in Table 4.7.

From Table 4.7 it can be understood that, students have positive thoughts on the course concepts and they feel that flexibility in time is very useful for them while studying. They have almost identical feelings about the online content and face to face instruction of the course.

Table 4.7 Distribution of Responses for Items 1, 2, 3, 4 and 8 (n:104)

Statements	**Number of Responses and Percentages**					
	SD	D	N	A	SA	Mean
1. I'm confident that I can understand the basic concepts taught in this course.	0 0%	2 1.9%	9 8.7%	39 37.5%	54 51.9%	4.39
2. Face to face lessons improved my concentration about the course.	2 1.9%	7 6.7%	17 16.4%	48 46.2%	30 28.9%	3.93
3. This course contributed to my educational or personal development.	2 1.9%	3 2.9%	18 17.3%	45 43.3%	36 34.6%	4.06
4. I liked studying the resources on the course web site.	3 2.9%	5 4.8%	22 21.2%	39 37.5%	35 33.7%	3.94
8. Flexibility in time helped me to work effectively.	2 1.9%	3 2.9%	7 6.7%	34 32.7%	58 55.8%	4.38
					Subscale mean score	4.14

4.2.2. Course Content and Method of Instruction

Students' perceptions about the course content and method of instruction are analyzed in items 5, 6, 7, 12, 28, 29, 30 and 46. The perceptions of the students about the course content and the method of instruction were positive. The subscale mean for this category is 4.14. Percentages and means about these items are shown in Table 4.8.

The most positive perception was about the adequacy of the resources available on the web site of the course. On the other hand, the frequency distribution shows that while most of the students have positive thoughts about the course content, the number of students who feel neutral on this issue is also considerable. One can also observe from this table that students have positive thoughts about the online resources.

Table 4.8 Distribution of Responses for Items 5, 6, 7, 12, 28, 29, 30 and 46 (n: 104)

Statements	**Number of Responses and Percentages**					
	SD	D	N	A	SA	Mean
5. I was very interested in the content of this course.	1 1.0%	9 8.7%	30 28.8%	37 35.6%	27 26.0%	3.77
6. The course was appropriate to my discipline.	0 0%	7 6.7%	17 16.3%	50 48.1%	30 28.8%	3.99
7. I believe I will receive an excellent grade in this course.	1 1.0%	2 1.9%	13 12.5%	43 41.3%	45 43.3%	4.24
12. The method of instruction used in this course was appropriate.	1 1.0%	1 1.0%	10 9.6%	48 46.2%	44 42.3%	4.28
28. I have learned the subject better while creating an online course site.	2 1.9%	3 2.9%	8 7.7%	52 50.0%	39 37.5%	4.18
29. The resources in order to construct project site were adequate.	1 1.0%	1 1.0%	9 8.7%	62 59.6%	31 29.8%	4.16
30. I was endowed with better skills to create a new online course material.	1 1.0%	2 1.9%	8 7.7%	60 57.7%	33 31.7%	4.17
46. The resources on the course web site were clear and comprehensive.	0 0%	2 1.9%	8 7.7%	48 46.2%	46 44.2%	4.33
					Subscale mean score	4.14

4.2.3. Instructor's Way of Delivering the Course

Students' perceptions about the instructor's way of giving the course are analyzed in items 14, 19, 20, 21 and 22. Overall, the perceptions of the student's are positive. The subscale mean for this category is 4.40. Percentages and means about these items is shown in Table 4.9

Table 4.9 Distribution of Responses for Items 14, 19, 20, 21 and 22 (n:104)

Statements	**Number of Responses and Percentages**					
	SD	D	N	A	SA	Mean
14. The instructor provided written examples of assignments/projects.	0 0%	5 4.8%	6 5.77%	32 30.8%	61 58.7%	4.43
19. There was adequate interaction among the instructor and the students.	0 0%	3 2.9%	8 7.69%	42 40.4%	51 49%	4.36
20. I like having e-mail connection with the instructor.	0 0%	4 3.8%	11 10.6%	32 30.8%	57 54.8%	4.37
21. The instructor clarified the course content with the proper applications in the class.	1 1.0%	2 1.9%	11 10.6%	41 39.4%	49 47.1%	4.30
22. The instructor returned e-mail/posts within 24 hours.	1 1.0%	0 0%	12 11.5%	17 16.3%	74 71.2%	4.57
					Subscale mean score	4.40

The high positive results obtained in the items 19, 20, 22 in the Table 4.9 indicate that students were highly satisfied with the interaction available with their instructor, both in the face to face and in the online environment. These results highlight that the online aspect of the course seem to have increased the interaction level through the use of e-mail.

4.2.4. Instructor's Guidance About the Project as a Requirement of Learning by Design Method

Students' perceptions about instructor's guidance about the project are analyzed in items 13, 15, 16, 17, 18 and 23. Overall, the students had positive perceptions about supervision of the instructor about the project. The subscale mean for this category is 4.44. Percentages and means about these items are shown in Tables 4.10.

Table 4.10 Distribution of Responses for Items 13, 15, 16, 17, 18 and 23 (n:104)

Statements	**Number of Responses and Percentages**					
	SD	D	N	A	SA	Mean
13. The instructor managed and guided student interaction and discussion.	1 1%	4 3.8%	6 5.77%	37 35.6%	56 53.8%	4.38
15. The instructor is proficient with all the systems used in the course.	1 1%	1 1%	4 3.85%	35 33.7%	63 60.6%	4.52
16. The instructor posted the syllabus, course materials, and discussion topics at the beginning of the semester.	1 1%	0 0%	4 3.85%	27 26%	72 69.2%	4.63
17. The instructor posted timely bulletins and reminders about the course.	1 1%	2 1.9%	2 1.92%	25 24%	74 71.2%	4.63
18. I received clear and motivating feedback from the instructor when preparing the project.	2 1.9%	0 0%	14 13.5%	41 39.4%	47 45.2%	4.26
23. I received individual assistance from the instructor when I needed it.	2 1.9%	3 2.9%	18 17.3%	25 24%	56 53.8%	4.25
					Subscale mean score	4.44

The highest mean value in Table 4.10 refers to the items 16 and 17, which focus on two important parameters of learning by design. In item 16, the parameter of informing the students at the beginning of the term is questioned. The students are asked whether the instructor posted syllabus, course materials, and discussion topics at the beginning of the course. 95.2% of the students agreed or strongly agreed. In item 17, the students are asked whether the instructor posted timely bulletins and reminders about the course. Reminding the major steps of the project is another important component of the learning by design method. 95.2% of the students agreed or strongly agreed. The mean

score for item 16 and 17 is calculated as 4.63. The table shows that the students are aware of these recommendations and reminders and they benefited from them.

4.2.5. Team Interaction During the Preparation of the Project

Students' perceptions about the team interactions in project preparation process are analyzed in items 9, 10, 11, 24, 32, 33 and 35. Overall, the students had positive perceptions about team interactions in project preparation process. The subscale mean for this category is 3.83. Percentages and means about these items are shown in Tables 4.11.

In item 33, it was proposed that students could not accomplish the project unless they worked together. 49.0% of the students agreed or strongly agreed with this proposition. The mean score of item 33 is 3.32.

In item 35, student opinion on the statement "*Working as a team made me understand things from different perspective.*" is asked. 74% of the students agreed or strongly agreed with this statement. The mean score of item 35 is 3.95.

Most of the students prepared their projects through team work. Despite this, as one can observe from item 33 of the frequency table, their thought on the view "in the completion of the project team work has been very effective" is merely neutral. Nevertheless their thoughts regarding the "contribution of team work to their motivations" and the "influence of team work to their learning" is more positive.

Table 4.11 Distribution of Responses for Items 9, 10, 11, 24, 32, 33 and 35 (n:104)

Statements	**Number of Responses and Percentages**					
	SD	D	N	A	SA	Mean
9. Working as a team improved my interpersonal skills.	3 2.9%	9 8.7%	17 16.3%	40 38.5%	35 33.7%	3.91
10. Learning together was very beneficial to me.	1 1.0%	5 4.8%	22 21.2%	41 39.4%	35 33.7%	4.00
11. Working as a team increased my motivation towards the subject.	3 2.9%	11 10.6%	17 16.3%	34 32.7%	39 37.5%	3.91
24. I am satisfied with the collaboration of the group project.	2 1.9%	14 13.5%	9 8.7%	45 43.3%	34 32.7%	3.91
32. The mood of the team encouraged hard work for everybody.	3 2.9%	8 7.7%	22 21.2%	45 43.3%	26 25.0%	3.80
33. We couldn't accomplish this project unless we worked together.	10 9.6%	16 15.4%	27 26.0%	33 31.7%	18 17.3%	3.32
35. Working as a team made me understand things from different perspective.	3 2.9%	8 7.7%	16 15.4%	41 39.4%	36 34.6%	3.95
					Subscale mean score	3.83

4.2.6. Communication Tools of the LMS Related to Project

Students' perceptions about online communication tools of the learning management system which are used in the project preparation process is analyzed in items 25, 26, 31, 34, 42, 43 and 44. Overall, the students' perceptions about online communication tools can be viewed as positive. The subscale mean for this category is 3.95. Percentages and means about these items are shown in Tables 4.12.

Frequency distribution of the responses for this category shows that majority of the students have positive thoughts about the communication tools of the LMS

of the course. The students gain benefits for their projects by using the forums or other online communication tools. Students think that joining an online discussion is easy and advantageous for sharing ideas.

Table 4.12 Distribution of Responses for Items 25, 26, 31, 34, 42, 43 and 44 (n:104).

Statements	**Number of Responses and Percentages**					
	SD	D	N	A	SA	Mean
25. Working on the project through online communication socialized me.	4 3.8%	14 13.5%	22 21.2%	38 36.5%	26 25.0%	3.65
26. Participating in the forums encouraged me to develop my project web site.	3 2.9%	8 7.7%	23 22.1%	41 39.4%	29 27.9%	3.82
31. The material provoked insightful class discussion.	2 1.9%	3 2.9%	20 19.2%	46 44.2%	33 31.7%	4.01
34. On many instances, it was easy to contact an online discussion.	0 0%	5 4.8%	8 7.7%	57 54.8%	34 32.7%	4.15
42. The forum was very advantageous to understand each other's ideas.	3 2.9%	4 3.8%	9 8.7%	49 47.1%	39 37.5%	4.13
43. The forum was very useful to share and develop the ideas about course content.	3 2.9%	7 6.7%	8 7.7%	48 46.2%	38 36.5%	4.07
44. Participating in the forums increased my motivation towards the subject.	4 3.8%	7 6.7%	19 18.3%	45 43.3%	29 27.9%	3.85
					Subscale mean score	3.95

4.2.7. Usage of the Learning Management System of the Course

Students' perceptions about the learning management system software, which is Moodle in this study, were analyzed in the items 27, 38, 40, 41 and 47. In general, students' perceptions about general structure of the software and its usage can be regarded as positive. The subscale of this category is 3.95. Percentages and means about these items is shown in Tables 4.13

Table 4.13 Distribution of Responses for Items 27, 38, 40, 41 and 47 (n:104).

Statements	**Number of Responses and Percentages**					
	SD	D	N	A	SA	Mean
27. I liked using the software (Moodle) while constructing my project.	3 2.9%	5 4.8%	18 17.3%	42 40.4%	36 34.6%	3.99
38. Online course interface was difficult to understand.*	10 9.6%	41 39.4%	17 16.3%	12 11.5%	24 23.1%	2.99
Reverse calculation of the item 38[2]	24 23.1%	12 11.5%	17 16.3%	41 39.4%	10 9.6%	3.01
40. There was proper technical support for the web site.	1 1.0%	3 2.9%	11 10.6%	49 47.1%	40 38.5%	4.19
41. The icons that were used for navigation were consistent and well defined.	1 1.0%	3 2.9%	7 6.7%	56 53.8%	37 35.6%	4.20
47. The web site has a reasonable structural organization (hierarchical, linear etc.)	1 1.0%	1 1.0%	10 9.6%	42 40.4%	50 48.1%	4.34
** Reverse Item*					Subscale mean score	3.95

Items 38 and 47 were the reverse of each other, but when the frequency distribution of these items is carefully analyzed, it's observed that the responses were not consistent. In item 38 whether the interface is difficult to understand or not is asked to the students. Only 34.6% of the students agreed or strongly

[2] The subscale mean value is calculated according to the reversed responded values of the item.

agreed that it was difficult to understand. Item 47 was about the structural organization of the web site. 88.5% of the students found that the structural organization of the web site is reasonable. The mean score of item 47 is 4.34.

According to the students' responses to the other items in this category, they have positive perceptions about the structure of the web site. Moreover, the most confident response was about the structure of the learning management system. The reason for the inconsistency was possibly due to the fact that it was not really understood by the students.

4.2.8. Evaluation Tools of the Learning Management System

Students' perceptions about the evaluation tools of the learning management system software of the course are analyzed in items 36, 37, 39 and 45. On the whole, students' perceptions about evaluation tools of the LMS software can be regarded as positive. The subscale of this category is 4.33. Percentages and means about these items is shown in Tables 4.14

Table 4.14 Distribution of Responses for Items 36, 37, 39 and 45. (n:104)

Statements	**Number of Responses and Percentages**					
	SD	D	N	A	SA	Mean
36. Online quizzes were beneficial to reinforce the subject.	2 1.9%	3 2.9%	8 7.7%	36 34.6%	55 52.9%	4.34
37. I have improved my knowledge while preparing the online assignments.	1 1.0%	4 3.8%	7 6.7%	47 45.2%	45 43.3%	4.26
39. Quizzes, assignments and forum improved my understanding of the topic.	0 0%	1 1.0%	11 10.6%	47 45.2%	45 43.3%	4.31
45. I enjoyed submitting quizzes.	1 1.0%	2 1.9%	10 9.6%	32 30.8%	59 56.7%	4.40
					Subscale mean score	4.33

It is observed from the frequency table of the items that most of the students enjoyed using the evaluation tools of the learning management system and participated in the quizzes and the forums. They think positively about these tools' contribution to their learning and their knowledge on the subject.

Especially in item 45, which has the highest mean value, the students are asked whether they enjoyed responding to the quizzes. 87.5% of the students were affirmative in this issue.

4.2.9. Summary of the Students' Questionnaire Results

Students' responses to the eight categories of the questionnaire were summarized in Figure 4.1 and Table 4.15. From the figure and the table, it can be observed that the highest sub-scale mean scores belong to the items involving the instructor. On the other hand, it can be seen that the lowest mean value belongs to the category involving team interaction.

Table 4.15 Table of Mean Scores for Students' Questionnaire Results

Categories	**Subscale Mean Score**
Blended course	4,14
Course content and method of instruction	4,14
Instructor's way of delivering the course	4,40
Instructors guidance about the project	4,44
Team interactions in project preparation process	3,83
Online communication tools of the LMS	3,95
Usage of the LMS of the Course	3,95
Evaluation tools of the LMS	4,33

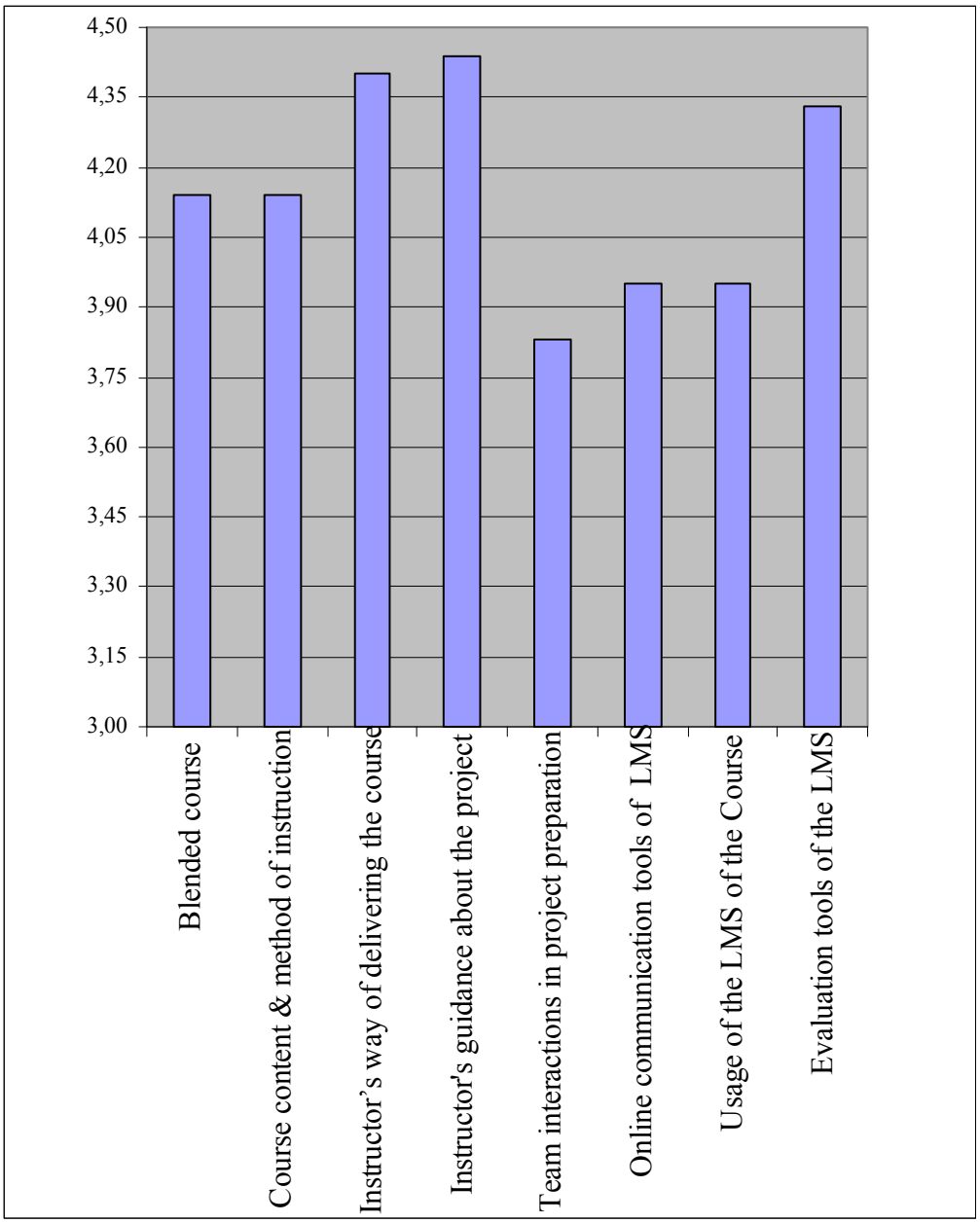


Figure 4.1 Graph of the Summary of the Students' Questionnaire Results

4.3. Students' Interview Results

Students' responses to the interview about the project they prepared were presented in four dimensions listed below:

- The project preparation process
- Student and instructor interaction during the project preparation process
- The web based learning environment as a project tool

- The blended course given by learning by design method.

12 volunteer students participated in the qualitative part of the study. The demographic data about the students who participated in the interview is given in Table 4.15

Table 4.15 Gender and Grades of the Interviewees (n:12)

VARIABLE	FREQUENCY	PERCENTAGE
Gender (n:12)		
Male	8	66.7%
Female	4	33.3%
Grades (n:12)		
AA	7	58.3%
BA	3	25.0%
BB	2	16.7%

4.3.1. Students' Perceptions About the Project Preparation Process

The participants of the interview were asked how they decided on the subject of their project and what the effect of their choice on their motivation was. The decision criterion of the subject of the project was different for all students, but most of them preferred to prepare the project about a subject with which they feel themselves most familiar.

The second most popular criterion was availability of the resources for their subjects. In fact, 2 participants (out of 12) stated that they preferred a topic that they were not familiar with, but wanted to learn about while preparing their projects. All students emphasized the fact that choosing their own subject had a positive effect on their motivation.

The effect of preparing a web based learning environment on their learning was also questioned. Students emphasized that by preparing a web based learning tool, they learned not only how to design a specific course by using the LMS software by assuming the role of "editing teacher", but also how to prepare a lesson plan and to develop evaluation strategies on a virtual learning environment. This was also mentioned to be another motivating factor for one of the participants. Being more familiar with the educational methodologies for an online tool is definitely a very important benefit of the course "Distance Education". One of the students stated that:

> We have a chance to practice what we learned when developing our web based courses. Even when we didn't thoroughly understand some subjects at the beginning, we were able to learn these subjects when studying on our project.

Whether the students faced a problem during project preparation process was another question. Most of the students stated, they encountered software related difficulties during several phases of the project. It was also stated that these problems were solved by the help of the resources in the learning management system of the course.

The abilities that the students acquired, such as preparing lesson plan, creating and developing a course and evaluation material for a virtual learning environment, organizing instructional strategies according to online learning environments were also included among the primary objectives of the course.

One of the students stated that:

> In project preparation phase, while preparing our course content, we were certainly doing a lot of research, and this contributed immensely to our project topic. We learned how to write the lesson plan, how to organize a term, how to write the course objectives. We learned all these in a distance education tool, used what we learned

and developed our courses in a distance education environment. The course was very beneficial for me as an educator.

Having doubt on preparing the content, related to the subject to be taught was also stated as a problem. The basis of these problems is mentioned as language related. Moreover, their being not really sure how they should organize the content for a 13 week semester, week by week was another concern.

Another type of problem pointed out by two students was group related problems, namely organizing group meetings. Nevertheless, they declared that they solved this problem by using asynchronous text based communication tools in the virtual learning environment of the course.

Students are also asked whether their previous academic background had effect on their learning the subject. In general, students stated that they learned the course content better since they related the course content with what they had learned in previous courses. They used not only the course content in preparation of their project but also their previous knowledge.

Majority of the students stated that their educational background was very helpful to understand the course subject and to prepare their own project. According to participants, their computer knowledge and familiarity with the learning management system of the course, Moodle, was also supportive in developing their own web based tools.

4.3.2. Students' Perceptions About the Interaction with the Instructor During the Project Preparation

Instructor guidance is a very important parameter for learning by design method. The interaction between the students and the instructor was also investigated in the study as students are supposed to share the important steps of their project with the instructor. According to the interviews, some students tried to do so. However, due to time constraints, they could not.

The instructor also gave general feedback about the projects in face to face sessions and some of the students expressed that they used the generic suggestions for their own projects. All of the participants acknowledge that, whether it be for their own project or general, the project related feedback from the instructor has very important effect on the final form of their projects.

Two of the comments about the instructor's feedback are given below:

> "We couldn't share all the steps of the project with the instructor in a 6 week term. We could only present the project report at the end of the term. In contrast, we are able to give mid-term reports in the courses that we are enrolled in this semester (14-week) and this increases the quality of the project. But in summer school we couldn't. If we could, the final form of the project would be much better."

> "Yes, we were always in contact with the instructor. This made preparing the project easier. We received feedback about the content and structure of our project. Project would have been different if we hadn't been in contact with the instructor."

Students declared that in case of a problem related to either the project or the web site, they received instant guidance or suggestion from the instructor. When they were unable to solve it by themselves, they appealed to the instructor by e-mail or asked about it in face to face sessions. The students who could not attend the face to face lectures also stated that they received instant feedback for their projects in the immediate replies they received to their e-mails.

One of the comments is written below.

> "The instructor replied directly, immediately and any time he could. He also gave explanations for our questions in classes many times. Especially the students from other departments

were not familiar with Moodle or instruction style of the course. The instructor gave answers and detailed explanations for all of their questions patiently."

4.3.3. Students' Perceptions About Web Based Learning Environment as a Project Tool

The learning environment of the course was not only a tool for course delivery but also an environment to give chance to present what they learned in the course. The students also mentioned that the interface of the course web site was exciting for the student. These were motivating factors for the students. Most of the students pointed out that they were logged in the course website at least once a day. One of the students affirmed that;

> "I enrolled in similar courses given in similar learning management systems, but this course was different because we were in an administrator[3] position and this improved my motivation towards the course."

The students were asked whether the resources in the web site of the course had any effect on their learning. Students emphasized that they benefited from the resources of the course, such as readings, videos, quizzes and the like as a source of information, as a model for their project sites in terms of its modules and tools and for the exams. As one of the students stated, the course web site was regarded as a guide for the students' courses:

> We developed our course sites according to the assignments and quizzes of the course web site. The tools in course site provided examples for us.

[3] The students prepared their course sites as a requirement of learning by design method. They were in the role of "editing teacher" for their own sites. The interviewee called this statue as "administrator".

Students are asked whether they used the text based communication tools of the learning management system of the course. All students participated in the forums. Actually participating in the forums was one of the assignments of the course but some of the students stated that the content of the forums was very useful and sharing knowledge was beneficial for understanding the subject.

> I tried to participate in the forums. I saw different aspects of the subject, which I have not thought about, in these forums. I think forums in the course web site are very useful. Following the discussions on the forum topics, I realized the different dimensions of distance education.

Other tools, such as discussions, videos etc. are also used by the students. These tools are used to create interaction between the student and instructor or between students.

4.3.4. Students' Perceptions About Course Given in Blended Form by Learning by Design Method

The students are asked whether they recommend the course to others or not. More than half of the students emphasized that the content of the course, distance education, is a very important subject in educational sciences and all educators should be competent about the topic. Students also highlighted the fact that preparing the course site gives different abilities such as developing course material, being more competent on online instructional technologies etc.

Their general opinions about the course delivery methods and the method of instruction seemed to be positive. Students emphasized that the forum assignments are very advantageous. One of the students declared that the project seemed to be evaluating only the students' ability on how they can use the LMS of the course. He claimed that, project could have been more complicated and included different course related missions.

4.3.5. The Summary of the Students' Interview Results

Students' responses to the interview with respect to the project preparation process, interaction with the instructor, the web based learning environment and the design of the course were summarized in Table 4.16.

Table 4.16. The Summary of the Students Interview Results

Interview Topics	Responses
The project preparation process	• Preparing a project increased the students' knowledge level both on a web based learning environment and on the course content. • The students had adaptation problems with LMS software of the course when in the role of editing teachers.
The interaction with the instructor during the project preparation	• Presenting the steps of the project leads to better projects • Students used the interaction tools in course web site when they need to ask a question to the instructor. • The instructor always provided support when the students needed it.
The web based learning environment as a project tool	• The course web site was considered as a model for the project • The students generally used the resources in the course web site. • The asynchronous text based communication tools of the software are used for group organization.
Course given in a blended form by learning by design method	• General opinions about preparing project and course delivery methods are positive. • Participating in the forums increased the students' reinforcement • Being in an administrator situation on the course web site increased motivation of the students.

CHAPTER 5

DISCUSSION AND RECOMMENDATIONS

In this chapter the results of the study are discussed and some recommendations are drawn based on to the conclusions of the study. Finally recommendations for future studies are also presented.

5.1. Discussion

The purpose of this study was to understand the students' perceptions about learning by design method given in a web based learning environment. This study was carried out with 104 students who were enrolled to an undergraduate course, "Foundations of Distance Education", offered in 2009 Summer School and 2009-2010 Fall Semesters. A questionnaire was distributed to the students at the end of each semester. In addition to the questionnaire, an interview was also conducted with 12 volunteer participants in order to understand students' perceptions about the method of instruction, the interaction with the instructor and the web based learning environment of the course.

5.1.1. The Course Content and Method of Instruction in the Blended Course

The course had positive impact on the students. According to the results, students have positive thoughts on the content of the course, they were pleased about the flexibility in time, and in other words they were more enthusiastic about the distance education part of the course than face to face lesson sessions.

The assignments given to the students in this course were performed in web environment and this fact also caused the students to prefer web based instructional and communication tools rather than face to face sessions. It was

observed that attendance to the face to face lessons were also very high. In face to face sessions general recommendations about the projects were given and the theoretical part of the course was covered.

Almost all of the students had their own computers and they preferred accessing the course web site from their home or dormitory rooms. Their computer skills and knowledge level on the LMS of the course were intermediate of higher. Being familiar with the course delivery medium also had positive effect on the students' perceptions.

Connors (2006) and Delialioğlu (2004) found in their studies that there were no significant differences in terms of the students' perceptions about the course design given in blended or traditional form. In this study there were no comparison between the two forms of instruction but according to the interview results and questionnaire findings students get benefits both from the face to face sessions and online part of the course. It is implied from the responses of the interviewees that, the students who had no chance to attend to the course sessions were also confident about the web based environment of the course.

By assigning students a project on preparing their course sites, on a subject that they like, in the learning management system of the course, students' interest in the course and their learning of the subject matter is improved. This web based learning environment gave the students an opportunity to apply what they have learned in "Foundations of Distance Education" course. The project also aimed at students' reinforcement of what they have learned. Interview and questionnaire results gave proof to the fact that this teaching method is appropriate for the intended purpose.

5.1.2. Instructor's Interaction with the Students and Guidance About the Project

In this course the instructor's mission was not limited to teaching the subject. At the same time, since he assigned the students to create their own course environments, he was a facilitator on the progress of the projects. The role of the instructor in such courses is more than just being a teacher and includes being a technician or supporter as well. Interaction, in this study, refers both to the instructor's responses of the students questions and the instructor's guidance about the intermediate phases of the students' project.

It was acknowledged both in the interviews and in the questionnaires that the instructor guided the students all the time. Students received benefits from the timely reminders and feedback about the projects which the instructor had given in face to face sessions and announced on the course web site. It was also strongly emphasized that periodic reports about the project had positive effect on the final versions of the web sites, the students prepared.

Responding to students' questions in the shortest time was very important. The questions were not only about the subject of the course but also about the problems students encountered during the preparation of the project. Speedy replies from the instructor contribute positively to the motivation of the students. In recent literature related to distance education, the effect of communication between the instructor and the student on the motivation of students is often mentioned (Barham and Lawver, 1998, Moore and Kearsley, 1996, Topçu and Ubuz, 2008). According to the instructor of the course, the technical maintenance of the course web site was not very easy since he also had other courses to give and other duties to take care of in the department. He also declared that in web based courses, presence of a technical team who would take care of the LMS infrastructure would enhance the efficiency of the course since the instructor could then focus only on the course content and evaluation.

5.1.3. Web Based Learning Environment of the Course

There were different types of resources for the course material, presented in the LMS of the course. Students are asked to participate in the forums to share their information on the current course related topic. Assignments improve students' relations between their understanding and experiences. They also stimulate reflective thinking in order to encourage new understandings in the course content (Mouza, Kaplan and Espinet, 2000).

Forums are used as a discussion board and students declared they had opportunity to broaden their perspective on the subject when they participated in the forums. It is also highlighted that participating in forums has positive effect on the students' motivation and their learning. Teo and Webster (2008) stated that discussion boards are more beneficial as compared to the static web pages since it is possible to create learner-learner interaction in addition to the instructor-learner interaction. Sevim (2009) also stated the benefits of discussion environments.

Since there is no constraint such as meeting in a classroom or time limitation, forums are most preferred interaction tools in web based instruction. It also has social advantages, since it naturally reduces probable problems related to shyness, language or power relationships. In an efficient classroom discussion, students present their ideas about a subject one by one and when they have chance to speak. This fact may cause the students to be anxious and they may not be able to present their ideas clearly, or fully. Another disadvantage is that the student could focus on what he is about to say and miss out what other people are telling. However, in an asynchronous forum environment, since there is no time limitation, no worries about making a mistake, or keeping people waiting, the student feels more relaxed and is able to present his/her opinion on the subject more clearly.

The learning management system of the course also provided an example for the students. Students stated that while preparing their projects, they utilized

not only course content related resources but also the LMS related resources. When the access logs of the system are examined, it is observed that students not only accessed the course contents but also keenly followed “how to” videos and documents related to the learning management system of the course, Moodle.

In general, students found the LMS interface understandable and they stated that it provided great ease to set up a similar structure while they are preparing their own projects. The only problem mentioned in the interviews was the difficulties encountered while uploading course contents to the project sites. This difficulty however has been overcome by using the resources provided in the course web site. Another important result that came up from both the questionnaire and the interview results is the positive influence of the quizzes and the assignments on learning the course subject and on student motivation. Students used the quizzes which they were given as examples in their projects.

The presentation of the course by using LMS software brought about some technical problems. These problems were not only related to the students’ lack of grasp of the subject matter but also related to the server on which LMS software was installed. A couple of short interruptions have occurred in two semesters. Since these interruptions run the risk of negatively effecting students’ motivation, instructor of the course took the necessary precautions to avoid such incidents.

5.1.4. The Preparation of the Project as a Requirement of Learning by Design Method

Students are expected to use what they have learned about distance education in face to face sessions and from the online content in preparing their web based course environment. Due to the format of learning by design method, in the very first session of the course students are informed about what is being expected from them and they are given the resources necessary for project preparation. There was no limitation about the content of the course which the

students are supposed to prepare, but they were expected to present the knowledge that they acquired from distance education course in their projects.

In both questionnaires and interviews, students stated that by doing such a project, they had the opportunity to use the contents of the course they took and in this manner they could better reinforced what they have learned. Course has been offered in both six weeks summer school and 13 weeks fall semester. In the process of project preparation, certain phases are supposed to be presented to the instructor from the first week till the last. For the summer school, however, both the instructor and the interviewees stated that they were unable to present project phases effectively during the term. But the students also acknowledged that if they were able to show, the final form of the project would have been better.

On the other hand, from the interview results it is understood that during the project preparation process, every new subject that has been learned during the semester, every new resource that has been made available on the course web site, or every new tool used for course evaluation gave students new ideas for their projects. The students in this method not only learned what distance education is as the course content but also experienced how a distance education course is designed.

The semi-finished steps of the project are considered to be a prototype of the project site and each presentation affected the structure of the project to be better in the next step. Through these iterative processes the finalized projects became better and the students gained more experience on the course content. The students learned the course material and related skills in the context of engaging in design challenges. The use of the method learning by design effected the motivation and the attention of the students on the course content. In the earlier studies on learning by design, the positive effects of this method on students' motivation and concentration on the subject matter have been mentioned (Kolodner, 2002). Kolodner also emphasized the fact that iteratively presenting the project helps the students reflect on their experiences in ways

that endorse abstraction from experience, explanation of results, and understanding of conditions of applicability. Repeated use of concepts; repeated practice of skills; and experience with those skills and concepts over a variety of circumstances seems to be important.

5.2. Recommendation for Practice

In this study the effect of the use of learning by design method applied in a web based course on the students' perceptions is investigated and the following recommendations are made based on the results of this study.

- The duration of the semester has a direct effect on the applicability of learning by design method. That's why especially for short term courses such as summer school or courses which are given during a certain part of a regular semester, the due dates for the presentation of the projects should be organized accordingly.
- The students' level of computer skills and their knowledge level the learning management system should be considered. Since the students are responsible for preparing a course web site with the same LMS, it would be better if their knowledge level is intermediate or higher.
- The LMS of the course is located in a web server of the department. For the maintenance of the LMS, a person should be employed. By doing so, the instructor could care more about the course content and facilitate the students' projects better. Besides, technical support would be provided for students' problems on LMS, in addition to the assistance from the course instructor.
- At the beginning of the semester, the students were told that they are expected to prepare a web site similar to the course web site as a course requirement. This project was supposed to be implemented in the same LMS environment as the course web site .This being the case a more detailed introduction and an orientation on the LMS could be presented. Such an orientation can focus on the construction of a new course where the students are in the role of editing teachers. Additionally the students

can be honored with certificates showing their ability in the use of the LMS as editing teachers.

- The students benefited significantly from the forum as a discussion environment. Since the projects were usually prepared in group studies, increasing peer interaction was very important both in the conduct of the course and in the process of preparing the project. For this reason, the number of different online communication facilities such as blogs, wikis, etc. which are made available to the students should be increased and these should be integrated to the course.
- The feedback from the instructor was given in face-to-face classroom sessions or in one-on-one meetings. By implementing different synchronous or asynchronous communication tools into the system of the course, web based facilitating could also be done.

5.3. Recommendations for Future Studies

It is possible to provide some recommendations for further studies related to learning by design method.

The data of the study has been collected from both a six week term and a regular term which lasted thirteen weeks. This is a case study for university level students. A similar study can be conducted with graduate level participants. Besides, the same study can be conducted with the participants who are students in other departments.

In this study, the students are assigned to prepare a course in a LMS environment. Their perceptions are investigated with respect to the software used, the project they prepared, the interaction with instructor, and conduct of the course. A similar study can be conducted with the instructor.

Finally, in this study, student grades are presented for the information of readers but in future studies, the effect of learning by design method on students' learning can be investigated in more detail.

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APPENDIX A

ÖĞRENCİ DEĞERLENDİRME ANKETİ GÖNÜLÜ KATILIM FORMU

Bu çalışma, Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE) bölümü Yüksek Lisans öğrencisi Evrim Akman tarafından yürütülmektedir.

Açık Kaynak Kodlu bir Öğrenme Yönetim Sistemi aracı olan "Moodle" yazılımının "Tasarlayarak Öğrenme" metodu ile kullanımı ve etkinliğini araştırmaktadır. Çalışmanın amacı, öğrencilerin bu eğitim metodunun öğrenci algısına ve motivasyonuna etkisini incelemeye yönelik katılımcıların tutum ve eğilimleri üzerinden veri toplamaktır.

Çalışmaya katılım gönüllülük temelinde olmalıdır. Ankette, sizden kimlik belirleyici hiçbir bilgi istenmemektedir. Cevaplarınız kesinlikle gizli tutulacak ve sadece araştırmacılar tarafından değerlendirilecek, bu formdaki bilgilerinizle eşleştirme yapılmayacaktır. Elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır.

Anket, genel olarak kişisel rahatsızlık verecek soruları içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda anketi uygulayan kişiye, anketi tamamlamadığınızı söylemek yeterli olacaktır. Anket sonunda, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz.

Çalışma hakkında daha fazla bilgi almak için Evrim Akman ile iletişime geçebilirsiniz.

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Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum.

APPENDIX B

EVALUATION ON STUDENT PERCEPTION OF COURSE

1) Gender: o Female o Male
2) Student Living Arrangements
   o Live with parents o Live in Campus Dormitory
   o Live off campus with roommates o Other: _____
3) What is your high school type?
   o General o Anatolian o Private
   o Vocational o Other _____
4) What is your Cumulative GPA
   o 0 - 0.99 o 1.00 - 1.99 o 2.00 - 2.99 o 3.00 - 4.00
5) Do you own a computer?
   o Yes o No
6) How can you define your computer knowledge level?
   o Novice o Elementary o Intermediate
   o Upper Intermediate o Advanced
7) How can you define your LMS (Moodle) usage level?
   o Novice o Elementary o Intermediate
   o Upper Intermediate o Advanced
8) Where is the computer located that you primarily use to access the course?
   o Computer Lab in Departments (CC or Department Lab.)
   o Computer Lab in Dormitories
   o In my room in Dormitory
   o In my home/apartment
   o Any where in Campus via Laptop Computer
9) How many online courses have you taken before this course?
   o None o 1 o 2 o 3-4 o 5 or more
10) What percentage of the course did you attend?
   o 75%- 100% o 50%-75% o 25%-50% o less than 25%
11) If your attendance is less than 50%, what is the reason for this?
   o I couldn't understand the content in the lesson
   o I could understand the course material better when I studied the course materials by myself.
   o The course hour was very early in the morning
   o I couldn't take notes in the lesson effectively
12) What is the percentage of the participation in the online tools of the course (forum, e-mail communication etc)?
   o 75%- 100% o 50%-75% o 25%-50% o less than 25%
13) Please select the most important reason to take this online course
   o Prefer to learn online
   o Prefer the scheduling flexibility of attending online classes.
   o Other: _____

I. Questions related to the Course

Using the scale below, please indicate how strongly you agree or disagree.
(SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree)

	SD	D	N	A	SA
1. I'm confident that I can understand the basic concepts taught in this course.					
2. Face to face lessons improved my concentration about the course.					
3. This course contributed to my educational or personal development.					
4. I liked studying the resources on the course web site.					
5. I was very interested in the content of this course.					
6. The course was appropriate to my discipline.					
7. I believe I will receive an excellent grade in this course.					
8. Flexibility in time helped me to work effectively.					
9. Working as a team improved my interpersonal skills.					
10. Learning together was very beneficial to me.					
11. Working as a team increased my motivation towards the subject.					
12. The method of instruction used in this course was appropriate.					

II. Questions related to Instructor

Using the scale below, please indicate how strongly you agree or disagree.
(SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree)

	SD	D	N	A	SA
13. The instructor managed and guided student interaction and discussion.					
14. The instructor provided written examples of assignments/projects.					
15. The instructor is proficient with all the systems used in the course.					
16. The instructor posted the syllabus, course materials, discussion topics at the beginning of the semester.					
17. The instructor posted timely bulletins and reminders about the course.					
18. I received clear and motivating feedback from the instructor when preparing the project.					
19. There was adequate interaction among the instructor and the students.					
20. I like having e-mail connection with the instructor.					
21. The instructor clarified the course content with the proper applications in the class.					
22. The instructor returned e-mail/posts within 24 hours.					
23. I received individual assistance from the instructor when I needed it.					

III. Questions related to Project

Using the scale below, please indicate how strongly you agree or disagree.
(SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree)

	SD	D	N	A	SA
24. I am satisfied with the collaboration of the group project.					
25. Working on the project through online communication socialized me.					
26. Participating in the forums encouraged me to develop my project web site.					
27. I liked using the software (Moodle) while constructing my project.					
28. I have learned the subject better while creating an online course site.					
29. The resources in order to construct project site were adequate.					
30. I was endowed with better skills to create a new online course material.					
31. The material provoked insightful class discussion.					
32. The mood of the team encouraged hard work for everybody.					
33. We couldn't accomplish this project unless we worked together.					
34. On many instances, it was easy to contact an online discussion.					
35. Working as a team made me understand things from different perspective.					

IV. Questions related to Course web site

Using the scale below, please indicate how strongly you agree or disagree.
(SD: Strongly Disagree, D: Disagree, N: Neutral, A: Agree, SA: Strongly Agree)

	SD	D	N	A	SA
36. Online quizzes were beneficial to reinforce the subject.					
37. I have improved my knowledge while preparing the online assignments.					
38. Online course interface was difficult to understand.					
39. Quizzes, assignments and forum improved my understanding of the topic.					
40. There was proper technical support for the web site.					
41. The icons that were used for navigation were consistent and well defined.					
42. The forum was very advantageous to understand each other's ideas.					
43. The forum was very useful to share and develop the ideas about course content.					
44. Participating in the forums increased my motivation towards the subject.					
45. I enjoyed submitting quizzes.					
46. The resources on the course web site were clear and comprehensive.					
47. The web site has a reasonable structural organization (hierarchical, linear etc.)					

APPENDIX C

QUESTIONNAIRE CATEGORIES CONCERNING STUDENTS' PERCEPTIONS

Group Description	Item
Blended Course	1, 2, 3, 4 and 8
Course Content and Method of Instruction	5, 6, 7, 12, 28, 29, 30 and 46
Instructor's Way of Delivering the Course	14, 19, 20, 21 and 22
Instructor's Guidance About the Project According to Learning by Design Method	13, 15, 16, 17, 18 and 23
Team Interaction During the Preparation of the Project	9, 10, 11, 24, 32, 33 and 35
Communication Tools of the LMS	25, 26, 31, 34, 42, 43 and 44
Usage of the LMS of the course	27, 38, 40, 41 and 47
Evaluation Tools of the LMS of the course	36, 37, 39 and 45

APPENDIX D

ÖĞRENCİ İLE MÜLAKAT SORULARI

Değerli arkadaşlar;

Bu dönem almış olduğunuz Uzaktan Eğitim dersi haftada 2 saat yüzyüze ders, içerik, ödev ve sınav içeren web ortamı ve proje görevinden oluşmuştur. Bu eğitim modeli ile ilgili bazı konularda düşüncelerinizi öğrenmek istiyorum. Bu yapılan çalışmada benimle paylaşacağınız bilgiler sadece bu araştırmada kullanılacak, kesinlikle gizli tutulacak, dersle ve bölümle ilgili akademik durumunuzu etkilemeyecektir. Bu araştırma ile ilgili işbirliğiniz için şimdiden teşekkür ederim.

1. Proje konunuzu nasıl belirlediniz, seçiminiz dersle ilgili motivasyonunuzu nasıl etkiledi.
2. Proje olarak belirlemiş olduğunuz konu ile ilgili bir eğitim modeli hazırlamanın bilgi birikiminize bir katkısı oldu mu?
3. Oluşturmuş olduğunuz eğitim modelinin içeriğini hazırlarken karşılaştığınız zorluklar oldu mu?
4. Projenin ara aşamalarını dersin öğretmeni ile paylaşmak dönem sonunda projenin son halini etkiledi mi?
5. Dersin ağ sitesindeki kaynak ve araçların öğrenmenize etkisi nasıl oldu?
6. Dersin iletişim araçlarını etkin bir şekilde kullandınız mı?
7. Öğretmeniniz, dersle ilgili karşılaştığınız herhangi bir sorunu çözmek için size destek oldu mu?
8. Bu dersi diğer öğrencilere almaları için tavsiye eder misiniz? Neden?
9. Daha önceki (akademik) bilgi birikiminiz dersin takibinde kolaylık sağladı mı?
10. Son olarak bu dersin değerlendirilmesinde faydalı olabilecek eklemek isteğiniz herhangi bir şey var mı?

Katıldığınız için çok teşekkürler.