BLENDING ONLINE INSTRUCTION WITH TRADITIONAL INSTRUCTION IN THE PROGRAMMING LANGUAGE COURSE: A CASE STUDY

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Approval of the Graduate School of Natural and Applied Sciences

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ABSTRACT

BLENDING ONLINE INSTRUCTION WITH TRADITIONAL INSTRUCTION IN THE PROGRAMMING LANGUAGE COURSE: A CASE STUDY

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This study investigated the students' perceptions about the web-based learning environment in the blended learning environment in terms of web-based instruction, online collaborative learning and the online instructor. The study tried to show the contributions of the web-based instruction in traditional face-to-face instruction.

In this case study, Programming Languages II Course (CEIT211), a undergraduate course at Computer Education and Instructional Technology Department (CEIT), at Middle East Technical University, at the 2002-2003 Spring semester, was delivered as blended learning with a new web site. Totally 65 subjects, 2nd year CEIT students, attended the course in the term and participated to the study. The course was delivered via traditional face-to-face instruction and supported with the web site.

At the end of the semester, three questionnaires were administrated in order to understand the students' perceptions about web-based learning environment in terms of web-based instruction, online collaborative learning and online instructor. The time spent on the web site and the numbers of messages posted to forum were other data sources in this study. The data were statistically analyzed.

The quantitative data showed that the students' perceptions about web-based instruction and online instructor were positive, but online collaborative learning perceptions are about neutral. Beside the research questions, some design considerations in the blended learning case were presented.

The study results may be used in evaluation of the blended learning environment for the instructor and for the department, may show a direction in the future design of the course.

Keywords: Blended learning, web-based instruction, online collaborative learning, online instructor, computer mediated communication, perceptions.

ÖZ

ÇEVRİM İÇİ ÖĞRETİMİN GELENEKSEL ÖĞRETİM İLE PROGRAMLAMA DİLİ DERSİNDE HARMANLANMASI: BİR DURUM ÇALIŞMASI

Ersoy, Halil
Yüksek Lisans, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü
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Bu çalışma harmanlanmış öğrenimde öğrencilerin web-tabanlı öğrenme ortamı algılarını, web-tabanlı öğretim, çevrimiçi işbirlikçi öğrenme ve çevrimiçi açısından araştırmıştır. Çalışma web-tabanlı öğretimin geleneksel yüz yüze öğretime katkılarını göstermeye çalışmıştır.

Bu durum çalışması için, 2002 – 2003 öğretim yılı bahar döneminde, Orta Doğu Teknik Üniversitesi (ODTÜ), Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE) Bölümü'nde açılan Programla Dilleri II Dersi (CEIT211) yeni geliştirilen bir web sitesi ile harmanlanmış öğrenim olarak verilmiştir. Bu dönemde toplam 65 ikinci sınıf BÖTE Bölümü öğrencisi derse devam etmiş ve çalışmada yer almıştır. Ders geleneksel yüz yüze öğretim ile işlenmiş, web sitesi ile desteklenmiştir.

Dönem sonunda, öğrencilerin web-tabanlı öğretim, çevrimiçi işbirlikçi öğrenme ve çevrimiçi öğretmen açısından web-tabanlı öğrenim ortamı algılarını anlamak için üç anket uygulanmıştır. Sitede harcanan süreler ve foruma gönderilen mesaj sayıları da çalışmada kullanılan diğer veri kaynaklarıdır. Veriler istatistiksel olarak incelenmiş ve sonuçlar sunulmuştur.

Çalışmadaki nicel veriler, öğrencilerin web-tabanlı öğretim ve çevrimiçi öğretmen algılarının olumlu, çevrimiçi işbirlikçi öğrenme algılarının ise kararsız olduğunu göstermiştir. Bunun yanında, araştırma soruları dışında, ele alınan duruma özgü bazı önemli noktalar belirtilmiştir.

Bulgular harmanlanmış öğrenimle uygulanmış dersi veren öğretmen ve bölüm için değerlendirme amaçlı kullanılabilir, daha sonraki zamanlarda dersin tasarımında yol gösterici olabilir.

Anahtar Kelimeler: Harmanlanmış öğrenim, web-tabanlı öğretim, çevrimiçi işbirlikçi öğrenim, çevrimiçi öğretmen, bilgisayar destekli iletişim, algı.

To myself

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INTRODUCTION

1.1. Background of the study

Technology and education both affect each other. While new technologies change educational activities with new facilities, educational activities cause some technologies to be shaped according to the needs of learners, teachers, content, and context. Most of the time, it is a technology that seems to challenge educators for making modifications in learning activities. However, the educators' counter argument claims that technology is only a vehicle, and the significance depends on the pedagogical dimensions delivered through it. (Reeves & Reeves, 1997)

Due to the tool role, similar technologies take many different places in various implications of educational theories, some of which are claimed to be opposite to others in terms of epistemology. Instructivism and constructivism are two of the main educational theories and they are argued against each other. In pedagogical philosophy, instructivist side considers the objectives important and shapes learning to reach to these objectives. In learning activities, learner is assumed to be an empty vessel and be filled with knowledge. This knowledge exists separated from learner and from knowing, and defined with objectivist epistemology (Margules, 1996).

The instructional strategies rooting from instructivism are focused on the content to be taught, the instruction to transfer the content, and the objectives as outcomes of these instructions. The challenges to create better strategies are to structure the

content well so that it is possible to transfer it to the learner as small and sequential pieces. The instruction is designed to act according to the objectives. Direct instruction, mastery learning and experiential learning are the significant strategies in this view. In classrooms today, most of the teachers plan their activities as direct instructions where she/he presents content to students in predetermined units.

At the other side, constructivist theory puts the learner at the center. His/her perceptions, experiences, cognitive strategies are the strong components in constructivist perspective of instructional design. Learning is accepted to occur with learner's previous knowledge, tasks and problems handled in rich environments. Knowledge and reality do not exist outside of minds and they are built individually and socially.

Constructivists make learner, rather than instructor, active in learning because they claim that people learn themselves and others-teachers- can only help them. The view proposes problem solving, discovery learning and other strategies where the learner is active, in authentic environments that are similar to the real world situations. Within these learning environments, learners are directed to discover or to live as in real contexts.

In some studies (Collins, Greeno, & Resnick, 2002; Shuell, 2002; Margules, 1996), these two educational theories – instructivism and constructivism – are claimed as opposite to each other, or at least as the ends of a continuum. Instructional strategies integrating contemporary educational technologies into learning environments make use of strategies from both theories cooperatively. Especially with new communication and information technologies, employment of only one theory seems not to be adequate. Margules stated that the methods of pre-technology systems are not enough for gaining ultimate benefits from technology. While his position favors constructivism against instructivism, he later added the necessity of combining knowledge from behaviorism, cognitivism and constructivism.

In some cases, the face-to-face instruction is required in order to reach the desired instructional strategies or the interaction. As Hohn (1995) cited, Ausubel offered

expository teaching to give basic factual and conceptual knowledge or to introduce learners with a topic through connections to their previous knowledge. He asserted that before engaging discovery learning, learners could gain structured information from expository lessons and use this information as a guide in discovery.

Franka, Reichb and Humphreysc (2002) stated the importance of social interaction in the learning environment. In their study, they investigated distance education students and concluded that one disadvantage in distance education was its lack of eye-to-eye interaction between both teacher-student and student-student.

The cooperation of the strategies is not new. Blended learning (Troha, 2002), hybrid instruction or hybrid instructional model (Tuckman, 2002), and dual delivery (Dabbagh, 2002) are the terms describing an educational strategy as a combination of different strategies. In these studies, the components of the combination are mostly face-to-face instructions and new instructional technologies like web-based supportive tools or computer-aided instruction environments. Tuckman described the ADAPT instructional model as a combination of objectivist and constructivist approaches in the case. He emphasized that web-based instruction could be utilized not only in distance education but also in traditional classroom instructions as well, and this could be named as blended learning.

Furthermore, Passerini and Granger (2000) proposed the ideal paradigm for internet course design as a hybrid model that was a blend of constructivism and objectivism. They added that the new information and communication technologies were composing a new (fourth) generation in distance education though which the instructional patterns shifted.

1.2. Purpose of the study

The traditional face-to-face instruction can be supported by utilization of the web-based instruction, so that the instructional strategies from constructivist approach can be added to the learning environment, as a blended learning strategy. While the web-based instruction ensures time and place independency, communication and collaboration, easy access to resources in distance education; it can provide the

similar facilities for the classroom learning to create constructive learning environments.

The purpose of the study is to understand learners' perceptions about the web-based learning environment in the blended learning environment in terms of web-based instruction, online collaborative learning and the instructor. The aim is to see how a web-based instruction can compensate the instructivist face-to-face instruction with constructivist strategies.

1.3. Research Questions

1. What are the learners' perceptions about web-based instruction in terms of
    a. The quality of content of the web-based learning environment
    b. The interactivity of the environment
    c. The structure of the environment
    d. The support of the environment

2. What are the learners' perceptions about online collaborative learning in terms of
    a. Group work
    b. Computer-mediated communication
    c. Motivation
    d. Learner support
    e. Benefits

3. What are the learners' perceptions about the roles of the instructor in blended learning as
    a. Administrator
    b. Facilitator
    c. Technician
    d. Evaluator

1.4. Significance of the study

In the light of the research on web-based instruction and limited blended learning studies, this case study was conducted in order to investigate the web-based learning environment supporting the face-to-face instruction. A web-based learning environment was developed and implemented to support face-to-face instruction. With the answers to the research questions above, the support of web-based instruction will be presented and investigated in terms of the students' perceptions with sub-scales. It is believed that the results of the study will be used in order to make modifications of the web-based learning environment in the case. The presentation of the case will contribute the subsequent case where the face-to-face instruction be supported by web-based instruction.

The web-based environments are unique in their ability to carry a vast amount of information and a variety of media from anywhere to anywhere. This permits both sharing and communicating either person to person or person to entire world (Crossman, 1997).

Butter (1997) categorized using web-based tools to support classroom-based education into three different strategies: For bringing the world to the classroom, for supporting classroom activities, and for opening the classroom to the world. Despite of the limitations, he concluded, the World Wide Web provides significant benefits when applied in the classroom.

While the web-based instruction can be utilized in classroom-based education in blended learning, face-to-face instruction may also assist learner to take advantage of web-based instruction even more. Liaw (2001) suggested that hypermedia-based learning environments had four main limitations: learners' background discrepancy, disorientation, over-rich information (Harasim, 1987), and ineffective user-interface. Especially, second and third constrictions, which are the learners' disorientation about nonlinear and uncontrolled characteristic of the Internet, and the information overload, may cause the learner loss and rupture from the ongoing discussion and overall progress. Blended learning environment may overcome these possible

disadvantages of both face-to-face instruction and web-based instruction compensating each other.

The web-based instruction assigns new roles to the stakeholders in the learning environment, particularly to the instructor and the learners. The roles of online instructors are categorized into four areas as an administrator, facilitator, technician and evaluator. (Berge, 1995; Shank, n.d.)

Moreover, the expectation is that the perceptions of the students will direct the instructional designer to apply design methodologies as to fit in student-centered approach. The hope is that the results will contribute to the accumulation of the literature about blended learning environments based on the instructivist and constructivist approaches.

Another expected outcome is that, the consequences of the study will show the instructor's competencies in the case, and put forth the necessary training to be an online instructor.

1.5. Definition of terms

Instructivism

It is an educational theory proposing that learning can occur by well-designed instruction transmitting the information to the learner with teacher-centered instructional design. In the literature, the term is used as opposite to constructivism since it focuses mainly not on the learner, but on content and objective improvements. It can be said that the learner is passive in learning. In this study, it means the pedagogical theory recommending the face-to-face instruction and representing the traditional education's background.

Constructivism

It is an educational theory suggesting that learning can happen by construction and interpretations of knowledge. It claims that learners' previous experiences are important in that construction. The theory signifies the student-centered instructional

strategies and real-life situations. In this study, it means a theory driving collaborative, problem-based and student-centered instructional strategies where the learner is active. The term is accepted as an underlying theory for the forming and involving the web-based learning environment.

Web-based Instruction

It is a collection of the learning activities through intentionally developed web-based tools, like World Wide Web pages, emails, chat and forums.

Traditional Education

Traditional education is a collection of learning strategies using/used in a classroom within educational organizations (schools, universities, and training services).

Face-to-face instruction

It is a conventional instructional strategy where the teacher and students come together in the classrooms where the control of all activities is on the teacher.

Blended learning

It is an instructional strategy combining the instructivist and constructivist learning approaches.

Motivation

It is an effect of web-based learning environment on learners creating intention for learning activities.

Online Collaborative Learning

It is an instructional strategy employing group working supported with online communication tools.

Computer Mediated Communication

CMC can be defined as any form of organized interaction among people by utilizing computers or computer networks as the medium of communication (Romiszowski, 1997).

CHAPTER 2

LITERATURE REVIEW

In this chapter, the literature related with instructivism, constructivism, online collaborative learning, online instructor and blended learning are presented.

2.1. Constructivism and Instructivism

Educational theories have been affirmed with their tenets of what the knowledge is or what knowing is, and then what the learning is or how to learn this knowledge. (Collins, Greeno & Resnick, 2002, Shuell, 2002). Constructivism is the current theory that defining the knowledge as individually constructed through social interactions in realistic environments. However, behaviorism and cognitivism claim more objectivist knowledge that can be acquired by, or accumulated on, individuals with well-designed instructions by teachers. In behaviorism and cognitivism, knowing is the way you act in certain situations physically and cognitively. Learning, therefore, is the activities strengthening those changes in physical and cognitive behaviors. On the other side, constructivist point of view rejects the transfer of knowledge from expert to novice since it accepts knowing as a result of construction of own understanding by interactions. (Jonassen, 1996)

While constructivism required active participation of the learners to construct their own knowledge, behaviorism placed the teachers in mission of transmitting the knowledge commodity to the students. The focus is more on the content, curriculum and other external factors in learning environment, rather than learner. The direct

instruction is one of the widely known instructional strategies based their ground on the behaviorism and cognitivism. According to Ausubel, as cited in Hohn (1995), the meaningful learning can result from traditional expository instructions. The instructor should introduce broad concepts initially, then, progress to successively more specific ideas and processes. Then the learner can more easily assimilate incoming information because a structure has been established. Examples, applications, and illustrations also facilitate meaningful learning.

Papert (as cited in Jonassen, 1996) distinguishes between instructionism and constructionism, which stand for instructivism and constructivism. He argues that instructionism supposes students to be passive learners who absorb instructions given them until examinations. He defines constructionism as an alternative theory where learners construct their own knowledge by social interactions with other people and with environment, and base new constructions on previous knowledge and experiences.

Margules (1996) used the term instructivism, as a synonym for objectivism, for the educational perspective based largely on the application of behavioral principles. Margules tailored instructivism as a methodology of pre-technology systems, and argued that the failure of the instructional technology might be based on the disharmony between the technology and the instructivism. While technology provided easy communication of people and easy access to the resources, isolating the individuals within the classrooms and putting the teacher center of the learning might have increased the need for constructivist learning strategies.

Since new communication technologies offer an access to much many resources and to people independent from time and distance, the literature about implementing technology in education has been connected to constructivism because it claims collaborative learning and social interactions through which individuals construct their own knowledge. (Miller & Miller, 1997, Leflore, 1997).

2.2. Web-Based Instruction

Internet-based technologies have attracted the educational specialists' attention very early. World Wide Web technologies provided the long-missed hypertext with animated graphics, sound and movies. Alexander (as cited in Khan, 1997) stated that the Web gave an opportunity to develop new learning environments and experiences for students not possible previously. Many applications of World Wide Web technologies in educational settings have been studied. Web-based instruction, web-based training, and web-supported learning are such developing fields, where the names are used interchangeably for implying their ground technology. However, their particular features draw lines among them in practice and definition.

Web-based instruction (WBI) has many definitions, which gives almost steady understanding. Khan (1997) defined the WBI as follow:

> WBI is a hypermedia-based instructional program that utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported. (p.6)

Khan (1997) added some indispensable characteristics of the WBI learning environments. He emphasized that the WBI system should include many resources, support collaboration, implement web-based activities as a part of learning framework, and encourage both novices and experts.

For qualification in WBI, Khan (1997) deployed components-and-features specifications. In this set of specifications, Khan named the integral part of a WBI system as components. For example, e-mail, forum, conferencing tools are the components of a WBI system. Features, on the other hand, are the processes or products of the WBI system using the components. For instance, asynchronous communication feature may use e-mail components in certain systems. One or more components may jointly contribute a feature, or single component can be utilized in various features.

Khan (1997) listed major components of the WBI system as followings:

- Content development (Instructional theory, design and development)

- Multimedia component (Text, animation, graphics, sounds, etc.)
- Internet tools (Communication tools, remote access tools, navigation tools, search tools, etc.)
- Computers and storage devices (Platforms and operating systems, hardware)
- Connections and service providers (Modems, connection services, Internet service providers, etc.)
- Authoring programs (Programming languages, authoring tools, HTML coding and converting tools, etc.)
- Servers (HTTP servers, server software, server-side and client side scripts)
- Browsers and other applications (Text-based or graphical browsers, hyperlinks, plug-ins, etc.)

Key features and additional features are two categories, separated by Khan (1997) according to their level of being inherent to the Web and integral to WBI design. Key features may be seen as base characteristics of the WBI system. Some of them are interactivity, having online search, device-distance-time independency, globally accessibility, etc. Some additional features are convenience, easy of use, online support, authenticity, cost-effectiveness, collaborative learning, etc.

Maddux and Cummings (2000) proposed a set of guidelines for faculties who wish to support their traditional instruction with web pages. While they emphasized the careful planning, they claimed three questions to be answered in planning.

First, what elements of the class will be placed on the Web? The possible options are syllabi, handouts, sample quizzes, chat rooms, tests and lecture notes.

Second, how can students access the Web material if they do not have a home computer with Internet? The students should be provided a computers and accessing Internet within the campus or an institution facilities.

Third, is there a help available for students who are not familiar with Internet and the Web? The students have to be supported in use of Internet and the Web. This can be done by a simple document, a short training session or with many other resources in Internet.

Hara & Kling (2000) showed that two kings of problems frustrate learners: technical problems and pedagogical problems. Driscoll (2002) summarized some of the problems in WBI as below:

1. Technical problems are sort of software or hardware problems. Many WBI offering institutions employ staffs for helpdesk. However, the popular advantage of WBI, that is learning anywhere and anytime, may be a source of frustration especially after work hours, on weekends or at night.
2. Inadequate feedback is another potential frustration for learners when feedback does not provide enough information for learners when expected. Therefore, the role of the instructor or the role of the software in providing adequate feedback is essential for success.
3. Overwhelming messages through emails or in discussions may discourage learners either by taking a great deal of time or by creating a feeling when learners cannot keep up or they have missed a current discussion.
4. Lack of navigational skills and ambiguous instructions may deter learners. If a user does not understand how to use certain tools, where to go, and so on, the WBI system fail at the beginning.
5. Domination by one group or a learner is another source of frustration. As it is possible in any kind of communication, one group or a learner may dominates conversation. In these cases, Driscoll (2002) suggested that the instructor facilitates the democratic participation.
6. Physical tiredness is another problem for WBI learners, as for any one working in front of the computers. The responsibility of designer embraces some visual design principles, such as using legible and easy-for-eye screens, putting a few words in lines, considering the possibility of printing the document, etc.

These limitations seem to be under the responsibility of the design team or the teacher. However, on the learner side, WBI requires both additional and new skills to be successful. For example, learner preparedness is an important factor determining the achievement of students (Schilke, 2001). Beside the technical competencies for a particular technology, pedagogical skills to work in online environments, social interactions and other factor that are expected to be gained by the students can be a limitations in WBI. Since WBI is popular in distance education, many researches studied on distant learners. Research shows that distance students should be mature, assertive, self-disciplined, and independent (Buchanan, 1999), be able to shape and manage change (Rogers, 2000), be high motivated and possess well-developed self-directed learning skills (Carlson & Repman, 2000) in order to reach effective distance learning. These characteristics are considered in distance settings where a learner is alone physically from the instructor and other learners. In other settings, that WBI is used for supportive purposes to traditional education, other abilities may de required depending on the design, activities and mission of the WBI in overall learning.

2.3. Online Communication and Collaboration

With the development of the constructivist approach, the purpose and the use of instructional technology shifted from previous scenarios to more contemporary applications (Edelson, Pea & Gomez, 1996). The main use of the technology in education, previously, was transmission of instruction in which the technology was utilized to bring instruction near to students, either in distance education or in traditional settings. Distance education has been making use of technology in same way.

The role of technology has been changing into a broadening form that collaboration takes place to include not only discussions but also sharing artifacts and collaborative works across time and distance (Edelson et al, 1996). Edelson et al believe that technology can enhance the communication yielding collaborative learning. However, it is not the kind of that merely transmits knowledge back and forth among the participants. It is the intended communication where the participants speak their

thoughts so that they recognize the gaps of their ideas, experience the structuring their own understanding.

2.3.1. Group Working

Group working is one of the widely used instruction strategies in many learning settings. In the studies about group working, some findings presented the gainings of it. In such effort, Azmitia (1999) denotes that peers collaboration can influence knowledge acquisition and revision in many ways. As Azmitia stated, the members of a group affect each other at motivational or affective level. Thus, the peers' willingness to attempt difficult tasks may increase, and the frustration of the challenging works may be reduced. The behaviors of members may also become a model action for others. Moreover, the more knowledgeable members may coach to others while refining their own knowledge and learning to communicate it. Shared and higher understanding is another gaining through member discussions.

According the Hatano and Inagaki (1999), the social interaction plays an important role in the knowledge acquisition. However, constructive interactions, that is the collective invention of knowledge that none of the group's member can acquire as is likely to produce independently, occurs frequently only in some types of groups. Hatano and Inagaki described four parameters, which characterizes the groups where the constructive interaction takes place:

Horizontal In Terms of the Flow of Information

In interaction of adults and children or teachers and students, the information is transmitted from one side to other side directly. A student does not interpret the information, or not construct himself since the teacher's knowledge figure out the information directly. The student does not need to doubt and process about it in terms of elaboration. In peer-to-peer interaction, the information acquisition is horizontal. The student does not accept the information proposed by the peers directly, and can argue for or against it. The comprehension is more likely to occur. Also in the vertical interactions, expert side always seems to have right information, so other side is not motivated to construct own knowledge since it is easily possessed by the

expert. In horizontal interactions of peers, the motivation is high since there are no authoritative right answers and there are more discussion opportunities for peers.

Three or More Members

Hatano and Inagaki (1999) claimed the preference of three or a few more people to be in a group. Two-people discussion can be fruitful in front of other peers because they can elaborate their thoughts by getting feedback of listeners.

Involvement of Empirical Confirmation

The peers in the group may need a validity pointer to accept the new constructs produced after group discussions. The plausible connections to the external factors and empirical evidence support the peers in assimilating new knowledge.

Room for Individual Knowledge Acquisition

Working as a group might solve a problem collectively, but this does not mean that every person in the group acquired knowledge individually. The peer collaboration in the group work may create a synergy to solve a problem, but this synergy can be only a combination of the existing knowledge of the members, thus no new acquisition may be needed. If the collaborative means that each member will do his/her own piece of the task, then peers may not add new understandings from the group work, and they seem to only practice on their own knowledge. The constructive knowledge acquisition needs the construction a new knowledge in individuals.

Crook (1996) believes three processes through which learners may gain in from group working. First, one is an articulation of the peer thinking in public and explicitly. Articulation of ideas can facilitate the intellectual growth because it brings greater conceptual clarity for them. The second one is confliction in the ideas of the group members. The benefits of confliction ground the disagreements between peers and their efforts to solve them. Such confliction may be a distinctive and productive feature of peer-based problem solving. The third one is co-construction. While the peers articulating their ideas and arguing for them in conflictions, the discussions bring out a common understanding. Crook calls these understandings or conceptualizations as jointly constructed objects.

2.3.2. Computer Mediated Communication (CMC)

CMC can be defined as any form of organized interaction among people by utilizing computers or computer networks as the medium of communication (Romiszowski, 1997). Romiszowski states that, by the proceeds of the Internet, CMC provides many advantages in educational systems.

First, CMC is a particular versatile approach to the delivery of distance education. Many distance education programs uses Internet and computer networks as a medium of instruction delivery.

Secondly, besides the value of CMC in distance education, it provides the asynchronous communication in computer networks in traditional education. For example, individuals read messages, respond in their own time and place, join into group discussions. While the face-to-face communication brings the advantages of interpersonal and social contact, non-verbal communication like body language, and so on, it has also some limitations in terms of time and number of active participant. Simpson (2000) states that student-support through Internet is cheap, immediate and attractive to students.

CMC may help people who have personal fear or anxiety in communicating with others. Hiltz, as cited in Jonassen (1996), found that students in CMC classroom produced more interaction and interchange among them than did face-to-face interchanges since the students remained anonymous. The same easiness for students may be more important in conversations with an instructor or someone not familiar.

The benefits of CMC, however, are not easily reachable yet. Romiszowski (1997) put forth the need for further research in the CMC field. Especially, there seems to be a gap in knowledge of design and development of CMC where effective group working and critical thinking abilities are supported.

Considering all the arguments above, Romiszowski (1997) concluded that there are two emerging results in CMC. First, if planned and implemented well, CMC may be

as effective as small-group discussions for the development of a wide range of higher-order decision-making and planning skills. Second, the scientific theory of conversation may be helpful in finding ways of designing effective instructional CMC environments.

Jonassen (1996) stated some limitations, addition to the advantages, in CMC. One type of limitations is about hard-to-use features of CMC tools. Many CMC tools require more or less technical knowledge from users and, otherwise, claim training. Another limitation lies on a mode of the communication. Most of the CMC tools use text-based messages, so they suppose high language and writing skills from participants. Lack of nonverbal interaction and hardware-dependency of communication delay are also important risks in CMC.

2.3.3. Synchronous and Asynchronous Communication in Education

Another classification of CMC can be done according the mode of communication time. In synchronous communication, the participants are in interaction at the same time. For example, telephone conversation is a synchronous communication since the system carries the messages to others sides immediately. On the other hand, in asynchronous communication, the participants do not need to be interacting at the same time. For instance, the conversations through e-mail are asynchronous, because the medium both carries the messages and store them in order to access after a period of time.

Driscoll (2002) stated the advantages and disadvantages of asynchronous tools in WBI. The advantages are:

- Providing a sense of community
- Keeping learners connected the course and motivate to participate
- Creating a community of practice where the participants work on common works, share their related problems, experiencing similar activities.

The possible disadvantages are:

- Learning the usage of the tools can be difficult
- Participation requires good writing skills

- The low quality of the messages or excessive volume of the content may tire learners
- It may be needed to challenge the participants to keep conversations going and on track.

For both mode of the communication, the research presented proper circumstances and way of using them. For example, Scardamalia and Bereiter (as cited by Shotsberger, 1997) said that:

> The flow of information must allow for progressive work on a problem, with ideas remaining active over extended periods and revisited in new and unexpected ways. (p.38)

Like in the words of Scardamalia and Bereiter, the asynchronous communication through current technologies, can also give a chance of elaborated thinking for the participants. Before posing, a participant may benefit of having an option of considering the thoughts, collecting more information if necessary, or comprehending the current discussion with his/her pace.

The asynchronous communication is a valuable for the instructor, too. Jonassen (1996) claims that the instructors, who utilize an electronic discussion in his/her course settings, have better understanding of students' thinking about topics. The argument may base on the idea that successful comprehension should be reflected in communications with others.

As a synchronous communication tool, Driscoll (2002) listed the advantages and disadvantages of a chat tool as follow:

- It is an effective tool for creating peer-to-peer learning opportunities,
- It is motivating in nature because the participants can be represented by nicknames,
- Learners have a chance of thinking about conversation before reflecting since the conversation is displayed in text format,
- The conversations can be saved in order to refer them later.

On the other hand,

- It requires good writing skills, otherwise the participants may be discomforted in the conversations,
- In addition to good writing skills, it needs fast-typing since the time for response is very short and the ongoing discussion, otherwise, may pass the participant,
- Much delay time may cause asynchronization in slow connections,
- Chat, in essence, lacks of real-time communication aspects, like an inflection of voice, a smile or a god timing.

Chat is a text-based communication tool, or software. The participants write a message and send it to other participants or a chat room. The other participants get this message immediately and can respond it in the same way. A chat room is an analogy used for a virtual space, where the messages are sent to all participants in the room, and all conversations within the room are visible to all connected participants in the room.

Driscoll (2002) advised five guidelines to benefit from the chat in educational settings.

1. Provide clear directions, explain the expectation or discussion topic,
2. Limit number of participant five to seven. Too many participants may create a chaotic conversations, and a few people may lag the conversation,
3. Keep the conversation on track by driving the participant when the conversation is stopped by encouraging passive participants,
4. Obtain a conversation summary and sent it to the discussion list or to the forum to give the learners an opportunity of analysis and synthesis,
5. Involve learners in setting conversation, or chat, policies.

It seems that the chat communication requires a great deal of time for an instructor. In order to suffice in these actions, the instructor needs not only additional time, but also, more importantly, extra complex skills.

2.4. Blended Learning

Marques, Woodbury, Hsu and Charitos (1998) used the term, hybrid instruction, for their new instruction model. Marques et al defined their project as

> …that integrates conventional classroom teaching and Web-based distance learning technologies to form a hybrid instruction model for a teaching paradigm that can be easily applied toward learner-centered education. (p.1)

This definition can be a base frame in blended learning environments. It is an instructional model, or instruction (as Marques et al referred), that combines two or more instructional model. However, there is no consensus on the definition of it.

Clark (2002) claims that blended learning is not new. In his descriptive report about blended learning, he extended blended learning definition beyond the current Internet and the Web technologies. Writing, printing, broadcast media, consumer storage media, PC and CD-ROM, and lastly the Internet technology are major waves of technological innovations in learning. Clark claimed that after each innovation, some type of blending occurred. For example, with the addition of printing, learners could blend oral-communication learning by reading at their own pace in their own time, giving a blend of live, synchronous learning with self-paced asynchronous learning. Every technological improvement might be introduced in to educational settings in a blend of it with existing environment.

Clark (2002) regards Web-based learning, or the recent Internet technologies, as an important environment because it contains all of the other technologies and can actually manage and deliver many of the blended components in a sustainable fashion to learners. He considers the Internet as the largest single learning resource in the world.

While criticizing some blended learning models, Clark (2002) said that

> Blended learning does not need to imply more methods of delivering, merely better methods of delivery. It is at this point that we must turn to how exactly we make these decisions on what goes into an optimal blend. (p. 10)

Clark (2002) stressed the rationale behind the blending models. It should be designed to provide better learning environments for learners, not because many channels are available. Blending multi technologies or/and instructional environments without significant justifications may result a chaos for learners. Clark (2002) used the term "cocktail" analogously and said that:

> Good cocktails are not normally made by including as many different drinks as you can muster. They are carefully crafted blends of complementary tastes, where the sum is greater than the parts. In some cases, as with whisky, single malt is superior to the blend! (p. 41)

As a design methodology for blended learning, Clark (2002) proposes six criteria that are the principles and the policies shaping the correct choice of components in blended solutions. These six criteria are:

1. Learning
2. Learner
3. Maintenance
4. Scalability
5. Resources
6. Sustainability

These criteria imply that blended learning should improve learning outcomes, be appropriate for the audience, fit to resources and budget to cope, scalable to targeted number of the learner within available resources, like human resources, physical infrastructure, technical resources and budget, and suitable for the organization culture in terms of attitudes, management, etc.

2.5. Online Instructor

WBI has changed the role of the instructors. With the extra factors, like technology, time and space separation, new instructional strategies for online environments, the instructor role seems to be more critical. (Shank, n.d.). Shank summed the online instructor characteristics under four categories: administrative, facilitator, technician and evaluator roles. Table 2.1 indicated the categories and sample activities for each category.

Table 2.1 – Four categories of Online Instructor Characteristics

Category	Sample Activities
Administrator	• Sets course agenda, objectives, rules, and decision-making norms. • Posts course materials (syllabus, assignments, discussion topics, etc.) at the beginning of the course. • Posts timely bulletins about changes and updates to course. • During first week, assures that all students are 'on board' and responding (contacts privately by phone or email if not). • Returns student calls/emails within 24 hours. • Refers student problems to advisors and follows up to assure resolution.
Facilitator	• Manages discussion and student interactions with leadership and direction. • Posts thoughtful discussion questions related to the topic and appropriate to the desired cognitive outcomes (Bloom's Taxonomy). • Moderates discussion, models desired methods of communication. • Engages students, fosters sharing of participants' knowledge, questions, and expertise. • Contributes outside resources (online, print-based, others). • Contributes advanced content knowledge and insights, weaves together discussion threads. Helps students apply, analyze, and synthesize content. • Fosters group learning. • Minimum of 10% of discussion postings are from the instructor. • Provides public and private acknowledgment to students who contribute to discussion. • Privately (by email or phone) asks noncontributing students to participate in discussion.
Technician	• Proficient with all technical systems used in the course. • Helps students troubleshoot technical systems used in the course and refers to appropriate help sources, as needed. • Helps students quickly feel comfortable with the system and the software.
Evaluator	• Provides students with clear grading criteria. • Reminds students about upcoming assignments. • Expects college level writing (in higher ed courses). Grades/corrects spelling and grammar mistakes. • Provides examples of desired writing/assignments. • Provides resource ideas for completing assignments. • Assists students who are having problems (by email or phone) completing the assignments. • Acknowledges receipt of assignments within 24 hours. • Returns students assignments, with detailed notes and grade, within 96 hours. • Contacts (by email or phone) students who have not completed assignments within 24 hours after assignment due date. Helps student work out plan to complete assignments.

Note. Sample Activities from "Asynchronous Online Learning Instructor Competencies". from the World Wide Web: http://www.learningpeaks.com/instrcomp.html. Adapted with permission.

The similar categorization came from Berge (1995) with four main roles of online instructor: pedagogical, social, managerial and technical. Pedagogical role, Berge also used the term educational facilitator, includes activities supporting individual and group learning. Social role is responsible for creating a friendly environment so that learners are not affected by the social lacks of virtual environment. Managerial role encompasses administrative functions like managing individual students, applying policies in managing discussions and group works, managing course functions. Technical role contains selecting software appropriate to learning goals and assisting students to become competent and comfortable users.

Teles, Ashton, Roberts, and Tzoneva (2001) investigated these four online instructor role in a three online course where online collaboration and group working were dominant activities. At the end of the study, Teles et al came across with in depth characteristics of these four roles. Pedagogical role has offering feedback, giving instructions and information, advising opinions/preferences, questioning, summarizing student comment, and referring to outside sources. Managerial role has coordinating assignments, discussion and course. Social role has empathy, interpersonal outreach, meta-communication and humor. Technical role has user issues and system issues.

Technology competencies took their place in teacher standards. ISTE (2002) listed the broader technology standards for teachers as Table 2.2.

Table 2.2 – ISTE (2002) Technology standards for Teachers

Standards	Indicators
I. Technology Operations and Concepts	Teachers demonstrate a sound understanding of technology operations and concepts.
II. Planning and Designing Learning Environments and Experiences	Teachers plan and design effective learning environments and experiences supported by technology.
III. Teaching, Learning and Curriculum	Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning
IV. Assessment and Evaluation	Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.
V. Productivity and Professional Practice	Teachers use technology to enhance their productivity and professional practice.
VI. Social, Ethical, Legal and Human Issues	Teachers understand the social, ethical, legal, and human issues surrounding the use of technology in PF-12 schools and apply that understanding in practice.

Note. The indicators from "Educational Computing and Technology Standards for Secondary Computer Science Education Initial Endorsement Program", ISTE, 2002. Adapted with permission.

About more narrowed competencies in WBI, Lowther, Jones and Plants (2000) set forth the new proficiencies and capabilities of teachers. Before doing these, Lowther et al set five levels of the Web use in education:

- Level 1: Informational (Descriptive information about a course is put into a Web page.
- Level 2: Supplemental (Add lecture notes and related resources as the course implemented to level 1)
- Level 3: Essential (The Web page content is a required part of the course)
- Level 4: Communal (Course is possessed both online and face-to-face)
- Level 5: Immersive (Course is completely online)

After classifying the Web use in education with five levels, Lowther et al (2000) introduced three kinds of capability of teachers sequentially.

- Information literacy,
- Technology skills,
- Technological competencies

Information literacy includes history of the Web, reading an Internet address, browser skills, search skills, evaluating information, bookmarking, and downloading. Second category is technology skills needed for teachers to use the Web effectively. These are about disk management, graphics creation and editing, code stealing, HTML and visual literacy. Third category one is technological competency. It goes beyond the computer literacy, and requires two understanding:

- The relationship between basic computer functions, and student learning
- When and how to create an environment for effective technology

Since blended learning combines different instructional technologies, the competencies mentioned above can be valid for other kind of technologies than the Web.

The literature is almost agreed with the online instructor roles as mentioned above. The greater consensus is that whatever functions exists in these roles, online instructors need more time, especially when the instructor is only person charged with all roles. Berge (1995) added that not all of these roles were expected to be carried out by the same person, and it was rare. The effort and time required in the online learning environments are much more than traditional education. As the students are provided more flexible time and opportunities to possess learning, more time, more skills, and more working is needed from the instructor.

2.6. Research Studies

There are many research studies on WBI and online collaborative learning where a subject matter is about single learning environment. On the other hand, the studies on blended learning are rarer to find. In the most of studies, the term blended learning, or hybrid instruction, is not used explicitly. Common sayings include “enhanced” or “supported” words to express the instructional blend of the technology or medium by others. Research findings about blended learning are presented and discussed below from the literature.

2.6.1. Web-Based Instruction Research Studies

Driver (2002) conducted a research study where the effect of small group online activities on the students’ perceptions about overall interaction in web-enhanced

environment. His study structured on the blend of web-based instruction and a ongoing broadcast-television instruction. Driver provided online communication tools like forum and chat in the web site for the course. The group-based project and discussions on certain topics were the main activities that were expected to be carried out through online environment. After a term, Driver delivered a survey to find out the perceptions about group interaction, class interaction and class satisfaction. He found that the students most liked the peer-to-peer interactions in their groups, but not much liked interactions with other students in the class or with the instructor. Consequently, Driver claimed that in web-enhanced learning environments, communication tools targeting peer-to-peer interactions in groups should be utilized, so that the instructor stays as a facilitator only and gain time and resources.
In the same study, Driver (2002) reported that the chat tool had not been used ever. He said that the students had not used the chat because they had preferred face-to-face interactions if they had found a chance.

İnan (2003) concluded the same result in his study where he investigated the utilization of an online learning support system for pre-service teachers. İnan stated that the web site was not used for communication purposes, but students preferred to use telephone and GMS for communicating. The possible reason, as he said, might be an existence of chance of face-to-face interaction and lack of privacy of the forum messages that rendered students passive participants.

2.6.2. Online Instructor Research Studies

In order to enlighten the online instructor characteristics, Mazzolini and Maddison (2003) conducted a research study where the effect of the instructors' post frequency on students' participation and perception was investigated. With analysis of discussion forum archives of three semesters, Mazzolini and Maddison observed 135, 180 and 200 students participating online discussion forum. The course was online and given by multiple instructors in these semesters. After analyzing the forum archives, Mazzolini and Maddison concluded that as the instructors post frequently, the length of thread, that is the number of messages sent as a response or as a reaction to a certain initial message, gets shorter. The students thread extends more in student-to-student discussions with regard to student-to-instructor

discussions. Mazzolini and Maddison interpreted this result like that; students share their gaps about content easily and are more willing to refute each other ideas. Instructors' posts might be perceived as declarative statements so that students reflect with small number of posts to instructors' messages.

An interesting finding in Mazzolini and Maddison (2003) study is that, as a instructor sends less messages to the forum in order not to intervene student-to-student discussions, he or she looses his or her popularity and credit in students' perceptions. The students in the study appreciated instructors who contributed often, even it meant that the students themselves contributed less. Mazzolini and Maddison responded this dilemma with two questions:

> Did they, for example, appreciate those instructor contributions just because the instructors saved them the effort of answering all the difficult questions, or did they feel that they really learnt more when instructors contributed more? (p. 16)

Mazzolini and Maddison (2003) finished with a need for better measures of the quality of interactions in discussion forums.

2.6.3. Blended Learning Research

Although it is not new, there is a lack of blended learning research in the literature. In his doctoral dissertation, Brannan (2002) studied on effects of technology in interactions. He attempted to learn students' perceptions about the interactions in three different king of instruction: face-to-face instruction, hybrid instruction and online instruction. Totally 318 students, 106 from each environment were delivered a survey. As a result, Brannan found that

- In all four types of interactions, that are student-student, student-instructor, student-content and student-technology, interactions are impacted favorably by the use of technology.
- Hybrid instruction is excellent way for group work to continue even when class meets only half of the time face-to-face.
- Students rated online environment as the highest in interaction preference, then hybrid instruction, and least face-to-face instruction in student-instructor.

After the results, Brannan (2002) stressed that, as technology use is expected to be higher in education, so the stakeholders should included necessary training programs into both student and teacher training programs.

CHAPTER 3

METHODOLOGY

In this chapter, the research questions, the design, the subjects, general information about CEIT211 Course, the instruments, the data collection and data analysis procedures, and lastly the assumptions of the researcher with limitations are presented.

3.1. Research Questions

The main purpose of the study is to understand learners' perceptions about the web-based learning in the blended learning environment in terms of web-based instruction, online collaborative learning and the instructor.

The three research questions with the sub-questions were asked in this study to achieve the purpose of the study.

1. What are the learners' perceptions about web-based instruction?
    a. What are the learners' perceptions about the quality of the content in web-based instruction?
    b. What are the learners' perceptions about the interactivity in web-based instruction?
    c. What are the learners' perceptions about the structure of web-based instruction?
    d. What are the learners' perceptions about the learner support of the web-based instruction?

2. What are the learners' perceptions about online collaborative learning?
    a. What are the learners' perceptions about group work?
    b. What are the learners' perceptions about computer-mediated communication?
    c. What are the learners' perceptions about motivation?
    d. What are the learners' perceptions about learner support in the online learning?
    e. What are the learners' perceptions about benefits of the online learning?

3. What are the learners' perceptions about the roles of the online instructor in the blended learning?
    a. What are the learners' perceptions about the administrator role of the instructor?
    b. What are the learners' perceptions about the facilitator role of the instructor?
    c. What are the learners' perceptions about the technician role of the instructor?
    d. What are the learners' perceptions about the evaluator role of the instructor?

3.2. Design of the Study

The design of the study is a descriptive study conducted with quantitative data collection methods. Case studies work with a single or a unique instance in a real situation (Cohen, Manion & Morrison, 2000). Particularistic, descriptive, and heuristic features of the case studies let the researchers to illuminate the phenomenon or the case (Merriam, 1998). Sturman (as cited in Cohen et al) stated the significant point of case studies was that the researchers could investigate and report human systems and contexts that were unique and dynamic in their entities.

The purpose of the study directed the researcher to work with the case in which a blended learning environment could be performed. The "Programming Languages - II: Visual Basic" course (CEIT211) at the department of Computer Education and

Instructional Technology (CEIT), Middle East Technical University (METU) at 2002/2003 spring semester was been taken into investigation. The traditional educational methods of the course were converted into a new blended strategy. In addition to the face-to-face instruction and laboratory sections, the web-based learning environment for the course was developed and administrated by the researcher as an instructor of the course for the semester. At the beginning of the semester, usability test was conducted about the web site and sufficient upgrades were done. This test captured the problems in the interface design of the web site with actual tasks and with real users. During the semester, the students and the instructor used the web site. At the end of the semester, three perception surveys addressing the research questions were performed and analyzed. In addition to these data, the time spent by the students in the site and the number of the posts sent to the forum by the students were examined.

Table 3.1 - Research Design

Data Source	Case Attribute	Data
CEIT211 Course Students n=65	Blended learning strategy combining face-to-face instruction and web-based learning	• Three perception surveys performed at the end of the semester • Time spent in the web site • Number of posts in the forum during the semester

3.3. Subjects

The subjects of the study were the CEIT students taking the CEIT211 course during 2002/2003 spring semester at METU, in Ankara, Turkey. Totally 65 students were involved in the course. The numbers of male and female students were 48 and 17 respectively. The students were 2nd year CEIT students taking the course as a must course within their curriculum. None of students had online course before and in this term. The CEIT211 course was intended to provide the more detailed programming competencies in the visual environments for the students.

Table 3.2 – Subject of the Study

Subjects	Number	Percentage
Males	48	74%
Females	17	26%
Total	**65**	**100%**

3.4. Information about CEIT211 Course and Web-Based Learning Environment

The descriptive feature of the case studies let the researcher write the detailed documentation of the case in the research report (Merriam (1998). This section will describe the CEIT211 course in details.

3.4.1. Course Description and General Objectives

The course, Programming Languages II: Visual Basic, is a 2nd year course given to the CEIT 2nd year students as a must course. It introduces the underlying concepts and principles of programming in visual environments. It also emphasizes the design and implementation of such visual software as Visual Basic (VB). It covers general structure of a VB programming language, data types, variables, standard functions, subprograms, selection statements, loops, text files, user-defined data types, dynamic data structures, database programming and Internet applications development with VB.

The course aims to provide students with the necessary knowledge and skills to;

- Identify and define the basic features of VB
- Write both user and programmer friendly VB applications
- Create applications for Windows environment
- Manage database facilities of VB
- Develop Internet applications by VB.

3.4.2. Instructional Strategies

Ongoing instructional strategy of the course before this study was a traditional lecturing with three-hour lessons in the classroom and two-hour laboratory works in a computer laboratory. The face-to-face instruction in the classroom included mostly the expository teaching. The instructor introduced a new topic and demonstrated the sample codes in real programming environment. The students were passive listeners in the lectures, though the small discussions took place about new concepts.

The practice of the course was done in the computer laboratories for two hours in each week. The students were given a problem of which the solution was related with the last lesson's content, and the students were expected to code a proper program. During the laboratory works, a research assistant helped the students.

This design of the course was changed into a blended learning with a newly developed web site. The researcher developed the web site using Active Server Pages (ASP) technology which was a scripting language allowing more dynamic HTML content management. The web site was adapted from the similar web-based learning environment of the CEIT333 course, namely "Applications of Authoring Languages in Internet Environment", constructed by Prof. Dr. M. Yaşar Özden.

In the new format, the web site was expected to provide additional support to the students in terms of content related various resources, communicating with others and with the instructor via synchronous and/or asynchronous ways. The site was assumed to improve the implication of constructivist learning methodologies like problem solving and collaborative learning throughout its components.

3.4.3. The Components of The Web Site

The user interface used in this study was presented in Figure 3.1. The structure of the web site had three frames; first one was the top frame showing the title of the course, user name and three buttons, that are the administrator options, user options and logout. The second one was the menu frame at the left side of the screen. It included hyperlinks to other pages within the site and links for the communication/collaboration tools, i.e. chat, group chat and forum. The last frame was, at the right, content frame presenting the content. While first two frames were stable, the content frame was dynamic according to the selections made on the menu frame.

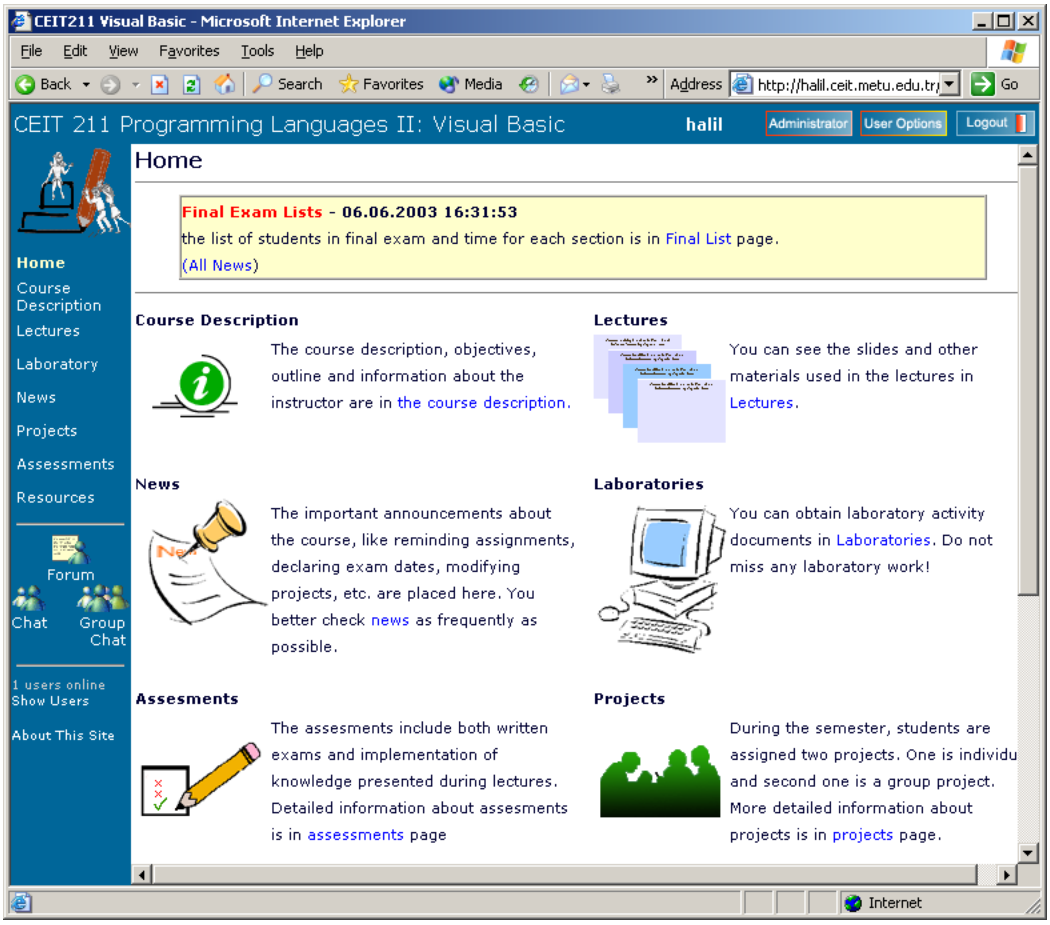


Figure 3.1 – The user interface of the web site

The web site had the following components:

3.4.3.1. Course Description Page

It included the descriptive information about the course, its objectives, the course outline, the time and place information for classroom lessons and computer laboratories, the contact information with the instructor.

3.4.3.2. Lectures Page

It contained the presentation files used in the lessons both in Microsoft PowerPoint slides format and in HTML page format into which converted from the slides with Learning Resource iNterchange (LRN) Toolkit, software of Microsoft Cooperation (2002). The students were either able to see the lecture notes for each week on the web browser, or download them into local machines.

3.4.3.3. Laboratory Page

The information about the physical laboratories, the schedule of the laboratory hours for all sections, the problems that were handled by the students each week in the laboratory were presented here.

3.4.3.4. News Page

This page showed the short news announced by the instructor. The instructor could add new news, delete or modify existing news by his/her administrative privileges. The latest news was also presented on the Home page where every user comes to at the beginning.

3.4.3.5. Projects Page

The course had a project study for students in order to apply their knowledge into the practice. The project groups were composed of three to five pupils and semi-free topics. Since the instructor needed to observe particular skills and knowledge in the projects, the topics were judged after the discourse among the group members and the instructor. The project page was used to declare the group members and the topics. The students who were not a member of any group were expected to select and join one of the groups displayed here.

3.4.3.6. Assessments Page

It provided the whole grading information of the course. The percentages of the exams, laboratory works, projects, and time & place of them were given here. The results were also listed here. Figure 3.2 shows the assessments page.

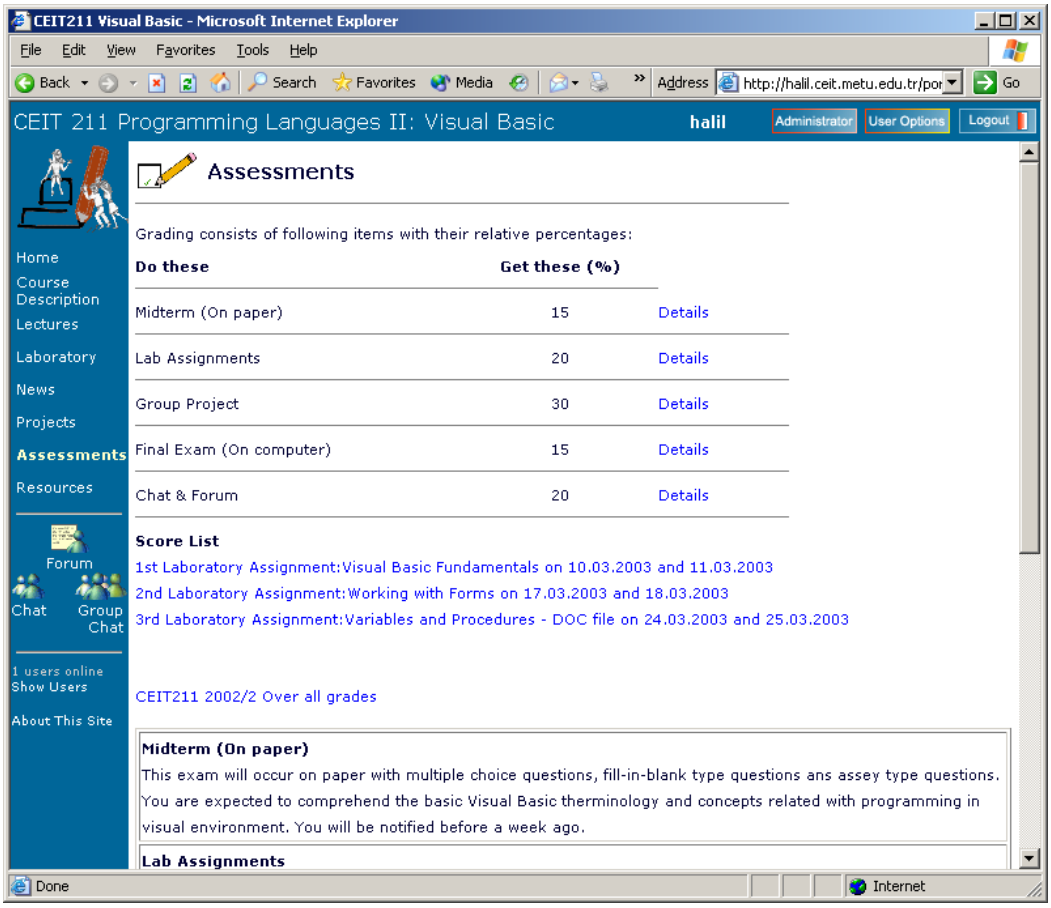


Figure 3.2 – Assessments Page

3.4.3.7. Resources Page

The page supplied the electronic books about the Visual Basic and the hyperlinks to other web pages on the Internet. The information about the course textbooks could also be found here.

3.4.4. Online Communication

The web site provided the online communication tools. These were forum and chat tools beside the email opportunity.

3.4.4.1. Forum

In order to support asynchronous communication, the forum was provided to all members (Figure 3.3). It was taken as a software package and installed into the web site from Snitz™ Communications (2003). Students were free to post messages,

create topics and reply the others via forum. During the semester, the students' communication throughout the forum could be categorized into two topics, public communication and private communications. The former was the communication on the public topics, i.e. everybody could post a message and join to discussion. The latter was private communication among particular members. These private communications were held on among the project members for whom the special forums were opened and only the members to the group were allowed to read and post messages.

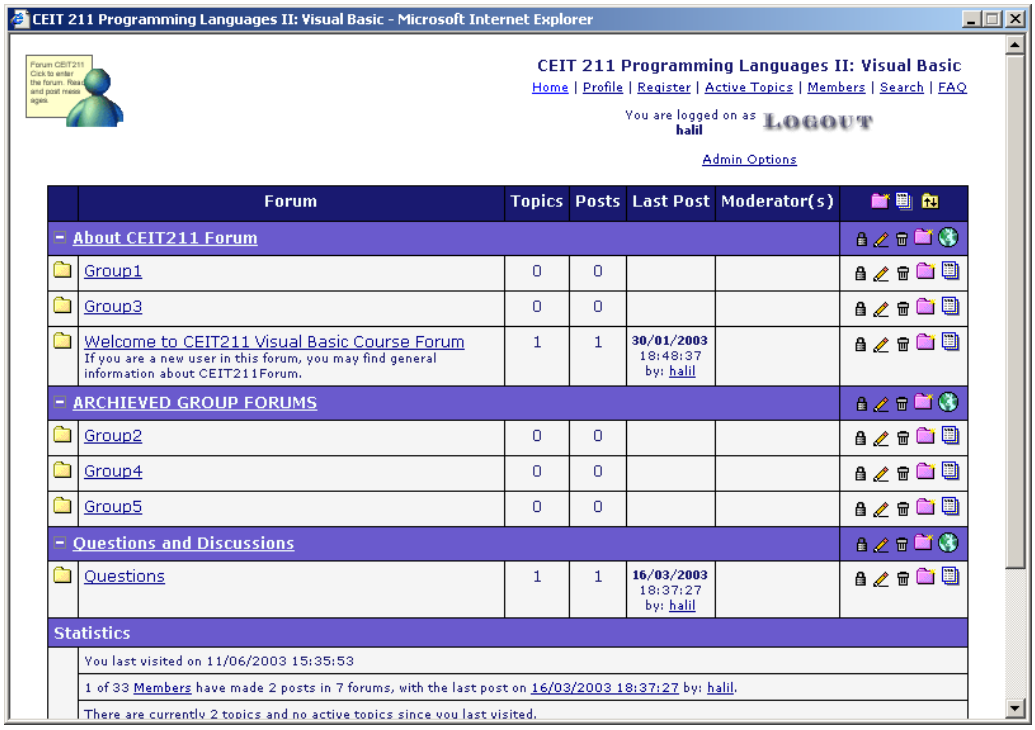


Figure 3.3 – Forum Interface

3.4.4.2. Chat

The chat tool gives the students and the instructor a chance of communicating synchronously in text-based format (Figure 3.4). The chat tool in the site was using Microsoft Exchange 2000 Server, which was run and configured by Prof. Dr. M. Yaşar Özden in the CEIT department. In order to connect a chat room, a user needed to connect a web site and select a chat link. During the chat session, the students were presented with their login names. The chat tool was not in a peer-to-peer nature, but the open room to everyone including the instructor.

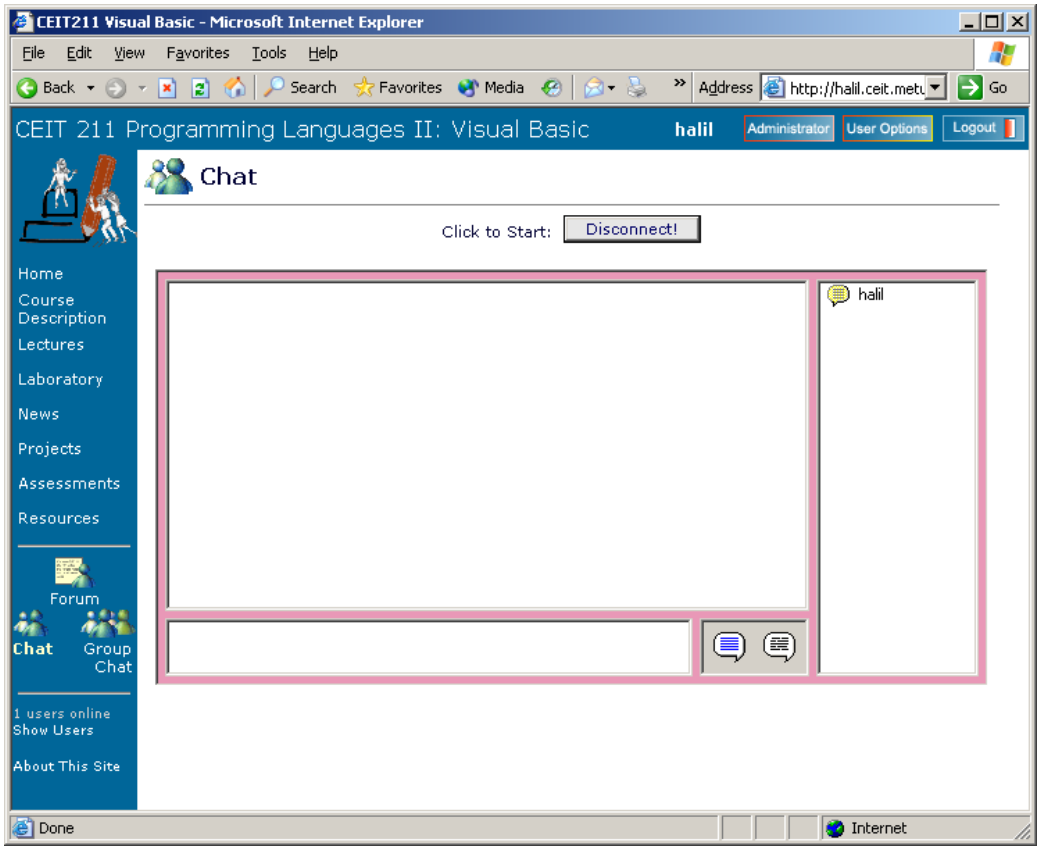


Figure 3.4 - Chat Interface

3.4.4.3. Group Chat

In order to keep private communications of the group members, the separate chat rooms were arranged to the students. There were 16 groups and the group chat rooms accessible only by the members of the each group and the instructor. The user interface in the group chat page was the same with the chat page.

3.4.5. Online Course Administration

Using the web site required authorization. When the user logged in, some information about the site usage were recorded, i.e. visited pages and time spent in that pages. In order to keep all of that information, administrative tools were developed. These available tools were user control, backups and monitoring login information and chat records, dynamically presenting news and grade

announcements, and group management. The users having the administrator privileges were performed these functions via an administrator interface (Figure 3.5).

Figure 3.5 Online Administration Interface

In the "Users" option, the administrator could add a new user or group of new users, edit or delete existing users. "Backups and Logs" options helped the administrator with ability of looking the logs and backing up the existing log records. "News" and "Grades" options let the administrator modify the corresponding pages' content, i.e. add news or add new grade list. By "Groups management" options, the administrator could create a new group with the members and open new chat room or forum topic private to that group members. The last "Chat Logs" option was used to display the chat records.

3.5. Implementation of Course With The Web Site

In this part, the integration and usage of the web site is described.

3.5.1. Introduction to Web site

At the beginning of the semester, the students were registered to the web site as normal users by the instructor. First, the instructor introduced the web site in one of the lectures then the students practiced with the site in the first laboratory hours.

3.5.2. Laboratory Works and Chat

For a semester, the course was held on in three-hour classroom instruction and two-hour laboratory works. In each week, there was an assignment in the laboratory works to complete within two laboratory hours. After some weeks, the period extended to a day or a week depending on the program required for the assignment. The grades for the assignments were announced in the web site in a week after their submission. During the laboratory works, the instructor was on the chat room and ready for students' questions. The students asked questions about the content or sent the sample codes to talk on it. Most of the synchronous communication via chat was done by this way.

3.5.3. Forum Discussions

Forum was used to more delayed communication that was no need to get response immediately or no response at all. At the beginning, the instructor started to pose topics to encourage discussion. After some times, other topic were accumulated and built discussion categories like technical issues, the resources about the content, interpretations on laboratory assignments.

3.5.4. Group Projects

When the group projects were started, private group forums and chat rooms were arranged by the instructor. With the instructor, only members of a group were allowed to access to that chat or that forum room.

3.5.5. Assessment Strategies

The assessment strategy of the course had varying measurements. There were five main measurements as show in Table 3.3. Only first exam was given on paper, and the rests were practice-based exams on the computers. Lab assignments were composed of ten weeks' assignments. The grade from the group project was the same

for each member of the group. The last measurement was about the participation of the students into chat and number of posts sent to the forum.

Table 3.3 – Percentage Distribution of Measurements in the Course

Measurement	Percentages (%) in Cumulative Grade
Midterm (On paper)	15
Lab Assignments	20
Group Project	30
Final Exam (On computer)	15
Chat & Forum	20
Total	**100**

3.6. Instruments

Three questionnaires were the data collection instruments in this study. While the questionnaires were used to understand the perceptions of the students, site usage time and number of posts were analyzed for triangulation purpose. The detailed information about each instrument is given as follows:

3.6.1. Web-Based Instruction Evaluation Questionnaire (WBIEQ)

Bayram (2002) adapted the questionnaire from the study of Khan & Vega (1997). The study of the Khan & Vega presented the key factors to consider when evaluating a web-based instruction course. Their evaluation list included four sub-scales that were quality of the content, interactivity, structure of the web site, and learner support. Bayram developed the questionnaire and went over it with the experts to ensure the validity. He also found the overall reliability statistic as 0.89, which was an acceptable value in educational studies.

The questionnaire is a 5-scale Likert type survey and composed of 25 items. For the subjects' responses, 5 shows strongly agree and 1 shows strongly disagree with the item's statement. The items are grouped under four categories: Quality of the content, interactivity, structure of the web site, and learner support. There are 6 items in the first sub-scale, 7 items in the second sub-scale, 7 items in the third sub-scale and 5 in the fourth last sub-scale. Table 3.4 displays the items for all sub-scales.

Table 3.4 – WBIEQ Items Group by Sub-Scales

Item No	Quality of Content (7 items)
1.	The course objective(s) were clear and achievable.
4.	The course was accurate.
5.	The course was interesting.
6.	The course was appropriate to discipline.
7.	The course was appropriate to method of distribution.
12.	The web site was limited in typing errors.
16.	The effectiveness of training was determined in terms of achieving the course objectives.
Item No	**Interaction (7 items)**
2.	The web site contained more required activities for the user than optional activities.
13.	
15.	The web site provided application of content to practice.
21.	The material provoked insightful class discussion.
22.	There was an advantage to use this technology than traditional methods.
24.	The web site took full advantage of the capabilities of the medium.
25.	Use of hypertext added value to this course topic.
	The web site took advantage of the powers of being online (something beyond just long pages of text).
Item No	**Structure (7 items)**
8.	The web site has good navigational design.
9.	The web site has a complementary structure of similar, print-based materials.
10.	The web site has a reasonable structural organization (hierarchical, linear, etc.).
11.	The web site was clear, and used effective language.
17.	The architecture of the web site facilitated students' ability to discern relevance in an ocean of information.
18.	The icons that were used for navigation were consistent and well defined.
23.	The design of links was consistent with the knowledge that the web site was intended to impart.
Item No	**Learner Support (4 items)**
3.	The web site provided access to instructor or other students (e-mail, listserv, chat rooms, and online conferencing).
14.	There was proper technical support for the web site.
19.	There was an opportunity for the students to provide informal feedback and evaluation concerning their thoughts on the learning experience.
20.	The material was easy for students to access. (download time, access to computer lab, materials)

In the first sub-scale, the perceptions of the students about the content of the web site and the course were aimed to be discovered.

In the second sub-scale, the perception about the interaction was investigated. It was expected to see whether the web site had required materials and technology to encourage interaction.

Structure of the web site was the third sub-scale. The purpose was to understand the perceptions about the arrangement of the elements and general organization.

In the last sub-scale, the support from the web site about various domains like technical and content related issues was inquired.

The scores of each item were presented with the mean statistic, and both the sub-scales' and overall means were calculated in this study. The reliability of the questionnaire was found 0.86 that was acceptable value for research purposes (Fraenkel & Wallen, 1990). The sub-scales had reliability coefficients as 0.64 for quality of the content, 0.67 for interaction, 0.75 for structure of the site, 0.45 for support. The reliability statistics for each sub-scale and for overall questionnaire are displayed in Table 3.5.

Table 3.5 – WBIEQ Sub-scales' Reliability Statistics

Sub-scales	Number of items	Alpha Coefficient
Quality of Content	7	0.64
Interaction	7	0.67
Structure of site	7	0.75
Learner Support	4	0.42
Total	**25**	**0.86**

3.6.2. Online Collaborative Learning Evaluation Questionnaire (OCLEQ)

The survey is a 5-scale Likert type questionnaire. There are 28 items, and each item has 5-Likert scale where 5 corresponds to strongly agree, 4 to agree, 3 to neutral, 2 to disagree and 1 to strongly disagree. Only 19th item was stated negatively and it was reverse coded.

The questionnaire was developed by Özden, Koç and Yıldırım, and Koç (2002) used the questionnaire in his case study where he obtained reliability measure of the

overall questionnaire 0.90. In this research study, the same reliability coefficient was found 0.92 that was very satisfactory value. Table 3.6 demonstrates the reliability coefficients and number of items for each sub-scale.

Table 3.6 – OCLEQ Sub-scales' Reliability Statistics

Sub-scales	Number of items	Alpha Coefficient
Group Working	6	0.72
CMC	6	0.59
Motivation	4	0.73
Learner Support	4	0.54
Benefits	8	0.85
Total	**28**	**0.92**

As it can be seen in Table 3.7, there are 5 sub-scales in the questionnaire and these are group working, computer mediated communication (CMC), motivation, learner support and benefits. The numbers of items for each sub-scale are 6, 6, 4, 4 and 8. The sub-scales were reviewed by the researcher and Özden, and then the questionnaire was delivered. The reliability coefficients for each category are, respectively, 0.72, 0.59, 0.73, 0.54, and 0.85.

Table 3.7 – OCLEQ Items Grouped by Sub-Scales

Item No.	Group Work (6 items)
9.	The number of people in my group was appropriate.
11.	We could not accomplish this project unless we worked together.
16.	The arguments in the group were fruitful.
17.	On many instances, it was easy to conduct an online discussion.
18.	The group leader did a well job on summarizing things and scheduling.
19.	I would rather work alone for this project.

Item No.	Computer Mediated Communication (CMC) (6 items)
2.	The forum was very beneficial to understand each other's ideas.
3.	I used the chat very frequently to communicate with the other group members.
22.	The absence of social context did not affect me negatively to work on the project.
23.	All group members participated in online discussions equally.
24.	As a group, we did not have any communication delay.
25.	It did not take too much time to make decisions on the project through online communication.

Table 3.7 (Continue) – OCLEQ Items Grouped by Sub-Scales

Item No.	Motivation (4 items)
6.	The forum and chats increased my motivation towards the subject.
7.	Working as a team increased my motivation towards the subject.
8.	The mood of the team encouraged hard work for everybody.
10.	I enjoyed working with my teammates.

Item No.	Learner Support (4 items)
1.	The resources in order to search for answers for my questions were adequate.
4.	I had no difficulties in accessing the web site of the course.
5.	I was able to receive immediate feedback through chats and forums.
27.	Flexibility in time made me to work effectively.

Item No.	Benefits (8 items)
12.	Working as a team made me understand things from different perspectives.
13.	Learning together was very beneficial to me.
14.	Working as a team improved my interpersonal skills.
15.	I understand the subject matter better working with teammates.
20.	Chats and forums improved my understanding of the topic.
21.	I was endowed with better skills to create a pleasing web site.
26.	Working on the project through online communication helped my professional growth.
28.	Working on the project through online communication socialized me.

In the first sub-scale, the group work was examined. The students' perceptions about working as a group in the project were queried. If they were comfortable with the group study or they could exposed the advantages of group working.

The second sub-scale was computer-mediated communication. It was the point that if the web site provided sufficient ways with required level of communication facilities.

Motivation was the third sub-scale. The concern of the sub-scale was to clarify how motivating the working as a group and tools helping collaborative learning.

Learner support was the fourth sub-scale. With the items in this category, to access resources, to get immediate feedback and flexibility of World Wide Web were investigated.

In the last sub-scale, it was expected to see if the students perceive the collaborative working as beneficial.

3.6.3. Online Instructor Evaluation Questionnaire (OIEQ)

Online instructor can be defined with four roles that are the administrator, facilitator, technician and evaluator (Shank, n.d.; Özden, personal communications, April 1, 2003). In order to get the perception data of these roles of the instructor, the researcher built up the questionnaire with 20 items. The four roles were represented with the numbers of items as sub-scales, and the numbers were 4, 8, 2 and 6 correspondingly. Table 3.8 shows the items in all sub-scales.

Table 3.8 – OIEQ Items Grouped by Sub-scales

Item No.	Administrator (4 items)
1.	Does the teacher return e-mails/posts within 24 hours?
2.	Does the teacher follows up student problems and try to find out solution?
3.	Does the teacher post timely bulletins about changes and updates to course?
4.	Does the teacher post the syllabus, course materials, and discussion topics at the beginning of the course?

Item No.	Facilitator (8 items)
5.	Can the teacher cope all the questions raised by the students and respond in time?
6.	Does the teacher manage and guide student interaction and discussion?
7.	Does the teacher moderate discussion, models desired methods of communication?
8.	Does the teacher foster group learning?
9.	Are minimum 10% of the discussion postings from the instructor?
10.	Does the teacher provide public and private acknowledgment to students who contribute to discussion?
11.	Does the teacher contact the students privately or by e-mail to ask noncontributing students to participate in discussion?
12.	Does the teacher engages students, fosters sharing of participants' knowledge, questions, and expertise?

Item No.	Technician (2 items)
13.	Is the teacher proficient with all the systems used in the course?
14.	Does the teacher help students troubleshoot technical systems used in the course and refers to appropriate help sources, as needed?

Item No.	Evaluator (6 items)
15.	Does the teacher provide students with clear grading criteria?
16.	Does the teacher remind the students of the upcoming assignments?
17.	Does the teacher provide written examples of assignments/projects?
18.	Does the teacher provide resource ideas for completing assignments?
19.	Does the teacher assists students who are having problem completing the assignments?
20.	Does the teacher acknowledge the receipt of assignments within 24 hours?

Administrator sub-scale embraced the abilities like generating course policies and improving comfort level of the learners to keep regular participation.

In the second sub-scale, facilitator role was examined. The abilities were composed of activities fostering collaboration among the students.

As a third sub-scale, technical abilities of the instructor were examined. Offering and solving users' technical problems stood in this category.

The last sub-scale was the evaluator role of the instructor. Throughout the items in this category, it was questioned that if the instructor made evaluation criteria clear for the students and aided the students to meet these criteria.

The questionnaire was 5-scale Likert type, and 5 stood for strongly agree, 4 for agree, 3 for neutral, 2 for disagree and 1 for strongly disagree. As indicated in Table 3.9, the reliability coefficient was found 0.97. The sub-scale reliability coefficients were 0.92 for administrator, 0.93 for facilitator, 0.89 for technician and 0.91 for evaluator.

Table 3.9 – OIEQ Sub-scales' Reliability Statistics

Sub-scales	Number of items	Alpha Coefficient
Administrator	4	0.92
Facilitator	8	0.93
Technician	2	0.89
Evaluator	6	0.91
Total	**20**	**0.97**

3.6.4. Time Spent in the Web Site

The students' action in the web site were captured automatically by the web server and recorded to the database. In these records, the identity information of the student, the local Internet Protocol (IP) numbers of the client computers, date and time of the action, the name of the current web page at the moment, and the seconds spent in this current page were included. At the end of the semester, the time for each student was summed up. Moreover, the time in general included the time in the chat.

3.6.5. Number of Posts in the Forum

The forum software was a freeware package, Snitz Forum 2000 Version 3.4.03, and integrated into the existing web site. With the unique usernames, date and time information, the forum tool was keeping the number of the users' messages posted. At the end of the term, these data were taken and analyzed in order to see the online participation of the students. The descriptive measures were considered in the study.

3.6.6. Comments from the Students

In addition to the items in three questionnaires, one open-ended question was asked to the students. The questions were inquiring any additional comments from the subjects about the main idea evaluated in the questionnaire.

3.7. Data Collection

The three questionnaires were delivered to the students on the web site at the end of the semester. The response data were recorded automatically into the Microsoft Access database file, and then imported into SPSS program to be analyzed.

While delivering the questionnaires, the students were told that the data was important and would contribute to the instructor in analyzing the instructional strategy of the course. Out of 65 registered students, 59 returned the web-based instruction evaluation questionnaire, 50 returned the collaborative learning evaluation questionnaire and 52 returned the online instructor evaluation questionnaire.

The time spent on the site and the chat session was automatically. This data imported into SPSS Version 10.0 program and analyzed.

The numbers of posts were obtained from the forum's own database file. The forum software package recorded user actions and posts statistics for a semester.

3.8. Data Analysis

The descriptive statistics of the data was used. For three questionnaires, the mean scores were calculated for overall and sub-scales.

While interpreting the questionnaires' results, perception was stated as negative if the mean score of an item or a sub-scale was below 2.59, as neutral if between 2.60 and 3.39, and as positive if above 3.40 out of 5.

For the time and number of posts measures, the frequency distributions and the mean scores were obtained to see any possible tendency in the web site.

The students' comments were analyzed and grouped. The classified data were presented.

3.9. Assumptions

In this study, the following assumptions were made:

- The participants would respond the questionnaires accurately,
- The measures in the study were reliable and valid to make accurate assumptions,
- The data were correctly recorded and analyzed,
- The subjects' computer literacy skills and reading ability in English were sufficient for comprehending and responding in all written instructions and questionnaires.

3.10. Limitations

The following limitations resided in the study:

- Validity is limited to the honesty of the subjects' responses to the instruments,
- Validity of the study is limited to the reliability of the instruments used in the study.
- The results and conclusions are limited to the case investigated.
- Validity of the study was threatened of participant observation. The researcher was the instructor in the study, and in order to eliminate the

researcher bias, the researcher applied the peer evaluation and expert opinion during the instrumentation preparation and selection, data collection and analysis.

3.11. Delimitations

The delimitations of the study were the followings:

- The study was limited to sixty-five students who enrolled CEIT 211 course at the department of Computer Education and Instructional Technology, Middle East Technical University in the 2002/2003 spring semester.

CHAPTER 4

RESULTS

In this chapter, the statistical results of the questionnaires, the time and the post numbers are presented. The findings are summarized in the conclusion part. The statistical measures were calculated by SPSS v10 (Statistical Package for Social Science), a software for PCs.

4.1 Web-Based Instruction Evaluation Questionnaire Results

For the first research question, the responses of the web-based instruction evaluation questionnaire (WBIEQ) were analyzed. The statistics of the questionnaire with four sub-scales are given in Table 4.1.

Table 4.1 – Statistics of the WBIEQ

N = 59 Sub-Scales	Number of Items	Mean	St. Dev.	Reliability Coefficient
Quality of the Content	7	3.98	0.21	0.64
Interaction	7	3.89	0.26	0.67
Structure of the Site	7	3.95	0.15	0.75
Learner Support	5	4.09	0.30	0.42
Overall	25	3.96	0.37	0.86

For the first sub-scale, the mean score of 7 items is 3.98, for the second sub-scale the mean of 7 items is 3.89, for the third one the mean of 7 items is 3.95, and for the last sub-scale of 4 items the mean is 4.09. The overall mean is 3.96, which means that, the students agree with almost all of the statements in the questionnaire.

The analysis of each sub-scale item is presented below.

4.1.1 Quality of the Content

The first sub-scale of the WBIEQ is about the perception of the students about the quality of the content in the course. The 7 item was used in this sub-scale and the mean score for the sub-scale was found to be M=3.98. It can be stated that the students perceived the quality of the content fine and appropriate.

Table 4.2 – Distribution of Responses in Quality of the Content

Quality of the Content	**Percentage and Responses**					**N=59**
Statements	SA	A	N	D	SD	**Mean**
Q#1 The course objective(s) were clear and achievable	42.4 (25)	47.5 (28)	6.8 (4)	1.7 (1)	1.7 (1)	4.27
Q#4 The course was accurate	33.9 (20)	55.9 (33)	10.2 (6)	0 (0)	0 (0)	4.24
Q#5 The course was interesting	23.7 (14)	49.2 (29)	20.3 (12)	6.8 (4)	0 (0)	3.9
Q#6 The course was appropriate to discipline	18.6 (11)	52.5 (31)	23.7 (14)	5.1 (3)	0 (0)	3.85
Q#7 The course was appropriate to method of distribution	16.9 (10)	54.2 (32)	25.4 (15)	3.4 (2)	0 (0)	3.85
Q#12 The web site was limited in typing errors	22 (13)	35.6 (21)	37.3 (22)	1.7 (1)	3.4 (2)	3.71
Q#16 The effectiveness of training was determined in terms of achieving the course objectives	23.7 (14)	55.9 (33)	18.6 (11)	1.7 (1)	0 (0)	4.02
Sub Scale Mean Score						3.98
St.Dev.						0.21

In the 1st item, the students were asked whether the course objectives were clear and achievable. 89.9% of the students strongly agreed or agreed with the statement with a mean of M=4.27. It can be said that the students were aware of what was the expected from them at the end of the course and they believed that they could satisfy these expectations.

In the 4th item, the students were asked whether the course was accurate. 89.8% of the students strongly agreed or agreed with the statement. The mean score was found to be M=4.24. It can be said that the students perceive the course precisely.

In the 5th item, the students were asked if the course was interesting. Most of the students strongly agreed or agreed with the statement. The mean score for this item was M=3.9. It can be stated that the course was likable for them.

In the 6th item, the students were asked whether the course was appropriate to discipline. Majority of the students strongly agreed or agreed with the statement. The mean score for this item was found to be M=3.85. So it can be said that the course was perceived to be fitting to discipline.

In the 7th item the students were asked if the course was appropriate to method of distribution. 71.1% of the students strongly agreed or agreed with the statement with a mean of M=3.85. Thus it can be said that the distribution of the course was accepted suitable by the students.

In the 12th item, the item asked if the web site was limited in typing errors. While 57.6% of the students strongly agreed or agreed with the statement, 37.3% of them were neutral. The mean score was found to be 3.71, then it can be said that the web site had rare typing errors.

In the 16th item, the students were asked whether the effectiveness of training was determined in terms of achieving the course objectives. 79.6% of the students strongly agreed or agreed with the statement. The mean score for this item was M=4.02. Then it can be said that the students were aware of the reaching to objectives as a indicator of the course effectiveness.

4.1.2 Interaction

The interaction sub-scale had 7 items. The mean score for the sub-scale was M=3.89. The findings lead to the conclusion that the students almost satisfied with the interaction in the web site.

Table 4.3 – Distribution of Responses in Interaction

Interaction	**Percentage and Responses**					**N=59**
Statements	SA	A	N	D	SD	**Mean**
Q#2 The web site contained more required activities for the user than optional activities	8.5 (5)	55.9 (33)	28.8 (17)	6.8 (4)	0 (0)	3.66
Q#13 The web site provided application of content to practice	13.6 (8)	52.5 (31)	27.1 (16)	5.1 (3)	1.7 (1)	3.71
Q#15 The material provoked insightful class discussion	8.5 (5)	50.8 (30)	30.5 (18)	8.5 (5)	1.7 (1)	3.56
Q#21 There was an advantage to use this technology than traditional methods	47.5 (28)	35.6 (21)	11.9 (7)	5.1 (3)	0 (0)	4.25
Q#22 The web site took full advantage of the capabilities of the medium	20.3 (12)	50.8 (30)	27.1 (16)	1.7 (1)	0 (0)	3.9
Q#24 Use of hypertext added value to this course topic	20.3 (12)	55.9 (33)	20.3 (12)	3.4 (2)	0 (0)	3.93
Q#25 The web site took advantage of the powers of being online (something beyond just long pages of text).	33.9 (20)	52.5 (31)	11.9 (7)	1.7 (1)	0 (0)	4.19
Sub Scale Mean Score						4.00
St.Dev.						0.26

In the 2nd item, the students were asked whether the web site contained more required activities for the user than optional activities. 64.4% of the students strongly agreed or agreed the statement. 28.8 % of them were neutral about the statement. The mean score for this item was M=3.66. The result shows that the majority of the students thought that the activities in the web site are sufficient.

In the 13th item, the students were asked if the web site provided application of content to practice. While 66.1% of the students strongly agreed or agreed with the statement, 6.8% of them strongly disagreed or disagreed with it. The mean for this item was M=3.71. So it can be said that majority of the students perceived the web site as enough practice provider.

In the 15th item, the students were posed whether the material provoked insightful class discussion. While 59.3% of the students strongly agreed or agreed with the statement, 30.5% of them were neutral about the statement. The mean score was found to be M=3.56. This shows that the student thought that the support was not sufficient to involve in the class discussions.

In the 21st item, the students were asked whether there was an advantage to use this technology than traditional methods. 83.1% of the students strongly agreed or agreed with the statement with the mean score of M=4.25. Therefore, it is not wrong to say that the students believed that using World Wide Web technology was more advantageous than traditional methods.

In the 22nd item, the students were asked whether the web site took full advantage of the capabilities of the medium. 71.1% of the students strongly agreed or agreed with the statement and only 1.7% of them disagreed. The mean score was found to be M=3.9. Then it can be said that the students perceived the existing site as adequate in terms of using the capabilities of the medium.

In the 24th item, the students were asked if the use of hypertext added value to this course topic. 76.2% of the students strongly agreed or agreed with the statement with the mean score of M=3.93. This shows that the students perceived the use of hypertext beneficial in the course.

In the 25th item, the students were asked whether the web site took advantage of the powers of being online. Most of the students strongly agreed or agreed with the statement. The mean score was M=4.19. It can be said that the web site utilized advantages of the technology.

4.1.3 Structure of the Site

Seven items in the questionnaire inquired the students' perceptions about the structure of the web site. The sub-scale mean score was found to be 3.95, so it is possible to say that the perception about the structure of the web site was positive and liked by the students.

Table 4.4 – Distribution of Responses in Structure of the Site

Structure of the Site	**Percentage and Responses**					**N=59**
Statements	SA	A	N	D	SD	**Mean**
Q#8 The web site has good navigational design	37.3 (22)	39 (23)	15.3 (9)	6.8 (4)	1.7 (1)	4.03
Q#9 The web site has a complementary structure of similar, print-based materials	18.6 (11)	47.5 (28)	30.5 (18)	3.4 (2)	0 (0)	3.81
Q#10 The web site has a reasonable structural organization (hierarchical, linear, etc.)	25.4 (15)	52.5 (31)	16.9 (10)	5.1 (3)	0 (0)	3.98
Q#11 The web site was clear, and used effective language	30.5 (18)	52.5 (31)	10.2 (6)	6.8 (4)	0 (0)	4.07
Q#17 The architecture of the web site facilitated students' ability to discern relevance in an ocean of information.	11.9 (7)	50.8 (30)	32.2 (19)	5.1 (3)	0 (0)	3.69
Q#18 The icons that were used for navigation were consistent and well defined	28.8 (17)	57.6 (34)	10.2 (6)	3.4 (2)	0 (0)	4.12
Q#23 The design of links was consistent with the knowledge that the web site was intended to impart	18.6 (11)	62.7 (37)	16.9 (10)	1.7 (1)	0 (0)	3.98
Sub Scale Mean Score						3.95
St.Dev.						0.15

In the 8th item, the students were asked whether the web site had good navigational design. 76.3% of the students strongly agreed or agreed with the statement. The mean score was M=4.03. Therefore, it can be concluded the navigation in the site was appreciated by the students.

In the 9th item, the students were asked whether the web site had a complementary structure of similar, print-based materials. 66.1% of the students strongly agreed or agreed with the statement with the mean score of M=3.81. 30.5% of the students were neutral about the statement. Therefore, it can be said that the web site supported the similar, print-based materials.

In the 10th item, the students were asked whether the web site had a reasonable structural organization. Majority of the students strongly agreed or agreed with the statement. The mean score was found to be M=3.98. Thus, it can be claimed that the structural organization of the web site fitted the students' perceptions.

In the 11th item, the question asked to the students that the web site was clear, and used effective language. 83% of the students were strongly agreed or agreed with the statement, and the mean score was M=4.07. It can be said that the students encountered no difficulties in understanding the web site.

In the 17th item, the inquiry was on the architecture of the web site and if it facilitated students' ability to discern relevance in an ocean of information. 62.7 % of the students strongly agreed or agreed with the statement and the mean score was M=3.69. The percentage of the students whose responses were neutral was 32.2. Therefore, it can be claimed that the web site structure helped the students comprehending and distinguishing information.

In the 18th item, the students were asked the icons used for navigation. The statement posed that whether those icons were consistent and well defined. Eighty-six point four percent of the students responded either strongly agree or agree. The mean score was M=4.12. It can be said that there were no problem regarding the navigational icons.

In the 23rd item, the students were asked whether the design of the links were consistent with the knowledge that the web site was intended to impart. 81.3% of the students strongly agreed or agreed with the statement with the mean score of M=3.98. It is possible to say that the students' thoughts about the links were consistent with the knowledge related with the topic.

4.1.4 Learner Support

In the last sub-scale of WBIEQ, support, there were 4 items posed in order to see the perceptions about learner support feature of the web site. Table 4.5 shows the frequency distributions of the items. The overall mean was M=4.09 indicating agreement of the students

Table 4.5 – Distribution of Responses in Learner Support

Learner Support	**Percentage and Responses**					**N=59**
Statements	SA	A	N	D	SD	**Mean**
Q#3 The web site provided access to instructor or other students (e-mail. Listserv, chat rooms and online conferencing)	47.5 (28)	45.8 (27)	5.1 (3)	1.7 (1)	0 (0)	4.39
Q#14 There was proper technical support for the web site	11.9 (7)	57.6 (34)	25.4 (15)	5.1 (3)	0 (0)	3.76
Q#19 There was an opportunity for the students to provide informal feedback and evaluation concerning their thoughts on the learning experience.	22 (13)	49.2 (29)	25.4 (15)	3.4 (2)	0 (0)	3.9
Q#20 The material was easy for students to access. (download time, access to computer lab, materials)	47.5 (28)	35.6 (21)	11.9 (7)	5.1 (3)	0 (0)	4.29
Sub Scale Mean Score						4.09
St.Dev.						0.30

In the third item, the students were asked if the web site provided access to instructor or other students. Most of the students strongly agreed or agreed with the statement with the mean score of M=4.39. It can be said that the web site provided sufficient facility for the students to communicate with other students and with the instructor.

In the 14th item, the students were asked if there was a proper technical support for the web site. 69.5% of the students strongly agreed or agreed, and 25.4% of them were neutral. The mean score was M=3.76. It can be said that the majority of the students thought that the technical support was proper.

In the 19th item, the students were asked if there was an opportunity for the students to provide informal feedback and evaluation concerning their thoughts on the learning experience. 71.2% of the students strongly agreed or agreed with the statement. 25.4% of the students were neutral, and the mean score was M=3.9. Therefore, it can be said that the most of the students knew that they had a chance of providing an informal feedback and evaluation about the learning experience.

In the 20th item, the students were asked whether the material was easy for the students to access, for example download time, access to computer laboratory and materials. 83.1% of the students were strongly agreed or agreed with the statement

with the mean score of M=4.29. It is feasible to conclude that most of the students had no difficulties to access to the web site and the content.

4.2 Online Collaborative Learning Evaluation Questionnaire Results

For the second research question, the Online Collaborative Learning Evaluation Questionnaire (OCLEQ) was conducted and 50 subjects returned the responses. The statistics of the questionnaire was given in Table 4.6. The overall mean of the 20-item questionnaire was M=3.41 which shows that the students slightly agreed with the statements.

For five sub-scales, which are group working, computer mediated communication (CMC), motivation, learner support and benefits, the mean scores were 3.54, 3.26, 3.53, 3.60 and 3.32 respectively as seen in Table 4.6. The detailed analysis of each items in the sub-scales are presented below.

Table 4.6 – Statistics of OCLEQ

N = 50 Sub-Scales	Number of Items	Mean	St. Dev.	Reliability Coefficient
Group Working	6	3.54	0.40	0.72
CMC	6	3.26	0.37	0.59
Motivation	4	3.53	0.54	0.73
Learner Support	4	3.60	0.20	0.54
Benefits	8	3.32	0.40	0.85
Overall	28	3.41	0.64	0.92

4.2.1 Group Working

The first sub-scale is group work and composed of 6 items. The overall mean for the group work sub-scale was found to be M=3.54. It means that the students' perceptions about group work is not negative but to some extent positive.

Table 4.7 – Distribution of Responses in Group Working

Group Working	**Percentage**					**N=50**
Statements	SA	A	N	D	SD	**Mean**
Q#9 The number of people in my group was appropriate	34 (17)	44 (22)	16 (8)	4 (2)	2 (1)	4.04
Q#11 We could not accomplish this project unless we worked together	20 (10)	40 (20)	16 (8)	12 (6)	12 (6)	3.44
Q#16 The arguments in the group were fruitful.	26 (13)	38 (19)	24 (12)	6 (3)	6 (3)	3.72
Q#18 The group leader did a well job on summarizing things and scheduling	26 (13)	40 (20)	28 (14)	4 (2)	2 (1)	3.84
Q#19 I would rather work alone for this project	12 (6)	22 (11)	22 (11)	28 (14)	16 (8)	2.86
Sub Scale Mean Score						3.64
St.Dev.						0.40

Note. 19th item was coded reversely and the mean score for reversed item was 3.14. The sub-scale mean was calculated with reversed items' mean.

In the 9th item, the students were asked whether the number of people in their groups was appropriate. 78% of the students strongly agreed of agreed with the statement with the mean score of M=4.04. In this study, the number of people in a group was 3 to 5. The students seemed to be agreeing with these numbers.

In the 11th item, the students were asked whether they could not accomplish the project unless they worked together. While 60% of the students were strongly agreed or agreed with the statement, 24% of them were strongly disagreed or disagreed and 16% of them were neutral. The mean score of M=3.44 showed that there was not consensus in the statement.

In the 16th item, it was asked if the arguments in the group were fruitful. 64% of the students strongly agreed or agreed with the statement. The percentage of the students who were neutral about the item was 24%. The mean score was M=3.72. Therefore more than half of the students were satisfied with the opinions in the groups.

In the 18th item, the students were asked whether the group leader did a well job on summarizing things and scheduling. While 66% of the students strongly agreed or agreed with the statement, the 28% of them were neutral. It can be said that the

majority of the students found the group leader adequate in arranging the group work.

In the 19th item, the question was asked whether they would rather work alone for the project or not. While 40% strongly disagreed or disagreed with the statement, 36% of them strongly agreed or agreed with working alone. The item mean was 2.86 and the item was reverse coded in overall mean calculation. From this item's result, it can be concluded that although a great deal of the students did not prefer group work, at least the same portion of others favored group work.

4.2.2 Computer Mediated Communication

The sub-scale asked the students about their perceptions about online communication through the web site. The CMC sub-scale was composed of 6 items and had a mean score of M=3.26. As seen in Table 4.8, the mean score shows that the students' perceptions about CMC were neutral.

Table 4.8 – Distribution of Responses in Computer Mediated Communication

CMC	**Percentage and Responses**					**N=50**
Statements	SA	A	N	D	SD	**Mean**
Q#2 The forum was very beneficial to understand each other's ideas	10 (5)	34 (17)	34 (17)	16 (8)	6 (3)	3.26
Q#3 I used the chat very frequently to communicate with the other group members	6 (3)	24 (12)	30 (15)	26 (13)	14 (7)	2.82
Q#22 The absence of social context did not effect me negatively to work on the project	4 (2)	30 (15)	52 (26)	8 (4)	6 (3)	3.18
Q#23 All group members participated in online discussions equally	8 (4)	30 (15)	32 (16)	20 (10)	10 (5)	3.06
Q#24 As a group, we did not have any communication delay	34 (17)	38 (19)	16 (8)	10 (5)	2 (1)	3.92
Q#25 It did not take too much time to make decisions on the project through online communication	12 (6)	36 (18)	34 (17)	8 (4)	10 (5)	3.32
Sub Scale Mean Score						3.26
St.Dev.						0.37

In the 2nd item, the students were asked whether the forum was very beneficial to understand each other's ideas. Although 44% of the students strongly agreed or agreed, 22% of them strongly disagreed or disagreed with the statement. The mean

score was found to be M=3.36. It can be said that the forum tool was not perceived as being fully beneficial.

In the 3rd item, the students were asked whether they used the chat very frequently to communicate with the other group members. Only 30% of the students strongly agreed or agreed and 40% of them strongly disagreed or disagreed with the item. The mean score was M=2.82. The low mean score and percentages indicate that the students did not use the chat often.

In the 22nd item, the students were asked whether the absence of the social context did not affect them negatively to work on the project. 34% of them strongly agreed or agreed with the statement. On the other hand, 52% of them were neutral and only 14% of them strongly disagreed or disagreed. The mean was found to be 3.18. Therefore, it can be said that only small number of the students was uncomfortable with the lack of social context.

In the 23rd item, the question was asking about whether all group members participated in online discussions equally. 38% of the students strongly agreed or agreed with the statement, but 30% of them were strongly disagreed or disagreed and 32% of them were neutral with the mean score of M=3.06. It can be said that not all of the members took part in the online discussions.

In the 24th item, the students were asked whether they had a communication delay as a group in a negative form. Majority of the students strongly agreed or agreed with the statement with the mean score of M=3.92. The students declared that they communicated sufficiently with group members.

In the 25th item, the students were asked if it took too much time to make decisions on the project through online communication in a negative form. The mean score was M=3.32, and 48% of the students strongly agreed or agreed with the statement. The proportion of the students who were neutral was 34%. Therefore, it can be concluded that while online communication did not help all students decision making, some of them still took advantage of it.

4.2.3 Motivation

With the four items, motivation sub-scale had a mean score of 3.53. In Table 4.9, the percentages of each item and mean scores are listed. The mean score of the sub-scale shows that the web site motivated some students well and some students at a particular extend.

Table 4.9 – Distribution of Responses in Motivation

Motivation	**Percentage and Responses**					**N=50**
Statements	SA	A	N	D	SD	**Mean**
Q#6 The forum and chats increased my motivation towards the subject	10 (5)	20 (10)	28 (14)	20 (10)	22 (11)	2.76
Q#7 Working as a team increased my motivation towards the subject	28 (14)	32 (16)	18 (9)	16 (8)	6 (3)	3.60
Q#8 The mood of the team encouraged hard work for everybody	24 (12)	42 (21)	22 (11)	10 (5)	2 (1)	3.76
Q#10 I enjoyed working with my teammates	36 (18)	42 (21)	12 (6)	6 (3)	4 (2)	4.00
Sub Scale Mean Score						3.53
St.Dev.						0.54

In the 6th item, the students were asked whether the forum and chats increased their motivation towards the subject. While 30% of the students strongly agreed or agreed, 44% of them strongly disagreed or disagreed with the statement. The mean score was M=2.76. The low mean score and the percentages shows that the students did not perceive the forum and chats as motivating tools.

In the 7th item, the students were asked if working as a team increased their motivation towards the subject. Sixty percent of the students strongly agreed or agreed with the statement. The mean was found to be M=3.60. Therefore, it can be concluded that working as a team was quite motivating for most of the students.

In the 8th item, the students were asked whether the mood of the team encouraged hard work for everybody. While 66% of the students strongly agreed or agreed with, the 22% of them were neutral about the statement. The mean score was M=3.76. It can be said that the most of the students felt that the team atmosphere persuaded for hard work.

In the 10th item, the students responded the question that was whether they enjoyed working with their teammates. Seventy-eight percent of the students strongly agreed or agreed with the statement with the mean score of M=4. It is obvious that the students were pleased with their teammates.

4.2.4 Learner Support

The fourth sub-scale was learner support in the collaborative learning environment. There are four items and the overall mean score for the scale was found to be M=3.60, which indicates that the students were supported in some extent. Table 4.10 shows the percentages of the responses and the mean scores for each item.

Table 4.10 – Distribution of Responses in Learner Support

Learner Support	**Percentage and Responses**					**N=50**
Statements	SA	A	N	D	SD	**Mean**
Q#1 The resources in order to search for answers for my questions were adequate	18 (9)	52 (26)	22 (11)	4 (2)	4 (2)	3.76
Q#4 I had no difficulties in accessing the web site of the course	30 (15)	28 (14)	14 (7)	22 (11)	6 (3)	3.54
Q#5 I was able to receive immediate feedback through chats and forums	14 (7)	32 (16)	36 (18)	10 (5)	8 (4)	3.34
Q#27 Flexibility in time made me to work effectively	22 (11)	48 (24)	18 (9)	8 (4)	4 (2)	3.76
Sub Scale Mean Score						3.60
St.Dev.						0.20

In the 1st item, the students were asked if the resources in order to search for answers for their questions were adequate. 70% of the students strongly agreed or agreed with the statement. The mean score was found to be M=3.76. Hence, it can be said that most of the students found the resources in the web site sufficient.

In the 4th item, the students were posed about whether they had difficulties in accessing the web site of the course in negative form. The mean score was M=3.54, and 58% of the students strongly agreed or agreed with the statement. However, 28% of them strongly disagreed or disagreed. Consequently, it is possible to say that for some students it was difficult to access the web site but this portion was about one of fourth of the all of them.

In the 5th item, the students were asked whether they were able to receive immediate feedback through chats and forums. Fourth-six percent of the students strongly agreed or agreed with, and 18% of them strongly disagreed or disagreed with the statement. The mean score was M=3.34. Therefore, it can be said that the some student did not get immediate feedback through communication tools in the web site as expected.

In the 27th item, the question was that flexibility in time made them to work effectively. Seventy percent of the students strongly agreed or agreed with the statement with the mean score of M=3.76. Thus, it can be concluded that the flexibility in time was important factor for most of the students providing effective work.

4.2.5 Benefits

The last sub-scale is about the perceptions of the students about benefits of the online collaborative learning. There are 8 items in the sub-scale and the mean score was found to be M=3.32. The result shows that there were no consensus about the benefits and the students were neutral about it.

Table 4.11 – Distribution of Responses in Benefits

Benefits	**Percentage and Responses**					**N=50**
Statements	SA	A	N	D	SD	**Mean**
Q#12 Working as a team made me understand things from different perspectives	28 (14)	34 (17)	22 (11)	12 (6)	4 (2)	3.70
Q#13 Learning together was very beneficial to me	26 (13)	40 (20)	20 (10)	6 (3)	8 (4)	3.70
Q#14 Working as a team improved my interpersonal skills	22 (11)	42 (21)	20 (10)	6 (3)	10 (5)	3.60
Q#15 I understand the subject matter better working with teammates	26 (13)	34 (17)	22 (11)	10 (5)	8 (4)	3.60
Q#20 Chats and forums improved my understanding of the topic	10 (5)	18 (9)	38 (19)	20 (10)	14 (7)	2.90
Q#21 I was endowed with better skills to create a pleasing programs	10 (5)	30 (15)	52 (26)	6 (3)	2 (1)	3.40
Q#26 Working on the project through online communication helped my professional growth	8 (4)	28 (14)	28 (14)	12 (6)	24 (12)	2.84
Q#28 Working on the project through online communication socialized me.	6 (3)	28 (14)	28 (14)	18 (9)	20 (10)	2.82
Sub Scale Mean Score						3.32
St.Dev.						0.40

In the 12th item, the students were asked whether working as a team made them to understand things from different perspectives. While 62% of the students were strongly agreed or agreed with, 22% of them was neutral about the statement. The mean score was M=3.70. Thus, it can be said that most of the students took advantage of working together in terms of meeting different perspectives.

In the 13th item, the students were asked if learning together was very beneficial to them. Sixty-six percent of the students strongly agreed or agreed with the statement with the mean score of M=3.70. Hence, it is possible to say that the students were slightly agreed with the group work.

In the 14th item, the question was asking that working as a team improved their interpersonal skills. Sixty-six percent of the students strongly agreed or agreed with the statement. The mean score was M=3.60. Therefore, it can be concluded that the students less agreed with the statement.

In the 15th item, the students were asked about whether they understood the subject matter better working with teammates. Sixty percent of the students strongly agreed or agreed with the statement. The mean score was calculated as M=3.60. From the results, it can be claimed that the students believed to get a little benefit in comprehending the subject matter from working with teammates.

In the 20th item, the students were asked whether chats and forums improved their understanding of the topic. While 28% of the students strongly agreed or agreed with the statement, 34 of them strongly disagreed or disagreed and 38% were neutral. The mean score was M=2.90. Therefore, it can be said that the many students did not think that chats and forums were effective in understanding the topic.

In the 21st item, the students were posed about whether they were endowed with better skills to create pleasing programs. Forty percent of the students strongly agreed or agreed, and 52% of the students were neutral with the mean score of M=3.40. Thus, it can be said that the students slightly agreed with the statement.

In the 26th item, the students were asked whether working on the project through online communication helped their professional growth. While 36% of the students strongly agreed or agreed with the statement, 36% of them strongly disagreed or disagreed. The mean score was found to be M=2.84. The results show that the students slightly disagree with the statement.

In the 28th item, the students were questioned about whether working on the project through online communication socialized them. Thirty-four percent of the students strongly agreed or agreed, but 38% of them strongly disagreed or disagreed with the statement. The calculated mean score was M=2.82 and that demonstrates that the many students did not believe that working online socialized them.

4.3 Online Instructor Evaluation Questionnaire Results

In order to understand the students' perceptions about the instructor, the online instructor evaluation questionnaire (OIEQ) were conducted and analyzed. The distribution percentages of the responses and mean scores of each item for four sub-scales are presented in Table 4.12. The overall mean for the questionnaire was obtained to be M=3.83, which indicates the agreement of the students with the roles of the instructor in the online learning environment.

For four sub-scales, mean scores were as follows: For administrator role, it was 4.05, for facilitator role, it was 3.73, for technician role, it was 3.92, and for evaluator role, it was 3.80. More detailed analysis of the sub-scales and of items is presented as follows.

Table 4.12 - Statistics of OIEQ

N = 52 Sub-Scales	Number of Items	Mean	St. Dev.	Reliability Coefficient
Administrator	4	4.05	0.15	0.92
Facilitator	8	3.73	0.21	0.93
Technician	2	3.92	0.00	0.89
Evaluator	6	3.80	0.20	0.92
Overall	20	3.83	0.22	0.97

4.3.1 Administrator Role

The perceptions of the students about the instructor's administrator role were investigated with 4 items. The mean score was found to be 4.05, which indicates that the students agreed that the instructor performed well as an administrator in charge. The items and mean scores are presented in Table 4.13.

Table 4.13 – Distribution of Responses in Administrator Role

Administrator	**Percentage and Responses**					**N=52**
Statements	SA	A	N	D	SD	**Mean**
Q#1 Does the teacher return e-mails/posts within 24 hours?	36.5 (19)	30.8 (16)	21.2 (11)	5.8 (3)	5.8 (3)	3.87
Q#2 Does the instructor follows up student problems and try to find out solution?	55.9 (29)	25 (13)	9.6 (5)	3.8 (2)	5.8 (3)	4.21
Q#3 Does the teacher post timely bulletins about changes and updates to course?	36.5 (19)	40.4 (21)	11.5 (6)	5.8 (3)	5.8 (3)	3.96
Q#4 Does the teacher post the syllabus, course materials, discussion topics at the beginning of the course?	50 (26)	30.8 (16)	9.6 (5)	3.8 (2)	5.8 (3)	4.15
Sub Scale Mean Score						4.05
St.Dev.						0.15

In the 1st item, the students were asked whether the instructor returned e-mails/posts within 24 hours. 67.3% of the students strongly agreed or agreed with the statement with the mean score of M=3.87. Therefore, it is possible to say that the students were almost pleased the instructor's response within a day.

In the 2nd item, the students were asked whether the instructor followed up student problems and try to find out solution. 80.5% of the students strongly agreed or agreed with the statement. The mean score was M=4.21. Thus, it can be said that the instructor assisted the students' problems.

In the 3rd item, the students were asked whether the teacher posted timely bulletins about changes and updates to course. 76.9% of the students strongly agreed or agreed with the statement with the mean score of M=3.96. Hence, it could be stated that the instructor announced changes and updates timely.

In the 4th item, the students were asked whether the teacher posted the syllabus, course materials, discussion topics at the beginning of the course. 80.8 of the students strongly agreed or agreed with the statement. The mean score was fount to be M=4.15. Therefore, it can be said that the instructor delivered the necessary materials, course syllabus and discussion topics at the beginning of the course.

4.3.2 Facilitator Role

The facilitator sub-scale had 8 items. The mean score was found to be M=3.73, which leads to say that the students agreed with the facilitator role of the instructor. The items with percentages of the responses and mean scores are shown in Table 4.14.

Table 4.14 – Distribution of Responses in Facilitator Role

Facilitator	**Percentage and Responses**					**N=52**
Statements	SA	A	N	D	SD	**Mean**
Q#5 Can the teacher cope all the questions raised by the students and respond in time?	38.5 (20)	38.5 (20)	11.5 (6)	7.7 (4)	3.8 (2)	4.0
Q#6 Does the teacher manage and guide student interaction and discussion?	36.5 (19)	36.5 (19)	13.5 (7)	7.7 (4)	5.8 (3)	3.9
Q#7 Does the teacher moderate discussion, models desired methods of communication?	25 (13)	42.3 (22)	21.2 (11)	5.8 (3)	5.8 (3)	3.75
Q#8 Does the teacher foster group learning?	23.1 (12)	48.1 (25)	19.2 (10)	5.8 (3)	3.8 (2)	3.81
Q#9 Are minimum 10% of the discussion postings from the instructor?	21.2 (11)	32.7 (17)	36.5 (19)	7.7 (4)	1.9 (1)	3.63
Q#10 Does the teacher provide public and private acknowledgment to students who contribute to discussion?	21.3 (11)	40.4 (21)	30.8 (16)	3.8 (2)	3.8 (2)	3.71
Q#11 Does the teacher contact the students privately or by e-mail to ask noncontributing students to participate in discussion?	13.5 (7)	26.9 (14)	44.2 (23)	5.8 (3)	9.6 (5)	3.29
Q#12 Does the teacher engages students, fosters sharing of participants' knowledge, questions, and expertise?	21.2 (11)	42.3 (22)	26.9 (14)	7.7 (4)	1.9 (1)	3.73
Sub Scale Mean Score						3.73
St.Dev.						0.21

In the 5th item, the students were asked whether the teacher could cope with all the questions raised by the students and respond in time. 77% of the students strongly

agreed or agreed with the statement with the mean score of M=4. Thus, it can be said that the students were satisfied with the response time from the instructor.

In the 6th item, the students were asked whether the teacher managed and guided student interaction and discussion. 73% of the students were strongly agreed or agreed with the statement. The mean score was found to be M=3.9 which allow to say that the students agreed with the instructor management and guidance.

In the 7th item, the question was that the teacher moderated discussion, models desired methods of communication. The mean score was M=3.75, and the percentage of students who strongly agreed or agreed with the statement was 67.3%. The neutral response percentage was 21%. Then, it can be said that a great deal of the students agreed that instructor moderated discussions and formed communication manner well.

In the 8th item, the students were asked whether the teacher fostered group learning. The percentage of students who strongly agreed or agreed with was 71.2%, and the mean score was M=3.81. This shows that the instructor promoted group work.

In the 9th item, the students were asked if minimum 10% of the discussion postings were from the instructor. While 53.9% of the students were strongly agreed or agreed, 36.5% were neutral about the statement. The mean score was M=3.63. Therefore the students were slightly agree with the statement.

In the 10th item, the students were asked whether the teacher provided public and private acknowledgment to students who contribute to discussion. 61.7% f the students strongly agreed or agreed with the statement and 30.8% were strongly disagreed or disagreed. The mean score for this item was M=3.71 which indicates that the many students agreed with the statement.

In the 11th item, the students were asked whether the teacher contacted the students privately or by e-mail to ask noncontributing students to participate in discussion. Only 40.4% of the students strongly agreed or agreed with the statement and 44.2%

of them were neutral. The mean score was M=3.29. This shows that the instructor did not invite the noncontributing students to participate all times.

In the 12th item, the students were asked whether the teacher engaged students, fostered sharing of participants' knowledge, questions, and expertise. The percentage of the students who strongly agreed or agreed with the statement was 63.5 and the neutral students' percentage was 26.9. The mean score was M=3.73. Hence, it can be said that the students were slightly agreed with the statement.

4.3.3 Technician Role

Third sub-scale of the OIEQ was about the perceptions about the technician role of the instructor. There were two items in the sub-scale and the mean score for the item was calculated to be M=3.92. Therefore, it is possible to say that the students agreed with the technician role of the instructor. The percentage distributions of all items and mean scores are indicated in Table 4.15.

Table 4.15 – Distribution of Responses in Technician Role

Technician	**Percentage and Responses**					**N=52**
Statements	SA	A	N	D	SD	**Mean**
Q#13 Is the teacher proficient with all the systems used in the course?	30.8 (16)	46.2 (24)	11.5 (6)	7.7 (4)	3.8 (2)	3.92
Q#14 Does the teacher help students troubleshoot technical systems used in the course and refers to appropriate help sources, as needed?	36.5 (19)	38.5 (20)	11.5 (6)	7.7 (4)	5.8 (3)	3.92
Sub Scale Mean Score						3.92
St.Dev.						0.00

In the 13th item, the students were asked whether the teacher was proficient with all the systems used in the course. Most of the students (77%) strongly agreed or agreed with the statement. The mean score was M=3.92 which shows that the instructor was proficient with the systems used in the course.

In the 14th item, the students were asked whether the teacher helped students troubleshoot technical systems used in the course and referred to appropriate help sources, as needed. Majority of the students (75%) strongly agreed or agreed with the

statement with the mean score of M=3.92. With reference to this point, it can be said that the instructor supported the students in solving technical problems.

4.3.4 Evaluator Role

As the last sub-scale, the perceptions about evaluator role of the online instructor were queried. There were 6 items in the sub-scale. The mean score of each item and overall sub-scale are listed in Table 4.16.

The mean score was M=3.8 by which it can be understood that the students perceptions about evaluator role of the instructor was positive.

Table 4.16 – Distribution of Responses in Evaluator Role

Evaluator	**Percentage and Responses**					**N=52**
Statements	SA	A	N	D	SD	**Mean**
Q#15 Does the teacher provide students with clear grading criteria?	26.9 (14)	44.2 (23)	15.4 (8)	11.5 (6)	1.9 (1)	3.83
Q#16 Does the teacher remind the students of the upcoming assignments?	26.9 (14)	48.1 (25)	19.2 (10)	1.9 (1)	3.8 (2)	3.92
Q#17 Does the teacher provide written examples of assignments/projects?	32.7 (17)	36.5 (19)	15.4 (8)	11.5 ()	3.8 (2)	3.83
Q#18 Does the teacher provide resource ideas for completing assignments?	32.7 (17)	40.4 (21)	13.5 (7)	9.6 (5)	3.8 (2)	3.88
Q#19 Does the teacher assists students who are having problem completing the assignments?	38.5 (20)	28.8 (15)	21.2 (11)	9.6 (5)	1.9 (1)	3.92
Q#20 Does the teacher acknowledge the receipt of assignments within 24 hours?	9.6 (5)	46.2 (24)	25 (13)	13.5 (7)	5.8 (3)	3.4
Sub Scale Mean Score						3.80
St.Dev.						0.20

In the 15th item, the question was that whether the teacher provided students with clear grading criteria. The mean score for this item was M=3.83 with the 71.1% of the students strongly agreeing or agreeing. Therefore, it is safe to say that most of the students were informed about the grading criteria.

In the 16th item, the students were asked whether the teacher reminded the students of the upcoming assignments. Majority of the students strongly agreed or agreed with

the statement with 75 percent. The mean score was found to be M=3.92. Thus, it can be said that the students were reminded of coming assignments.

In the 17th item, it was asked that whether the teacher provided written examples of assignments/projects. A great deal of the students (69.2%) strongly agreed or agreed with the statement. The mean score was M=3.83, and this shows that the students obtained the written examples of the assignments.

In the 18th item, the students were inquired about whether the teacher provided resource ideas for completing assignments. The great percentage of the students (73.1%) strongly agreed or agreed with the statement. The mean score was calculated to be M=3.88. Hence, it can be said that the instructor offered resource ideas for assignments.

In the 19th item, the question was that the teacher assisted students who were having problem completing the assignments. Many students (67.3%) strongly agreed or agreed with the statement with the mean score of M=3.92. Then, it is possible to say that the instructor supported the students in a trouble with completing the assignments.

In the 20th item, the students were asked whether the teacher acknowledged the receipt of assignments with in 24 hours. While 55.8% of the students strongly agreed or agreed with the statement, 25% of them were neutral about the item. The mean score was M=3.4. It is possible to say that the instructor did not declare the results of the assignments within 24 hours in all times.

4.4 Time Spent by the Students in the Web Site

During the semester, the web site had logged the user actions. These logs captured every action and included various data. These were username, IP number, the name of the page where the user were actively using it, time in seconds that was spent in that page and other technical values about the user. At the end of the semester, these data was analyzed and time measure was calculated for all users. Table 4.17 shows the mean score of time measure of 64 students to be M=53748 seconds, which means

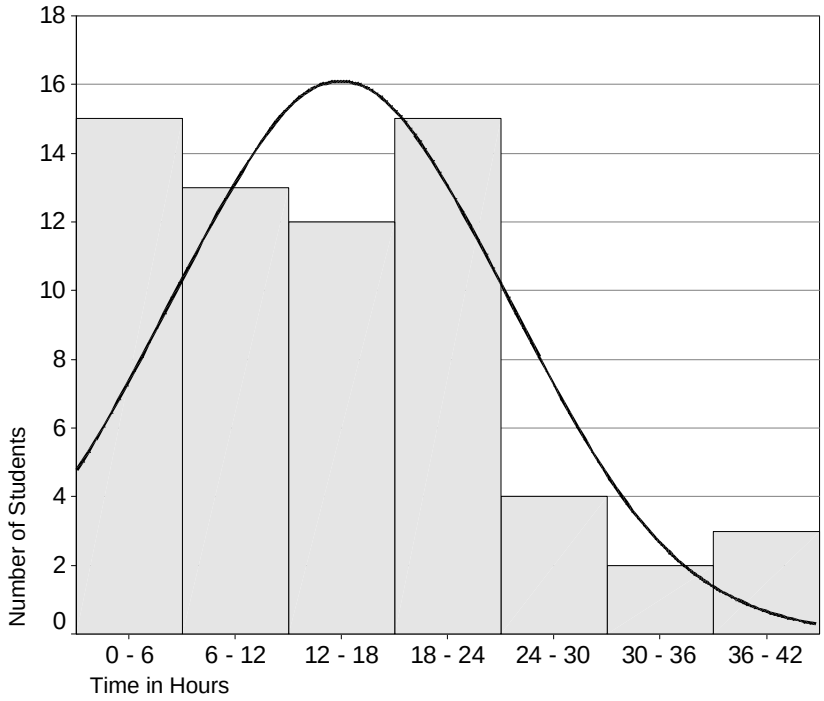
14 hours, 55 minutes and 48 seconds. Out of 64 students, one student have never entered the web site and never attended the course.

Table 4.17 – Descriptive Statistics of Time Spent in the Web site

N=64	Total Time (Sec.)
Mean	53748
Std. Deviation	34198
Skewness	0.865
Std. Error of Skewness	0.299
Minimum	3776
Maximum	145450

To understand the distribution of the time among the students, the frequency histogram was drawn in SPSS and displayed in Figure 1. As it is seen in Figure 1 and in Table 4.17, the distribution was left skewed with positive Skewness statistic to be 0.865, and that means the calculated mean score was influenced by the a few extreme data. The central tendency can be assumed lower than calculated means. The right skewed distribution shows low time spent in the web site

Figure 4.1 – Frequency Histogram of Time Spent in the Web Site



4.5 Time Spent by the Students in Chat Session

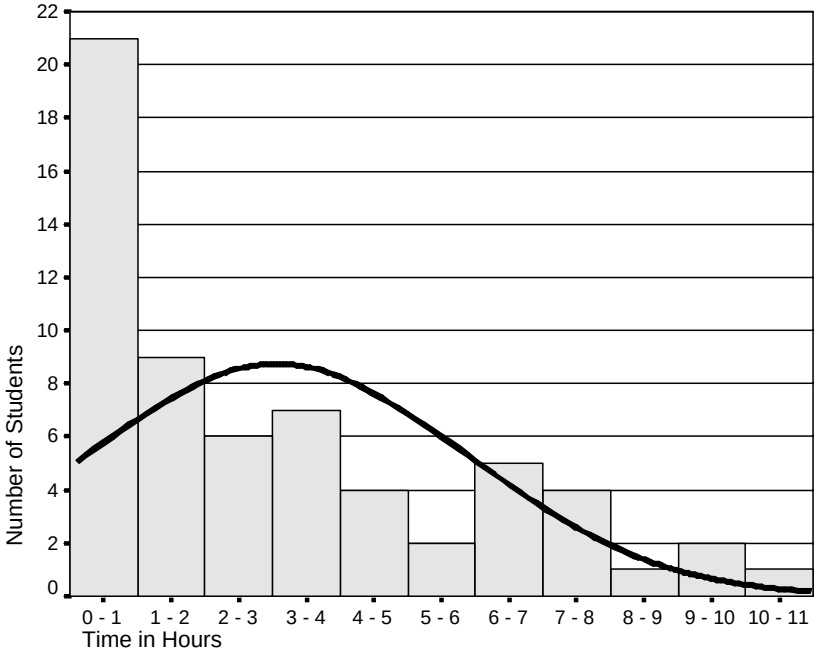
The chat page logs were analyzed individually in order to see the usage rate of the students. In the chat page, students had text-based chat object and this chat tool was open everyone attending the course. In every week during the regular laboratory hours, which lasted 2 hours, the instructor was connected to the chat object and join ongoing conversations. Beside that, the chat tool was open always and continued to recording logs. As it is shown in Table 4.18, the mean score was M=11021 seconds, which means 3 hours 3 minutes 41 seconds. Out of 65 students, 3 did not enter the chat site during the semester.

Table 4.18 - Descriptive Statistics of Time Spent in Chat

N=62	Time in Chat (Sec.)
Mean	11021
Std. Deviation	10179
Skewness	0.856
Std. Error of Skewness	0.304
Minimum	21
Maximum	37300

The time spent in the chat by the 62 students is demonstrated in Figure 2.

Figure 4.2 – Frequency Histogram of Time Spent in Chat During the Semester



The Skewness coefficient for the distribution curve was 0.856 that means a right or positive skewed. The mean score of 3 hours 3 minutes 41 seconds was affected by a few subjects' data and the central tendency was lower than the mean score.

4.6 Number of the Messages Posted in the Forum

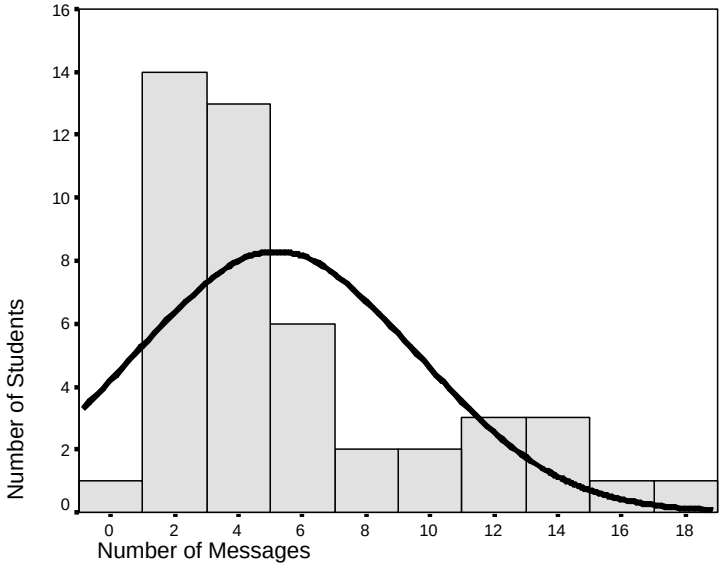
Forum tool was presented to students to allow asynchronous communication among the students and the instructor. During the semester, both as individuals or as group members, the students were expected to communicate through the forum and these messages were recorded by the forum software automatically. At the end of the semester, the log files were imported to SPSS and analyzed. Table 4.19 shows the descriptive statistics. The mean score was found to be M=5.17 of 238 messages for 49 students.

Table 4.19 – Descriptive Statistics for Number of the Posts in the Forum

N=46	Post Numbers
Mean	5.17
Std. Deviation	4.42
Skewness	1.241
Std. Error of Skewness	0.350
Minimum	0
Maximum	18
Sum	238

Beside the 238 posts by the students, the instructor sent 37 messages (15% of the students' posts) to the forum. As it is indicated in Figure 3, the central tendency was lower than the mean score since the distribution was skewed to right with Skewness statistic to be 1.241.

Figure 4.3 – Frequency Histogram of Number of Messages Posted to Forum



4.7 Comments

In each questionnaire, in addition to the Likert-type items, there was a open-ended question asking about the any other opinions of the responder related to the questionnaire's general domain. These comments were analyzed and presented in Table 4.20 as frequencies of grouped responses.

Table 4.20 – Frequencies of Comments in Three questionnaires

Comments on Web-Based Instruction	**F**
Forum is not useful.	5
Chat is effective in sharing problems.	1
I have a limited access to the web site	1
More practice resources should be included in the web site in addition to assignments and lecture notes.	1
Having such a web site was good	7
Comments on Online Collaborative Learning	**F**
There is no need to use the forum and the chat tools because of having a face-to-face communication option.	6
Including forum and chat use in assessment pressured the students and was undesirable.	4
Group working caused incomplete working	1
Group working was beneficial	1

Table 4.20 (Continue) – Frequencies of Comments in Three questionnaires

Comments on Online Instructor	F
Supporting students via chat during the laboratory works was not as helpful as by an assistant.	1
The instructor had a friendly relation with students and well-prepared for the course	4

All comments are grouped according to the questionnaire they were collected. In the first group, the comments obtained from WBIEQ were mostly cumulated on the forum usability. As indicated before, the forum software had been acquired as freeware from Internet. At the beginning of the semester, the usability tests were done except on the forum interfaces because it was impossible to make any modification on the interface. In five comments, the students stated that the using forum was difficult in terms of usability.

One student said that chat was effective in problem sharing, and another pointed out the wish that more practice resources should have been included in the web site in addition to assignments and lecture notes.

Another student stated that he/she could not have attended the forum since he/she had limited access to the Internet except the laboratory works.

Other seven comments were positive and appreciative thoughts about the having such a web site was good. These were not clear in deep and some were mixed with both positive and negative arguments stated above.

In the second group, the students wrote their ideas about collaborative learning in OCLEQ. The greater part of the comments was about that the face-to-face communication in classroom satisfied the students so they did not fell it necessary to use the forum and chat. There were six comments like this suggestion. Four students added that the same cause mentioned above, they were uncomfortable with the assessment including the use of forum and chat.

Beside these, one student stated that group work was beneficial socially, and another spoke that group working caused incomplete learning.

For last group, in Table 4.20, the students presented their ideas about instructor. There were four positive opinions about the instructor and one student said that there should have been a live assistantship in the laboratory works rather than the support of the instructor via chat.

The positive opinions about the instructor were actually not related with the online instructor characteristics and more about the interpersonal relations between him and the students.

CHAPTER 5

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

In this chapter, the discussions of the findings, implementations, recommendations for researchers and future research are presented.

5.1. Discussions

The purpose of the study is to understand the perceptions of the students about web-based learning environment in the blended learning environment in terms of web-based instruction, online collaborative learning and the instructor. The case study was carried out with 65 undergraduate students taking CEIT211 course at 2002/2003 spring semester at CEIT department. Three 5-scale Likert type surveys were distributed the students at the end of the term. In addition to that, time spent on the web site, number of posts sent to the forum during the semester, and comments about web-based instruction, online collaborative learning and online instructor were other data.

5.1.1. Web-Based Instruction

5.1.1.1. Quality of Content and Interaction

After using the web site, the students perceived the course content and the web site content as qualified and adequate (Mean= 3.98). The similar results came from the interaction perceptions (Mean is 3.89). The students found the web site as satisfying in terms of the interaction requirements like synchronous and asynchronous communication, content updating which was keeping the attention high. The site was

not a static environment. During the semester, as parallel with the ongoing topics, the content was being added with new documents, materials, and new resources. The flexibility in content editing in World Wide Web pages throughout ASP technology yielded dynamic environment. It can be said that the live content of the web site might let the students expect differences or new materials to face with in every time when they enter the site. Therefore, the content quality and the interaction on the web site are sufficient for the students.

5.1.1.2. Structure of the Web Site

In the same questionnaire, the students depicted their perceptions about structure of the site. The results demonstrate that they perceived the structure of the web site as convenient and they were comfortable with it (Mean score is 3.95). This assumption could be supported with two bases.

First one is the structure of the web site was constructed as similar to web-based learning site of Özden (2002a, 2002b, 2002c). His experience in the web-based learning might shape and create a web-based learning environment pattern.

Second one is the usability test done at the beginning of the semester. In the test, the basic interface and navigation features of the web site were observed with real users. As results of this test, some modifications were made. Thus, some possible structural problems might have already been recovered. Driscoll (2002) stressed the importance of easy-of-use in the navigation and clearness in instructions in the web site. He warned that the lack of such features might frustrate learners.

On the other hand, five students said that the forum tool was not usable in the comments of WBIEQ. As it is stated before, the forum tool was the only tool taken as a package, and adapted to the web site. There was no chance of modifying the interface or navigation in the forum tool, and the forum was excluded from the usability test.

However, the warning of Driscoll (2002) about navigational lack of tools happened in the case. The result of this frustration might affect the perceptions about computer

mediated communication. At first glance, the possible true action for the instructor or the designer of the web site would be that the forum tool should had been included in the usability test and according to the results, the training about the use of forum tool should be given at the beginning of the term.

5.1.1.3. Learner Support

Learner support in the web site was perceived as adequate. The agreement in the learner support (Mean is 4.05) shows that recovering the students' problems about both in technical and instructional issues was performed as expected. Actually, the technical issues were not severe, for example some students forgotten their passwords, and they asked to the instructor to get a new one. Easy to access feature allowed the students connecting the web site without any advanced software, in fact, web browser was the only tool needed to be used. Moreover, the learners were supported to communicate with and get feedback from the instructor by simple commonly used tools like emails, chat and forum.

With this perspective, it can be said that the web site carries minimum requirements fulfilling the students' web-based instruction perceptions (Overall mean is 3.96). Another data supporting this conclusion is the time measured. The average time spent in the web site for a semester was 14 hours, 55 minutes and 48 seconds for each student. When it is thought that the face-to-face lectures takes about 35 hours totally in a semester, it is possible to say that the web site expanded learning opportunities by about 40% of the classroom time. This additional learning differs also in that the learners were more active and self regulated to comprehend the content.

5.1.2. Online Collaborative Learning

In the second research question, it was expected to understand the students' perceptions about online collaborative learning. The results expressed slight agreement on the items in the online collaborative learning evaluation questionnaire with the mean of 3.41. When the sub-scales are examined, the similar tendency is observed in all five sub-scales.

5.1.2.1. Group Working

The first sub-scale is group working. The students' perceptions about it were slightly positive (Mean is 3.54). As instructor stated, during the group projects, while some students were willing to work in a group, there were some others asking the instructor for individual projects. The pleasure of working as a group for all students was reflected as statistically neutral, this may be due to students preferring individual work.

One may claim that the way used while selection of group members and project topics would produce the negative attitude on the group work. However, in this course's group projects, there were no obligations existed.

Another explanation may emerge from one student's comment. He said that the group work caused incomplete learning because of unequal work distribution among the group members. This argument may be a clue about the social interaction in this group.

Hatano and Inagaki (1999) put forth the group parameters characterizing the constructive interactions, that is collective invention of knowledge that none of the group's members can acquired or is likely to produce independently. Among the four parameters, the existence of a room for individual knowledge acquisition is one parameter that can explain the group that the student complained above. Hatano and Inagaki state that working as a group might solve a problem, or complete the project, but this does not mean that every members in the group acquired knowledge individually. They continue that individuals in the group may not solve the problem that they solved collaboratively because their own individually knowledge can accumulate in the group working and no additional knowledge acquisition may occur in the individuals. They based their arguments that, in that group works the knowledge has not been invented or represented in an explicitly stated and usable form for individuals.

Although the argument might be true, since it was stated by one student, the generalization might be false for all students and groups.

5.1.2.2. Computer Mediated Communication

In the second sub-scale, computer mediated communication (CMC), the students' perceptions are a little far away from the agreement with the questionnaire items. The mean score is 3.26, so it is better to say that they are neutral about CMC. The results allow saying that the collaborative learning in this course does not satisfy the students through online tools. As seen in the CMC results, although the forum and the chat tools in the web site were stated to be used rarely, the students declared that this did not cause any communication delay in a group work.

The low use of these tools can be identified with two other measures that are time spent in chat and number of posts. The mean score was about 3 hours spent in the chat for a term and it presents low participation. The numbers of sent to the forum by the students have a mean score of 5 for each student and it is also a low number for a semester. With those low participation scores and the students' neutral perceptions about CMC, the students may think that their communication was not delayed. In this case, it is possible to say that they preferred face-to-face communication rather that online ways. This conclusion is much safer than to be claimed with the comments directly asserting the same reasons for not using forum and chat.

In the comments written in OCLEQ, six students stated that there was no need to use the forum and the chat tools because of having a face-to-face communication chance. The similar thoughts were spoken out in the semester in informal dialogs between the instructor and the students. This result is very similar with the findings of Driver (2002), where the face-to-face interaction was preferred over the chat and the students did not use the chat tool.

Another comments expressed in the OCLEQ were that four students complained about including the forum and chat use in assessment as twenty percent. These opinions were discussed in the classroom lectures. The aim in grading online communication was motivating the students to make them familiar with online communication tools since there were countless programming resources in the Internet.

Other possible reason for low participation to the forum might be the lack of easy-of-use feature in the forum, stated by the students in comments of WBIEQ. Such design problems might discourage the students (Danielson, Lockee and Burton, 2000). Since the comments come at the end of the semester, the usability problem might be serious. The ultimate solution may be a short training about the forum at the beginning of the semester, or the design of forum tool may be adjusted for the students

5.1.2.3. Motivation

Third sub-scale was about motivation. The data obtained from the questionnaire remarked that the students' perceptions about motivation were a little high (Mean is 3.53). The only one low rated item in the motivation sub-scale was the sixth question that was about whether the forum and the chat were motivating. The students were disagreed with the statement. Beside this item, the students found the group work with their group members as motivating. The result can be expected after the CMC results where the forum and chat use were criticized. As a result, the students found group work motivating, but they believed that CMC was not motivating.

5.1.2.4. Learner Support

Learner support sub-scale results shows that the perception is slightly positive. The mean was 3.60, which was the highest score among the OCLEQ sub-scales. While a neutral perception is not a surprising result in the fifth item, which claims getting immediate feedback through forum and chat, the low score in the fourth item, which says that no difficulty existed in accessing the web site, is improbable. The similar question, item 20, in the WBIEQ had been responded to be 4.29 showing the easy access to the web site. This contradiction let to say that the low responses in the OCLEQ were marked by the students whose opinions had been affected by the general medial perception in the questionnaire. The other items show that the students have positive perception about the support of resources and the flexibility in time.

5.1.2.5. Benefits

The last sub-scale in OCLEQ is benefits. The mean score of 3.32 demonstrates that the students are in doubt with the benefits of online collaborative learning. The low scores in the 26th and 28th items (2.84 and 2.82 respectively) showed that they did not believe that working on the project through online communication was beneficial in terms of socialization and professional development. As parallel with the CMC perceptions, they did not accept as true that the forum and chat could improve their comprehension of the topic. Like motivation scores, the students' perceptions about benefits of collaboration were high but not about with online tools.

To sum up, the findings of the students' perceptions about online collaborative learning can be interpreted in a way that the online collaborative tools (forum and chat) were not used in the blended learning environment since there was a face-to-face communication chance in this study.

5.1.3. Online Instructor

The third research question was about the perceptions of the students about the instructor in terms of online instructor capabilities. With four sub-scales, the online instructor evaluation questionnaire (OIEQ) was administrated, and the overall mean score was found to be 3.83. From this point of view, it can be possible to say that the students' perceptions about online instructor were positive, which meant the instructor has usually accomplished the works and functions in the study.

5.1.3.1. Administrator Role

In the first sub-scale of the question, the administrator role of the instructor was analyzed by the students' perceptions. The mean score 4.05, which shows an agreement of the students' perceptions with the administrator role. The result can be stated like that the instructor arranged facilities and assisted the students to let them get benefits of the web site. The students valued the immediate feedback from the instructor. Therefore, it was important to deal with the problems of the learners and announcing daily changes as quickly as possible.

The efficiency of administrator role of the instructor might be fostered with the administrator options in the web site. Actually, these options were helpful for the instructor in terms of doing sequential tasks automatically and displaying the online movements and use of the web site. These were perhaps the tools helping the instructor giving immediate feedback and easy updating the content. For that reason, in such environments, where the content is dynamic and open to the modifications according to the individuals, the tools helping the instructor in his/her duties are beneficial.

5.1.3.2. Facilitator Role

Facilitator role of the instructor was tried to be understood from the second sub-scale of the OIEQ, and the mean score was found to be 3.73. The score is not enough to say the instructor facilitated well, but somehow. The lowest score in the sub-scale come from 11th item as 3.29. The item was asking whether the teacher contacted the students privately or by e-mail to ask noncontributing students to participate in discussion. The result showed that the nonparticipating students expected encouragement from the instructor.

The lack of facilitation was cautioned by Eastmond (1997). Eastmond claimed that the self-directed learning can be accomplished by the individuals, but it did not rest on the individual only, the facilitator and the institution needed to encourage it. In this study, the lack of facilitator role might affect the participation to online communication tools (forum and chat) so that the low number of participation was obtained.

One more medial result in the facilitator sub-scale was in 9th item with the mean score of 3.63. The item was about that if minimum 10% of the discussion postings were from the instructor. It seems to be that the instructor was expected to take the lead and encourage the discussions.

5.1.3.3. Technician Role

Another online instructor characteristic is the technician role. In the sub-scale of technician role, the students' perceptions resulted in the mean score of 3.92, which

demonstrated the almost high proficiency. The technician role granted by the instructor in solving the practical problems of the students related with the web site and related with the course content. Since the content of the course was about programming in Visual Basic, the students' perceptions might be reflecting the technical proficiencies in both web site and Visual Basic.

5.1.3.4. Evaluator Role

The last online instructor characteristic investigated in the study was an evaluator role. The statistical result of the mean of 3.80 can conclude that the students are nearly agreed with the items in the evaluator sub-scale. Once, students' pleasure might be appeared from that they had already known the all assessment criteria at the beginning of the course. Secondly, they might be happy with that the laboratory works were graded and announced as soon as possible, like within one or two days. These grades were giving feedback about their efforts and such rapid comments about their works. Another appreciation might be the assistantship of the instructor in finding related materials and directing the students to the resources on the Internet. This assistantship showed itself both as individual supports and as guiding the whole students through publications on the web site.

In conclusion, the students' perceptions about the instructor were positive almost enough to call him as an online instructor. Only doubtful role was seemed to be facilitator role where the more encouragement to nonparticipating students was expected from the instructor. Another conclusion might be that some tools, related to online environment management, can support the online instructor in terms of administrator role, like in this study.

5.2. Conclusion

After the data analysis, the main results addressing the research questions are presented as followings.

For the first research question of what the students' perceptions about web-based instruction are, the WBIEQ showed that

- The content of the web site was perceived as qualify by the students.

- The interactivity of the web site was suitable to the students.
- The structure of the site was identified as appropriate to the students.
- The support of the web site to the students was satisfactory.

For the second research question of what the students' perceptions about online collaboration were, the OCLEQ showed that

- The students liked group work
- The students' perceptions about CMC were neutral.
- The students found online collaborative learning somewhat motivating.
- The online collaborative learning supported learners.
- The students were not sure about that online collaboration was beneficial.

For the third research question of what the students' perceptions about online instructor were, the OIEQ showed that

- The students' perceptions about an administrator role of the instructor were positive.
- The students' perceptions about a facilitator role of the instructor were to some extent positive.
- The students' perceptions about a technical role of the instructor were positive.
- The students' perceptions about an evaluator role of the instructor were positive.

5.3. Recommendations for Blended Learning Environments

The study is a descriptive study, where the findings are very specific to this case, and generalization from the results might not be credible for other cases. However, in particular instances, the analogous features of the cases can let the stakeholders be inspired from the study.

In the blended learning environments, web-based instruction can enhance the learning environment in terms of time and place flexibility and alternative mode of instruction. The students can benefit from the web sites even with the face-to-face

instruction. Beside the low level of participation to the forum and chat in this case, there were many students using these tools. In the learning environment, it is not expected that every students are comfortable with the ongoing instructional strategies. Therefore, it might be better if the course could offer alternative, or additional, learning strategies and environments. Even for a small number of the students, engaging the web site or different learning options would help reaching targeted learning.

World Wide Web has been used in many distance education programs. The tools, which are used in distance education, may not work similarly in blended learning environments, where the conventional face-to-face instruction is combined with a web-based instruction. The need of the learners and the instructor might require different design of instructional environment. As this study depicted, students might prefer the face-to-face interaction to online communication tools, like forum and chat. However, the low participation does not mean there are no students using these tools. Still for some learners, the communication with the instructor or with the others is more attractive than face-to-face instruction.

Group work needs communication. In any learning environment, the students may be better if they are offered communication chance in order to get benefits from the group work.

The implication of the blended learning in the course may include activities engaging the online communication tools to make them more attractive. It seems that the instructor was slightly lack of the facilitator role in the environment. The student may get more positive idea about computer mediated communication if the instructor plans learning experiences, where the students are able to see the benefits of the tools directly in learning.

On the other hand, online environment management, also called as learning management systems (LMS), tools may simplify the administrative tasks of the instructor, so, provide for more time. Like in classrooms, the instructor may need to watch the actions in the online environment or arrange activities for online

environments. Such software systems are seem to be beneficial and should be integrated into design of the course.

5.4. Recommendations for Researchers

In order to understand what drives the students to acquire negative and positive perceptions about the dimensions in the research questions, it would be better to conduct qualitative focus groups after the perception surveys' results.

Moreover, a formative evaluation of the perceptions may be recommended for the researcher. During the semester, there might be changes in the perceptions depending on certain aspects, like midterm results, selection of group members or topics, or new added materials to the web site.

In order to increase the validity of the findings, the non-participative observation would be possessed. However, the participant observation in this case study let the researcher understand the case in dept. The researcher prevented the threats of participant observation by consultancy of field experts and specialist in al phases of the study.

The participation to the online communication tools were evaluated quantitatively in the study. The total time spent in the web site and in the chat session, and the numbers of posts sent to the forum were analyzed as participation indicators. The qualitative analysis of these usages may illuminate the forces behind the perceptions.

5.5. Recommendations for Future Research

Beside the contribution of the study, there seems to be further research in blended learning environments.

Firstly, a further research investigating both components, web-based instruction and the face-to-face instruction, of the blended learning environment may be performed to see the effects of the combined activities. The design of the face-to-face instruction may affect the students' perceptions about web-based instruction system.

Secondly, an additional research may explore the online communication style of the students in the blended learning. Some students in current study had used forum and chat frequently and stated they benefited of them, even though the number of them was small. The additional research may ask question that if the communication of those students through online tools is different, and if so, what makes this difference.

Third, a further research may be conduct to see the impact of the previous knowledge about how to collaborate or how to work in-group efficiently. Jonassen (1996) gives notice that collaboration is a rare strategy. He adds that in order to get most benefit from collaboration, students should learn how to communicate, how to assume a leadership, how to deal with a conflictions when them arise. Learners' collaborative learning skills may affect the perception and the way they use collaboration tools. A further research may show the extent of this effect, and if so, students may need additional training activities to gain collaborative learning skills.

Fourth, another research may investigate the attitudes and perceptions of online instructor about the blended learning. The instructor perceptions and attitudes may affect the performance on the online environment. Since the time and efforts spent on more than one environment is not negligibly small, the instructors' point of view is important in the evaluation of blended learning environments.

REFERENCES

1. Azmitia, M. (1999). Peer interactive minds. In D. Faulkner, K. Littleton & M. Woodhead (Eds.), *Learning relationships in the classroom.* (pp. 207-233). London: Routledge.

2. Bayram, L. (2002). Effectiveness of a Web-Based Tutorial on Computer Literacy for Pre-Service Teachers: A Case Study. Master's thesis, Middle East Technical University. Turkey

3. Berge, Z. (1995). The Role of the Online Instructor/Facilitator. *Educational Technology*, 35 (1), 22-30. Retrieved June 29, 2003 from the World Wide Web: http://www.emoderators.com/moderators/teach_online.html

4. Brannan, T. A. (2002). Learner interactivity in higher education: comparing face-to-face, hybrid and online instruction. Dissertation Abstracts International (UMI No. 3074977)

5. Buchanan, E. A. (2000). Assessment Measures: Pre-tests for Successful Distance Teaching and Learning? *Journal of Distance Learning Administration*, 2 (4). [Online]. Retrieved August 8, 2003, from http://www.westga.edu/~distance/buchanan24.html

6. Carlson, R. & Repman, J. (2000). Chalk dust from the virtual classroom: Building that human touch into your web-based course.*WebNet Journal*, 2(3), 9-11

7. Clark, D. (2002). Blended Learning (White Paper). Epic Group plc.

8. Cohen, L., Manion, L., Morrison, K. (2000). Research Methods in Education. London: Routledge & Falmer.

9. Collins, A., Greeno, J.G. & Resnick, L.B.(2002). Educational Learning Theory. In N. J. Smelser & P.B. Baltes, (Eds.), *International Encyclopedia of the Social & Behavioral Sciences.* (pp. 4276-4279)

10. Crook, C. (1996). Computers and the Collaborative Experience of Learning: A Psychological Perspective. New York: Routledge.

11. Crossman, D. M. (1997). The Evolution of the World Wide Web as an Emerging Instructional Technology Tool. In B. Khan, (Ed). *Web-based Instruction.* (pp 19-23). New Jersey: Educational Technology Publications, Englewood Cliffs.

12. Danielson, J., Lockee, B. & Burton, J. (2000). ID and HCI: A Marriage of Necessity. In B. Abbey. (Ed). *Instructional and Cognitive Impacts of Web-Based Education*. (pp. 118 – 128). London: Idea Group Publishing.

13. Driscoll, M. (2002). Web-Based Training: Creating e-Learning Experiances. San Francisco: Jossey-Bass/Pfeiffer.

14. Driver, M. (2002). Exploring students' perceptions of group interaction and class satisfaction in the web-enhanced classroom. *Internet and Higher Education*. 5, 35-45.

15. Eastmond, D. V. (1997). Alone But Together: Adult Distance Study Through Computer Conferencing. New Jewsey: Hampton Press, Inc.

16. Edelson, D. C., Pea, R. D., & Gomez, Louis (1996). Constructivism in the Collaboration. In B.G.Wilson, (Ed.). *Constructivist Learning Environments: Case Studies in Instructional Design*. (pp. 151-164). Englewood Cliffs. NJ: Educational Technology Publications Inc.

17. Ersoy, H. (2003). Bir Çevrimiçi Öğrenim Destek Sisteminin Kullanılabilirlik Testi: Planlama, Uygulama, Değerlendirme. Paper presented at International Educational Technologies Symposium and Fair. Gazi Mağusa, Turkish Republic of Northern Cyprus.

18. Fraenkel, J. R., & Wallen, N. E. (1990). How to Design and Evaluate Research in Education. New York: McGraw-Hill Publishing Company.

19. Hara, N. & Kling, R. (2000). Student distress in a web-based distance education course. *Information Communication & Society*, 3(4), 557- 579.

20. Harasim, L. (1987). *Teaching and Learning On-Line: Issues in Computer-Mediated Graduate Courses*. Canadian Journal of Educational Communication. 16(2), 117-135

21. Hatano, G., & Inagaki, K. (1999). Sharing cognition through collective comprehension activity. In D. Faulkner, K. Littleton & M. Woodhead (Eds.), *Learning relationships in the classroom.* (pp. 276-292). London: Routledge.

22. Hohn, R. L. (1995). Classroom Learning & Teaching. N.Y: Longman Publishers.

23. International Society for Technology in Education (ISTE) (2002). Educational Computing and Technology Standards for Secondary Computer Science Education Initial Endorsement Program. Retrieved August 4, 2003, from World Wide Web: http://www.ncate.org/standard/new%20program%20 standards/ ISTE_csed_2002.pdf

24. İnan, F. A. (2003). A design and development of an online learning support system for pre-service teachers: A discussion of attitudes and utilization. Unpublished master's thesis, Middle East Technical University. Turkey

25. Jonassen, D. H. (1996). Computers in the Classroom: Mindtools for critical thinking. Englewood Cliffs, NJ: Prentice Hall.

26. Kahn, B. H. (1997). Web-Based Instruction (WBI): What is it and why is it? .In B. H. Khan (Ed.), *Web-Based Instruction.* (pp. 5-18). Englewood Cliffs. NJ: Educational Technology Publications. Inc.

27. Kahn, B. H., & Vega, R. (1997). Factors to Consider When Evaluating a Web-Based Instruction Course: A Survey. In B. H. Khan (Ed.), *Web-Based Instruction.* (pp. 375-378). Englewood Cliffs. NJ: Educational Technology Publications. Inc.

28. Koç, S. E. (2002). Exploring the Students' Perceptions About Problem Based Online Learning Environment: A Case Study. Master's thesis, Middle East Technical University. Turkey.

29. Leflore, D. (1997). Theory Supporting Design Guidelines for Web-Based Instruction. In B. Abbey. (Ed). *Instructional and Cognitive Impacts of Web-Based Education*. (pp. 102 – 117). London: Idea Group Publishing.

30. Miller, S. M. & Miller, K. L. (1997). Theoretical and Practical Considerations in the Design of Web-Based Instruction. In B. Abbey. (Ed). *Instructional and Cognitive Impacts of Web-Based Education*. (pp. 156 – 177). London: Idea Group Publishing.

31. Lowther, D. L., Jones, M. G. & Plants, R. T. (2000). Preparing Tomorrow's Teachers to Use Web-Based Education. In B. Abbey. (Ed). *Instructional and Cognitive Impacts of Web-Based Education*. (pp. 129 – 145). London: Idea Group Publishing.

32. Maddux, C. D. & Cummings, R. (2000). Developing Web Pages as Supplements to Traditional Courses. In B. Abbey. (Ed). *Instructional and Cognitive Impacts of Web-Based Education*. (pp. 147 – 155). London: Idea Group Publishing.

33. Margules, D. (1996). Instructivism or Constructivism: Which end of the continuum? Paper presented at the 1996 AUC Academic Conference: Form Virtual to Reality. Retrieved June 15, 2003, from http//:auc.uow.edu.au/conf/Conf96/Papers/ MarguleD.html

34. Marques, O. Woodbury, J. Hsu, S. and Charitos, S. (1998). *Design and Development of a Hybrid Instruction Model for a New Teaching Paradigm*. Paper presented at meeting of Frontiers in Education Conference, Tempe, Arizona.

35. Mazzolini, M. & Maddison, S. (2003). Sage, guide or ghost? The effect of instructor intervention on student participation in online discussion forums. *Computers & Education* 40, 237–253

36. Merriam, S. (1998). Qualitative Research and Case Study Applications in Education. San Francisco: Jossey-Bass Publishers.

37. Microsoft Corporation. (2002). Learning Resource iNterchange (LRN) Toolkit, Version 3.0. [Computer Software] Retrieved August 10, 2003 from World Wide Web: http://www.microsoft.com/elearn/support.asp.

38. Özden, M. Y. (2002a). CEIT333-Online. [Course Web Site] Retrieved August 10, 2003 from World Wide Web: http://guide.fedu.metu.edu.tr

39. Özden, M. Y. (2002b). CEIT419-Internet for Teachers.[Course Web Site] Retrieved August 10, 2003 from World Wide Web: http://guide.fedu.metu.edu.tr

40. Özden, M. Y. (2002c). CEIT519-Online. [Course Web Site] Retrieved August 10, 2003 from World Wide Web: http://guide.fedu.metu.edu.tr

41. Passerini, K. & Granger, M.J. (2000). A developmental model for distance learning using the Internet. Computers & Education, 34, 1-15

42. Reeves, T. C. & Reeves, P. M. (1997). Effective Dimensions of Interactive Learning on the World Wide Web. In B. Khan, (Ed). *Web-based Instruction.* (pp 59-65). New Jersey: Educational Technology Publications, Englewood Cliffs.

43. Rogers, D. (2000). A Paradigm Shift: Technology Integration for Higher Education in the New Millennium. *Educational Technology Review.* 1(13), 19-33.

44. Romiszowski, A. J. (1997). Web-Based Distance Learning and Teaching: Revolutionary Invention or Reaction to Necessity? .In B. H. Khan (Ed.), *Web-Based Instruction.* (pp. 5-18). Englewood Cliffs. NJ: Educational Technology Publications. Inc.

45. Schilke, R. A. (2001). A case study of attrition in web-based instruction for adults: Updating Garland's model of barriers to persistence in distance education. Dissertation Abstracts International (UMI No. 3013802)

46. Shank, P. (n.d.). Asynchronous Online Learning Instructor Competencies. Retrieved June 29, 2003 from the World Wide Web: http//www.learningpeaks.com/instrcomp.html

47. Shotsberger, P. G. (1997). Emerging Roles for Instructors and Learners in the Web-Based Instruction Classroom. In B. H. Khan (Ed.), *Web-Based Instruction.* (pp. 101-106). Englewood Cliffs. NJ: Educational Technology Publications. Inc.

48. Shuell, T.J.(2002).Learning Theories and Educational Paradigms. In N. J. Smelser, & P. B. Baltes, (Eds.), *International Encyclopedia of the Social & Behavioral Sciences.* (pp. 8613-8620)

49. Simpson, O. (2000). Supporting Students in Open and Distance Learning. London: Kogan Page Limited.

50. Snitz™ Communication, (2003). Snitz Forums 2000 Version. 3.4.03.[Computer Software] Retrieved July 22, 2003 from World Wide Web: http://forum.snitz.com

51. Teles, L., Ashton, S., Roberts, T. & Tzoneva, I. (2001). The Role of the Instructor in E-Learning Collaborative Environments. *International Journal of Technologies for the Advancement of Knowledge and Learning*, 3(3) 46 - 50

APPENDIX A

WEB-BASED INSTRUCTION EVALUATION QUESTIONNAIRE

Please, first enter your name, surname, student number and an accessible email address. Then answer the questions about the web site of CEIT211.

Use the mouse to click on the "circle" in the column that indicates the level you agree or disagree with the ideas expressed. If you make a mistake, click on the correct choice and the previous choice will disappear. When you finish, press the **Send** button in the end of the page.

SD - Strongly Disagree, **D** - Disagree, **N** - Neutral, **A** - Agree, **SA** - Strongly Agree

Questions	SD	D	N	A	SA
1. The course objective(s) were clear and achievable.					
2. The web site contained more required activities for the user than optional activities.					
3. The web site provided access to instructor or other students (e-mail, listserv, chat rooms, and online conferencing).					
4. The course was accurate.					
5. The course was interesting.					
6. The course was appropriate to discipline.					
7. The course was appropriate to method of distribution.					
8. The web site has good navigational design.					
9. The web site has a complementary structure of similar, print-based materials.					
10. The web site has a reasonable structural organization (hierarchical, linear, etc.).					
11. The web site was clear, and used effective language.					
12. The web site was limited in typing errors.					

13. The web site provided application of content to practice.					
14. There was proper technical support for the web site.					
15. The material provoked insightful class discussion.					
16. The effectiveness of training was determined in terms of achieving the course objectives.					
17. The architecture of the web site facilitated students' ability to discern relevance in an ocean of information.					
18. The icons that were used for navigation were consistent and well defined.					
19.There was an opportunity for the students to provide informal feedback and evaluation concerning their thoughts on the learning experience.					
20. The material was easy for students to access. (download time, access to computer lab, materials)					
21. There was an advantage to use this technology than traditional methods.					
22. The web web site took full advantage of the capabilities of the medium.					
23. The design of links was consistent with the knowledge that the web site was intended to impart.					
24. Use of hypertext added value to this course topic.					
25. The web site took advantage of the powers of being online (something beyond just long pages of text).					

Any other comments

APPENDIX B

ONLINE COLLABORATIVE LEARNING EVALUATION QUESTIONNAIRE

Please answer the questions about CEIT211.

Use the mouse to click on the "circle" in the column that indicates the level you agree or disagree with the ideas expressed. If you make a mistake, click on the correct choice and the previous choice will disappear. When you finish, press the **Send** button in the end of the page.

SD - Strongly Disagree, **D** - Disagree, **N** - Neutral, **A** - Agree, **SA** - Strongly Agree

		SD	D	N	A	SA
1	The resources in order to search for answers for my questions were adequate.					
2	The forum was very beneficial to understand each other's ideas.					
3	I used the chat very frequently to communicate with the other group members.					
4	I had no difficulties in accessing the web site of the course.					
5	I was able to receive immediate feedback through chats and forums.					
6	The forum and chats increased my motivation towards the subject.					
7	Working as a team increased my motivation towards the subject.					
8	The mood of the team encouraged hard work for everybody.					
9	The number of people in my group was appropriate.					
10	I enjoyed working with my teammates.					
11	We could not accomplish this project unless we worked together.					
12	Working as a team made me understand things from different perspectives.					
13	Learning together was very beneficial to me.					
14	Working as a team improved my interpersonal skills.					
15	I understand the subject matter better working with teammates.					
16	The arguments in the group were fruitful.					
17	On many instances it was easy to conduct an online discussion.					
18	The group leader did a well job on summarizing things and scheduling.					

19	I would rather work alone for this project.					
20	Chats and forums improved my understanding of the topic.					
21	I was endowed with better skills to create a pleasing web site.					
22	The absence of social context did not effect me negatively to work on the project.					
23	All group members participated in online discussions equally.					
24	As a group, we did not have any communication delay.					
25	It did not take too much time to make decisions on the project through online communication.					
26	Working on the project through online communication helped my professional growth.					
27	Flexibility in time made me to work effectively.					
28	Working on the project through online communication socialized me.					
	Please Type Your Additional Comments on This Site, in the Following Box. 					

APPENDIX C

ONLINE INSTRUCTOR EVALUATION QUESTIONNAIRE

Please answer the questions about the instructor of CEIT211 course.

Please answer by clicking the most accurate answer on each item. After finishing the form, Please, do not forget to **send** your form. Thank you very much for assistance in this process.

SD - Strongly Disagree, **D** - Disagree, **N** - Neutral, **A** - Agree, **SA** - Strongly Agree

		SD	D	N	A	SA
1	Does the teacher return e-mails/posts within 24 hours?					
2	Does the teacher follows up student problems and try to find out solution?					
3	Does the teacher post timely bulletins about changes and updates to course?					
4	Does the teacher post the syllabus, course materials, discussion topics at the beginning of the course?					
5	Can the teacher cope all the questions raised by the students and respond in time?					
6	Does the teacher manage and guide student interaction and discussion?					
7	Does the teacher moderate discussion, models desired methods of communication?					
8	Does the teacher foster group learning?					
9	Are minimum 10% of the discussion postings from the instructor?					
10	Does the teacher provide public and private acknowledgment to students who contribute to discussion?					
11	Does the teacher contact the students privately or by e-mail to ask noncontributing students to participate in discussion?					
12	Does the teacher engages students, fosters sharing of participants' knowledge, questions, and expertise?					
13	Is the teacher proficient with all the systems used in the course?					
14	Does the teacher help students troubleshoot technical systems used in the course and refers to appropriate help sources, as needed?					
15	Does the teacher provide students with clear grading criteria?					

16	Does the teacher remind the students of the upcoming assignments?					
17	Does the teacher provide written examples of assignments/projects?					
18	Does the teacher provide resource ideas for completing assignments?					
19	Does the teacher assists students who are having problem completing the assignments?					
20	Does the teacher acknowledge the receipt of assignments within 24 hours?					
	Please Type Your Additional Comments on Instructor, in the Following Box.