THE PRESERVICE TEACHERS' PERCEPTIONS ABOUT ONLINE COMMUNICATION IN BLENDED LEARNING: A CASE STUDY

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ABSTRACT

THE PRESERVICE TEACHERS' PERCEPTIONS ABOUT ONLINE COMMUNICATION IN BLENDED LEARNING: A CASE STUDY

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This study aims to investigate the preservice teachers' perceptions about online communication in blended learning. The study tries to understand strengths and weaknesses of online communication from the learners' point of view. To reach this aim, four research questions are asked: (1) What are the learners' perceptions about the online synchronous communication tool? (2) What are the learners' perceptions about web-based support? (3) What are the learners' perceptions about collaboration with online communication? (4) What are the learners' perceptions about the roles of the instructor at blended learning as (a) administrator, (b) facilitator, (c) technician, and (d) evaluator? To answer the research questions, a case study in line with action research design was conducted. An undergraduate course in blended learning form was selected as a case and both synchronous and asynchronous communication tools were utilized throughout the semester. At the end of the semester, data about perceptions was collected via four questionnaires and interviews with the students. Both qualitative and quantitative results showed that the online communication facilities in the case were perceived to be adequate by the students. Yet, the students reflected diverse thoughts about preference of communication

modalities in synchronous communication. Moreover, the value of asynchronous communication was pointed out. It is concluded that communication needs, communication partner and other contextual factor have impact on selection of communication modalities.

Keywords: Computer mediated communication, synchronous communication, blended learning, students' perception, video conferencing.

ÖZ

HİZMET ÖNCESİ ÖĞRETMENLERİN HARMANLANMIŞ ÖĞRENİMDE ÇEVRİMİÇİ İLETİŞİM HAKKINDAKİ ALGILARI: DURUM ÇALIŞMASI

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Bu çalışma, hizmet öncesi öğretmen adaylarının harmanlanmış öğrenimde çevrimiçi iletişim hakkındaki algılarını araştırmayı amaçlamıştır. Çalışma çevrimiçi iletişimin güçlü ve zayıf noktalarını öğrencilerin gözünden anlamaya çalışmıştır. Bu amaca ulaşmak için dört araştırma sorusu sorulmuştur: (1) Öğrencilerin çevrimiçi eşzaman iletişim aracı hakkındaki algıları nelerdir? (2) Öğrencilerin web-tabanlı destek hakkındaki algıları nelerdir? (3) Öğrencilerin çevrimiçi iletişim ile işbirliği hakkındaki algıları nelerdir? (4) Öğrencilerin harmanlanmış öğrenimde dersi veren hocanın (a) yönetici, (b) kolaylaştırıcı, (c) teknisyen ve (d) değerlendirici rolleri hakkında algıları nelerdir? Bu soruları cevaplamak için eylem araştırma deseni içinde bir durum çalışması yapılmıştır. Lisans düzeyinde harmanlanış öğrenim biçiminde yürütülen bir ders çalışmanın durumu olarak seçilmiş, senkron ve asenkron iletişim araçları bir dönem boyunca kullanılmıştır. Dönem sonunda algı hakkındaki veriler dört anket ve görüşmeler yoluyla toplanmıştır. Nitel ve nicel bulgular göstermiştir ki durumdaki çevrimiçi iletişin olanakları öğrenciler tarafında yeterli düzeyde algılanmıştır. Yine de öğrenciler senkron iletişimdeki iletişim kanalı

seçimlerinde farklı düşünceler belirtmişlerdir. Öte taraftan, asenkron iletişimin değeri de vurgulanmıştır. Sonuç olarak, senkron iletişimde, iletişim kanallarının tercihinde iletişim ihtiyaçları, iletişim kurulan kişi ve diğer yerel etmenlerin etkisinin olduğu söylenebilir.

Anahtar Kelimeler: Bilgisayar destekli iletişim, senkron iletişim, barmanlanmış öğrenim, öğrenci algıları, video konferans.

Sevgili Eşime…

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CHAPTER 1

INTRODUCTION

1.1. Background to the Study

With the help of the advancements in computer networks, the current Internet and communication technologies provide people with opportunities more than simply sending messages to each other. By coding text, sound and vision into electronic signals, high-bandwidth Internet connections transmit words, voices and pictures in seconds to someone else around the world. Hence, the communication of two people via computer mediated communication (CMC) has become more qualified, efficient and information rich. From textual messages to video conferencing, various communication modes enable people to access, talk and listen to each other simultaneously and more easily.

Education is not an exceptional field that the blessings of the Internet and related communication technologies are diffusing every day. With numerous software and tools, instructors and students access each other through computers over distances. E-mail, discussion lists, chat software and other instances of online communication are becoming indispensible components of instructional design.

With the constructivist paradigm of learning and the availability of various forms and tools of CMC technologies, stakeholders in instructional design have been challenged to integrate CMC into instructional settings. Distance education is the major field that offers computers and the Internet to make communication over distances possible, fast and cost effective. On the other hand, the decrease in the cost of electronic equipment and connection fees with respect to 1980s and 1990s fastened the spread of CMC technologies at every home and schools. Either with the name of blended learning or without using the term explicitly, the Internet and CMC technologies have become part of regular course activities. Therefore, the use of

CMC technologies exceeded the border of distance education programs and were welcomed at conventional education.

Learners in conventional education can benefit from CMC as much as distant learners can (Ersoy, 2003). For example, in a blended design, face to face instruction and any other CMC mediated instruction are combined in various formats (Marques, Woodbury, Hsu & Charitos, 1998). Today, it is not rare that a lecture of an undergraduate course in a classroom may be followed by an online discussion session through a forum. Similarly, an individual practice may be supported with synchronous chat with the instructor at any time. CMC facilities in blended learning environments may provide learners with engagement in instructional activities, in addition to classroom attendance, like discussions at forums or debating with the instructor at a chat room.

Online communication in blended learning can be achieved by two types of communication modes: Synchronous (real time) and asynchronous (delayed time) communication (Romiszowski & Mason, 2004). In synchronous mode, communicators send and receive messages immediately like face-to-face talking. Either by textual messaging or video sharing people interacts with each other in real time. In asynchronous mode, two people send and receive messages to each other at different times, like sending an e-mail.

At the beginning, synchronous communication was limited to textual messaging because early technologies and capacities of computer networks were not capable of transmitting large amount of data over distances. Then, recent communication technologies and connection speeds have came to the point that a high-quality multi channel communication over the Internet is possible. Today, it is possible that two people can watch and listen to each other via web cameras, in addition to textual messaging, and can share documents in affordable costs. There are many chat software which provide video conversations, in addition to a basic textual messaging; for example, Microsoft Windows Live Messenger™, Yahoo Messenger™, etc. With this software, participants can connect to each other, send textual messages, watch

each other via web cameras, talk and listen to each other with microphones and speakers.

There have been many research studies about the use of CMC in education since the emergence of communication technologies. While most of them resulted in significant and positive differences in learning, there are others that reflect no significant differences (Harasim, Hiltz, Teles, & Turoff, 1995). Showing the strengths and weakness of synchronous and asynchronous communication, research agenda of CMC is still full of questions about various dimensions (Romiszowski & Mason, 2004).

Constructivist paradigm of learning is a theoretical base for the use of CMC application in education, since it emphasizes communication among learners to construct their own meanings (Duffy & Cunningham, 1996). By utilizing online communication tools, learners can participate in collaborative learning activities, like group work and cooperative learning. Online discussions and text-based messaging facilities provide learners with faster assignment return, more immediate feedback, robust model for queries with greater perceived reliability, increased interaction with the tutor and other students, extending learning experiences beyond the tutorial, and the Internet experience (Romiszowski & Mason, 2004). With their peculiar advantages, many CMC technologies have been integrated into conventional education.

1.2. Purpose of the Study

The aim of many CMC research studies is to obtain CMC tools resembling face-to-face interaction in the classroom. For example, Shank (2004) claims that online learning environments should have similar social interaction types that occur in face to face interaction. New synchronous communication tools are capable of connecting learners and instructors not only by textual mode but also by audio and video. Thereby, transmission of both verbal and nonverbal cues is possible over CMC technologies. This capability enriches the quality of communication in term of social presence, which is the degree to which a person feels socially present or perceived as

a real person in mediated communication (Gunawardena & McIsaac, 1996). By increasing intimacy and immediacy at communication (Gunawardena & McIsaac, 1996), video conferencing approximates face to face interaction.

On other hand, since these capabilities of computer networks and related communication technologies have just become accessible and affordable in education in the last few years, empirical studies of video conferencing are quite new and most of the synchronous communication studies deal with text-based instant messaging. Research on synchronous audio/video communication is required to improve the online communication in blended learning.

The purpose of this study is to investigate the learners' perceptions about online communication. By introducing a synchronous communication tool application into a course in a blended form, the study aims to describe strengths and weaknesses of online communication from the learners' point of view. To achieve the research purpose, new synchronous communication software was developed and implemented in an undergraduate course, and then learners' perceptions were investigated. Due to the fact that the applications in this study were conducted in real time, the investigation of perceptions of synchronous communication required relatively long period of time, which was a fourteen-week semester. Because of the contextual aspects of the course in blended form, the implication of synchronous communication facility approached as a unique situation; therefore, a case study approach was decided on.

The new features of synchronous communication tool in the case are:

- Audio/video conversation among participants
- Publishing audio/video conversation to all participants in real time
- Instructor control of conversations in terms of time to start/finish.
- Text-based simultaneous messaging for all participants in real time

Some of these features exist in commercial software. For example, peer to peer video conferencing is possible in many commercial applications, and textual messaging is very common via large number of software. However, publication of video conferencing among all participants is very rare. In order to study perceptions, a singe tool was developed and used in the study. The tool is described in the Method chapter in depth.

1.3. Research Questions

In order to reach the research purpose, four research questions are formed:

Research Question 1: What are the learners' perceptions about the online synchronous communication tool?

Research Question 2: What are the learners' perceptions about web-based support?

Research Question 3: What are the learners' perceptions about collaboration with online communication?

Research Question 4: What are the learners' perceptions about the roles of the instructor at blended learning as (a) administrator, (b) facilitator, (c) technician, and (d) evaluator?

Perceptions about the tool are important to be understood, since the tool itself may affect the general perception toward online communication. The particular features of the tool, its user-friendliness, and other aspects of the tool may render learners gain positive or negative attitude toward online communication.

Rather than a stand alone implementation, synchronous communication and the tool developed for it are the components of a web-based support in the blended learning environment. Web-based support is serviced over a web site to the students and the instructor. In order to see if the web site and web-based support met the expectations of the learners, perceptions about the web site and web-based support are questioned.

Collaboration over online communication is important gain for learners either in distance education or in conventional education. By working on group projects, learners are provided with both synchronous and asynchronous CMC tools. Therefore, their perceptions about collaboration within the case are important factor to elaborate on and might give insight for further implications.

By integrating CMC and web-based technologies into the learning environment, the roles of the instructors evolve both theoretically and practically. Administrator, facilitator, technician and evaluator roles of the instructor conceptualize various tasks. As the last question, perceived roles of the instructor in blended learning are investigated. The behaviors of the learners in online communication would be related to their perceptions of the of roles of the instructor.

1.4. Significance of the Study

In parallel with the advancements in computer networks, learning environments would reflect the tenets of learning theories by various forms and tools. Understanding the effectiveness of the use of synchronous CMC with new capabilities is necessary in order to benefit from technology in learning. By the exploration of real implementation, this study would discover particular aspects of synchronous communication by audio/video.

By reflecting student's perceptions about synchronous communication, this study will contribute to generation of blended learning models integrating CMC into learning environment.

The instructors or other stakeholders in instructional technology can benefit from the study by observing the case and obtaining valid rationales for their cases implementing CMC tools efficiently.

For the case under investigation, the study would determine the effectiveness of online communication in learning, and provide a revision plan for the course. This revision would target various components of the environment. First, a synchronous communication tool would be modified according to the results. Second, the web-

based support for learners would be improved so that it better presents what the learners expect. Third, the effect of online communication in collaboration would approve itself with the new synchronous forms of interactions. Fourth, the data about perceived roles of the instructor would yield suggestions about which adequacies of the instructor are important at such environments.

Although generalizability of findings of a case study is not aimed in nature, the description of online communication within the case would enlighten practitioners on the design and implementation of applications within similar contexts.

1.5. Definition of Terms

Computer Mediated Communication: All electronic communication software that run over computers and systems that construct a network for this software. It includes e-mail, web-based discussion systems (forums, blogs, discussion lists, etc), synchronous communication systems (chat, instant messaging, audio/video conferencing tools).

Blended Learning: It is a learning environment that combines face-to-face instruction with computer mediated communication (Graham, 2006). This combination can be in four levels: activity level, course level, program level and institutional level (Graham, 2006). In this case study, it is the course-level combination where some activities are carried on face to face, and some others are conducted at online.

Video Conferencing: It is a synchronous communication way where more than one participant sees and hears each others simultaneously. In this case it requires special equipments (computer, web camera and microphone), software and Internet connection. For more professional systems, other tools designed for high quality image and voice transmission are used and special rooms are decorated for clear voice and bright light effects. However, in this study it is a simple conferencing that regular home users can effort.

Constructivism: It is an umbrella paradigm which describes learning as a knowledge construction process in social interactions within authentic environments (Duffy & Cunningham, 1996). In brief, Duffy and Cunningham categorized various learning theories to be rooted in either cognitive-constructivist or sociocultural-constructivist, where the former approach knowledge construction with respect to cognitive perspectives, the latter focuses on communication of learners with others. In this study, the latter part of the constructivist theories is addressed in integrating CMC into learning.

CHAPTER 2

LITERATURE

In this chapter, the literature related to the research purpose and questions are presented. The two main focus points are computer mediated communication (CMC) and blended learning. Synchronous communication is approached to be the bridge point between these two main frameworks. Use of instant messaging and video conferencing take special attention in this literature since the study tries to understand the pros and cons of the use of video-conference-enabled online communication in blended learning environment.

2.1. Computer Mediated Communication (CMC)

Computer mediated communication (CMC) is an organized interaction among people in various forms via computers or computer networks as the medium of communication (Romiszowski, 1997). Electronic mails, forums, discussion lists, chat and computer conferencing are the simple tools under the CMC title. In this section first the theoretical background of CMC technologies are presented. Then, its categories in terms of synchronicity and their relative benefits in educational activities are overviewed.

2.1.1. Theoretical Background of CMC

As new communication technologies offer an access to resources and people without time and distance constraints, 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). Constructivist theory claims that learning is a knowledge construction process through active learning and collaboration. Interactions with the content and with others in the learning environment are two promises of CMC valued by constructivists (Romiszowski & Mason, 2004).

While implementation of CMC tools and strategies has roots in constructivist approach of learning, how learners interact with these tools and with the content of communication are investigated from cognitive perspective, especially by human information processing model. This model explains how human memory acquires, transforms, encapsulates, synthesizes, stresses and uses information obtained from our sensory registers. (Moore, Burton, Myers, 2004). Multiple-channel communication (Broadbent, cited in Moore et al, 2004), cue-summation (Severin, cited in Moore et al, 2004) and dual coding (Paivio, cited in Moore et al, 2004) theories originate from the information-processing approach and explain how and why students act in communication.

Social Presence

Despite its merits, online communication is criticized due to its lack of providing interactions like in face to face interaction, where participants use more cues than words, like body language, mimics, body movements and eye contact. In deep overview of CMC, Gunawardena and McIsaac (2004) explained social presence as follows:

> Social presence is the degree to which a person feels "socially present" in a mediated situation or the degree to which a person is perceived as a "real person" in mediated communication. (p. 363)

Short, Williams and Christie (1976) explored social presence by two terms: intimacy and immediacy. Short et al. suggest that "the social presence of the communications medium contributes to the level of intimacy that depends on factors such as physical distance, eye contact, and smiling" (Gunawardena & McIsaac, 2004, p.363). From that perspective, video conferencing creates greater intimacy than text based communication tools, like chatting, since it can transmit nonverbal cues such as eye contact and smiling. Similarly, immediacy is a "measure of the psychological distance, which a communicator puts between himself or herself and the object of his/her communication." (Gunawardena & McIsaac, 2004, p.363) Immediacy or non-immediacy can be obtained by verbal or nonverbal cues in interaction. For example, the distance of two people, formality of dialogues and facial expressions generate

immediacy. According to Short et al.'s argument, "social presence is both a factor of the medium, as well as that of the communicators and their presence in a sequence of interaction." (Gunawardena & McIsaac, 2004, p.363). Because of its ability to convey audio and video information, video conferences can generate social presence which makes CMC closer to face to face interaction.

Transactional Distance

Moore (1997) defined the amount of dialogues between a learner and an instructor as a transactional distance. According to Moore (1997), if there is little dialogue between the learner and the instructor, probably due to the very structured course design, then there is greater transactional distance. While traditional distance education programs have very structured courses and a few communication facilities, Moore claims that the transactional distance at these courses is great. As online communication increases the communication facilities in distance education (even in conventional education), CMC can reduce the transactional distance and allow more collaboration. (Gunawardena & McIsaac, 2004)

Interaction

Interaction is another construct which determines the effectiveness of both distance education and traditional education. By communicating in two-way, instructors and learners consider each others' thoughts and needs and therefore behave accordingly. Interaction not only occurs between the learner and the instructor, but it also exists between the learner and the content; and between the learner and learners (Moore, 1989). Either engaging in an interaction or perceiving the potential of interaction increases the learner's satisfaction with the learning environment (Fulford & Zhang, 1993). Kearsley (1995) emphasizes that the need of interaction should be determined and related arrangements should be made. For example, Kearsley makes a distinction between immediate and delayed interaction, and argues that providing inappropriate logistics for different interaction needs will cause failure in gaining from interaction and even in obtaining efficient learning. For instructor-learner and learner-learner

interaction, CMC can offer both synchronous (immediate) and asynchronous (delayed) communication in an easy and efficient way.

Collaborative Learning

Collaborative learning is an instructional method where students work together as groups to accomplish shared goals (Johnson & Johnson, 2004). Although it is used interchangeably with the cooperative learning, collaborative learning is defined to be less structured in terms of shared group aims and members interdependentness. However, in this study, both terms will refer to the same mean and review of literature will cover both cooperative and collaborative learning studies.

Johnson and Johnson (2004) defined collaborative learning within four types: Formal cooperative learning, informal cooperative learning, cooperative base groups and academic controversy. In formal groups, learners work in groups for a specific period of time like a day or a semester. Their group has a certain purpose for which each member study interdependently. Informal cooperative groups are more contemporary groups joint for a couple hours within a lesson. Cooperative base groups are work together for longer period of time and aim to support each others around certain subject matters. Adjusting a reading and discussion meetings one a week by the research assistants can be count as base groups. Academic controversy is a strategy for discussion diverse opinions by constructing a group. Pupils in the group argue their own perspectives and try to get consensus.

The literature showed that, participants working together learn more than those who study alone (Johnson & Johnson, 1990). However, this does not mean that every group working is effective. Clark and Mayer (2003) gave suggestions for successful group working:

1. Make assignments that require collaboration among learners
2. Assign learners to groups in ways that optimize interaction
3. Structure group assignments around products or processes

Clark and Mayer (2003) emphasized that the interaction among group members is core point and instructors should pay extra attention in creating collaborative tasks which desire interaction from students.

Gunawardena and McIsaac (2004) stated that "media plays a critical role in linking the teacher and learner and providing for the two-way exchange of communication that is so necessary for the teaching and learning." (p 364). Especially, in distance education, two-way interaction is arrived by developments in telecommunications technologies. Gunawardena and McIsaac noted that for distance learning, asynchronous communication is more convenient foot learners because they join distance education programmes to be time and place independent. However, Gunawardena and McIsaac agreed that recent audio and video conferencing tools provide two way interactions for group of learners so that collaborative learning may gain from those implementations.

The learning outcomes of CMC in collaborative learning can be different in face to face environments. Johnson and Johnson (2004) requested the empirical studies on such applications:

> The unique strengths of technology-supported cooperative learning have not been assessed and documented. The impact of technology-based cooperative learning on relationships among students (especially in face-to-face and non-face-to-face situations and among diverse individuals) has not been studied."

2.1.2. Synchronicity of CMC

A major difference in various CMC tools and techniques lays in the timing of the communication: synchronous or asynchronous. 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 the other side 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 be accessed after a period of time (Romiszowski & Mason, 1996).

Asynchronous communication enables people to engage in effective learning activities by providing a sense of community, keeping learners connected to the course and others, motivating them to participate in discussions and creating a community of practice where the participants engage on common works (Driscoll (2002). However, Driscoll (2002) alerted that there are certain challenges in asynchronous communication. For example, learning the usage of the tools can be difficult and participation requires good writing skills. Low quality of messages or excessive amount of content may frustrate learners. Keeping participants attracted to the discussion also requires extra effort for instructors.

Another advantage of asynchronous communication is the time available for participants to elaborate on the content before continuing on dialogues (Romiszowski & Mason, 1996). This time, the participants have a chance of revising own thoughts, referencing other resources and looking at previous dialogues.

Synchronous communication, on the other hand, joins participants in a virtual environment where the messages are sent and received immediately. This immediacy can motivate the learners. Moreover, by conducting synchronous communication over audio and video channels, perceived distance between the participants reduces. Besides, by transmitting images and voice to interlocutors, participants can take the advantage of using accent and mimics in communication, therefore increase social presence in communication (Hackman & Walker, 1990).

2.1.3. Educational Practices of CMC

Distance education is the major field integrating CMC to learning environments. By eliminating time and place constraints, research on distance education showed that CMC technologies not only increased the efficiency of distance education programs, but also enriched the instructional strategies by providing access to resources and two-way interactions among learners (Gunawardena & McIsaac, 2004).

Beside distance education, CMC provides communication ability over computer networks in traditional education. For example, people can read messages, respond in

any time and any place, or join into online group discussions in regular schools. This way of communication may be more efficient than face to face interaction in some situations. While face-to-face communication benefits from using interpersonal and social contact, including non-verbal communication channels like body language, and so on; it also has some limitations in terms of time and number of active participants in a conversation. With the use of CMC, many students can be communicated and supported through the Internet cheaply, immediately and attractively (Simpson, 2000). Being able to archive dialogues and refer to them later is another advantage of CMC medium as compared to face to face communication. Students may recall and examine the past dialogues recorded by CMC tools (Romiszowski & Mason, 2004).

2.1.4. Instant Messaging

Instant messaging (IM), (or chatting), is a real-time text-based communication. 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 to 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.

Today, it is easy to find software for instant messaging. The most well known applications are Microsoft Messenger, Yahoo Messenger, Skype and ICQ. All these application are software packages which need to be installed on a personal computer of the participants. There are others which do not require any installation and work at an Internet browser like Google Talk. The common thing in all of this software is that the participant connects with a username and password and starts messaging.

Although the communication modality (textual, audio or video) in these applications is diverse and enhances by time, the term instant messaging mostly refers to text based messaging. In this form, instant messaging is criticized by lack of social interactions because of its inability to convey nonverbal cues (Walther & Parks, 2002). To fill the gap of nonverbal cues, some partial solutions have been added to

IM applications like using avatar images, emotional icons, sound and other visual elements.

In comparison of IM to face to face, conversations in these environments differ in that, in IM participants are somehow anonymous to each other (Caplan, 2007; Tanis & Postmes, 2007), located in comfortable and secure place (at home or at own offices) (Turkle, 2004), and able to select the topic of discussion (Greenfield & Subrahmanyam, 2003). Therefore, IM conversations increase motivation by providing a place for individual interest, personality and desires.

Lipinski-Harten (2008) claimed five differences of IM conversations, as compared to face to face (FTF) dialogues. These differences are clear and effective information transmission in IM, reduced discomfort in IM, reduced topical breadth and greater depth in IM, reduced sensitivity to the conversation partner in IM and reduced relationships interest in IM.

2.1.5. Behaviors of Interlocutors and Unique Features of Instant Messaging

Hudson (2007) discussed the unique characteristics of IM environments in terms of certain behavioral features and the effect of these behavioral features to learning. Hudson states that IM environments decrease inhibition and provide better conversational equity than face to face interaction. He explains that chat environment decreases public self-awareness (considering what others think about you) and increases private self-awareness (considering your own motivation and aims). By these ways chat environments reduce inhibition.

Similarly, Hudson (2007) says that there is a relationship between social status and inhibition. The reference of social status can be race, gender, physical attractiveness, popularity, explicit power relations (like instructor and student) and academic ability. In small groups, the social status results in dominance of individuals who are superior to others. The dominance of some individuals ceases the participation of others which is detrimental for learning in classrooms.

Hudson (2007) claims that chat environments can balance the participation in favor of those who are disempowered by social status. Especially, text based chat is the most effective environment for educing social status differences, followed by audio and video based chat environments, as second.

In compassion to face to face discussions, Hudson (2007) concludes that chat environments discourage conversational dominance by an individual not only by denying individual mechanisms to control the floor, but also by reducing the inhibition perceived by disempowered students. He adds that, the effect of communication medium does not affect the quality of discussions, to the extent other factors do. Lastly, he notes that the efficiency of online discussions are lower than face to face discussions because it takes more time to achieve quality discussion due to time loss in typing and other tasks engaged during chatting.

In a different manner, Hudson (2007) defines the synchronicity of CMC not as a binary distinction but rather as a continuum. In this continuum, chatting is not as synchronous as face to face interaction, since the participants have time to think and send messages. Although this period of time is very short, it makes a difference for participants and lets them feel more comfortable in online communication.

2.1.6. Video Conferencing

Video conferencing is a communication channel or modality through which the camera images (most of the time with the audio) of the participants are transmitted to each other simultaneously. In this real-time communication, one or more than one participant may broadcast video streams to others. It is called conference because there is two-way communication among participants, either over video channel or over text based messages.

Availability and quality of video conferencing is strongly dependent on the connection speeds of participants. While some commercial firms establish private connection lines between two locations to transmit high quality video images (like TV channels), for regular users, their Internet connection at home or offices is the

only way to conduct video conferencing. For that reason, the spread of video use conference has been waiting to increase in connection speeds for years.

Use of video conferencing as a synchronous communication channel is quite new in education. It was after 1990s when both connection speeds and software required to encode and send video images became available in daily life. Today in Turkey, the connection speeds came to the point that joining a video conference is possible and not costly. By the minimum connection speed of 512 Kbps in ADSL services, many home users and schools got the chance to get involved in such meetings.

In terms of effectiveness of video conference in learning, there is, relatively, small number of research studies and those indicated diverse results. With very strong impact of contextual factors, research on video conferencing showed both success and failure stories. For example, in a trial project, Freeman (1998) tried integrating video conferencing into a solution for creating multi campus instruction. While an instructor was talking in one classroom to 250 students, his video and audio was broadcasted to another campus of the university. At the remote campus, 80 students were watching the video conferencing simultaneously in an amphitheatre where the image was projected onto a wide screen. After the quantitative and qualitative data analysis, Freeman (1998) admitted that the study had failed to meet the expectations of cost efficiency and improving learning, but had achieved only perceived equity in access to the instructor. Freeman also reported unexpected technical difficulties and lack of motivation of the lecturing staff.

On the other hand, Legutko (2007) implemented video conferencing with four college students by Microsoft NetMeeting, which is a freeware distributed within the Microsoft XP operating system. Legutko used textual messaging, audio conferencing and white board facilities of the application and said that the students had been quite satisfied with the online communication.

Coventry (1995) reported that the primary factor in reaching effectiveness of a video conference is the quality of inputs: image and voice quality. Imperfect image quality (due to lighting, equipment capacities, etc) will reduce the chance of obtaining

successful interactions. Coventry underlined other factors which have impact on the success of a video conference:

- Critical preparation
- Site logistics
- Microphone issues
- Leadership
- Timing
- Non-verbal and verbal communication
- Enhancement of interpersonal skills
- The issue of control for the instructor
- Information dissemination
- Media to use
- Site involvement
- Variations in teaching skills and instructional strategies
- Training requirements

All these factors are underlined for professional systems rather than for a desktop video conferencing; however, many of them apply to IM with video conferencing to benefit from any synchronous communication system.

In a blended learning environment, Grant and Cheon (2007) studied how synchronous conferencing influenced teaching and learning. They found that despite the positive perceptions of video conference, face to face interaction could not be replaced with video conferencing. Grant and Cheon also emphasized that there should be great focus on technical issues, the training of the teacher and the instructor, and teaching strategies. In their experimental research study, they found that technical quality was the highest contributor to instructional quality; and relative to video quality, audio quality was important for synchronous conferencing. They added that "without training session, a class may have pauses and delays because it is difficult to just ignore a person who has a technical problem." (p 223)

In many studies, video conferencing is reported as increasing social presence, (Weisz, Kiesler, Zhang, Ren, Kraut, & Konstan, 2007), active support (Alexander,

Higgison, & Mogey, 1999; Chan, Tan, & Tan, 2000) and convenience (Alexander et al., 1999).

2.2. Blended Learning

Blended learning, as defined by Graham (2006), involves learning systems that combine face-to-face instruction with computer-mediated instruction. Marques, Woodbury, Hsu and Charitos (1998) define blended learning as an instructional model

> …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)

According to this definition, it is an instructional model or instruction (as Marques et al referred) that combines two or more instructional models. However, there is no consensus on its definition. The term "blended learning" is used interchangeably with "hybrid instruction" in many sources. The first one will be used in this report.

Clark (2002) claims that blended learning is not new. In his descriptive report about blended learning, he extended the definition of blended learning beyond the current Internet and 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 into educational settings in a blend with the existing environment.

By considering the Internet as the largest single learning resource in the world, 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 blended components in a sustainable fashion to learners.

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, be scalable to targeted number of learners within available resources, like human resources, physical infrastructure, technical resources and budget, and be suitable for the organization culture in terms of attitudes, management, etc.

By paying a special attention into the content, learners and the resources; Graham (2006) suggested four steps to obtain good blends: (1) Designing lessons with well-known methods and technologies, (2) avoiding complexity by eliminating unnecessary tools, (3) using a tool or a method when and where it is needed, and (4) relating different methods and tools in a rational way.

2.2.1. Strengths and Weaknesses of Blended Learning

Graham (2006) stated five strengths of blended designs. First, blended learning improves learning in terms of academic achievement (Garrison & Kanuka, 2004). Second, it provides combination of best sides of existing methods. Third, by reducing effort in accessing resources, it increases efficiency. Fourth, by employing CMC tools, it creates an environment for collaborative learning. Lastly, it prepares learners for employment by experiencing in the similar technologies.

By definition, various technologies can take place in blended learning environments. This diversity comes up with some biases because of inabilities in computer literacy or in related certain technology. Also lack of resources in institutes or schools

impedes stakeholders converting traditional education into blended learning. While pointing out these weaknesses, Graham (2006) argued that there is no need to try to integrate all technology because every blend requires special design according to contextual factors. Moreover, there are plenty of freeware applications which are as rich as commercial ones in terms of functionality and usability.

The most important weakness, probably, is poor designs where a lot of technological tools are utilized without meaningful rationale. Graham (2006) claimed that

> Good tools alone do not ensure a good lesson. Just as a good textbook can be poorly used, a good movie, software programme, or entire lesson plan also can be poorly used. Why have students spend days doing by computer what they can do by hand in a few minutes? Learning methods and tools need to be used well in conjunction with each other. Careful thought needs to go into making a good blend. (p. 119)

Not every combination is called blended learning. 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)

Chew, Jones, and Turne (2008) underlined that in every blend of educational technology and education there should be educational science and social science. 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)

2.2.2. Instructor Roles in Blended Learning

Additional learning activities ad environments require with the extra roles for the instructor. Shank (2004) summed the online instructor competencies under five categories: administrative, design, facilitation, technical and evaluator (Shank, 2004, p 1). Table 2.1 indicated the categories and sample activities for each category.

Table 2. 1. Online Instructor Competencies

Competencies	Sample Activities
Administrative	• Provides an unambiguous roadmap through the instruction. • Provides clear objectives, expectations, and policies. • Posts course materials (syllabus, assignments, discussion topics, etc.) in advance so learners can plan. • Conveys changes and updates. • Assures that all learners are 'on board' at the beginning of a course. • Returns learner calls/emails quickly to allow learners to progress. • Refers problems to appropriate sources and follows up to assure resolution.
Design	• Plans activities that allow learners to attach personal meaning to content. • Provides opportunities for hands-on practice and application. • Balances design to help learners manage load. • Helps learners assess their learning and attain personal learning goals. • Incorporates social aspects to improve satisfaction, provide a realistic environment, present multiple viewpoints, and overcome anonymity.
Facilitation	• Sets or facilitates setting of communication rules and group decision-making norms. • Provides compelling opportunities for online discussion, negotiation, debate. • Moderates discussion, contributes advanced content knowledge and insights, models desired • methods of communication. • Fosters sharing of knowledge, questions, and expertise. • Contributes outside resources (online, print-based, others) and encourages learners to do as well. • Responds to discussion postings adequately without 'taking over.' • Provides acknowledgment of learner contributions. • Moderates disagreements and group problems.
Evaluation	• Provides learners with clear grading criteria. Uses rubrics, grading criteria, or examples to help learners recognize expectations. • Assists learners who are having problems completing the assignments. • Allows learners to track assignment completion and impact on final grade. • Quickly acknowledges receipt of assignments. • Provides feedback and help with remediation, as needed. • Contacts learners who have not completed assignments and helps them plan to complete assignments.
Technical	• Becomes proficient with all technical systems used in the course. • Helps learners troubleshoot technical systems. • Refers problems to appropriate sources and follows up to assure resolution.

Various authors used similar categorizations (Berge, 1995; Teles, Ashton, Roberts & Tzoneva, 2001; Lowther, Jones & Plants, 2000) and standards for instructor competencies (ISTE, 2002) in online environments.

Lehmann (2004) noted that there are, also, competencies for instructors to overcome the lack of existence of nonverbal cues in text-based CMC. He provided a plenty of practical tips for being a successful in such interactions. For example, he advised using humor, being positive in tone and in outlook (in audio and video conferencing), giving time to students to answer questions and discussions, taking responsibility of everything that students can face with, and lastly answering any question or comment within at most twenty-four hour. Lehmann added that good online instructor should be self-motivated and enjoy in human interaction.

The literature is almost agreed with the instructor roles in online environments 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.

2.3. Summary

Both CMC and blended learning literature show that there are various purposes and ways to integrate online communication in traditional education. The successful integrations are not obtained by chance. Research on CMC, mostly at distance education, and blended learning proved that while online communication enhances the learning by eliminating the geographical boundaries, it may enrich the traditional education by providing extra interaction environment out of classrooms. However, as development of technology continues, the empirical studies are needed to define how to get benefit from these innovations. At first glance, availability of synchronous communication, especially video conferencing, may seem to replace the text-based

dialogues. However, literature showed that not every implementation of video conferencing is superior to text-based communication. More research in those innovations should be conducted.

CHAPTER 3

METHODOLOGY

This chapter presents the methodology, which contains the research design, research questions, subjects, the online communication system and its implementation, data collection and analysis procedures. The validity and reliability issues about the research are also explained in detail.

3.1. Purpose of the Study

In this study, the purpose is to investigate learners' perceptions about online communication in a blended learning environment. In order to accomplish that purpose, four research questions are formed for the designated case:

Research Question 1: What are the learners' perceptions about online synchronous communication tool?

Research Question 2: What are the learners' perceptions about web-based support?

Research Question 3: What are the learners' perceptions about collaboration with online communication?

Research Question 4: What are the learners' perceptions about the roles of the instructor in blended learning as (a) administrator, (b) facilitator, (c) technician, and (d) evaluator?

3.2. Research Design

In order to investigate these research questions, a case study in line with the action research paradigm was conducted. An online communication medium that was currently being used in an undergraduate-course, was selected as the case for this study.

Since the course, the instructor, and the students in the course and the implemented online synchronous communication system have their unique characteristics and properties; the current research fits the criteria of a case study design, which is defined by Merriam (1998) as an intensive and holistic description and analysis of a single unit or bounded system. This unit or bounded system can be a single person, a new program at a school, an event, or a group of people experiencing an intervention. The case, then, can be examined in terms of the research questions. Stake (1995) defines these studies as instrumental case studies. Either with qualitative or quantitative research methods, a case study is particularistic, descriptive and heuristic. The course under investigation is treated as a single case since the online communication tool was unique with its features and implemented for a semester within its own context.

Additionally, two contextual characteristics of the case implied that action research paradigm needs to be considered in the research design. The first one was the researcher's role in the study. Since the researcher was the instructor in this study, the action research paradigm is adopted in order to make use of the experiences in both roles in a systematic way. Mills (2000) defined action research as:

> Any systematic inquiry conducted by the teacher researchers, principles, school counselors, or other stakeholders in teaching and learning environment; to gather information about the ways that their particular schools operate, how they teach, and how well their student learn. (p. 6)

Secondly, the use of online communication tool could be considered as an innovative improvement at course design. Mills (2000) added that the main goal of action research is to enhance the lives of children and professionals by utilizing systematic inquiry techniques into local problems. Cohen, Manion and Morrison (2000) exposed the goals of an action research as to replace a teaching method, adapt learning strategies, evaluate procedures, encourage attitude and values and administrate a change effectively.

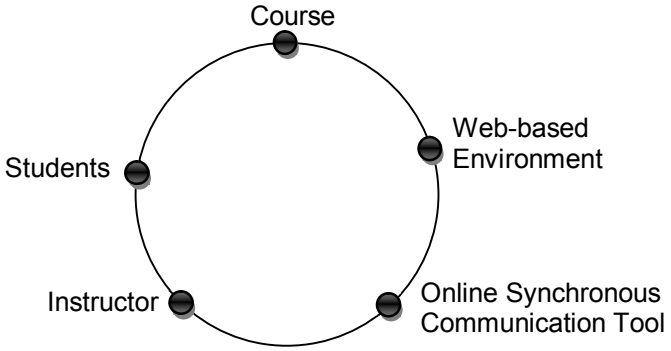
<table>
<tr><td>Title</td><td colspan="3">The Preservice Teachers' Perception about Online Communication in Blended Learning</td></tr>
<tr><td>Purpose</td><td colspan="3">To understand learners' perceptions about new online communication in blended learning environment</td></tr>
<tr><td rowspan="4">Research Questions</td><td colspan="3">1. What are the learners' perceptions about online synchronous communication tool at the case?</td></tr>
<tr><td colspan="3">2. What are the learners' perceptions about web-based support at the case?</td></tr>
<tr><td colspan="3">3. What are the learners' perceptions about collaboration in group projects with online communication?</td></tr>
<tr><td colspan="3">4. What are the learners' perceptions about the roles of the instructor at online communication at the case?</td></tr>
<tr><td rowspan="2">Research Methodology</td><td colspan="3">Case Study in Action Research</td></tr>
<tr><td colspan="2">→ Implementation of synchronous communication (Textual, auditory and visual communication)
→ Asynchronous communication through email and forum
→ Web based support
→ Programming language course
→ Second grade 51 students.</td><td>→ Researcher as an instructor
→ Application of a new communication tool</td></tr>
<tr><td rowspan="2">Sampling</td><td colspan="3">1. Selection of the Case: Criteria Based Selection</td></tr>
<tr><td colspan="3">2. Selection of the Subjects: Purposeful Sampling</td></tr>
<tr><td>Research Context</td><td colspan="3"> 
</td></tr>
<tr><td rowspan="5">Data Collection & Analysis</td><td>1. Synchronous Communication Perception Questionnaire</td><td>Quantitative Data</td><td>Descriptive Statistics</td></tr>
<tr><td>2. Web-Based Support Perception Questionnaire</td><td>Quantitative Data</td><td>Descriptive Statistics</td></tr>
<tr><td>3. Collaborative Learning Perception Questionnaire</td><td>Quantitative Data</td><td>Descriptive Statistics</td></tr>
<tr><td>4. Online Instructor Perception Questionnaire</td><td>Quantitative Data</td><td>Descriptive Statistics</td></tr>
<tr><td>5. Interview about Synchronous Communication and Tool</td><td>Qualitative Data</td><td>Coding and Categorizing</td></tr>
</table>

Figure 3. 1: Overall Research Design

In line with these statements, the aim of the instructor in this case was to improve the quality of communication in the learning environment. He introduced and utilized online communication technologies (forum, chat, video conference), and investigated the selected case in terms of student perceptions.

Within the case study, an online communication system has been arranged for an undergraduate course and implemented in the 2007/2008 academic year, spring semester, in a blended learning environment. After the development and implementation of the online environment, both quantitative and qualitative data collection instruments were utilized to answer the research questions. Figure 3.1 shows the overall research design.

3.3. Sampling

Different from other qualitative research methodologies, sometimes two stages of sampling are necessary for case studies. At the first stage, selection of the case is determined (Merriam, 1998). The criteria for the selection of the course in this study are:

- Free Internet access
- Computer literacy
- Familiarity with CMC tools
- Collaborative learning activities
- Blended learning environment

The students enrolled in the course are computer literate, familiar with CMC tools, and have a free Internet access. The course design includes group projects and offers web-based support. With activities like online communication, web-based discussions and online document sharing, the course combines both face to face and online activities, so it can be identified as a blended learning environment.

At the second stage, the selection of informants (subjects) for the current study is realized. At this stage, two purposeful sampling techniques are used, namely, typical sampling and maximum variation sampling (Merriam, 1998). For all questionnaires,

all students that are enrolled in the course are invited. Since the students meet the criteria of having computer literacy and familiarity with CMC, all of them are selected. For the interview sessions, students who have different perception results about the synchronous communication tool are selected. In order to obtain maximum variation in interviews, three groups of students (three in each group) are selected from top, middle and bottom of the ordered list.

Fifty one pre-service teachers were enrolled in the course in 2007/2008 academic year, spring semester. They were sophomores with the exception of the three students, who were seniors and who failed the course in the previous academic year. The course was their second computer programming course in the program. Five of them were foreign students. They had computer literacy in upper level, some web page design and development skills, and basic algorithms of computer programming.

Table 3.1: Subjects at the case

Subjects	Number	Percentage
Males	31	61%
Females	20	39%
Total	51	100

3.4. Research Context

A case study is distinguished by its intensive and holistic description and analysis of one single unit (Merriam, 1998). To illustrate the whole picture of the case, the students, course, web-based environment, online synchronous communication tool and the instructor are defined in depth below as components (Figure 3.2).

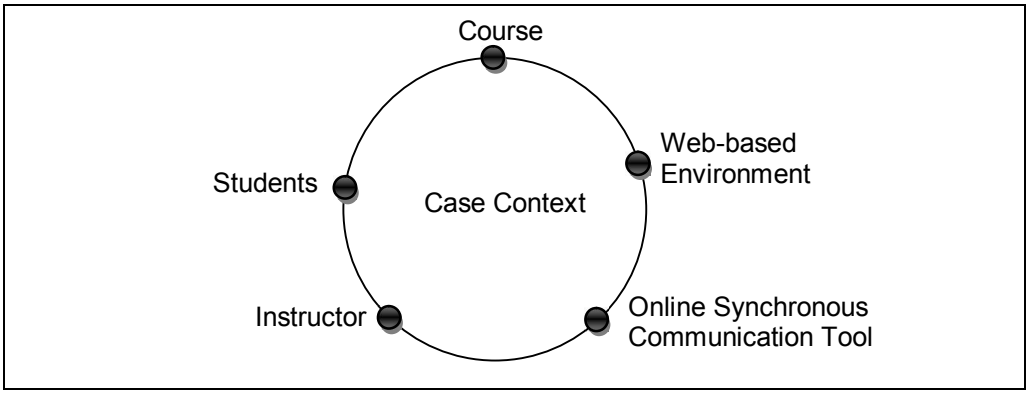


Figure 3. 2: Components of the Case

3.4.1. Course

The course under investigation was Computer Programming II, an undergraduate course at the Computer Education and Instructional Technology Department at Middle East Technical University in 2007/2008 academic year, spring semester. It was a compulsory course in the fourth semester of the departmental program. The main objective of the course is to gain programming techniques in Visual Basic.NET©. The students are expected to be equipped with advance programming skills, such as creating stand alone applications, integrating various pre-packaged components, employing object oriented programming techniques and creating distributable packages.

Two-hour lectures were followed by two hours of laboratory sections, each week. During the lectures, expository teaching was the dominant strategy with some discussion and question/answer activities. During the laboratory sessions, the students were given a worksheet about the related lecture and were expected to complete their assignments individually by using computers. During these laboratory sessions, a research assistant was providing individual support to the students, when needed. Some assignments required more than two hours in order to be finished and after the two- hour laboratory sessions, the students were asked to further work on the assignment at home.

The course assessments were one midterm, one individual and one group project, laboratory assignments and final exam in the laboratory. Besides the main reference book, the students were offered links to many useful web sites and electronic documents. Since the university's medium of instruction is English, students were proficient in English and therefore they were encouraged to use different resources on the Internet.

3.4.2. Students

Different from other teacher training programs, the students were familiar with online communication technologies as well as terminologies, since their undergraduate curriculum includes courses on computer literacy, computer programming and instructional technologies. Besides, in some courses, they use a web-based course management system, which is developed by the university and available for all instructors, but not compulsory.

3.4.3. Web-Based Environment

In addition to the classroom and laboratory environments, students are also provided with a web-based supportive environment. It is a course management system developed previously by Özden (2002) and modified by the researcher. The web site has the following content:

- Lecture notes updated weekly
- Electronic resources and links to useful sites
- Announcements of events and grades
- Homework submission and announcements
- Discussion board
- Download page for sample codes and Live Meeting installation
- Video broadcasts of the lectures added weekly

In this web site, the instructor is also an administrator who registers the students, updates content and manages users' accounts.

The students are given default user names and passwords, and expected to visit the page regularly. They are free to write on the discussion board, download lecture notes, watch lecture videos, access resources and submit homework projects on the expected due dates. A screen shot of the welcome page of the mentioned website is given in Appendix C.

3.4.4. Online Synchronous Communication System: ITL Live Meeting

Online synchronous communication can be put into practice via various software applications. For example, Microsoft Windows Live Messenger© enables users to communicate in various modes, such as textual, auditory and visual, but only with textual messaging is communication with more than two participants possible.

There are a few applications providing synchronous communication among more than two participants at the same time. Two of those applications are Adobe Connect© and Microsoft Live Meeting©. These applications let more than two participants to join the same meeting and talk, write, and see each others' actions. On the other hand, these kinds of applications have quite high costs.

With these challenges, a new software solution, called "Instructional Technologies Laboratory (ITL) - Live Meeting", has been designed and developed. The term "Live Meeting" (LM) will be used to refer to Instructional Technologies Laboratory Live Meeting while reporting in the following sections of the study and in the other related documents used in the study, such as surveys and interviews.

Live Meeting is a stand-alone application run at Microsoft Windows operating systems. It has been designed based on previous analysis of the interviews conducted with various instructional technology experts, from which recommendations about main design issues were obtained. Figure 3.3 summarizes those recommendations.

- A communication protocol
  - To manage dialogues
  - To control participation
- Usability issues at interface and work flow
  - Easy to use
  - Reducing cognitive load
  - Familiarity with commonly used chat applications
- Existence of prerequisite skills at target users
  - Computer literacy
  - Access of computers and Internet
- An orientation for users at the beginning of the semester

Figure 3. 3: Experts' Recommendations

Experts encouraged developing such an application, since it would be dedicated to online communication in instructional settings. They recommended different communication modes or protocols, by which certain features would be available to students or would be restricted to student access. About interface and usability issues, they suggested that the tool should be easy to use, transparent, informing about underlying processes and should avoid cognitive load. They added that it may have similar interaction style and interface elements with other commonly used chat tools. About target users, experts agreed that all students at Middle East Technical University are capable of studying with this tool in terms of computer literacy levels and technical requirements. Lastly, an orientation was strongly emphasized for both the students and the instructors.

After the analysis and design of the tool, the development of Live Meeting started. It is a stand alone application in client role in a communication system. The system includes some servers with high speed processors and services running on these servers. Those servers and services have been hosted and administrated by the Instructional Technology Laboratory at Middle East Technical University.

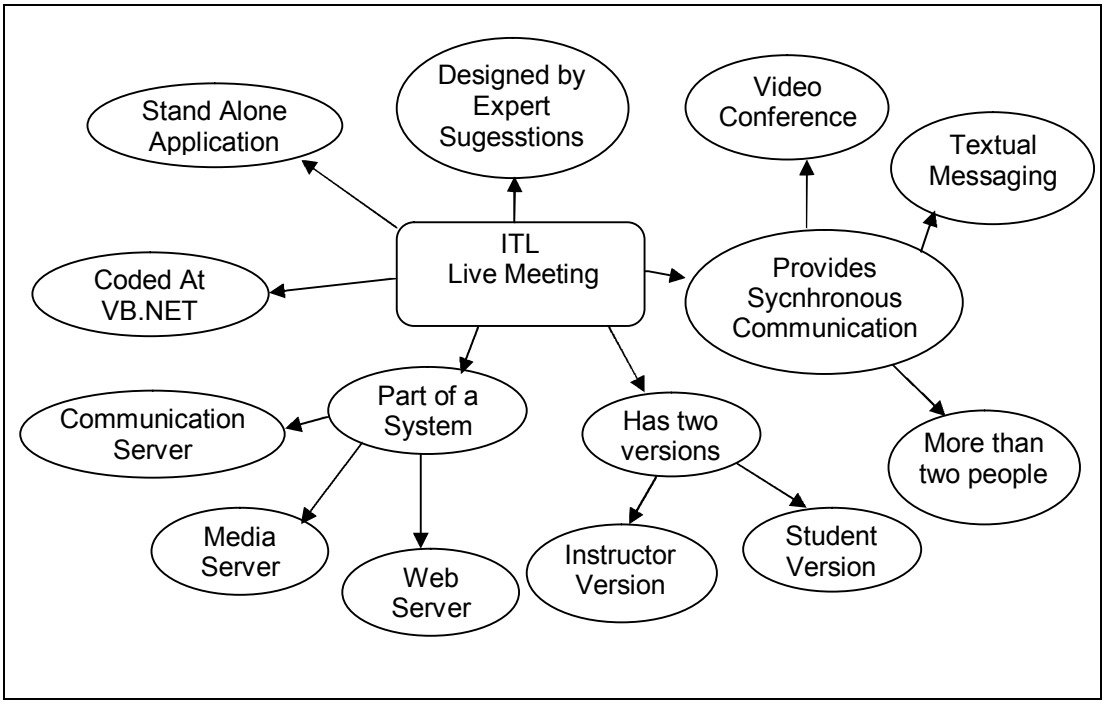


Figure 3. 4: Properties of Live Meeting

Live Meeting has been coded in Microsoft Visual Basic.NET© and adapted to the services provided from servers mentioned above. The instructor and student versions were generated as executable applications in Microsoft Windows© operating systems.

Both versions were provided to users via the web page of the course. The students and the instructor downloaded the related versions and installed them on their own personal computers. They were also provided with valid user names and passwords to log into the system. Below is Figure 3.5 to 3.8 that show screenshots of the different versions of the Live Meeting-Instructor. The same screenshots in original sizes and colors are given in Appendix D.

These two versions differ in that the instructor version enables the instructor to start and stop a dialogue session, and to start his or her video broadcast. The student version, on the other hand, allows a student to join an open dialog, to broadcast his or her video with the instructor's permission. During these video broadcasts, textual

Figure 3. 5: Login Screen of LM-Instructor Version

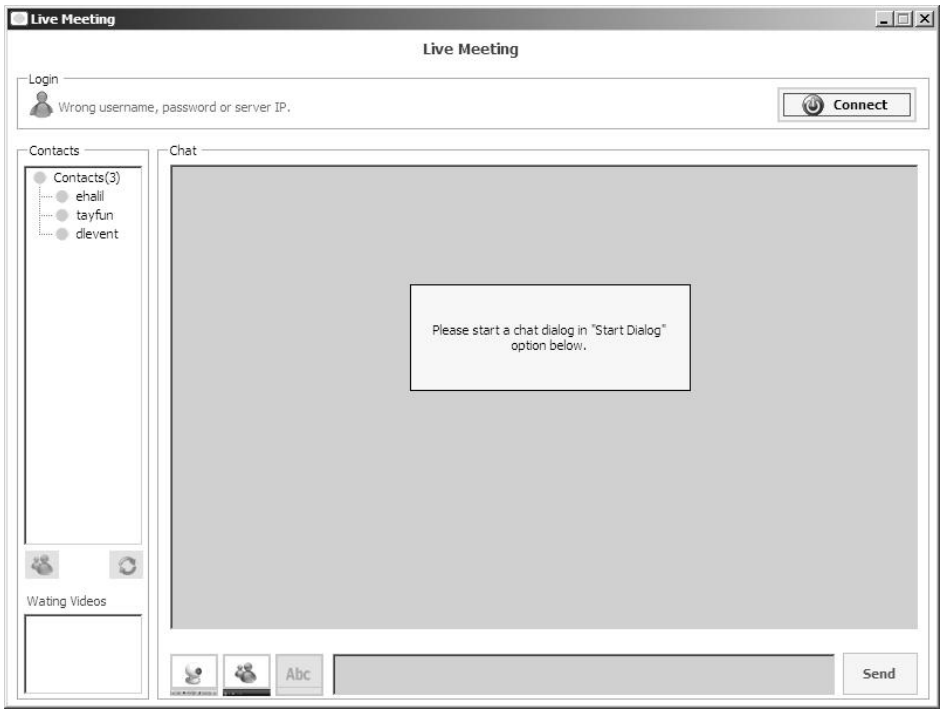


Figure 3. 6: Textual Messaging Screen of LM-Instructor Version

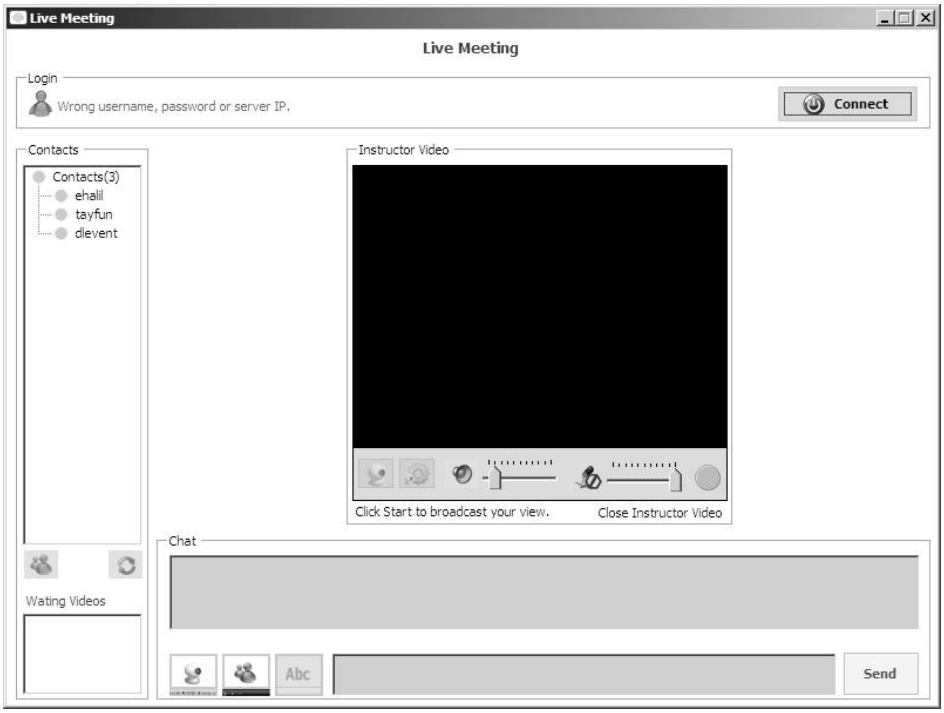


Figure 3. 7: Instructor's Video Broadcasting Screen of LM-Instructor Version

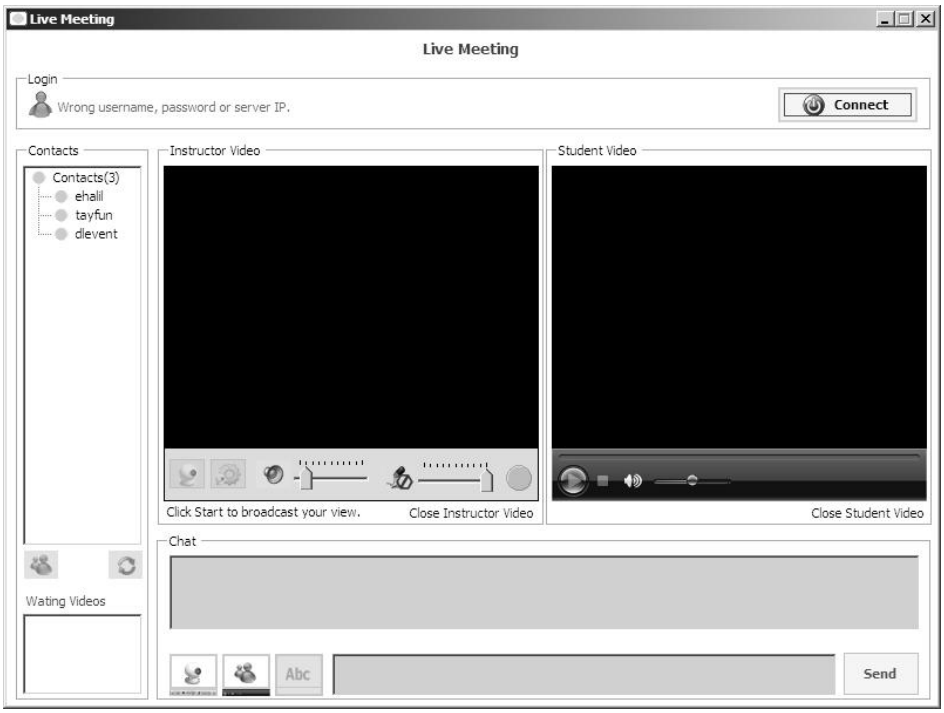


Figure 3. 8: Instructor-and-Student Sending Video" Screen of LM-Instructor

messaging is also available to all participants. The following section describes how each version works in detail.

Instructor Version

In Figure 3.9 below, the work flow of LM-instructor version is given. When an instructor logs in with his or her authorized username and password, Live Meeting lists contact his or her list. Once the contacts are added to the contact list by the instructor, they are represented by a green or red icon to show their online status; online or offline, respectively; for being available for a connection. In this instance, no dialog is allowed among online participants. Only the instructor is allowed to start a dialog session. When this happens, all online participants are automatically joined to the session and the text messaging becomes available to all of the participants. The sent messages are delivered to everyone, who is online at that moment.

The instructor can start a video broadcast any time. All students, then, start watching him or her. A student can close and open the instructor video individually. When a student wants to start his or her own video, he or she has to get the instructor's permission first. Once confirmed, he or she can broadcast his or her video to all other participants.

The system allows only two people to broadcast a video to all participants simultaneously. One is the instructor and the other one is the student to whom the instructor gives permission to broadcast. If the instructor allows, two students can also broadcast their own videos. This limitation is a design issue, not a technical restriction.

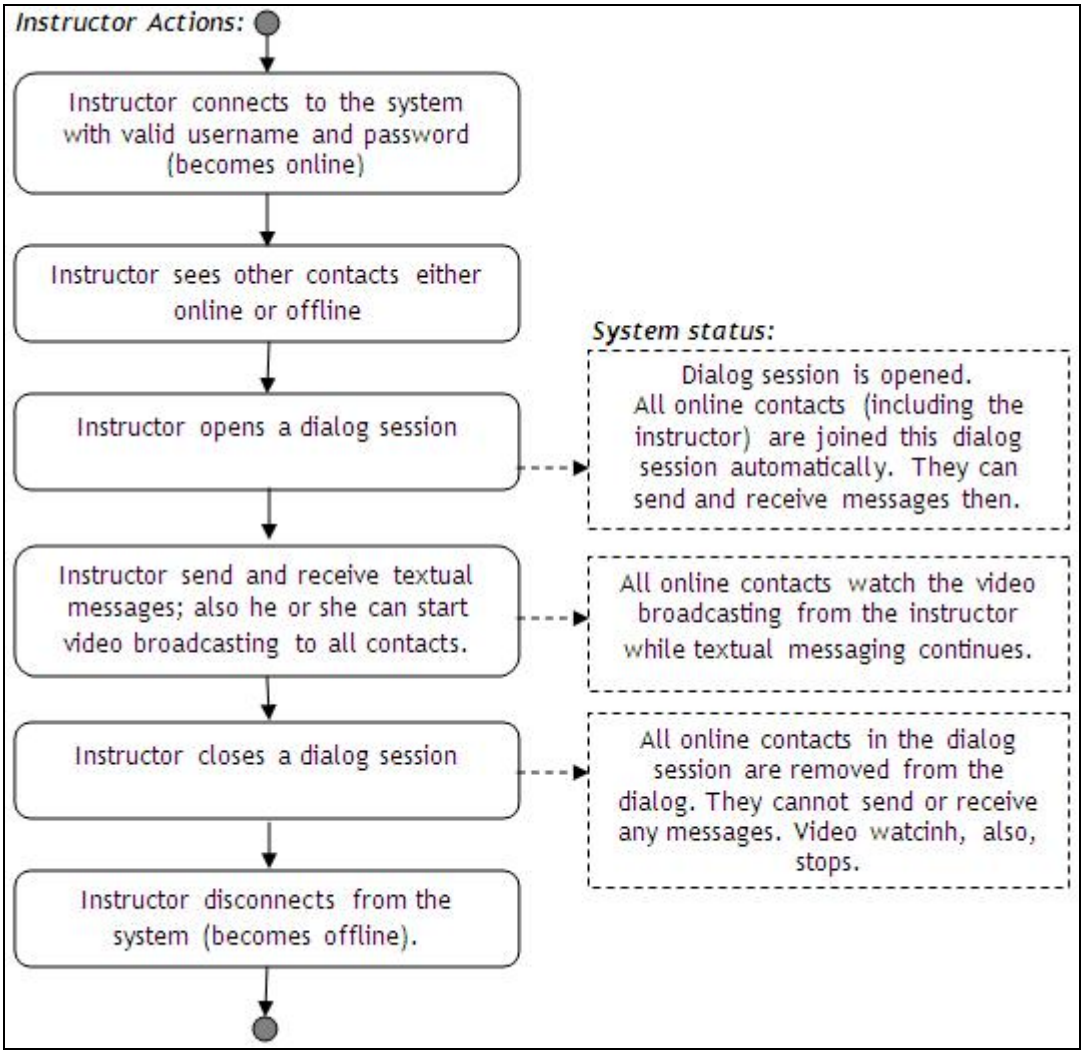


Figure 3. 9: Workflow of Live Meeting-Instructor Version

Student Version

Student version of Live Meeting has similar but relatively less features and functions in comparison to the instructor version (Figure 3.10). When a student connects with authorization information, he or she gets a list of contacts similar to the instructor version. However, he or she cannot do anything until his or her instructor opens a dialog session. Then, the student automatically joins that session and can start to send and receive messages just like the others.

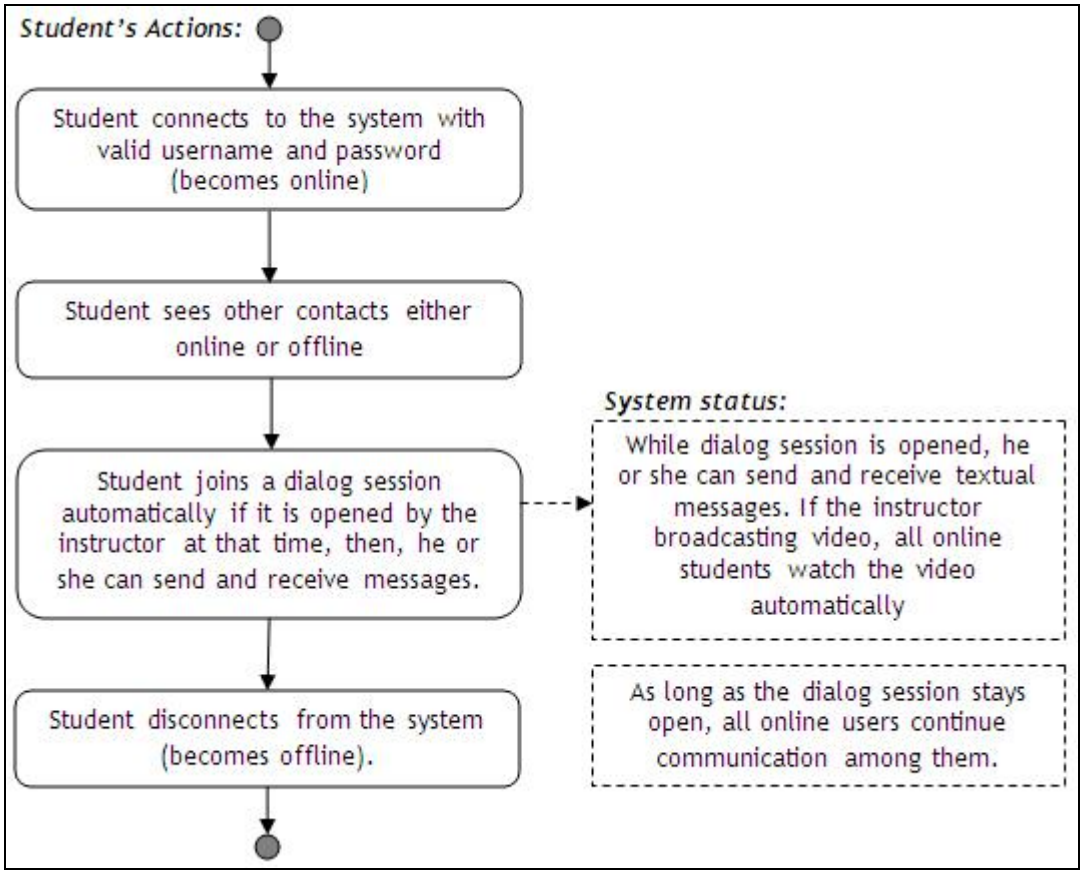


Figure 3. 10: Workflow of Live Meeting-Student Version

When the instructor starts video broadcasting, the student sees the video at his or her interface. If the student wants to show his or her video to all participants, the system automatically warns the instructor and waits for the instructor's permission. Only after the instructor's permission is given, will the student be able to start his or her video broadcast to all participants.

3.4.5. Instructor

The instructor was the researcher in this case study. He is a doctorate candidate in the Computer Education and Instructional Technology Department at the same university. Web-based environments and online communication are his main research areas. He has been giving the course, namely "Programming Language II" for seven years. During these seven years, he gained experience about using online

communication through e-mail, forum and discussion lists; and chat with the students. Since his first year as the instructor of the course, he has been trying to integrate a web-based support for students. For his Master's thesis, he and his advisor developed a course management system. Afterwards, he used that system for his course, which offers similar functions with the tool developed for this study.

3.4.6. Use of Live Meeting in the Course

At the beginning of the semester, the instructor introduced the students with the website and Live Meeting. In the first face-to-face meeting, the website and its content were presented in the classroom. Then, Live Meeting and its features were shown. The instructor demonstrated how to download and install it into a personal computer. In addition to that introduction, the instructor provided a short movie showing how to access and install Live Meeting on the web site. The students were informed that their use of Live Meeting and website would not be graded, and was totally voluntary.

Live Meeting was used both by the instructor and the students mainly during the laboratory sessions. During these sessions, the instructor got connected and started a dialog session from his office. The students at the computer laboratory run Live Meeting-Student and joined the ongoing dialogue. Once joined to the dialog session, all participants were able to send and receive text messages. Then, the instructor started his video broadcast and started to talk with the students, when needed. The students were allowed to watch and listen to him. If they had had a web camera and microphone, they would have been able to start own video broadcasts. Most of the time, the instructor ended the dialog session at the end of laboratory session, but he had waited for the last participant to leave before quitting.

3.5. Data Collection Instruments

To answer the research questions, four questionnaires and an interview with the selected students were used. The questionnaire and interview schedules are described in detail below.

Table 3.2: Data Collection Instruments

Research Questions	Data Type	Data Collection Instruments
What are the learners' perceptions about the synchronous communication tool?	Quantitative Data	Questionnaire: Synchronous Communication Perception
	Qualitative Data	Interview on Perception about Live Meeting and Communication via it.
What are the learners' perceptions about the web-based environment?	Quantitative Data	Questionnaire: Web-Based Support Perception
What are the learners' perceptions about collaboration	Quantitative Data	Questionnaire: Collaborative Learning Perception
What are the learners' perceptions about the roles of instructor?	Quantitative Data	Questionnaire: Online Instructor Perception

3.5.1. Synchronous Communication Perception Questionnaire

For the first question, a Likert-type Synchronous Communication Perception Questionnaire (SC-PQ) was implemented. The questionnaire items are given in Appendix E.

Table 3.3: Summary of SC-PQ

Items:	12 Likert-type items 8 semantic differential items 1 open-ended item
Sample:	All students taking the course (n=51)

The questionnaire has two parts. The first part includes 12 Likert-type items that have five scales. In the second part, there are eight semantic differential pairs of

adjectives of extreme meaning. For these items, the subjects are expected to select one point from the five-point scale located between two opposite points.

The first part was developed by Kies, Willigers and Rosson (1997). Later the same questionnaire was revised and used by Grant and Cheon (2007). Grant and Cheon (2007) reported high reliability coefficient (Cronbach's Alpha = 0.782). The same reliability coefficient (Cronbach's Alpha) was found in this study, 0.715, which is high enough for reliability in social studies (Fraenkel & Wallen, 1990).

The second part of the questionnaire was developed by Spencer and Hiltz (2003) to measure the students' perceptions about chat characteristics. The adjectives in this part were reviewed and some of them were replaced with their synonyms with respect to the suggestions of experts. The reliability coefficient (Cronbach's Alpha) for this part of the questionnaire is 0.802, which is also satisfactory enough.

3.5.2. Web-Based Support Perception Questionnaire

In order to measure the students' perceptions toward web-based supportive environment, a questionnaire (WBS-PQ) with 18 items was used. Out of seventeen items, 13 are Likert-type items and five are open-ended questions. The questionnaire was developed by Angula and Burce (1999) to examine the perceptions of 303 college students at five different courses about web-based instruction. The questionnaire's reliability coefficient (Cronbach's Alpha) for the first 13 items is 0.83, which is a quite acceptable value. Appendix F shows the questionnaire items.

Table 3.4: Summary of the WBS-PQ

Items:	13 Likert-type items 5 open ended items
Sample:	All students taking the course (n=51)

3.5.3. Collaborative Learning Perception Questionnaire

To answer the third sub question, Collaborative Learning Perception Questionnaire (CL-PQ) was implemented (see Appendix G). The questionnaire is composed of 28 Likert-type items that have five scales and one open-ended item for additional comments. It was used by Koç (2002) and Ersoy (2003) with the reliability coefficients (Cronbach's Alpha) of 0.90 and 0.92 respectively. The reliability coefficient in this study is obtained as 0.86, which is high enough to satisfy reliability requirements.

Table 3.5: Summary of CL-PQ

Items:	28 Likert-type items 1 open ended item
Sample:	All students taking the course (n=51)

3.5.4. Online Instructor Perception Questionnaire

For the last sub research question, Online Instructor Perception Questionnaire (OI-PQ) was implemented (see Appendix H). It has 20 Likert-type items that have five scales and one open-ended item for additional comments. It was constructed by Ersoy (2003) with respect to the definitions about roles of online instructor by Shank (n.d.) and Özden (personal communications, April 1, 2003). Ersoy (2003) obtained the reliability coefficient as 0.97. The same coefficient is acquired as 0.91 in the current study.

Table 3.6: Summary of (OI-PQ)

Items:	28 Likert-type items 1 open ended item
Sample:	All students taking the course (n=51)

3.5.5. Interview Schedules with Students

To understand student perceptions and the reasons underlying beneath, semi-structured interviews were conducted with nine students at the end of the semester. Those students were selected regarding their scores from the first questionnaire. The mean scores for all students were ranked on a list. Then three students from the top of the list, other three students from bottom of the list and another three students from the middle of the list were invited for interviews. One student did not respond to the invitation, so another one who had the closest score to that missing student was invited and he was interviewed.

The goal of the interview is to understand the students' perceptions toward Live Meeting and the communication via Live Meeting. While the questionnaires quantify perceptions in certain dimensions, the interviews are used to identify how and why the perceptions about online communication emerged.

Table 3. 7: Summary of Question at the Interview

Question 1: Frequency of use of online communication tools in daily life
Question 2: Experiences with those communication tools in any course before
Question 3: Experiences with those communication tools in the course under investigation
Question 4: How LM be introduced
Question 5: How and when to use LM at the course
Question 6: Liked features of the LM
Question 7: Disliked features of the LM
Question 8: Recommendations on LM
Question 9: Differences between face to face communication and online communication over LM
Question 10: Any comments about communication with LM

The interview protocol (see Appendix A) starts with some introductory questions about online communication tools in general (e-mail, forum, chat, video conference). After asking their experiences with those tools in educational activities, their use of Live Meeting during the semester was requested to be described. Then, four main

questions with alternative questions were directed. The first question was “What aspects did you like about Live Meeting and communication over Live Meeting?” If not mentioned, communication channels (textual, audio-video, video of own, of instructor and of another student) were explicitly asked. Subsequently, disliked aspects were inquired and their suggestions, if any, were expected. Beside those issues, their recommendations in terms of revision and new features were requested. Lastly, they were expected to compare online communication and face to face communication and prefer one or a combination. The last question was prepared to understand their arguments for and against Live Meeting or communication via Live Meeting.

The interview schedule (see Appendix A) was prepared and revised with the experts. A pilot interview was made with a student at the same grade and necessary revisions were made. Since the interview questions were semi-structured, the subjects were interviewed in their native language (Turkish). Only one subject was a foreign student and during her interview both Turkish and English were used.

3.6. Data Collection Procedures

At the end of the semester, four questionnaires were published on the course website. The students were informed about the availability of the questionnaires and were expected to submit them within a week. When the students accessed the web pages with their usernames and passwords, they saw a welcome screen which explained the aim of questionnaires and gave the instructions to fill in the questionnaires and submit them. They were also informed that participation was voluntary.

After the questionnaires, interviews with nine students were arranged. Those nine students were selected according to their mean scores from the first questionnaire, which was about subjective evaluation of the communication tool. Three students from the top, three from the middle and three from the bottom parts of a ranked list were invited for interviews. Except one, eight students agreed to participate. One student did not reply to the invitation, so another one who had the closest score was invited. After taking their consent for their voluntary contribution, each of these nine

students was interviewed alone during the appointments, which were previously-set at different times.

During the interviews, each student was alone with the interviewer. At the beginning of the interview, the participant was given a consent form (see Appendix B) about the interview. Their permission was asked for audio recording of the interviews.

The interviewer was the researcher who had taken a course about qualitative research techniques at PhD program and conducted many interviews previously. Since he was also the instructor, all interviews were conducted after the semester ended and course grades were announced. Also, the subjects were asked to consider the interviewer as someone else, not their instructor. Moreover, the interview questions were revised so that no directional questions were included. Before asking their perceptions, they were reminded to consider their own experiences in communication. In this way, their answers were aimed to reflect their thoughts based on real incidents independent from the existence of the instructor.

During the interviews, the students were asked questions from the interview protocol (see Appendix A). Since the interviews were semi-structured, some interviewees were asked alternative questions to cover all issues by the interviewer. Sound recorder device was on during the whole interview period. Each interview took approximately 20 minutes or less.

3.7. Data Analysis Procedures

Since the data obtained from questionnaires and interviews were different types of data, the analysis procedures were completed in separate, but subsequent stages. Those stages are described under two separate headings below.

3.7.1. Data Analysis of Questionnaires

Four questionnaires were analyzed using descriptive statistical analysis. Except for the semantic differential items, all items in the questionnaires were responded by the participants by expressing their agreement on an item using Likert-type options:

Strongly disagree, disagree, neutral, agree, and strongly agree. These options were, then, converted into numbers from 1 to 5 as given in Table 3.8 below.

Table 3. 8: Likert-type Options and Corresponding Numbers

Response Options of each item	Scores for those options
Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

A statistical calculations software, SPSS© v11.5, was used to store, sort and run statistical tests. All Likert-type items in the questionnaires were coded as numbers from 1 to 5 and negative items were coded reversely. Unanswered items were coded as 0 and treated as missing value. For each questionnaire, a separate SPSS data file was used.

Other open-ended items in the questionnaires were converted into tables and frequencies of similar answers are given in the Results section.

3.7.2. Interview Data Analysis

The interview results were analyzed by segmenting, coding and developing categories (Johnson & Christensen, 2004) in qualitative method. After the interviews were completed, all audio records were transcribed into text files and printouts. Segmenting the transcripts was started from the first questions for all subjects and continued to the next questions. Each question for all subjects was segmented in parallel, in order to eliminate any possible researcher bias.

The first five questions in the interview protocol were related to the subjects' experiences using online communication tools in general and in specific to the course during the semester. The responses for these questions were coded as frequencies of usage with respect to email, forum, chat and video conference.

The following four questions were the main questions asking about their perceptions of Live Meeting and communication via it from different perspectives. For these responses, the transcripts were read and re-read to extract codes. After the coding process was completed, all data were read again to match the segments to the extracted codes. From the coded data, different categories were generated.

3.8. Validity and Reliability

Validity and reliability are the main quality measures of a research study. Validity of the data-collection tool, procedure or analysis refers to "whether or not one's measurement of a phenomenon is true; that is, does it measure what it is supposed to measure." (Hunter & Brewer, 2003, p 581) A valid data gathering instrument or procedure is supposed to measure what it is really expected to measure (Best & Khan, 1993). Reliability, on the other hand, qualifies the consistency of data collection instruments and procedures. A reliable measurement is supposed to measure consistently (Best & Khan, 1993).

The definition and threats for validity and reliability change in various research methods. The following section explains potential validity and reliability threats and strengths of the research against these threats.

3.8.1. Internal Validity

For case studies, Merriam (1998) categorizes validity issues under two concepts: Internal and External validity. Merriam states that if research findings match reality and a research measures what it aims to measure, and then internal validity can be reached. The following table lists his suggestions for internal validity and the strengths of this research for each suggestion.

For quantitative data collection and analysis sections, validity issues were focused on obtaining content-related evidence (Johnson & Christensen, 2004) of the results. If the questionnaires' items represent, therefore measure, what is expected to be measured, the content-related evidence can be reached.

Table 3. 9: Internal Validity of the Research

Internal Validity Suggestions	Strengths of the Research
Triangulation	Using both quantitative and qualitative data collection instruments and dimensions to answer questions
Long-Term Observation	Implementing Live Meeting for a semester
Peer Examination	Consulting experts in design and development of Live Meeting, in preparing and implementing data collection instruments and in data analysis
Participatory or collaborative modes of research	Action research design, instructor role of the researcher
Reducing Researcher's Biases	Thick description of the case, of roles of the researcher, of assumptions and goals of the researchers.

Not only the items' content but also the format, wording and implementation of questionnaires should be revised and well designed. To measure perceptions in a valid way, questionnaires were obtained from the literature (given at Data Collection section above). To improve questionnaire items, Best and Khan (1993, p 232) made the following suggestions:

- Define or qualify terms that could easily be misinterpreted.
- Be careful in using descriptive adjectives and adverbs that have no agreed upon meaning
- Beware of double negatives
- Be careful of inadequate alternatives
- Avoid double-barreled questions
- Underline a word if you wish to indicate special emphasis
- When asking for ratings, or comparisons, a point of reference is necessary
- Avoid unwanted assumptions
- Phrase questions so that they are appropriate for all respondents
- Design questions that will give a complete response for open ended items
- Provide for the systematic quantification of responses

With these suggestions in mind, the questionnaires were revised together with the experts in terms of wording and format. A pilot administration of the questionnaires was conducted with three students at the same department and necessary adjustments were made.

3.8.2. External Validity

According to the definition of Merriam (1998), external validity of a study is the extent to what the findings can be generalized to other situations. In case studies, rich and thick description of the case helps readers to elicit the findings and compare them with other situations. To illustrate a clearer picture of the context, the case with its components were presented in depth.

In addition, how data was collected and analyzed were explained in depth. This information allows readers to see the picture well and to apply findings to their own contexts.

3.8.3. Reliability

If a research's findings can be replicated, that is the results are consistent, then the study is qualified as reliable (Merriam, 1998). By reliability, the researcher approves that his or her findings are obtained not by chance but in a systematic way and someone else would get the same results.

Table 3. 10: Reliability Coefficients (Cronbach's Alpha) of Questionnaires

Questionnaires	Reliability Coefficients
Synchronous Communication Perception Questionnaire	
Part I : 12 Likert-type items	0.72
Part II : 8 Semantic Differential Items	0.80
Web-Based Support Perception Questionnaire	0.83
Collaborative Learning Evaluation Questionnaire	0.86
Online Instructor Evaluation Questionnaire	0.91

Reliability of those questionnaires was tested using the reliability coefficient (Cronbach's Alpha). Büyüköztürk (2008) said that a reliability coefficient (Cronbach's Alpha) of a test instrument should be at least 0.70 to satisfy reliability in social studies. As seen from the Table 3.10 above, all questionnaires have satisfactory reliability coefficients (Cronbach's Alpha).

3.9. Ethics

This research collected data from real students so it was important to avoid any physical, psychological and emotional harm to them. For this purpose, the following steps were taken to avoid unethical issues:

At the beginning of the semester, the students were informed about the research study explicitly. However, it was added that the use of Live Meeting was completely voluntary and would not affect their grades for the course.

During the semester, there was no directing talk about the use of Live Meeting. All perception questionnaires and interviews were conducted at the end of the semester after the course grades were assigned.

Before administering questionnaires and conducting interviews, both questionnaires and interview protocol were sent to and checked by the Ethical Committee of METU. The committee confirmed that the questionnaires were appropriate to be administered to the students.

At the beginning of each interview, the participants were asked about their permissions to use audio recorder. They were given informed consent including the purpose and method of the interviews (see Appendix B).

3.10. Limitations

The methodology of this research study is a case study in line with an action research. The researcher of this study has many roles: researcher, instructor, developer (of Live Meeting) and interviewer. His abilities and skills on those roles are the primary limitation of the study. However, in order to prevent the researcher

bias, (1) the perceptions about the instructor roles were investigated and presented explicitly, (2) peer reviewing was applied in preparing instruments and doing data analysis.

The data sources were the students at Computer Education and Instructional Technology Department at Middle East Technical University. Their responses to the questionnaires and interviews were assumed to reflect their sincere thoughts and perceptions. The description and analysis of the context are dependent on the subjects' responses.

The subjects of the study were more familiar with the instructional technology than any other undergraduate students. Their acceptance and expectations from an online communication tool might most probably differ from other peers, which is another limitation of the findings.

CHAPTER 4

RESULTS

In this chapter, the results obtained from the four questionnaires and interviews are presented. To bear in mind, the purpose of this study is to evaluate learners' perceptions about online communication in blended learning environment in terms of synchronous communication, web-based support, collaboration, and roles of the instructor.

While reporting the results in this chapter, several abbreviations are used in order to make the report user-friendly to the readers. Those abbreviations are given in the table below.

Table 4. 1: Abbreviations Used at Results Chapter

Abbreviation	Explanation
SC-PQ	Synchronous Communication Perception Questionnaire
WBS-PQ	Web-Based Support Perception Questionnaire
CL-PQ	Collaborative Learning Perception Questionnaire
OI-PQ	Online Instructor Perception Questionnaire
LM	Live Meeting
LM-S	Live Meeting Student Version
LM-I	Live Meeting Instructor Version
SA	Strongly Agree
A	Agree
N	Neutral
D	Disagree
SD	Strongly Disagree
St.Dev	Standard Deviation
n	Number of subjects
%	Percentage of answers
Q1, Q2, …	Questions or items at questionnaires

4.1. Results of Synchronous Communication Perception Questionnaire (SC-PQ)

For the first research question, which questions learners' perceptions about synchronous communication, a questionnaire comprising Likert-type and semantic differential type items was administered. The results were imported into SPSS software and descriptive statistics were calculated. Table 4.2 and Figure 4.1 show the distribution and the frequency of responses for each item of 33 out of 51 students.

Table 4. 2: Responses of Likert-type Items at SC-PQ

Likert-type Items		Frequencies of Responses						n=33
		SA	A	N	D	SD	Mean	St.Dev
1. The video quality was acceptable	%	18.2	66.7	6.1	9.1	0.0	3.94	0.79
	n	(6)	(22)	(2)	(3)	(0)		
2. The video size was adequate	%	15.2	42.4	15.2	24.2	3.0	3.42	1.12
	n	(5)	(14)	(5)	(8)	(1)		
3. The video was good as being live in the same classroom	%	21.2	39.4	24.2	12.1	3.0	3.64	1.06
	n	(7)	(13)	(8)	(4)	(1)		
4. The audio quality was acceptable	%	18.2	54.5	15.2	9.1	3.0	3.73	1.07
	n	(6)	(18)	(5)	(3)	(1)		
5. The audio was good as being live in the same classroom	%	15.2	33.3	36.4	15.2	0.0	3.48	0.94
	n	(5)	(11)	(12)	(5)	(0)		
6. Communication via Live Meeting-Student encouraged me to think critically about the subject matter	%	12.1	51.5	27.3	9.1	0.0	3.67	0.82
	n	(4)	(17)	(9)	(3)	(0)		
7. Live Meeting-Student did not obstruct my communication with the instructor	%	15.2	39.4	30.3	12.1	3.0	3.52	1.00
	n	(5)	(13)	(10)	(4)	(1)		
8. I thought communicating via Live Meeting-Student was just as effective as face-to-face communication	%	0.0	42.4	27.3	27.3	3.0	3.09	0.91
	n	(0)	(14)	(9)	(9)	(1)		
9. I was able to interrupt and ask question easily	%	21.2	48.5	24.2	6.1	0.0	3.85	0.83
	n	(7)	(16)	(8)	(2)	(0)		
10. Adding video into communication would improve the communication	%	30.3	48.5	18.2	0.0	3.0	4.03	0.88
	n	(10)	(16)	(6)	(0)	(1)		
11. Adding audio into communication would improve the communication	%	33.3	48.5	18.2	0.0	0.0	4.15	0.71
	n	(11)	(16)	(6)	(0)	(0)		
12. I would be willing to take a course which utilizes a communication tool such as Live Meeting-Student	%	18.2	45.5	30.3	6.1	0.0	3.76	0.83
	n	(6)	(15)	(10)	(2)	(0)		
Overall							3.69	0.95

According to the mean score of the first two items (1st and 2nd), students perceive video quality and size good and satisfactory (84.8% and 57.6% agreed). The video size was 320 pixels width and 240 pixels height, a commonly used video size on the Internet. Video quality was set up as 248 Kbps, which is small enough to stream for slow connections and big enough to show moving objects smoothly, like a talking human face. Similarly, audio quality was perceived adequate (72.7% agreement at the 4th item) compared to the quality of human talking.

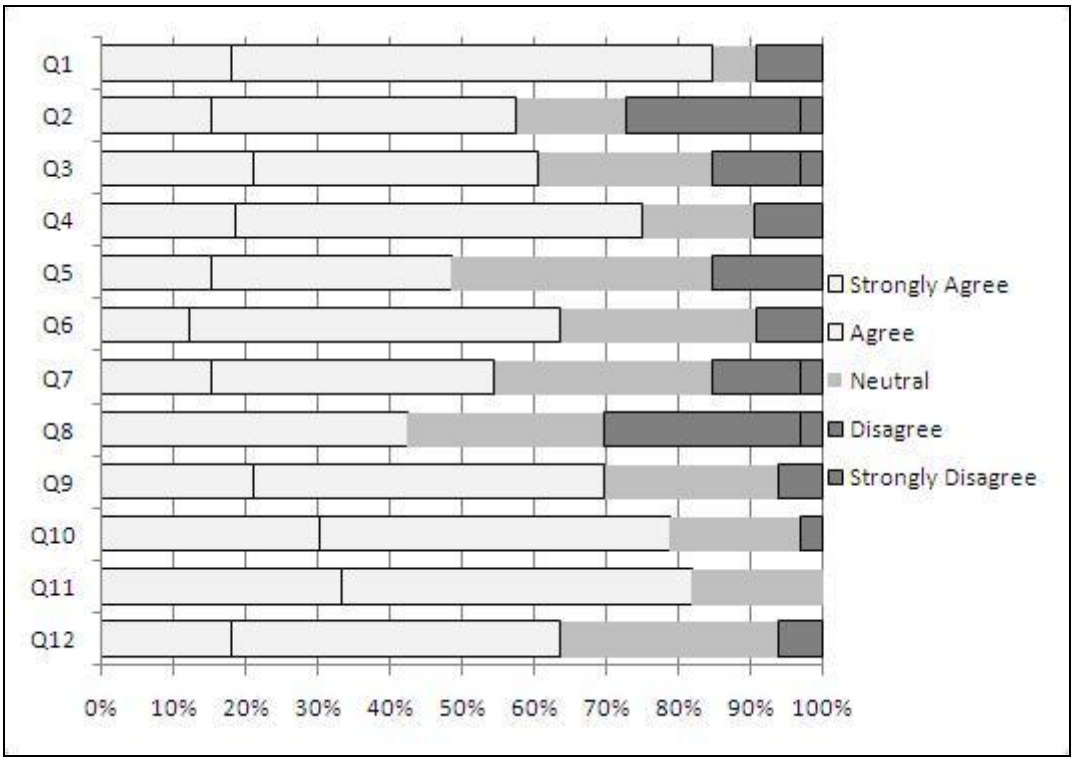


Figure 4. 1: Distribution of Responses for Likert-type Questions at SC-PQ

Adding video into communication (60.6% agreement at the 3rd item) was perceived as effective in terms of creating an environment close to a real classroom, whereas, adding audio (48.5% agreement at the 5th item) was perceived less valuable in the

same respect. In addition to these items, the students thought that adding video and audio into communication improved the communication (the 10th and 11th items with 78.8% and 81.8% agreement respectively).

In the sixth question, students thought that communicating via LM-S was encouraging in terms of critical thinking on the subject matter (63.6% agreement). Although it was an online communication tools, the students did not think that their communication with the instructor was obscured (54.5% agreed with the 7th item), and they could ask questions easily (69.7% agreement with the 9th item). On the other hand, they did not totally agree that communication vie LM-S was as effective as face to face communication (42.7% agreement and 30.3 disagreement at the 8th item)

At the last Likert-type question (12th item), 63.7% of the students said that they would be willing to take a course with LM-S as communication tool and 30.3% of them remained unsure.

The second part of the questionnaire's results is given in Table 4.3 and Figure 4.2 below. Items from 13 to 16 queried students' perceptions about "online communication with LM-S". While the distributions of option 1 and potion 2 are aggregated for the first adjective, 4 and 5 are aggregated for the second adjective in the results. Option 3 is in the middle and is thought as undecided.

With respect to the distribution of responses, it can be said that students found communication with LM-S helpful (81.8%), informative (69.7%), moderate primitive (39.3% are close to primitive and 39.4% are located in the middle), and lastly supportive (78.8%).

The items from 17 to 20 ask students' perceptions about LM-S itself (Table 4.3 and Figure 4.2). With reference to the distribution of scores, it can be said that students found LM-S helpful (81.8%), attractive (66.7%), sort of secure (51.5% secure, 33.3% in the middle) and comforting (63.7%).

The last open-ended item was used to get students additional comments on communicating with LM-S. Out of 33 students, only one wrote comments. He said that:

> Even though it has been used at laboratory hours, it is an effective communication tool. Even we have used the right of asking questions with the laboratory assistant. I think the purpose of it could not been realized well although its name is very effective one.

He stated that they could not use LM-S very much and its purpose could not be realized well.

Table 4. 3: Responses of Semantic Differential Items at SC-PQ

I found communication with LM-S were...									
		Frequencies of Responses						n=33	
		1	2	3	4	5		Mean	St.Dev
13.	Useless	3.0 (1)	6.1 (2)	9.1 (3)	42.4 (14)	39.4 (13)	Helpful	4.09	1.01
14.	Informative	27.3 (9)	42.4 (14)	18.2 (6)	12.1 (4)	0.0 (0)	Confusing	2.15	0.97
15.	Complex	3.0 (1)	18.2 (6)	39.4 (13)	12.1 (4)	27.3 (9)	Primitive	3.42	1.17
16.	Supportive	33.3 (11)	45.5 (15)	12.1 (4)	9.1 (3)	0.0 (0)	Unhelpful	1.97	0.92
I found LM-S was...									
		Frequencies of Responses						n=33	
		1	2	3	4	5		Mean	St.Dev
17.	Useless	6.1 (2)	6.1 (2)	6.1 (2)	48.5 (16)	33.3 (11)	Helpful	3.97	1.10
18.	Unappealing	0.0 (0)	9.2 (3)	24.2 (8)	36.4 (12)	30.3 (10)	Attractive	3.88	0.96
19.	Secure	18.2 (6)	33.3 (11)	33.3 (11)	9.1 (3)	6.1 (2)	Unsecure	2.52	1.09
20.	Comforting	18.2 (6)	45.5 (15)	30.3 (10)	6.1 (2)	0.0 (0)	Disturbing	2.24	0.83

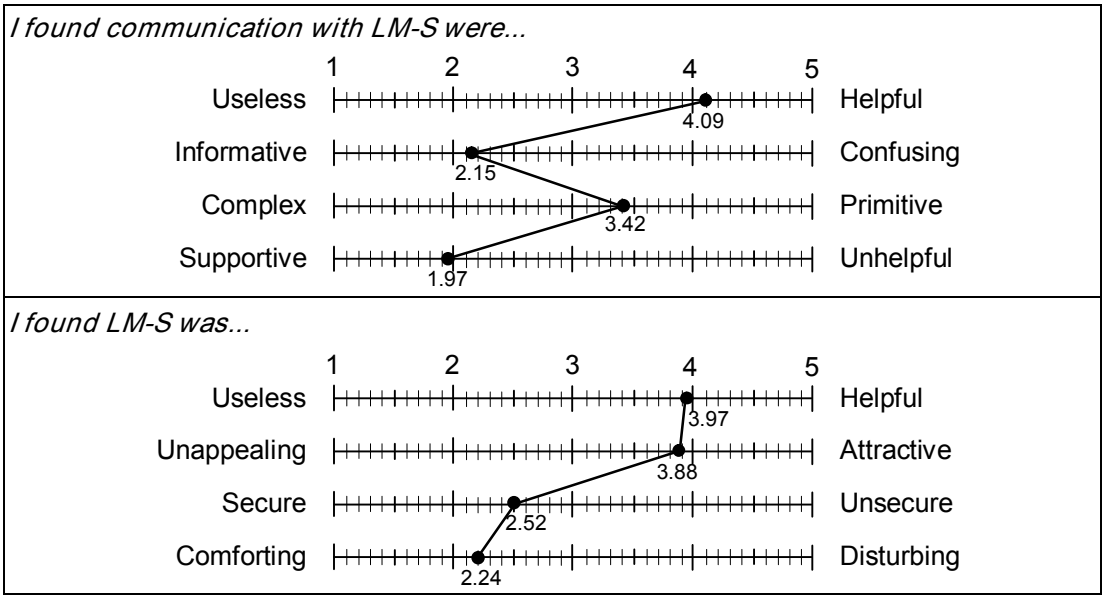


Figure 4. 2: Mean Scores for Semantic Differential Items at SC-PQ

To sum up, the students seem to agree with the items in the questionnaire except for item 9. Hence, it can be said that the use of LM provided adequate communication environment with video conferencing features. Although video and audio in communication seemed to approximate the communication to face to face interaction, the students did not want to eliminate face to face meetings.

4.2. Results of Web-Based Support Perception Questionnaire

The second questionnaire collects data on the perceptions about the web site in the blended course. There are 13 Likert-type items and 5 open-ended items in the questionnaire. Table 4.4 presents the frequencies and mean scores for all Likert-type-items.

The distribution of the scores of all 13 items is given in Figure 4.3 below. As seen in the figure, a great majority of the students (90.9%) agreed with the 1st item that is they thought that the web site was useful to their learning. Almost all them (97.0% at the 2nd item) agreed that they could access the web site when needed. They (90.9% at the 3rd item) found the web site clearly organized and easy to navigate (90.9%

agreement on the 8th item), but (54.5%) still need directions and help services in order to use it.

Table 4. 4: Responses of Likert-Type Items at WBS-PQ

Likert-type Items		Frequencies of Responses						n=33
		SA	A	N	D	SD	Mean	St.Dev
1. The web site, as a whole, was useful to my learning	%	39.4	51.5	9.1	0.0	0.0	4.30	0.64
	n	(13)	(17)	(3)	(0)	(0)		
2. Access to the web site was available when needed	%	51.5	45.5	3.0	0.0	0.0	4.48	0.57
	n	(17)	(15)	(1)	(0)	(0)		
3. The web site was clearly organized	%	57.6	33.3	9.1	0.0	0.0	4.48	0.67
	n	(19)	(11)	(3)	(0)	(0)		
4. The communication tool(s) at web site I used (forum, chat) was/were worthwhile.	%	18.2	51.5	24.2	6.1	0.0	3.82	0.81
	n	(6)	(17)	(8)	(2)	(0)		
5. I would consider myself an active user of the web site throughout the course (i.e., referred to materials, used interactive communications if applicable)	%	24.2	48.5	18.2	9.1	0.0	3.88	0.89
	n	(8)	(16)	(6)	(3)	(0)		
6. I would consider the instructor an active user of the web site throughout the course.	%	30.3	48.5	21.2	0.0	0.0	4.09	0.72
	n	(10)	(16)	(7)	(0)	(0)		
7. The instructor encouraged student use of the web site	%	54.5	39.4	6.1	0.0	0.0	4.48	0.62
	n	(18)	(13)	(2)	(0)	(0)		
8. It was easy to navigate within the web site	%	45.5	45.5	9.1	0.0	0.0	4.36	0.65
	n	(15)	(15)	(3)	(0)	(0)		
9. Directions/support services are needed to use the web site.	%	12.1	42.4	15.2	21.2	9.3	3.27	1.20
	n	(4)	(14)	(5)	(7)	(3)		
10. I would recommend a course that uses the web site to other students.	%	33.3	36.4	21.2	9.0	0.0	3.94	0.97
	n	(11)	(12)	(7)	(3)	(0)		
11. I would consider taking a course that only used the web site and had no class meetings.	%	9.1	18.2	27.3	33.3	12.1	2.79	1.17
	n	(3)	(6)	(9)	(11)	(4)		
12. I felt the web site enhanced communication and collaboration with other students.	%	9.1	42.4	30.3	12.1	6.1	3.36	1.03
	n	(3)	(14)	(10)	(4)	(2)		
13. I enjoyed using the web site as a supplement to my course.	%	30.3	45.5	15.2	9.1	0.0	3.97	0.92
	n	(10)	(15)	(5)	(3)	(0)		
Overall							3.94	0.99

For the 4th item, majority of the students (69.7%) found communication tools (forum and chat) worthwhile. Totally 72.7% of them stated that they felt as active users of the web site at the 5th item, and (78.8%) thought the same about the instructor at the 6th item. Additionally, they (93.9% at 7th item) said that the instructor encouraged them to use the web site.

More than half of the students (69.7%) said that they would recommend a course using the same web site to other students at the 10th item. On the other hand, at the 11th item, students did not totally agree with the statement that they would give up class meetings and take a course that only uses the web site. While 45.4% of them disagreed with the item, only 27.3% of them agreed with eliminating classroom meetings.

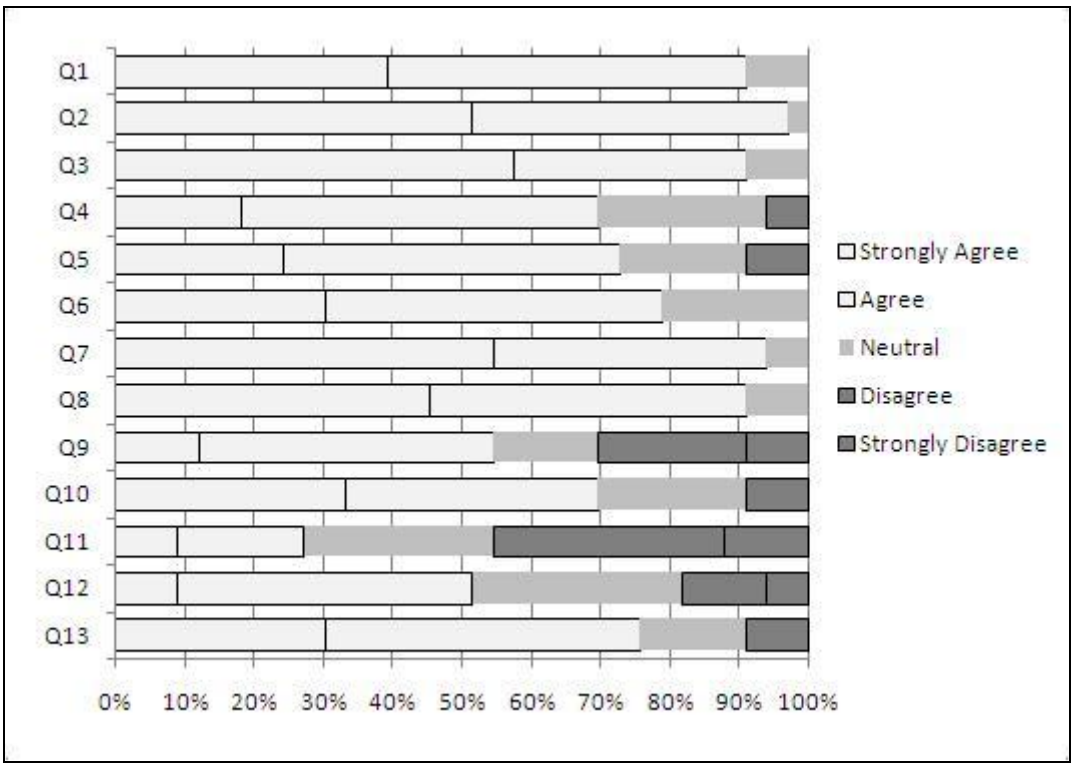


Figure 4. 3: Distribution of Responses for Likert-type Questions at WBS-PQ

Although 51.5% of the students agreed that the web site enhanced communication and collaboration with others, at the 12th item, 30.3% of them were unsure about that and 18.2% of them disagreed.

For item 13, the majority of the students (75.8%) stated that they enjoyed using the web site as a supplement to their course.

Purpose of Log in to Web Site

The answers to the 14th item, which is an open-ended type item, are given below. The item asked the student about their purpose of logging into the web site. After the analysis of the resulft obtained from 24 students, the reasons are collated with their frequencies in Figure 4.4. The core data is given at Appendix I Table A.1.

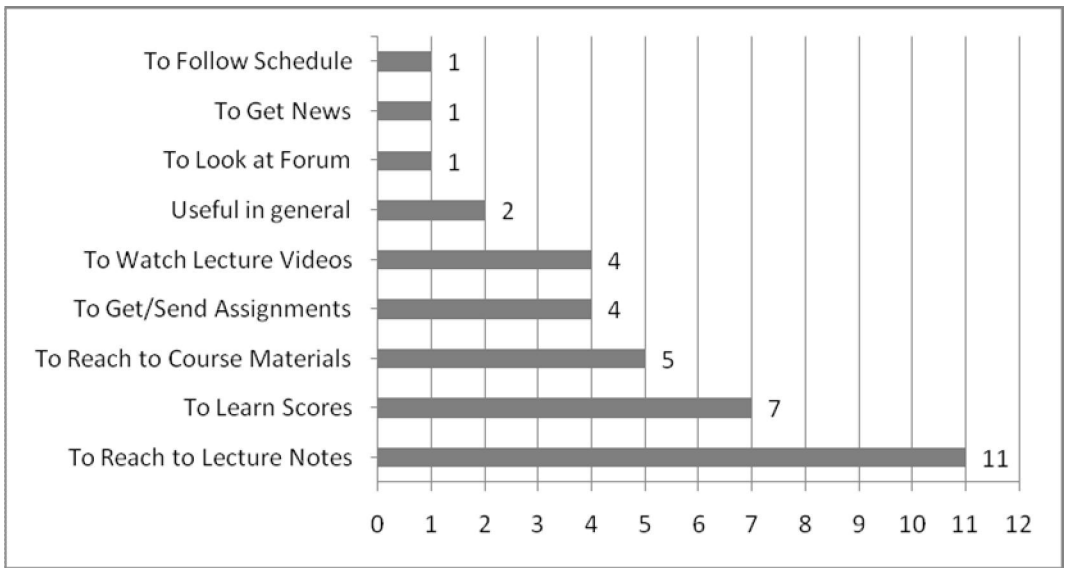


Figure 4. 4: Students' Purpose of Login to Web Site (14th Question at WB-PQ)

The reason mentioned with the highest frequency is to reach lecture notes (n=11), followed by the reason to learn exam scores (n=7), reach course materials (n=5 times), get an send assignments (n=5), and watch lecture videos (n=4 times). Also,

some students stated reasons like: to look at the forum (n=1), to get news (n=1) and to follow course schedule (n=1). Two students (n=2) added that he or she entered the site because it was useful in general.

Change in Use of Web Site

At the 15th item, the students were asked whether their use of the web site increased or decreased throughout the semester, and why. Out of 21 answers, 12 students said that their use increased, 8 students said that it did not changed, and only one student said that it decreased (Figure 4.5). The raw data are presented at Appendix I Table A.2.

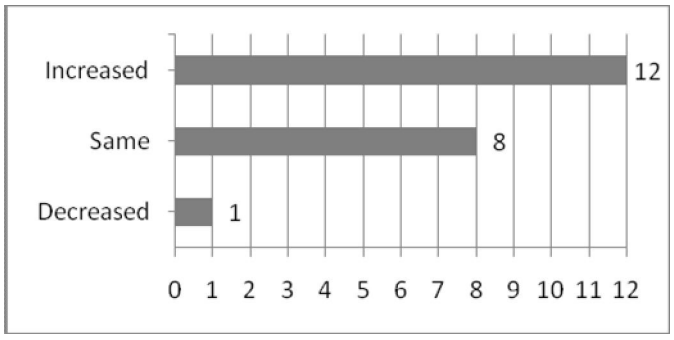


Figure 4. 5: Change in Use of the Web Site throughout the Semester (15th item at WBS-PQ)

One of the students whose use increased said that "At the beginning, I logged in to get lecture notes. My logins increased because the web site was constantly updated and I was curious about the question "Are there any difference on the web site today." Like this respondent, in total 3 students explained their increase in use due to the continuously updated content, and another 2 said that the increase was due to the availability of various materials.

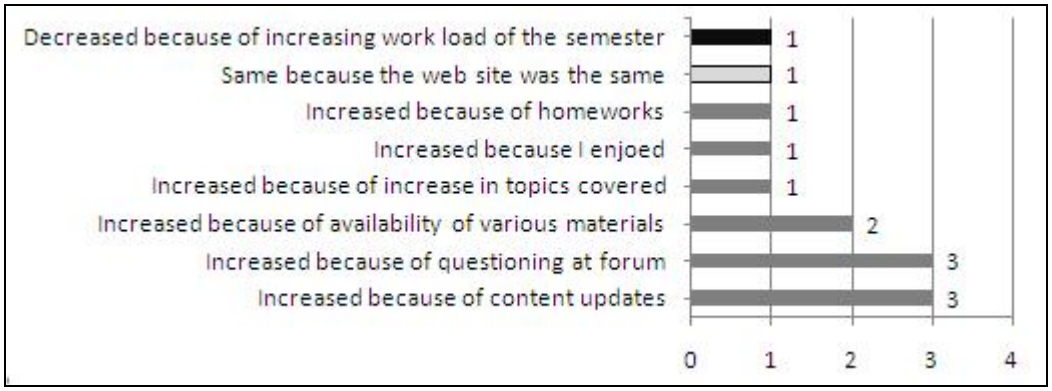


Figure 4. 6: Reasons of Change in Use of the Web Site (15th Question at WBS-PQ)

Another reason for increase expressed by three students was the forum discussions. For example one said that

> I increased the use of the web site throughout the semester because with time it became more powerful about the sharing with ideas. Since we had to do our projects, people started to ask more questions. More questions mean more idea for me :)

There were 8 students who said that their use did not change, and only one explanation was given: "The use of the website to me for the whole semester is the same because there was nothing different from the beginning of the term."

For decreasing usage, one student explained that:

> It decreased. Because during the first 2 months of the semester courses were not so hard so I had the chance to study this course regularly. When the exams had started, I used the web site less than before.

Most Liked Feature of Web Site

At the 16th item, the students were asked about their favorite features of the web site. The responses from 22 students are collected in Figure 4.7. The responses are presented at Appendix I Table A.3. The most liked features are lecture notes (n=11) and lecture videos (n=9). Following these features, 4 students said that their most liked feature was being easy to use (n=4). Grading (n=3) and sending/receiving homework (n=3) features are followed by self-study section (n=1) and instant

messaging (n=1). Having no technical problems and up-to-date content are also expressed once as most liked feature.

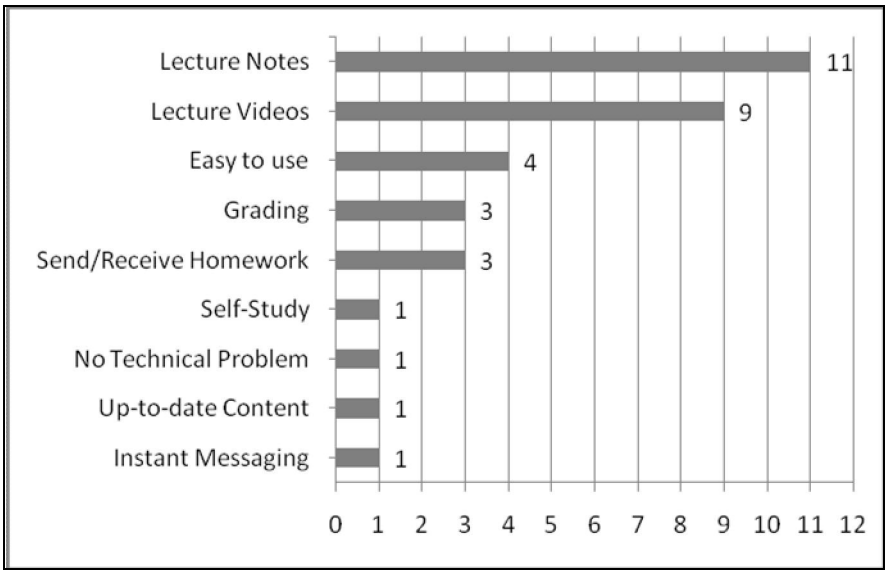


Figure 4. 7: Most Liked Features of the Web Site

Least Liked Feature of Web Site

In terms of least liked feature of the web site at the 17th item's responses, 15 students responded on six different features. All responses from 15 students are given at Appendix I Table A.4.

Not being able to download lecture videos is at the top of the list with 4 responses. Difficulty in changing password comes next with 2 responses. Too primitive navigation bar and forum are stated once. One student said that he or she sometimes entered the web site but did not like it in terms of security. On the other hand, 5 students said that there was noting that they disliked.

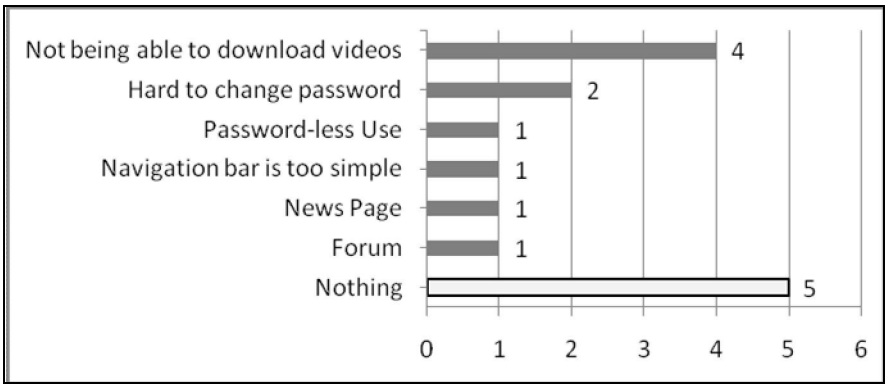


Figure 4. 8: Least Liked Features of the Web Site

Additional Comments about the Web Site

Lastly, the students were given a chance of expressing their additional comments about the web site. Totally 8 students responded and the aggregated comments are given in Figure 4.9. Their responses are presented at Appendix I Table A.5.

Figure 4. 9: Additional Comments on the Web Site

In these comments, students mentioned their satisfaction with the web site because of various aspects such as: respectful, helpful, complementary to face to face instruction, easy to use, and providing access to course materials.

In term of suggestions, one student said that "I think if there was a page showing which new information is added in forum, homework page, etc. it would be good since when I enter I must click all buttons again to look if there is any news." Another one suggested that

> I think the website is very good, useful, and simple. My only complaint about the website is that the videos could not be recorded. For this reason, I do not watch the videos whenever I want, only with an internet connection...not including this, I think the website is very good. I like it.

Since the lecture videos are in streaming format, members of the web site can watch them only by streaming (sustained download), that is the video file is not downloaded. When the user wants to watch the same video at another time, he or she has to connect to the web site. While this type of video broadcasting ensures that the video would not be used without authorization, one student mentioned that he or she would like to have had the opportunity to download the video file.

Finally, another expectation was to include more practices at the self-study part. One student said that:

> Even though finding lecture notes regularly is great favor for us, putting samples demonstrated at lectures and videos recorded by you rose our attention to the course (speak for myself). It was useful and nice that the site is a part of the lectures (I think, if it was only web-based instruction, the site would not be so beneficial). Besides, I wish, except for the samples at homework and "self-study" part, there to be unsolved practices (Maybe the forum would be more effective in this way)

4.3. Results of Collaborative Learning Perception Questionnaire

Collaborative learning perception questionnaire (CL-PQ) is composed of 28 Likert-type items and 1 open-ended item. Table 4.5 and Figure 4.10 show the distribution and the frequencies of the responses.

Most of the student (68.0% at the 1st item) thought that they had adequate resources to get answers. In accessing the web site (the 4th item), while 52.0% of them had no difficulties, 8.0% of them thought the opposite. In terms of reaching the course

objectives (the 21st item), most of the students stated that they had gained skills (72.0% agreed).

Table 4. 5: Responses of Likert-type Items in CL-PQ

Likert-type Items		Frequencies of Responses					n=25	
		SA	A	N	D	SD	Mean	St.Dev
1. The resources in order to search for answers for my questions were adequate.	%	24.0	44.0	32.0	0.0	0.0	3.92	0.76
	n	(6)	(11)	(8)	(0)	(0)		
2. The forum was very beneficial to understand each other's ideas.	%	16.0	36.0	40.0	4.0	4.0	3.56	0.96
	n	(4)	(9)	(10)	(1)	(1)		
3. I used the LM-S very frequently to communicate with the instructor.	%	8.0	20.0	20.0	32.0	20.0	2.64	1.25
	n	(2)	(5)	(5)	(8)	(5)		
4. I had no difficulties in accessing the web site of the course.	%	56.0	36.0	4.0	4.0	0.0	4.44	0.77
	n	(14)	(9)	(1)	(1)	(0)		
5. I was able to receive immediate feedback through chat and forum.	%	12.0	56.0	28.0	0.0	0.0	3.83	0.64
	n	(3)	(14)	(7)	0)	(0)		
6. The forum and chats increased my motivation towards the subject.	%	16.0	36.0	36.9	8.0	4.0	3.52	1.01
	n	(4)	(9)	(9)	(2)	(1)		
7. Working as a group increased my motivation towards the subject.	%	12.0	44.0	32.0	8.0	4.0	3.52	0.96
	n	(3)	(11)	(8)	(2)	(1)		
8. The atmosphere of the group encouraged hard work for everybody.	%	16.0	44.0	28.0	8.0	4.0	3.60	1.00
	n	(4)	(11)	(7)	(2)	(1)		
9. The number of people in my group was appropriate.	%	28.0	44.0	8.0	12.0	8.0	3.72	1.24
	n	(7)	(11)	(2)	(3)	(2)		
10. I enjoyed working with my group mates.	%	36.0	48.0	12.0	0.0	4.0	4.12	0.93
	n	(9)	(12)	(3)	(0)	(1)		
11. We could not accomplish this project unless we worked together.	%	16.0	40.0	28.0	12.0	4.0	3.52	1.05
	n	(4)	(10)	(7)	(3)	(1)		
12. Working as a group made me understand things from different perspectives.	%	20.0	60.0	12.0	8.0	0.0	3.92	0.81
	n	(5)	(15)	(3)	(2)	(0)		
13. Learning together was very beneficial to me.	%	20.0	40.0	36.0	4.0	0.0	3.76	0.84
	n	(5)	(10)	(9)	(1)	(0)		
14. Working as a group improved my interpersonal skills.	%	20.0	48.0	24.0	4.0	4.0	3.76	0.97
	n	(5)	(12)	(6)	(1)	(1)		
15. I understand the subject matter better working with teammates.	%	20.0	48.0	24.0	8.0	0.0	3.80	0.87
	n	(5)	(12)	(6)	(2)	(0)		

Table 4. 5: Responses of Likert-type Items in CL-PQ (Continue)

Likert-type Items		Frequencies of Responses					n=25	
		SA	A	N	D	SD	Mean	St.Dev
16. The arguments in the group were fruitful.	%	12.0	40.0	40.0	8.0	0.0	3.56	0.82
	n	(3)	(10)	(10)	(2)	(0)		
17. On many instances, it was easy to conduct an online discussion.	%	12.0	36.0	44.0	0.0	4.0	3.54	0.88
	n	(3)	(9)	(11)	(0)	(1)		
18. The group leader did a well job on summarizing things and scheduling.	%	8.0	44.0	40.0	4.0	0.0	3.58	0.72
	n	(2)	(11)	(10)	(1)	(0)		
19. I would rather work alone for this project.	%	4.0	32.0	12.0	28.0	20.0	2.71	1.27
	n	(1)	(8)	(3)	(7)	(5)		
20. Chats and forums improved my understanding of the topic.	%	12.0	36.0	40.0	8.0	4.0	3.44	0.96
	n	(3)	(9)	(10)	(2)	(1)		
21. I gained better skills to create high-quality windows applications.	%	32.0	40.0	16.0	12.0	0.0	3.92	1.00
	n	(8)	(10)	(4)	(3)	(0)		
22. The absence of social context did not affect me negatively to work on the project.	%	8.0	40.0	36.0	8.0	0.0	3.52	0.79
	n	(2)	(10)	(9)	(2)	(0)		
23. All group members participated in online discussions equally.	%	20.0	24.0	40.0	8.0	4.0	3.50	1.06
	n	(5)	(6)	(10)	(2)	(1)		
24. As a group, we did not have any communication delay.	%	24.0	28.0	32.0	16.0	0.0	3.60	1.04
	n	(6)	(7)	(8)	(4)	(0)		
25. It did not take too much time to make decisions on the project through online communication.	%	8.0	28.0	56.0	4.0	0.0	3.42	0.72
	n	(2)	(7)	(14)	(1)	(0)		
26. Working on the project through online communication helped my professional growth.	%	8.0	44.0	48.0	0.0	0.0	3.58	0.65
	n	(2)	(10)	(12)	(0)	(0)		
27. Flexibility in time made me to work effectively.	%	16.0	52.0	24.0	0.0	4.0	3.79	0.88
	n	(4)	(13)	(6)	(0)	(1)		
28. Working on the project through online communication socialized me.	%	4.0	48.0	32.0	12.0	0.0	3.46	0.78
	n	(1)	(12)	(8)	(3)	(0)		
Overall							3.63*	0.97*

* Overall mean and standard deviations are calculated with reverse coded 19th item's results

While working on projects, 48.0% of them mentioned that they had not been affected by the absence of social context (22nd item). While 36.0% located as undecided, only 8.0% of them disagreed with the item.

About chat and forum, many students agreed with the items, less number of them stayed in the middle, and a few of them disagreed in general. Most of them agreed that they could get immediate feedback through chat and forum (68.0% at the 5th item). About half of them agreed that chat and forum increased their motivation (52.0% at the 6th item) and understanding of the subject matter (48.0% at the 20th item). Similarly, about half of them (52.0% at the 2nd item) believed that the forum was beneficial to understand each others' ideas. In terms of their frequency of use of LM-S at the 3rd item, only 28.0% of them said that they had used LM-S very frequently, and 52.0% disagreed with the item.

With group work items, the students agreed moderately. They said that woking as groups increased their motivation (56.0% agreement at the 7th item), increased their understanding of the topic (68.0% agreement at the 15th item), interpersonal skills (68.0% agreement at the 14th item), so it was beneficial (60.0% agreement at the 13th item).

They said that they had enjoyed working with their group mates (84.0% agreement at the 10th item) and had been encouraged by the group atmosphere for hard work (60.0% agreement at the 8th item). Most of them were comfortable with the number of people in the groups (72.0% agreement at the 9th item). Students were allowed to form their own groups of 2, 3 or 4 classmates. By working in groups, they agreed that they understood different perspecives (80.0% agreement at the 12th item) and they could not have accomplished the project unless they had worked together (56.0% agreement at the 11th item). Similarly, only 36.0% of them agreed that they would prefer working alone for the project at the 19th item. According to about half of the students (52.0% at the16th item) the discussions in the groups were fruitful, but only 44.0% of them (at the 23rd item) thought that all group members participated in the online discussions equally. About half of them (52.0% at the 18th item) agreed that their group leader was successful in summarizing things and scheduling.

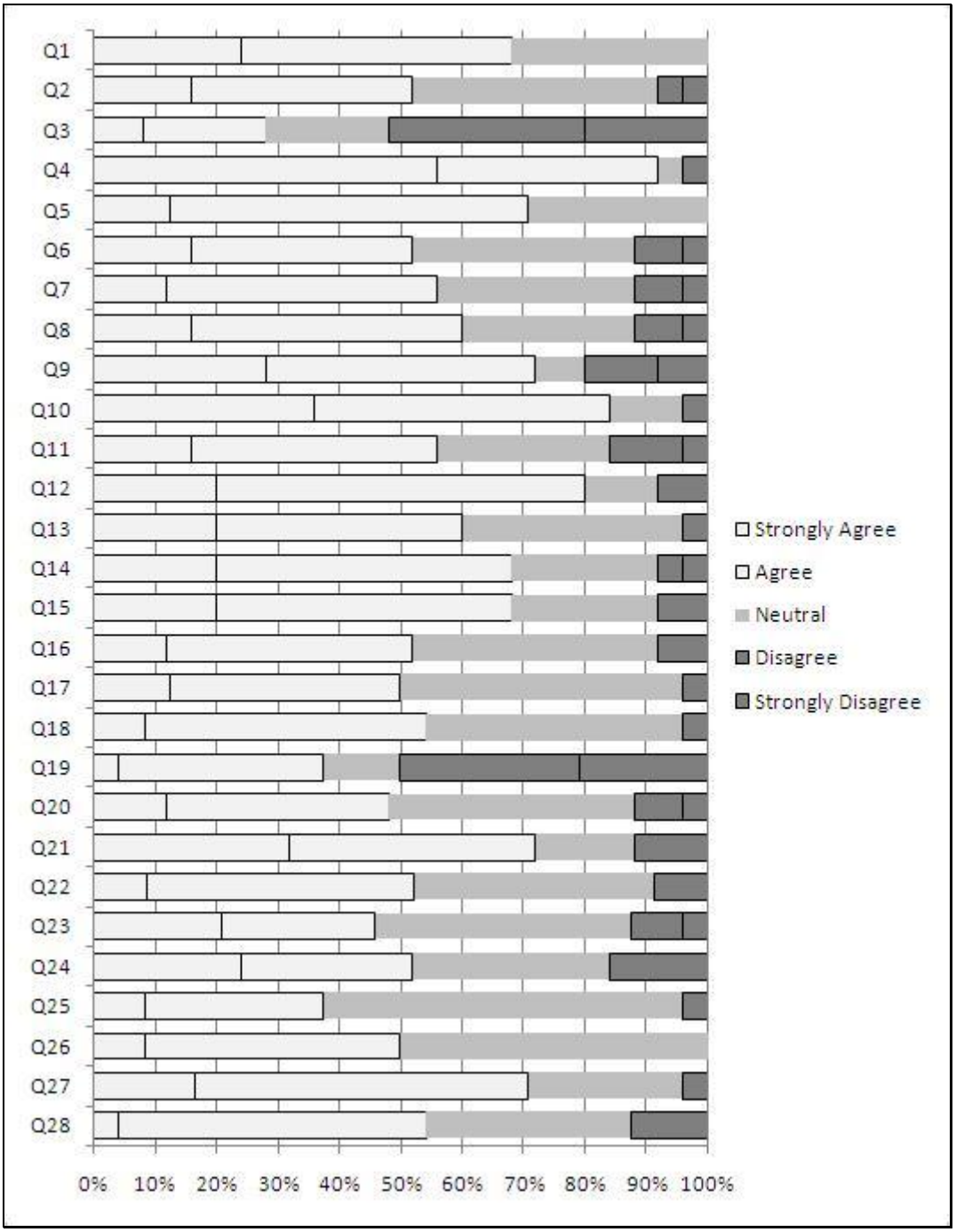


Figure 4. 10: Distribution of Responses for Likert-type Questions at CL-PQ

For items related to online communication, the agreement responses came from about half of the students. Almost half of them (48.0% at the 17th item) agreed that it was easy to conduct online communication and flexibility in time made them work

effectively (68.0% agreement at the 27th item). While 52% of them said that they had no communication delay (the 24th item), only 36.0% of them thought that they made group decisions quickly through online communication (the 25th item). Lastly, about half of them agreed that working on the project through online communication helped their professional development (48.0% agrement at the 26th item) and socialized them (52.0% agreement at the 28th item).

As a complementary question, additional comments about group work were asked at the 29th item. Three students answered the question quoted as follows:

> (P1) Yes, at the group project communication over the Internet was easier. Yes, time flexibility reflected on us. Yes, even we were working on different things, one who finished his or her own job shared with others. Yes, we supported each other about finishing. Yes, it was very useful. Even though I think that group projects prevents individuals' characteristics and abilities, working with someone else was nice.
>
> (P2) Online communication is not a good way since nobody can express itself clearly...
>
> (P3) I would like to emphasize on 19: I would rather work alone for this project.

As seen in the quotations, one student stated his or her satisfaction with working in groups by online communication in term of easiness in communicating, time flexibility, and sharing and supporting each other. However, two students declared the opposite view. One of them claimed that online communication was not a good way of expressing oneself. The other one said that he or she would have preferred working alone.

In general, perceptions about group work with online communication are positive, but there is a minority group who is mostly undecided, but sometimes has negative claims. It can be said that the students liked group work and perceived online communication as supportive in group work.

4.4. Online Instructor Perception Questionnaire

Perceptions about the roles of the instructor are obtained via Online Instructor Perception Questionnaire. There are 20 Likert-type items and one open-ended item in

the end. The distributions and frequencies of responses of Likert-type items are given in Table 4.6 and Figure 4.11.

Almost all of the students agreed with the items about the roles of the instructor. For the administrator role, the students said that the instructor replied emails and posted at the discussion board within 24 hours (92.0% agreement at the 1st item); traced students' problems and worked for the solution (100.0% agreement at the 2nd item); posted timely bulletins about changes and updates to the course (100.0% agreement at the 3rd item); and posted syllabus, course materials and discussion topics at the beginning of the semester (96.0% aggreement at the 4th item).

Table 4. 6: Responses of Likert-type Items in OI-PQ

Likert-type Items		Frequencies of Responses					n=25	
		SA	A	N	D	SD	Mean	St.Dev
1. The instructor returned e-mails/posts within 24 hours.	%	52.0	40.0	4.0	4.0	0.0	4.40	0.76
	n	(13)	(10)	(1)	(1)	(0)		
2. The instructor followed up student problems and tried to find out solution.	%	64.0	36.0	0.0	0.0	0.0	4.64	0.49
	n	(16)	(9)	(0)	(0)	(0)		
3. The instructor posted timely bulletins about changes and updates to course.	%	64.0	36.0	0.0	0.0	0.0	4.64	0.49
	n	(16)	(9)	(0)	(0)	(0)		
4. The instructor posted the syllabus, course materials, and discussion topics at the beginning of the course.	%	64.0	32.0	4.0	0.0	0.0	4.60	0.76
	n	(16)	(8)	(1)	(0)	(0)		
5. The instructor could cope with all the questions raised by the students and respond in time.	%	44.0	52.0	4.0	0.0	0.0	4.40	0.58
	n	(11)	(13)	(1)	(0)	(0)		
6. The instructor managed and guided student interaction and discussion.	%	36.0	56.0	8.0	0.0	0.0	4.28	0.61
	n	(9)	(14)	(2)	(0)	(0)		

Table 4. 6: Responses of Likert-type Items in OI-PQ (Continue)

Likert-type Items		Frequencies of Responses					n=25	
		SA	A	N	D	SD	Mean	St.Dev
7. The instructor moderated discussion and modeled desired methods of communication.	%	24.0	52.0	24.0	0.0	0.0	4.00	0.71
	n	(6)	(13)	(6)	(0)	(0)		
8. The instructor fostered group learning.	%	39.0	44.0	20.0	12.0	0.0	3.80	0.96
	n	(6)	(11)	(5)	(3)	(0)		
9. Minimum 10% of the discussion postings were from the instructor.	%	36.0	44.0	20.0	0.0	0.0	4.16	0.75
	n	(9)	(11)	(5)	(0)	(0)		
10. The instructor provided public and private acknowledgment to students who contributed to discussion.	%	28.0	60.0	12.0	0.0	0.0	4.16	0.62
	n	(7)	(15)	(3)	(0)	(0)		
11. The instructor contacted the students privately or by e-mail to ask noncontributing students to participate in discussion.	%	16.0	20.0	40.0	20.0	0.0	3.33	1.01
	n	(4)	(5)	(10)	(5)	(0)		
12. The instructor engaged students, fostered sharing of participants' knowledge, questions, and expertise.	%	28.0	52.0	20.0	0.0	0.0	4.08	0.70
	n	(7)	(13)	(5)	(0)	(0)		
13. The instructor was proficient with all the systems used in the course.	%	56.0	36.0	8.0	0.0	0.0	4.48	0.65
	n	(14)	(9)	(2)	(0)	(0)		
14. The instructor helped students troubleshoot technical systems used in the course and referred to appropriate help sources, as needed.	%	40.0	48.0	12.0	0.0	0.0	4.28	0.68
	n	(10)	(12)	(3)	(0)	(0)		
15. The instructor provided students with clear grading criteria.	%	36.0	40.0	20.0	0.0	0.0	4.16	0.75
	n	(9)	(11)	(5)	(0)	(0)		
16. The instructor reminded the students of the upcoming assignments.	%	32.0	60.0	8.0	0.0	0.0	4.24	0.60
	n	(8)	(15)	(2)	(0)	(0)		
17. The instructor provided written examples of assignments/projects.	%	48.0	44.0	8.0	0.0	0.0	4.40	0.65
	n	(12)	(11)	(2)	(0)	(0)		
18. The instructor provided resource ideas for completing assignments.	%	32.0	48.0	20.0	0.0	0.0	4.12	0.73
	n	(8)	(12)	(5)	(0)	(0)		
19. The instructor assisted students who were having problem completing the assignments.	%	36.0	40.0	20.0	4.0	0.0	4.08	0.86
	n	(9)	(10)	(5)	(1)	(0)		
20. The instructor acknowledged the receipt of assignments within 24 hours.	%	32.0	52.0	12.0	0.0	4.0	4.08	0.91
	n	(8)	(13)	(3)	(0)	(1)		
Overall							4.22	0.76

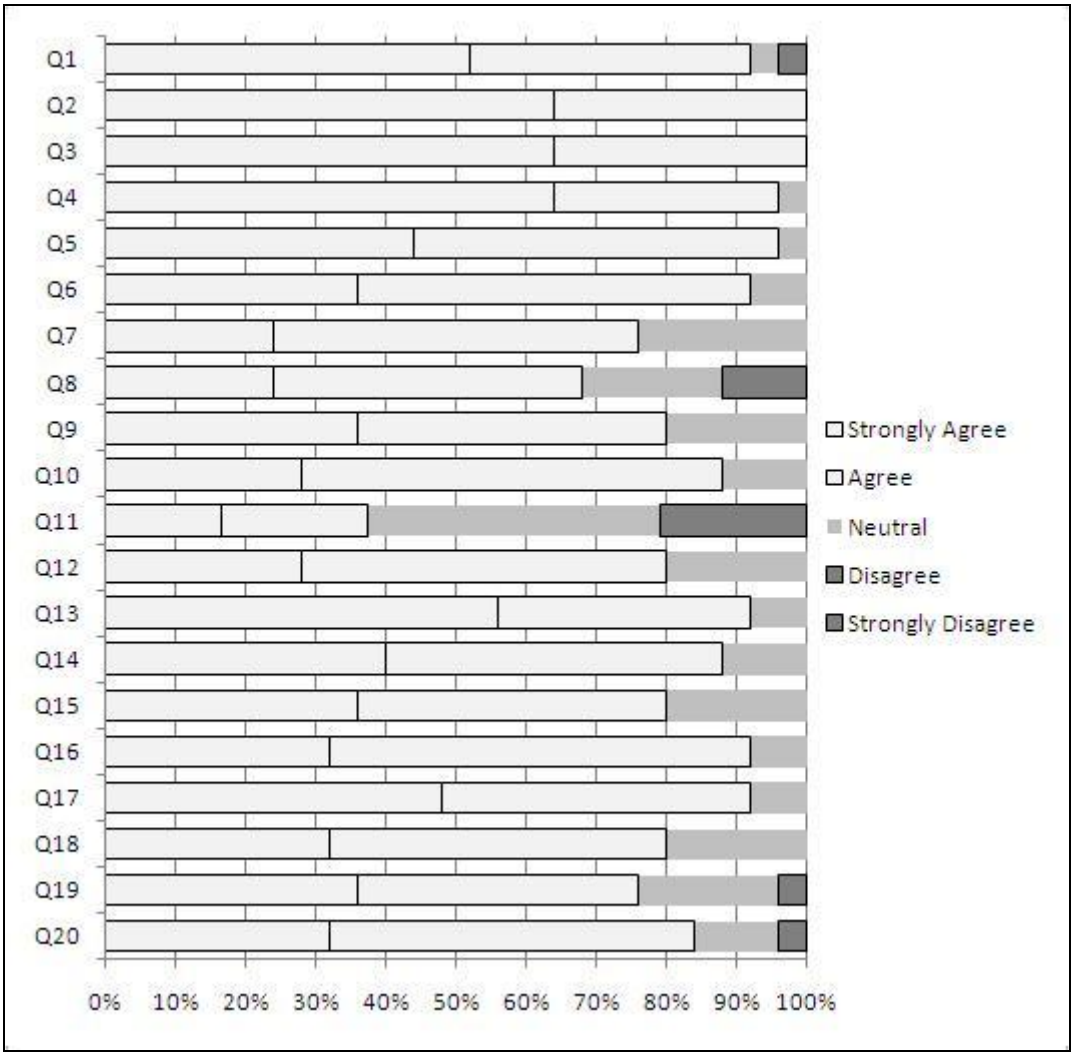


Figure 4. 11: Distribution of Responses for Likert-type Questions at OI-PQ

In terms of facilitator role, the students perceived the instructor quite adequate. Almost all of them agreed that the instructor coped with the question of the students (96.0% agreemet at the 5th item); managed and guided student interaction and discussion (92.0% agreement at the 6th item, and 76.0% at the 7th item). They said that the instructor encouraged group work (83.0% agreement at the 8th item). In discussions, the instructor had at least 10% of posting (80.0% agreement at the 9th item) and acknowledged the students who contributed to the discussions (88.0% agreement at the 10th item). Similarly, the students agreed that (80.0% agreement at

the 12th item) the instructor engaged the students and fostered sharing of knowledge, questions and expertise. On other hand, many student did not think that the instructor contacted the non-contributing student to participate (36.0% aggreement and 20.0% diasgreement at the 11th item).

As a technician, the students perceived the instructor to be sufficient in the 13th item (92.0% agreement) and helpful in technical troubleshooting at the 14th item (88.0% agreement).

Lastly, the perceptions of the students about the evaluator role of the instructor are very satisfacory. The students agreed that the instructor provided clear grading criteria (76.0% agreement at the 15th item); informed about incoming assignments (92.0% agreement at the 16th item); provided written examples of assignments (92.0% agreement at the 17th item) and resource ideas for completing assignments (80.0% agreement at the 18th item). They also thought that the instructor assisted students who had problems in completing the assignments (76.0% agreement at the 19th item), and also acnowledged the submission of assignments within 24 hours (84.0% agreement at the 20th item).

For the additional comments about the instructor, 9 students wrote their thoughts at the 21st item. These responses are given at Appendix I Table A.6. Figure 4.12 shows positive and critical opinions about the instructor after the coding process.

Due to these 10 students' expressions, the instructor is a good instructor (n=4), expert on the subject (n=3), easy to communicate (n=2), kind (n=2), helpful (n=2), shares knowledge (n=1) and esteems students (n=1).

Three of them also expressed thanks to the instructor in their responses. For example, one said "he is a kind of person who esteems students and is not selfish in sharing what he knows. Thanks." On the other hand, there are two critiques about the instructor. "It is better if the students acknowledged from where they lost points" said one respondent. Another one mentioned:

> Everything was appropriate for this course to me but the evaluation was a little bit unfair. Because even some people's projects don't work, they got better grade then the one's working efficiently.

These two respondents seemed to be critical about the evaluator role of the instructor.

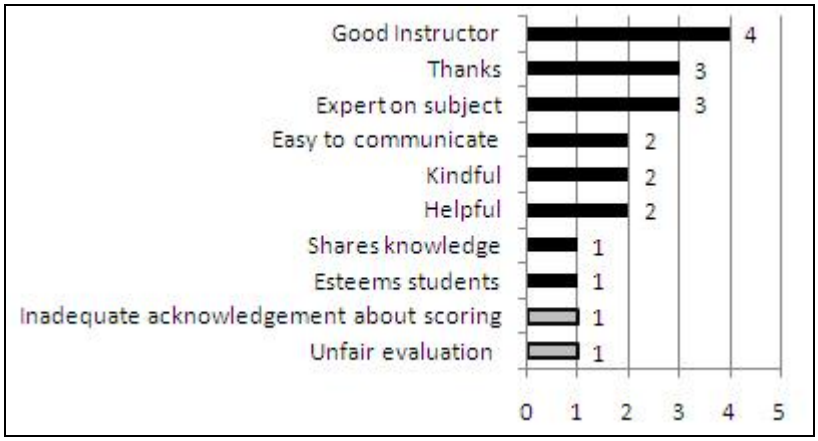


Figure 4. 12: Additional Comments on Instructor at OI-PQ

Based on these results, it can be said that the instructor was perceived quite satisfactory as an administrator, facilitator, technician and evaluator. The positive opinions at the open ended item claim that the instructor was in good rapport with the students. Relatively low score was obtained at one item (11^{th}) about the instructor's facilitator role and it can be said that the students expected more invitation and support when they were not contributing to the discussions. Other critiques were about the evaluator role of the instructor. Although the evaluator item had high agreement scores, one student mentioned that he or she needed more information about how he or she lost points. Another one was in doubt with the fairness in scoring.

4.5. Interview Results

There are 9 main questions and one "additional comments" question at interview guide. While the interview form is given at Appendix A, Table 4.7 below lists questions in short form.

Table 4. 7: Interview Questions in Short Forms

Question 1:	Frequency of use of online communication tools in daily life
Question 2:	Experiences with those communication tools in any course before
Question 3:	Experiences with those communication tools in the course under investigation
Question 4:	How LM be introduced
Question 5:	How and when to use LM at the course
Question 6:	Liked features of the LM
Question 7:	Disliked features of the LM
Question 8:	Recommendations on LM
Question 9:	Differences between face to face communication and online communication over LM
Question 10:	Any comments

The first five questions are descriptive ones and are asked in order to make interviewees remember their own experiences before expressing their perceptions about subsequent questions.

4.5.1. Question 1: Frequency of use of online communication tools in daily life

Table 4. 8: Frequencies of Use of Online Communication Tools in Daily Life

Question 1: How frequently do you use online communication tools? (n=9)				
Tools	Frequently	Rarely	Never	No Answer
Email	9	-	-	-
Forum	2	5	1	1
Chat	7	2	-	-
Chat with web camera	3	1	-	5
Video Conference	-	2	7	-

All participants said that they had been using email frequently. In terms of forum usage, five of the participants in the study admitted that they had been using forums (or discussion lists) rarely when they needed a specific answer. Other two participants stated that they had been using forums actively, that is, they had been both reading and writing.

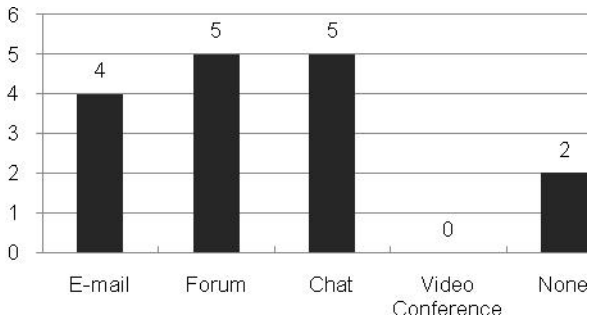
Two participants said that they had participated to a video conference once as a listener.

4.5.2. Question 2: Frequencies of experiences with communication tools in any course

Table 4. 9: Frequencies of Experiences with Communication Tools in any Course

Question 2: Have you ever used any of these tools in your courses for instructional purposes and how?

Tool	Frequency
E-mail	4
Forum	5
Chat	5
Video Conference	0
None	2



These experiences are either instructional activities planned in a course design or students' own initiations like using chat applications during group projects.

4.5.3. Question 3: Experiences with communication tools in the course under investigation

About forum usage, three participants stated that they were aware of the forum but neither read nor wrote messages. Among these three participants, one foreign student said that she would have read and written messages if they had been in English

instead of Turkish. Other two respondents said that there had been a few topics and they could ask their questions to the instructor in the classroom.

Table 4. 10: Experiences with Communication Tools in the Course under Investigation

Question 3: At CEIT211 course, which online communication tools have you used?		
Tool	Frequency	Description (Frequency)
Email	5	• Writing extra messages in addition to reading announcements via e-mails (5)
Forum	9	• Both read and write (1) • Only Read (5) • Aware but not read (3)
Chat (Video conference)	9	• I have used (5) • I could not used (4)

Chat and video conference usage were combined since the participants expressed the name of Live Meeting instead of chat or video conference. Those, who said they could not use the Live Meeting (n=4), explained the causes as follows:

- There was a connection problem.
- It was available but I did not use it.
- Support from research assistants at laboratory activities was more dominant.
- We used Microsoft MSN® during the projects.

4.5.4. Question 4: Introduction of Live Meeting

All participants agreed that the installation was easy and no problems occurred. They explained that the installation was similar to a regular application installation. They expressed words like “next and next”, “like normal program installation”, “easy”. They also mentioned the short movie published at web site. The movie was demonstrating how to install and start the application. It was produced previously by

the instructor, combining video of screen capture and audio of speech describing actions on the screen at that moment.

In terms of why to use it, except for one participant, they stated that they were clear about the purpose of the application. They expressed that it was communication software like Microsoft MSN®, and they used the phrases like "synchronous dialogues when the instructor and students were at distant". On the other hand, one participant argued that "it was difficult to understand without a demonstration".

Table 4. 11: Adequacy of Introduction of Live Meeting

Question 4: How has Live Meeting been introduced to you? Was that introduction useful for you in terms of how to install and why to use it? Why?		
Adequacy of the introduction	Adequate	Not Adequate
About how to install	9	-
About why to use	8	1

4.5.5. Question 5: How and When To Use Live Meeting at The Course

This question was asked to the participants in order to make them remember the details of their experience in Live Meeting. The aspects to be covered are their frequency and purpose of use; a sample usage scenario; whether or not they watched live video broadcast; whether or not they utilized a web camera to broadcast own video view; and any difficulties faced during these experiences.

All of the participants stated that they used LM during application hours at the computer laboratory in the department. These application hours were part of the course hours every week. During the application hours, students were using computers and the instructor was at his office and using LM to communicate with them simultaneously.

Only one participant had used LM at home at night additionally, and he expressed that he could not find anyone to talk then.

In terms of purpose of use, all students said that they opened LM to ask questions and get immediate answers about what they were working on at computers. One of them added that he was concerned only with his own questions, not with others'. If he had had no question to ask, then he would not have used LM.

Out of nine participants, eight said that they watched the instructor's video alive at least once. One participant, on the other hand, stated that he could not watch it because of technical problems.

Table 4. 12: How and when to use LM at the course

Question 5: When and how did you use Live Meeting during the semester?	
Sub Question 5.1: When and where did you use Live Meeting	Frequency
During application hours at computer laboratory	9
At home at night	1
Sub Question 5.2: Why did you use Live Meeting	
To ask questions and get answers about current topic at that moment	8
To see others questions	1
Sub Question 5.3: Have you ever watched the instructor alive?	
Yes	8
No	1
Sub Question 5.4: Have you ever broadcasted your video?	
Yes	1
No, but I would	3
No and I would not	2
No, no comment	3
Sub Question 5.5: Difficulties during the use of LM	
Losing connection during communicating (need to connect again)	4
Unable to connect at all times	1
Audio and video delay during video conference between participants	1
Audio delay during watching instructor video	2
Poor quality of speakers at the computer	1

The participants were asked whether they had broadcasted their own video alive at least once. Only one participant reported that he had. Other participants stated that

they had not opened their own video since they did not have the necessary equipment at the laboratory. While two of those conveyed that they would have open video if they had had the necessary equipment, other three declared that they would not have preferred to broadcast their own video even with the available equipment.

For question 5, the last aspect was about difficulties which occurred during the use of Live Meeting. As seen in Table 4.12, two major difficulties were reported, namely connection problems and quality of audio and video synchronization during video conferences.

4.5.6. Question 6: Liked features of the LM

The sixth question is one of the important questions at the interview since it focuses on the participants' perceptions about Live Meeting. Although this and the next (the 7th) question are directed as "aspects to be liked or disliked", their purpose is to investigate what they think about LM and how they perceive online communication with synchronous video via Live Meeting. With these purposes in mind, the participants were expected to focus their answers on communicating with audio and video channels. These aspects were focused under three groups after analysis:

- Benefits from Synchronous Communication
- Benefits from Communication Channels
- Other Concerns

Benefits from Synchronous Communication

Immediate feedback: The first group of liked features is related with synchronous communication. According to the students, immediate feedback and being able to study and to communicate at the same time are important benefits.

Engaging other task simultaneously: One student added that online communication can be better in the activities like programming since they can communicate and study at the same time, without interrupting coding:

> If I am in front of the computer, online communication will already be possible, and if it was a practice oriented course, it seems more reasonable. Online, meeting with the instructor during doing something individually, doing two things at the same time. Or if I mind something, for asking at the same time. I mean, if we think one instructor for one classroom.

Increased retention supplement to learning: Additionally, they added that synchronous communication increased their retention and supplemented their learning. One participant said that "I asked the questions and get the answers immediately; otherwise I would forget and give up asking."

Benefits from Communication Channels

When communication channels were focused, like messaging textually, watching the instructor, watching other students and broadcasting own video diverse replies were obtained.

Reducing perceived distance while watching the instructor: For watching the instructor during dialogues, seven participants stated that they had liked and preferred to watch him. One respondent said that seeing the instructor was fine and made them think that the instructor was near to them, and that the instructor was really spending time for them.

Increased retention and motivation while watching the instructor: Another one stated that watching the instructor increased their retention and motivation.

> Since everybody could write simultaneously, and since we were engaged in a task, tracing those scripts was hard. However, when you spoke, we could hear you even we were working on a project. For that reason, video and audio were advantageous for me.

Permanent appearance of text messages: On the other hand, three interviewees declared that written words were more important than the image of the instructor; therefore, the video channel could be neglected. They clarified that they could forget what the instructor had said, but written words would stay on the screen:

> Listening is more logical but I think it is reading (that I would prefer). Why? Because, since you can save readings, even you miss a thing, you can forget and may not ask the instructor again.

Accent in speech: One participant preferred only the voice of the instructor, because he thought that accent in speech made recognition easier than textual messages so video, again, could be neglected.

Easy to convey ideas by mimics: Another focus was on broadcasting own video during synchronous dialogues with the instructor or with the other students. Two participants stated that they would have preferred that application because it was easy to convey ideas by talking with mimics.

> Frankly speaking… sometimes I cannot say what I have not understood, but the instructor can recognize when he sees my face.

Easy to express ideas by voice: Similarly, three students pointed out that expressing or questioning with own voice was a more proper way than writing.

Other Concerns

Effect of Identity of Communication Partner: In categorization and coding of interview scripts, another emerging dimension was that perceptions seemed to change with regard to the communication partner. The subjects reflected different approaches with respect to the person with whom they communicated. For example, they qualified the communication with the instructor as motivating, supplementary and increasing retention. However, one interviewee said that that he would not want to communicate with the instructor if he did not like the instructor in general. He said he would not watch that instructor and would not send his own video to him.

The participants were asked whether they liked watching other students who were talking with the instructor at the video channel or not. While two interviewees stated positive opinion, other four declared opposite opinions since it distracted their concentration.

Being Uncomfortable in Front of Camera: Four participants expressed negative opinions based on their personal preferences. They said that they feel uncomfortable in front of the camera. Another student said that he would have opened his own video only if the other side had opened his or her own video too.

Table 4. 13: Summary of Most Liked Features of LM

Summary of Liked Features of LM

• Benefits from Synchronous Communication
  o Immediate Feedback
  o Engaging other tasks simultaneously
  o Increased retention
 	
• Benefits from Communication Channels
  o Reduced perceived distance in video conference
  o Increased retention and motivation in video conference
  o Permanent appearance of text messages
  o Accent in speech
  o Easy to express ideas by talking
  o Easy to convey ides by mimics in video conference
 	
• Other Concerns
  o Effect of Communication Partners
  o Being uncomfortable in front of camera

4.5.7. Question 7: Disliked features of the LM

To understand what aspects of communicating with Live Meeting were disliked; the interviewees were asked explicitly about those aspects at the seventh question. The participants' disliked aspects were grouped under two categories as technical problems and design problems.

Technical Problems

Time delay at audio/video transmission: One major technical problem was time delay of audio/video transmission. In some cases, it took 5 or 6 seconds for the instructor's voice to arrive and 5 or 6 seconds for the image to arrive at the students' monitors which could sabotage proper communication.

Problems in joining the dialog sessions: Another technical problem was that some participants could not login to dialog sessions, although they had provided authentication information or they dropped from ongoing dialog session and needed to login again.

Design Problems

Difficulty in tracing questions and responses at the same time: In design problems, participants said that they found tracing questions and answers difficult at textual messages. One said:

> When we ask a question or wonder about something, to our friends or to you, since the answer is given at the same medium in the same way, it may be confusion that who is being answered. Who are you answering for? Namely, I wish there was a difference, that is, we could recognize that it was us being responded. Among participations, who are having a talk with whom? We wish we knew that. Who is asking and who is answering, there would be that kind of sign.

Difficulty in understanding the source of messages at textual messaging: They added that understanding the source person of the messages was complicated when more than a few participants were actively sending messages at textual mode. Collecting all messages from all participants into one text box at the interface seemed to make tracing messages difficult.

> For instance if we think that 25 people ask questions at the same time to the instructor, waiting for my turn! I don't know whether it can be fixed.

Distracting by watching another student: Some subjects said that watching another student would have distracted their concentration if they had not been interested in. In fact, according to them, watching two people talking to each other might be boring after a while:

> Actually, it disturbs me, because the points that people did understand or not are all different… For example, when a student said he or she could not understood a topic, you continuously tell about it, and after a while we may get bored of that.

Formal and academic mood: In addition to those, one participant said that Live Meeting was cold and had academic style and should be designed again to be funnier like some commercial chat software:

> Different images (avatar images), smiles, and that kind of things could be added. I mean, this (Live Meeting) is, now, educational, academic, and formal; it could be a cooler thing.

Table 4. 14: Summary of Disliked Features

Summary of Disliked Features of LM

• Technical Problems
  ○ Time delay at audio/video transmission
  ○ Problems in joining the dialog session
• Design Problems
  ○ Difficulty in tracing questions and responses at the same time
  ○ Difficulty in understanding the source of messages at textual messaging
  ○ Distracting by watching another student:
  ○ Formal and academic mood

4.5.8. Question 8: Recommendations on Improving Live Meeting

The participants were asked to suggest their recommendations on Live Meeting. Many suggestions claimed by the participants are grouped under three categories: changes in communication patterns, changes in interface design and adding extra features.

Changes in Communication Patterns

Allow students to start a dialog session without the instructor's authorization: A participant said "For example, I wonder that how could we enter when you are not online at nights? We had that king of bother. I could not enter more because of that. How can that be fixed?"

The application allows only the instructor to start and stop a dialog session. Once the instructor starts a dialogue, a student who wants to join, can join the dialog session. This makes the students wait for the instructor to communicate. As quoted above, some student claimed that they would have entered dialogues more if the application had allowed them to start a dialog.

Allow private dialogues with the instructor to make message tracing easier and to get answers quickly: The students, who complained about the difficulty of tracing textual messages, mentioned that

> I would add like, you know, we want to talk privately to the instructor, so that we can receive response easily and quickly when we ask. It would not be confusing. Like double click on the name, then we open other window, yes like that.

Changes in Interface Design

More attractive signal about "new message arrived": One student said that there could have been a more attractive signal when "new message arrived", even though the application showed a small yellow balloon at the right-bottom corner of the screen. He suggested a sound or animated image for that signal.

Emotional icons and images at textual messaging: The students, who claimed that the application's mood is academic and cold, suggested that there could have been emotional icons or images in textual messaging representing emotions. They expressed some names of commercial chat software for these features.

Different text colors and fonts at textual messaging to differentiate instructor's messages: To differentiate textual messages of the instructor from other messages, students suggested using certain colors:

> For instance, the texts at bottom are all the same color. They could be colorful, for example red for he instructors' and blue for the students' would be better.

Similar to other chat software: While the students suggested their expectations above, they pronounced the name of some commercial software, like Microsoft MSN and Microsoft Messenger. Their experience in the use of chat applications in daily life is observed in their responses.

Adding Extra Features

Desktop or application sharing: Two students suggested desktop or application sharing in LM-S. Desktop sharing allows someone else at remote distance to see the screen of your computer through the Internet connection. The student said:

> Student: Right now, for example, we are unable to express our questions to you, or you may understand differently what we express.

Interviewer: Is that happening during chatting or talking face to face?

Student: Either chatting or talking, it may happen during either. After that, for example Messenger has something, you get the control of the computer and see the screen of other person.

Interviewer: Ok, they call it application sharing. Desktop becomes common for both.

Student: Yes, like that. For example, we could open desktop to you, and you could use it. That way, you use it. I don't know, when we have a question about codes, and when we cannot express it, when we cannot negotiate, you can look at from there and get it.

File sharing: Another suggestion was file sharing. Like some other features, file sharing is quite common feature in chat applications. Some students added that the LM-S could have provided file sending/receiving among participants.

Saving textual messages and audio/video dialogues: The last suggestion was about saving dialogue scripts and audio/video. They claimed that, this application would have provided an opportunity for a student to watch or read the dialogues when he or she missed the real time communication.

Table 4. 15: Summary of Recommendations for Improving LM

Summary of Recommendation for Improving LM

• Changes in Communication Pattern
  ○ Allow students to start a dialog session without the instructor authorization
  ○ Allow private dialogues with the instructor to make message tracing easier and to get answers quickly
• Changes in Interface Design
  ○ More attractive alert for new messages
  ○ Emotional icons and images at textual messaging
  ○ Different text colors and fonts at textual messaging to differentiate instructor's messages
  ○ Being similar to other chat software
• Extra Features
  ○ Desktop or application sharing
  ○ File sharing
  ○ Saving textual messages and audio/video dialogues

4.5.9. Question 9: Differences between face to face and online communication

As a last question, the subjects were asked to compare the communication via Live Meeting with face to face interactions at the classroom. In this question it is expected that after expressing pros and cons of communication via Live Meeting, students will make a preference of communication way one over another. After interviewing the first subject, the question was modified to be able to be comprehended easier and was directed like: "If there would be three different courses, one over Live Meeting, one at classroom, and one blending both Live Meeting and classroom; which one would you like, and why?" The answers were grouped under four categories.

Face To Face Interaction Preference

In the last question, although some subjects stated their preferences, they conveyed many arguments both for and against the different ways of communication.

Need for social interaction: In favor of *face to face communication* in traditional classroom activities, the subjects said that they would prefer it since they needed social interaction like in classroom interaction.

> My preference would be, directly, our classroom context at that moment. Ultimately, I do not want everything to be online. There should be, more or less, social interaction… Also, let's say there are 40 video, students' video; 1 for instructor video. It is difficult for the instructor to recognize whose face is sad. But in classroom, it is easy to get it.

Easy to convey and understand feelings and emotional states: They claimed that it was easy to understand the emotional states and feelings of others.

Easy to manage dialogues: The students said that it was easy to control the dialogues, like when to start talking, when to answer etc.

Easy to share ideas: They said they could share ideas at ongoing dialogues easily:

> In traditional education, if someone asks a question, you remember something else from it. Then, someone else minds something else. Something emerges. Albeit, seeing and hearing are also possible with what you said (LM-S), but traditional (face to face) is better.

Direct support: Moreover, they thought they had a direct support from the instructor:

> Classroom, my preference would be classroom because it is more comfortable. You may ask any time you like. We can ask at this (LM-S) too, but when every body writes something at the same moment to the instructor, or ask question, it becomes more confusing. But in classroom, there is more ordered environment. When we face with a problem, you (the instructor) can help directly. That is why it (face to face interaction) is better.

Live Meeting Preference

Some of the interviewees preferred a course totally given with online tools like LM. There are various explanations for their choice.

Existence of new technology: For some of them, the existence of new technology is one reason in their selection, because it is interesting and motivating:

> …But a study system composing computers and that kind of interactive activities very attractive for me…It really creates different perspectives and by the effect of these, change is quite different. Rather than coming to listen to the instructor in a standard way, communicating over computers and other tools out there create a different context, a different curiosity and interest on person.

Motivation by existing of instructor: Some of them said that they felt in contact with the instructor personally, not like in the classroom, which motivated them too:

> Actually, the both (fate to face and online communication) have specific advantages. For example, people like the classroom environment. They cannot get motivated themselves at home for studying. For that reason, (it is important) to be one-to-one with the instructor. Of course there should be someone near to him, someone who is master.

Feeling uncomfortable at classroom: Some of them admitted that they felt uncomfortable in any classroom, therefore, preferred online communication at home:

> At Internet context, it is more comfortable for me because I cannot feel comfortable in classroom. It would be easy for me to be with someone with whom I can ask questions and get answers at a comfortable place. I like both. But if you ask which one more, I would prefer studying at Internet environment.

Easy to manage dialogues: In contrast to previous face to face preferences, some of them defined communication more controllable and quieter than in a class interaction.

> That kind of communication (through LM-S) is more important for me because in classroom environment, every body may talk at the same time. It's not good. But in this way, a student, who has a question, can directly ask to the instructor. You (the instructor) answer that. They negotiate directly between each others. However, in classroom environment, we do not have that chance.

Accessing saved dialogues: They said that being able to look at saved dialogues later would be the foremost feature of such online communication:

> If saving them is possible, that are video and audio, in some way, each can be watched. However, in a classroom environment, there is no chance to repeat. We cannot repeat any thing. A lesson is lived at the lesson, at next lesson, just tiny things stay in our minds.

Appropriate course content: Some subjects argued that the use of Live Meeting in the course was appropriate because of the course content. According to them, programming course had activities which require immediate feedback, which is more essential for this course than any other courses.

Communicating in foreign language: Moreover, one foreign student, whose primary language is not Turkish and uses English as a foreign language, stated that she preferred communication via Live Meeting since it was easy to understand and reply in reading and writing:

> Participant: For me as a foreigner here, I prefer online because I can understand easily and they can explain more clearly by writing. But when speaking, you know, sometime I cannot, because I don't have much information about computer, about, I don't read a lot that is why may be problem for me. So I prefer online.
>
> Interviewer: Is it true for all courses?
>
> Participant: No. For me it is about those computers, but for like some science, other science, math whatever, it should be directly instructed and student better. But for about this innovative (computer programming), it should be online.
>
> Interviewer: I see. Does language make difference?

Participant: Yes.

Interviewer: For you? If you have a chance in your own language in your country, for example, you can talk with your instructor freely. And, at that time would you prefer face to face or online?

Participant: I would pick up face to face

Interviewer: In general?

Participant: In general.

Blended Design

Beside these preferences, five subjects explicitly suggested that they preferred a combination of online communication and face to face interaction in the classroom.

Task related communication needs: They explained that communication needs were affected by the tasks being done. They thought that various tasks required both online and face to face communication.

Need to feel the existence of the instructor: Furthermore, they stated that they needed to feel the existence of the instructor in order to feel motivated in those tasks. As stated previously, Live Meeting made them think that the instructor was near to them outside the classroom activities:

> I would prefer the second one (blended design) because sometimes it is necessary to be close to the instructor and see what he or she is doing. We ask questions correspondingly but sometimes there is a communication gap. For that reason, being one-to-one, for example, we can show something to the instructor. For that reason, both the classroom environment and video conferencing medium are good I think.

Affective Factors in Preference

For the question of "what factors do affect the students' preferences?" some statements gave clues about preferences.

Attitudes toward instructor and course: Some subjects said overtly that their preference on communication ways were related with their thoughts about the instructor and the course in parallel.

> It absolutely depends on the instructor because neither in undesired way nor with the disliked instructor, any student does not want to be in sight. You (the instructor) pay attention to each student, answer for their questions immediately or try to do. This was good for us.

They said that the communication style of the instructor in face to face interactions or in online medium affected their selection:

> The tool is not important :) Compulsorily, may be you go and use it but… You ask a question, after then look at the instructor, if he or she is one who you disliked; instead, you go and ask your friend.

Table 4. 16: Summary of Reasons and Effective Factors in Preference of Online Communication via LM and Face to Face Interaction

Summary of reasons and effective factors in preferences of communication via Live Meeting and face to face communication at classroom	
Preference	Reasons
• Face to face preference	○ Need for social interaction ○ Easy to recognize emotional states and feelings ○ Easy to manage dialogues ○ Sharing ideas from ongoing dialogues ○ Direct support from the instructor
• Live Meeting preference	○ Effect of new technology ○ Motivation of Existing of an instructor ○ Feeling uncomfortable in classroom ○ Easy to manage dialogues ○ Accessing saving dialogues ○ Appropriate course content ○ Communicating in foreign language
• Blended preference	○ Task related communication needs ○ Need to feel the existence of an instructor
• Effective Factors	○ Attitudes toward instructor ○ Abilities of instructor ○ Attitudes toward course

They also added that the ability of the instructor in communication at online medium was important factor in these decisions:

> The style (of an instructor) is very different. In some courses, our instructors remain inadequate… For that reason it is important… In terms of knowledge, communication, instructing abilities. …

Finally the subjects were asked about any additional comments on the topics discussed at the interview. Only one subject added that Live Meeting would be better if it had “less academic style”. That comment was coded under recommendations at question eight.

CHAPTER 5

DISCUSSION AND CONCLUSION

In this study, the purpose is to investigate the pre-service teachers' perceptions about online communication in a blended learning environment. A case study in line with an action research design was conducted to understand what the students think about online synchronous communication and why. For that purpose, a synchronous communication tool (ITL Live Meeting), which is capable of providing both textual and audio/video conversations simultaneously among all participants, was developed and implemented in blended learning environment for a semester. At the end, perception questionnaires and interviews were administrated to the students.

In this chapter, the data obtained from the questionnaires and from the interviews are interpreted and discussed addressing the research questions.

5.1. Discussion

Communication is one of the important actions for meaningful learning according to constructivist learning paradigm (Duffy & Cunningham, 1996). With computer mediated communication (CMC) technologies the communication activities have been extended from classrooms to virtual environments, like e-mails, instant messaging, discussion boards, and audio/video conferencing systems. As the affordability of such technologies increases and the speed of computer network increases, application of CMC in education has spread not only in distance education but also in conventional education. By these challenges, blended learning environments are designed to combine classroom activities and virtual learning facilities in a meaningful manner.

As Clark (2002) stresses, blending learning should be designed to provide better learning environments for learners, not only because many communication channels are available. Blending multi technologies or/and instructional environments without

significant justifications may result in a chaos for learners. In an effort of leading effective designs, this study aims to implement and improve synchronous communication in a blended learning environment by developing and investigating the use of a new tool. To reach its aims, this research focuses on the students' perceptions based on their authentic experiences in a real environment. Students' perceptions are investigated in four dimensions, about online synchronous communication, web based support, collaboration and roles of the instructor in the blended learning environment.

5.2. Research Question 1: What are the learners' perceptions about online synchronous communication?

To answer the first research question, results of both synchronous communication perception questionnaire and interviews are referred. Looking at the results of the synchronous communication perception questionnaire (SC-PQ) it can be said that Live Meeting fulfilled the synchronous communication needs of the students. In terms of video and audio quality, the students found the existing capacities acceptable. The size (320x240 pixels in width and height) and image quality (248 Kb per second and 29.9 frame per second) of the Live Meeting seemed to be satisfactory for such communication. At this point, it is important to mention that the instructor and students saw only the face and head of the speaker during the video conferences. In this case, the size and quality of the video were quite acceptable. In terms of video quality, the findings were in line with the research study of Kies, Williges and Rosson (1997). They had found that the size of 320x240 pixels and frame rate of 6 fps (30 fps is recommended) was the minimum acceptable quality measure.

On the other hand, if the content of the video was to be composed of detailed images, like a figure of many shapes, the students would be uncomfortable with the size and image quality. However, it should be noted that higher size and quality in video streaming required speedy Internet connection, fast servers and other equipment related to video streaming. Since the aim was only to provide the image of the talking person, in this study, the lower but acceptable size and quality was preferred.

In terms of communication channel, there were diverse results. While the students found both audio and video valuable to feel like in the classroom, according to the questionnaire results, they stated different preferences about audio and video in the interviews. For some students, mere listening was more proper during coding into the computer. They stressed that they would be distracted if they needed to switch the screen for video conference during the coding application. They added that listening was better since they could write codes and listen to the conversations simultaneously. The reason they expressed was in line with the cognitive load theory which explains that human working memory is limited and when mental processes reach that limit, desired learning cannot be achieved (Anglin, Vaez, & Cunningham, 2004). Since the recognition capacity and retention of auditory information are superior to visual information (Gelder & Vroomen (1997; Penney, 1989), the students' preference of audio channel is reasonable.

Moreover, dual coding theory of Paivio (1991) advocates that, people process verbal and nonverbal information separately. For that reason, presenting verbal and nonverbal information simultaneously supports a person in remembering. However, providing more than one verbal or nonverbal presentation simultaneously causes interference and causes decrease in gains. For effective recognition, overlapping and identical presentations should be avoided (Hannafin & Hooper, 1993). During video conferences via LM-S, the content of the video was a "talking head". Instead of spending mental effort for nonverbal presentation from video channel, suggestions of some students about eliminating video channel content with only audio channel can be acceptable.

In interviews it appeared that, not all students wanted to share their own video images with others. Among those, one said that she did not feel comfortable in front of a camera. Without any other reason, she spoke out that, like in daily use of chat applications, she did not like seeing her own video image on the screen and did not want to share it with others.

The students also underlined the importance of textual messages and relative strengths. For example, one student emphasized the permanency of texts:

> Listening is more logical but I think it is reading (that I would prefer). Why? Because, since you can save readings, even you miss a thing, you can forget and may not ask the instructor again.

However, others pointed out the advantage of audio and video over text messages by focusing on the easiness of expressing themselves in voice by accent of speech, and in video by use of mimics.

Another important result was the change in perceptions of communication channel with respect to the person with whom they were communicating. While the students thought that audio and video conversations with the instructor were motivating and making communication easier, they found watching another student unnecessary and even boring. Although this difference seems to be a conflicting result, it becomes reasonable when the aim of using Live Meeting is investigated. Most of them stated that their purpose in using LM was to ask questions and get answers about the topic. From their point of view, the answers for their question are more valuable than others' questions and answers. Since it was the instructor answering the questions, they preferred being in touch with the instructor more. Therefore, it was the communication needs that affected their perceptions about certain communication channels.

Aksomitis (2006) found the same diversity in preference of communication channels and warned the course designers that both the communication ways and tools should be arranged from the learners' point of view.

In addition to preferences above, the students found synchronous communication to be reducing perceived distance to the instructor during dialogues so that they were motivated by assuming that the instructor was near to them. As social presence theory suggested, adding nonverbal cues in communication with video conferencing increased the immediacy and decreased intimacy (Gunawardena & McIsaac, 2004) which results in higher social presence of interlocutors.

Students found synchronous communication valuable due to the immediate feedback provided the chance of studying on a task while communicating, and increasing their retention since they filled the gaps immediately. The immediacy of feedback is important in the case because they are coding an assignment which is composed of step by step stages. In order to continue with the next step, they have to success in the current stage with in a certain time period. The synchronous communication works as an immediate feedback for them. Mory (2004) saw the potential of CMC in learning environments as a way of effective feedback and added that computers supply interactivity and recording of student response information. Those features allow instructors to adapt feedback and instruction with respect to needs of the learner within the interactive environment almost instantaneously (Mory, 2004).

Did these perceptions make students give up face to face interactions? The answer was no. As the responses to the 8th item at SC-PQ ("I thought communicating via Live Meeting-Student was just as effective as face-to-face communication") indicated, not all students wanted to omit the classroom environment and to study through online communication. In interviews, similarly, many students expressed that they would prefer blended design where both classroom activities and online communication facilities were combined. They explained that they have task- related communication needs and they need to feel the existence of the instructor. Based on these results, it can be stated that even though the use of synchronous audio/video communication facilities reduced the perceived distance between the students and the instructor, the distance still remains for some students somehow.

One factor can be the quality of audio/video conferencing. Even audio and video conferencing increase social presence, the students may still feel a distance and difficulty in perceiving the other person is "real". "Talking head" in video conference within a 320x240-pixels-size screen field is seemed to be effective but not sufficient.

Another factor can be the interactions within the face to face environments. While audio/video conferencing conveys the nonverbal cues between the instructor and students, there are multi-way interaction in classroom environment such that students

talk each other, observe other students and instructor even while not communicating directly. Although there are a few students preferring online communication instead of face to face, the majority of them are still comfortable in traditional classroom.

Then, why did some other students prefer only online communication for a course? There were different reasons for that. First, some students claimed that they felt uncomfortable in a classroom environment. Second, some of them found managing dialogues via online tools easy because when one student asked a question as a textual message, he or she was sure that the instructor would queue the question and would answer it sooner or later. Third, since it was possible to save textual messages in the case, they had a chance of accessing them later. Fourth, the students realized that the subject matter, which is programming language, in the case was appropriate for online communication. The programming language course needed the students to practice very often in coding. In these practices, the students were expected complete coding tasks which required using mostly declarative knowledge, concept learning and rule learning. In all these learning outcomes, different feedback types, for example simple verification, correct response feedback, elaborated feedback and try-again feedback (Dempsey, Driscoll, and Swindell, 1993, in Mory, 2004) needed to complete the tasks successfully. During these practices, the students were provided with immediate feedback and quick answers to their questions to proceed in coding. Online synchronous communication provided each individual with those facilities.

Lastly, another reason was stated by the foreign student who said that since her native language was not Turkish, she used English most of the times and felt more comfortable in writing and reading, than talking and listening. Because of the time available to think and reflect, she stated that she would prefer online communication. The availability of time in asynchronous communication fits with the many distance education research (Romiszowski & Mason, 1996). Berge and Collins (1993) pointed out that time independency of CMC allows learners allocate extra time for reflection before posting messages. In this case, extra time seemed to be allocated in establishing dialogues in foreign language.

When the attention is paid to the tool, Live Meeting, it can be said that LM was perceived to be useful, attractive, secure and comforting (Table 4.3) according to the questionnaire results. Besides, the interview data explains why some students gave low scores for these items. Two categories of critique emerge for the LM: technical problems and design issues. Time delay at audio/video conversations and connection problems are counted for technical problems. Because of the time spent in coding and streaming the audio and video at computers about 5 or 6 seconds delay occurred between sending and receiving content. These delays made the participant wait in order to receive the response and continue talking, which needs further attention. Another technical problem is reported as connection problems and being unable to join the dialog sessions. These problems can be impeached to connection speeds and, at least, taken into account at improvements of LM.

Next, design issues are criticized by the student at interviews. The major complaint is the difficulty in tracing messages at textual mode. All messages from the participants accumulated into the same text field line by line on the screen. The name of the sender was written at the beginning of the message. In this style, student claimed that it was difficult to differentiate and follow the messages, especially when there were many active writers. To solve these problems, students suggested either a private messaging mechanism with desired participant, or use of colors and font to emphasize the messages from specific user. Their suggestions are compatible with the research findings of Dresner and Barak (2006) who explored the effects of space and color in communication efficiency. Drenser and Barak referred to the ability of engaging in more than one conversation as conversational multitasking. They found that using alternating color patterns and different message interfaces contributed to effective management of multiple instant message conversations.

One participant added that he found LM formal and academic, and recommended the use of emotional icons and images to create a warm and funny mood. It seems that experiences with the commonly used chat software have created some expectations from the application.

As additional features, desktop sharing and file sharing are recommended. In desktop sharing, students can see the desktop of the instructors' computer simultaneously. By this way, expressing complex content at conversations becomes easy. Similarly, file sharing would allow online participants send and receive documents. In communications where more than two people are engaged, file sharing is an effective way of content transmission. These suggestions are taken into account for the improvement of LM.

To sum up, for the first research question, students' perceptions about the online synchronous communication are high in term of agreement with the items at SC-PQ. The interview data showed why students' perceptions about certain dimensions shaped in that way.

5.3. Research Question 2: What are the learners' perceptions about web-based support?

In order to understand students' perceptions about web-based support, the second questionnaire (WBS-PQ) was used. The first thirteen items are in Likert-type and the last 4 questions are open-ended. At first glance, the students' responses showed that in most questions, majority of them agreed or strongly agreed with the items. The responses of the 1st, 5th and 13th items depicted that the student thought that the web site was beneficial to their learning because it involved them actively and became a supplement to their course. At the 10th item, they presented their satisfaction by recommending that other courses should use a web site too.

The web site hosted both discussion board (asynchronous communication) and resources related with installation of Live Meeting (synchronous communication). Beside the content of the course, the web site served for online communication needs of students. These features of the web site were perceived to be pleasing when the results of the 4th and the 12th items were obtained. The students qualified communication tools as valuable at the 4th item and they found these tools enhancing communication and collaboration at the 12th item. Clark and Mayer (2003) proved the benefits of web-based environments into collaborative learning by suggesting

adaptation of various collaborative learning methods in face to face instruction into online context. Clark and Mayer, for example, defined how web-based environments can accommodate jigsaw method, structured controversy method, problem-based learning method and peer tutoring methods for e-learners. Their main argument is that the web-based environments can support participants with various tools like synchronous or asynchronous communication to create interactions for meaningful discussions and negotiations.

When the design of the web site is focused, the results showed that the students were quite happy with the structure and design. In the 2nd, 3rd, and 8th items, almost all students agreed that the web site was clearly organized, available all times to access and easy to navigate within. Nevertheless, at the 9th item, about half of the students thought that directions or support services were needed to use the web site. This is a bit contradictory with the previous items' results, but the possible reason came from the results of the open-ended question, asking the least liked features of the web site at the 17th item. Download restriction of the lesson videos became the first least liked feature in the list and were followed by the difficulty in changing the password. Password-less use, simple navigation bar, news page and forum were mentioned once as the least liked features. These features seem to affect the perception of the design of the site a bit negatively. However, these results allow concluding that the web site had satisfactory structure and design.

The students thought that they were not alone on the web site since their instructor was perceived to be an active user of the web site who was also encouraging its use. These results are not surprising when the students remarked that they entered the web site because of various purposes. In a ranked order, the purposes are:

- To reach to lecture notes
- To learn scores
- To reach to course material
- To get and send assignments
- To watch lecture videos

- To look at the forum
- To get news
- To follow the schedule

In addition to these purposes, two students also said that they entered the web site because it was useful in general. This variety can explain the high satisfaction with the web site because it provides various services extending the learning environment outside the classroom. While some services let students work alone like accessing the lecture notes and get news, others required active participation of the instructor like discussions, preparing lecture videos, creating assignments and announcing them over the web site.

The question at that point is that can this web site replace the classroom? The answer is similar to the previous questionnaire: No. At the 11th item, only 37.3% of the student stated that they could consider taking a course that only uses the web site and has no classroom meetings. Others (45.4%) disagreed with the item, which proposes using blended learning environment where the web site is doing its job well, as stated in one student's comment:

> It was useful and nice that the site is a part of the lectures (I think, if it was only web-based instruction, the site would not be so beneficial).

Another factor that may illustrate the effectiveness of the web site is the change in the students' use of the site throughout the semester. At the 15th question, out of 22 respondents, 12 said that their web site use had increased and 8 said it was the same. Only one student said that his or her use decreased due to increasing academic load in general towards the end of the semester. Increase in the content with materials and increase in the number of questions in the forum were two main arguments in these changes.

For further investigation, the students were asked about the most liked features of the web site. The following are mentioned to be the most liked features:

- Lecture notes
- Lecture videos
- Grading section
- Sending/receiving homework
- Self-study section
- Instant messaging

Beside these, some respondents answered the question with “easy to use”, “no technical problem” and “up-to-date content” properties of the web site.

On the other hand, they noted the least liked features as follows:

- Restriction in downloading lecture videos
- Difficulty in changing password
- Password-less usage
- Too simple navigation bar
- News Page
- Forum

Among these features, lecture videos attracted most of the attention. These are the videos of lessons, recorded and published on the web site by the instructor. The students considered these video as the most liked feature since the videos gave them a chance of watching the lesson again and again at their home. On the other hand, the videos were published in a stream format, so that client users could watch them but could not download them. In that scenario, the clients had to stay connected to the Internet. What they disliked was that every time they wanted to watch the videos, they had to connect to the web site and start to stream, which had a risk of losing connection and using up the download quotas, if any existed. Even though they seemed to be right in their arguments, it was the preference of the instructor who was concerned about preventing distribution of his lesson videos to someone else by the students.

At the last question, additional comments about the web site were expected. The students added that the web site was very useful and easy to use. Also, some of them

recommended that there could have been more practices and a page summarizing all updates at various sections of the web site.

5.4. Research Question 3: What are the learners' perceptions about collaboration with online communication?

During the semester, the students had one group work project, which was their final project and lasted for two weeks. During this group project, both the subject and members of the groups were constructed by the students within some limitation. The subject had to cover some topics like database connection and there could be 2, 3 or 4 members in a group. Within these limitations, the groups were assigned a project subject and the instructor had a meeting with each group. In these meetings, project contracts were prepared and signed. The project contract included the grading criteria, important dates and other issues related with group projects. The aim of using these contracts was to motivate the students and avoid conflicts among groups in terms of grading. After these meetings, the groups were free to consult the instructor at any time in any way.

Based on the results of the collaborative learning perception questionnaire, it can be said that the students liked group projects but there were some concerns. In the items related to group work, many students had positive thoughts about group work. More than half of them agreed that group work was beneficial because it had increased their motivation, understanding of the topic and their interpersonal skills. Jaques (2000) noted that

> Small group discussion has a valuable part to play in the all-round education of students. It allows them to negotiate meanings, to express themselves in the language of the subject and to establish a more intimate contact with the academic staff than more formal methods permit (p.v- preface).

Lehmann (2004) informed instructors about grouping alternative. In self-selecting grouping, while students are more comfortable since they select their group mates as they wish, it is possible for someone to stay alone. On the other hand, instructor-selecting grouping can be more convenient in terms of obtaining more homogenous groups and no one will leave outside. In this case, the student selected their group members themselves. As expected from the literature, most of the students were

comfortable with their group members. They also agreed that they were satisfied with their group members and were motivated for working hard. However, not all of them were satisfied with the discussions in their groups. This could be due to the lack of a moderator in the groups as reflected in the 18th item at CL-PQ where the students said that the group leader was successful at summarizing things and scheduling.

On the other hand, it is important that the students felt that group work was effective for their learning due to the fact that they learned different perspecives and they could not have accomplished the project unless they had worked together. In parallel, only 36.0% of them preferred working alone for the project. The reasons of preferences on working alone could be the disappointment with the some group members or lack of satisfaction within the in-group discussions.

Did they perceive online communication features of the web site beneficial? To some extent, yes they did. About half of them agreed that online communication facilities made communication easy, eliminated communication delay, and created a flexible working environment. For this reason, they stated that they had not been affected by the absence of social context. Around the same number of students, also claimed that the use of online communication in group work contributed to their professional development and socialization.

In terms of specific tools of online communication, chat and forum gained similarly moderate agreement from the students. While more than half of the students confirmed that the immediate feedback through chat and forum were important, nearly half of them found chat and forum motivating and effective in increasing the understanding of the subject matter and each others' ideas. About the frequency of use of LM-S, 28% said very frequently, 20% said less frequently and 52% said rarely or never. Compared to their positive perceptions about chat and forum, these frequencies seem to be strange. How could the students be satisfied with communication via chat even though they used it occasionally? The interview results

gave the clues that the students were quite familiar with the chat software and some of them indicated that they had used chat applications very frequently in daily life.

In terms of contributions to collaborative learning, online communication in the case can be qualified as satisfactory. At least, the chat and forum seemed to be adequate in providing channels for communication. Beside the moderate number of agreements, there were a few disagreements with the items. Other factors rather than online communication features would have impacted these moderate agreements. As a place for collaboration outside the classroom, online communication features should be considered as effective tools.

5.5. Research Question 4: What are the learners' perceptions about the roles of the instructor at blended learning as (a) administrator, (b) facilitator, (c) technician, and (d) evaluator?

Results of the online instructor perception questionnaire (OI-PQ) indicated that the students were very satisfied with the roles of the instructor in blended learning. Except for the 11th item, the great majority of the students agreed with the items.

As an administrator, the instructor was perceived successful due to his quick replies to emails and posts, his efficacy in struggling with problems and working for the solution and his skill of posting timely announcements about changes and updates. Posting syllabus, course materials and discussion topics at the beginning of the semester also affected students' satisfaction. These satisfaction shows that the instructor was compentent in managerial role (Bonk, Kirkley, Hara & Denned, 2001).

Constructivist philosophy of learning implies that the instructors should leave the stage and become a facilitator for learners (Duffy & Cunningham, 1996). Facilitation in online environments is more important since learners need more guidance in interacting through Web based and CMC tools. Alexander and Boud (2001), for example, emphasized that the success of online discussions is affected by the moderation of the instructor rather than the tools used for. In terms of the facilitator role, the students perceived the instructor quite sufficient. Almost all of them agreed

that the instructor coped with the questions and was successful in moderating discussions. By encouraging group work and discussion, the instructor seemed to engage the students and foster sharing of knowledge and expertise. In online communication, he initiated dialogues by posting messages to enhance meaningful discussions. Even though he did not contact the noncontributing students to make them participate, he provided public and private acknowledgment to students who contributed to the discussion.

As a technician, the students thought that the instructor was expert on the tools used for online communication and helpful in trouble shooting of technical problems. As the instructor was experienced in using web based environments and online communication tools by either using them or studying with them, it is not wrong to admit that he was a bit above the average in terms of these skills. However, the core point may not be solving every problem but acknowledging the students and not leaving them alone when they are in trouble. At the 14th item, students agreed that the instructor had referred to appropriate help sources, which emphasizes that helping in finding solution is as valuable as providing the solution itself.

As the last role, an evaluator, the instructor was perceived to fulfill the expectations of the students. According to almost all students, the instructor provided clear assignment criteria and resources for completing assignments, gave written examples of assignments and assisted those who had trouble in completing assignments. By using the web site, he saved time in reminding upcoming assignments and in giving feedback on them.

In contrast to the perceived evaluator role, two students stated critiques about the evaluation processes at the open-ended item (the 21st item at OI-PQ). One said that the grading criteria was not clear in terms of scoring and another one stated that the grading was not fair because he could not take the score he thought he deserved when compared to others' projects. Out of 51 students, these two comments can be neglected in comparison with the questionnaire results.

Other comments about the instructor were quite positive and reflecting the students' satisfaction with him:

- Good instructor
- Expert on the subject
- Easy to communicate
- Kind
- Helpful
- Sharing knowledge
- Esteems students

After those high satisfaction scores, it can be asked that to what extent were these perceptions about the instructor affecting the online communication? The answer was in the interview data such as:

> (P1) It absolutely depends on the instructor because neither in undesired way nor with the disliked instructor, any student does not want to be in sight. You (the instructor) paid attention to each student, answered for their questions immediately or tried to do. This was good for us.
>
> (P2) The tool is not important :) Compulsorily, may be you go and use it but… You ask a question, after then look at the instructor, if he or she is one who you disliked; instead, you go and ask your friend.

Because of its nature, any communication can be affected by the attitudes of the participants. Like in face to face communication, the students probably could give up being in touch with the instructor if they did not like him. Delialioğlu (2006) found that informal and friendly interaction between the instructor and students supports intrinsic motivation of the student which relaxes them and enables more communication. Similarly Christensen and Menzel (1998) demonstrated that student learning is affected by teacher immediacy behaviors, which can be either nonverbal or verbal. In another study, Gendrin and Rucker (2004) stated that perceived low immediacy of teacher causes students think that they would be rewarded less, therefore, participated less to learning tasks. Therefore, attitudes toward the instructor may affect the participation in online communication with the instructor.

5.6. Conclusions

The following conclusions can be drawn at the end of the study:

1. Preference of communication channels at synchronous communication depends on (a) the aim of communication, (b) the content of communication, (c) the attitudes toward the interlocutor, and (d) personal preference.

2. Synchronous communication can motivate learners by reducing the feeling of perceived distance (transactional distance) and by providing immediate feedback in blended learning.

3. Even with a synchronous communication in audio/video channels, face to face interaction in classroom environment is still indispensible for some learners. However, for those who feel uncomfortable in the classroom environment, online communication is more valuable. Instead of a dominance of one type, a combination of these environments is more beneficial for most of the learners and the instructor.

4. Online communication facilities in the case (both asynchronous and synchronous) have enabled learners to engage in collaboration in an effective way.

5. The synchronous communication tool in the case, ITL Live Meeting, has answered the needs of the learners and the instructor. On the other hand, some modifications and remedies are needed for better interactions.

6. The web site provided necessary services for content management and online communication satisfactorily. Adding lecture videos attracted more attention than expected. With these kinds of components and content, the web sites can be addressed as an active learning space for learners and provide them with the opportunity of engaging within their own pace and time.

5.7. Implications For Practice

Although this study is a case study, in which the aim is to understand the case in terms of the research questions, the following recommendations can be made for practices both within the case and in other similar context:

1. Using synchronous communication in programming course can extend the learning experience outside the classroom. While working on their projects, a small but important feedback can assist the students in completing their tasks. These communication facilities make individual feedback easy and effective.

2. Preference of communication channel can be left to the students. While some of them feel comfortable in video conferencing, others may prefer textual messaging. Restricting students into a single channel of communication may not be beneficial for all of them, yet it can create overload both for the students and for the instructor.

3. The success of online synchronous communication can be affected by the positive attitude toward the instructor in the case. Therefore, the instructors should consider that they have to be willing to communicate in order to achieve successful learning outcomes.

4. The tool used in the case (ITL Live Meeting) should be revised in the light of students' suggestions. For example, collection of textual messages into one text field can be omitted or private chat channels can be added.

5. Even though Internet connection is getting faster everyday, for some locations in Turkey, it can be still frustrating. However, about 256 Kbps (slowest speed at ADSL connection in 2009 at Turkey) is enough for video conferencing among more than two participants.

6. Chatting over the Internet is quite common in Turkey, therefore while designing these tools, commonly used features and interfaces in these applications can serve as a guide for developing effective tools.

7. Asynchronous communication has its own advantages, like time to reflect and keeping messages for archiving. Web sites should provide a forum or discussion board for students.

8. While research and technology on CMC generates effective learning environments, the infra-structure of schools and universities should give space for online communication.

9. In this study, all participants are presented with a small icon and nickname. Many commercial applications, on the other hand, allow users to use a picture and to select custom interface vision. As some students indicated, the application could be improved so that it allows these individual preferences, like using avatars and selecting colors for fonts and background in order to increase the motivation for participating in dialogues.

5.8. Recommendations for Further Research

CMC research still has various questions as long as the development of technology continues. Beside the needs of its nature, the following research studies are recommended after this study:

1. In this study, it is found that, different communication needs required different channels of communication. For video conferencing, a research is suggested about what kind of communication needs fits video conferencing in blended learning.

2. Research on instructors' perceptions toward the use of synchronous communication is recommended. Their attitudes toward certain communication channels can affect the success of their dialogues on these channels.

3. Developmental research on models for implementing synchronous communication activities in blended learning environments is recommended for instructors who want to take advantage of these activities in their courses but have no experience, yet.

4. Different interaction styles in synchronous communication tools can affect the cognitive load of the participant differently. Depending on the aim of the communication, various interaction styles should be studied for their relative impact on the cognitive load of the participant.

5. Measuring the effectiveness of such new communication channels should be investigated. How does an instructor ensure that the communication over video conferencing is effective? How does an instructor assess the students' participation in communication? Does he or she assess the time spent on communication, or the number of messages sent to interlocutors or the learning outcomes after participating in dialogues as an active participant or passive listener?

6. Lastly, an important question is to what extent classroom management rules and principles apply in those virtual communication environments. In a new communication environment, how will the instructor manage conversations in order to ensure meaningful learning?

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APPENDIX A

INTERVIEW SCHEDULE WITH THE SUBJECTS

Görüşme Formu

Merhaba. Öncelikle görüşmeyi kabul ettiğiniz için teşekkür ederim. Bu görüşme bir doktora çalışması kapsamında veri toplama amacıyla yapılmaktadır. Görüşme soruları sizin CEIT211 dersi kapsamında kullandığınız ITL Live Meeting (LM) yazılımı ve bu yazılım üzerinden yapılan iletişim hakkındaki düşüncelerinizi öğrenmeye yöneliktir. Görüşme yaklaşık 20 dakika sürecektir. Görüşmeyi analiz etmeyi kolaylaştırmak amacıyla ses kayıt cihazı kullanılacaktır.

Bu görüşmede belirteceğiniz tüm bilgiler tamamen gizli tutulacaktır. Söyleyeceğiniz hiçbir şey üçüncü şahıslara iletilmeyecek ve çalışmada kesinlikle isminiz kullanılmayacaktır.

Hazırsanız ilk sorudan başlıyorum.

1. Çevrimiçi iletişim araçlarından hangileri ne sıklıkla kullanırsınız?
   a. (E-posta)
   b. (Forum, tartışma listeleri, blog)
   c. (Sohbet - Chat)
   d. (Video konferans)

2. Bu araçlardan herhangi birini bir ders kapsamında öğretim amaçlı kullandınız mı? Nasıl kullandınız?

3. CEIT211 dersinde hangi çevrimiçi iletişim araçlarını kullandınız?

4. CEIT211 dersinde kullanılan çevrimiçi iletişim araçlarından bir tanesi de Live Meeting'dir. LM size nasıl tanıtıldı? Bu tanıtım size ne kadar faydalı oldu?
   a. Ne işe yaradığı anlatıldı mı?
   b. Nasıl kurulacağı konusunda verilen bilgi yeterli mi?

5. LM'yi dönem içinde ne zaman ve nasıl kullandığınızı anlatır mısınız?
   a. Kullanma sıklığı
   b. Kullanma amacı
   c. Örnek bir görüşmeyi anlatabilir misiniz?
   d. Görüşmelerde görüşmeye katılanların canlı görüntülerini izlediniz mi?
   e. Kendi kamera görüntünüzü kullandınız mı?
   f. Yaşanan sıkıntılar (teknik, diğer)

6. LM'nin ve LM'yi kullanarak dersi veren öğretim elemanıyla görüşmenin <u>beğendiğiniz</u> yanları nelerdir?

   a. Görüşmeler sırasında canlı görüntü kullanılmasını beğendiniz mi ? Neden?
      a. (Kendi görüntüsü)
      b. (Dersi veren öğretim elemanının görüntüsü)
      c. (Başka bir öğrencinin görüntüsü)

7. LM'nin ve LM'yi kullanarak dersi veren öğretim elemanıyla görüşmenin <u>beğenmediğiniz</u> yanları nelerdir?
   a. Bu noktaların düzeltilmesi için önerileriniz nelerdir?

8. LM ve sunduğu olanaklar sizce daha nasıl geliştirilebilir?
   a. Başka hangi özellikler eklenebilir?

9. LM kullanılarak yapılan sunum veya anlatımları izleme, soru sorma, cevaplama ve diğer iletişim biçimleriyle, sınıf ortamındaki yüz yüze iletişim biçimleri arasında sizin için bir fark var mı? Varsa neler?

10. Sizin eklemek istediniz düşünceleriniz var mı?

Katıldığınız için teşekkür ederim.

APPENDIX B

INTERVIEWS CONSENT FORM

Gönüllü Katılım Formu

Bu görüşme bir doktora tezinin veri toplama araçlarıdır. Yürütülen çalışmanın amacı, katılımcıların CEIT211 dersi kapsamında kullandıkları çevrimiçi eşzamanlı iletişim yazılımı (ITL Live Meeting) hakkında algılarını anlamaktır.

Görüşmeye katılım tamamen gönüllüdür. Görüşmede kimlik belirleyici hiçbir bilgi istenmemektedir. Verdiğiniz cevaplar tamamen gizli tutulacak ve sadece araştırmacılar tarafından görülecektir. Elde edilen bilgiler bilimsel yayınlarda kullanılabilir.

Görüşme kişisel rahatsızlık verecek sorular içermemektedir. Yine de görüşmede bir sorudan ya da herhangi başka bir sebepten rahatsız olursanız, cevaplamayı yarıda bırakabilirsiniz. Çalışmaya katıldığınız için şimdiden teşekkür ederiz.

Çalışma hakkında daha fazla bilgi almak için Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü doktora öğrencisi Halil Ersoy (Tel: 533 4121939; e-posta: halilersoy@gmail.com) ile iletişim kurabilirsiniz.

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

(Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

Adı Soyadı	Tarih	İmza	Alınan Ders
	----/----/-----		

APPENDIX C

SCREEN SHOT OF WEB-BASED SUPPORTIVE ENVIRONMENT

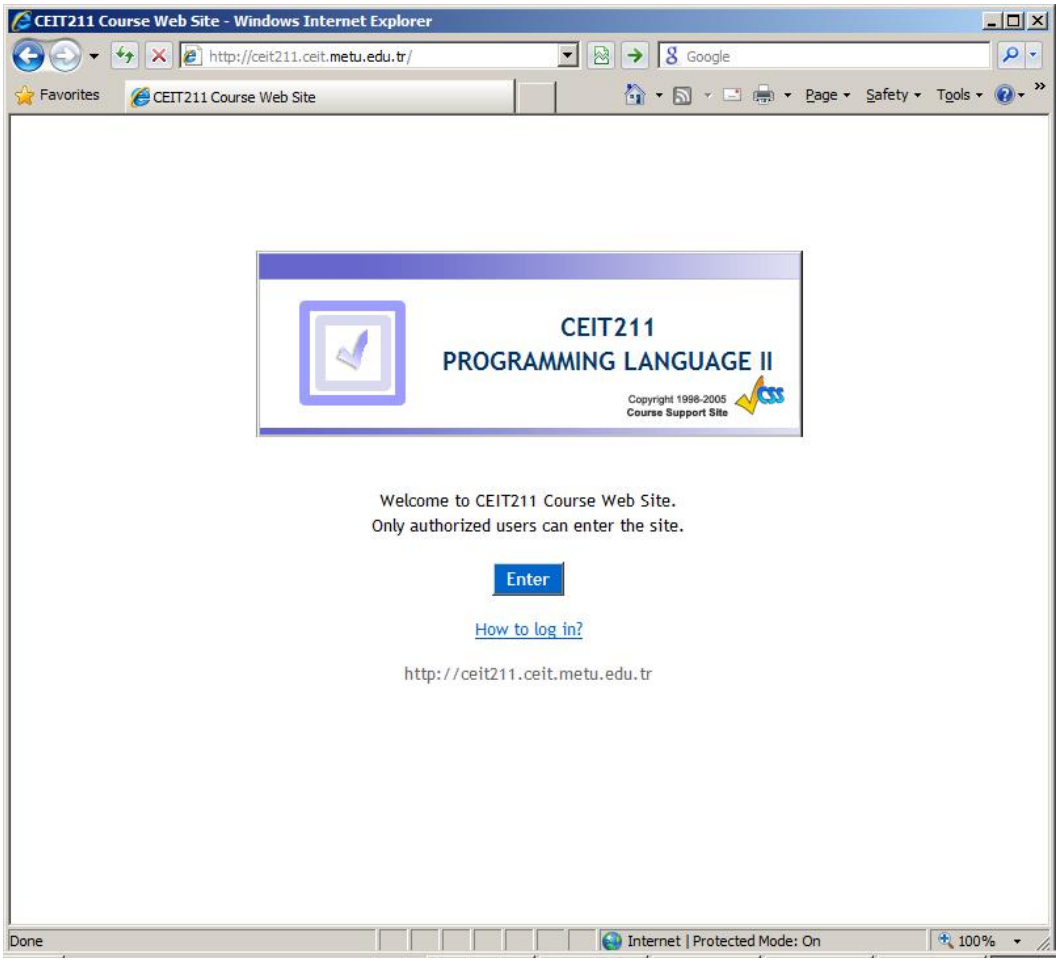

Figure A. 1: Web-Site Entry Interface

APPENDIX D

SCREEN-SHOTS OF LIVE MEETING

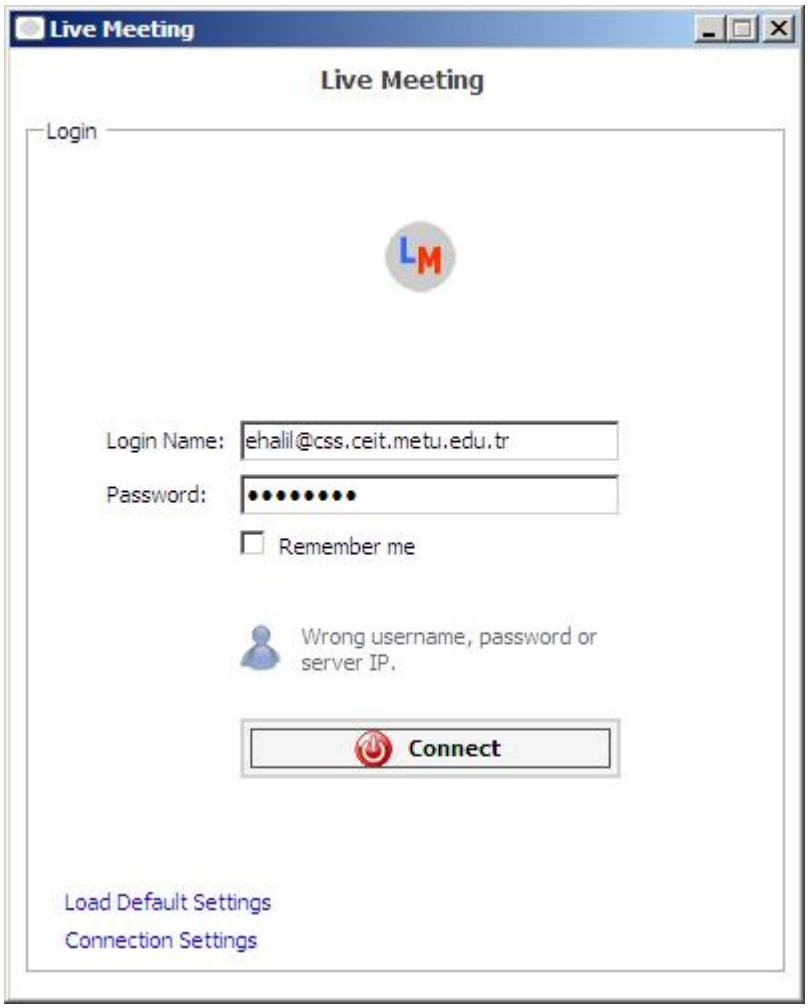

Figure A. 2: Login Interface

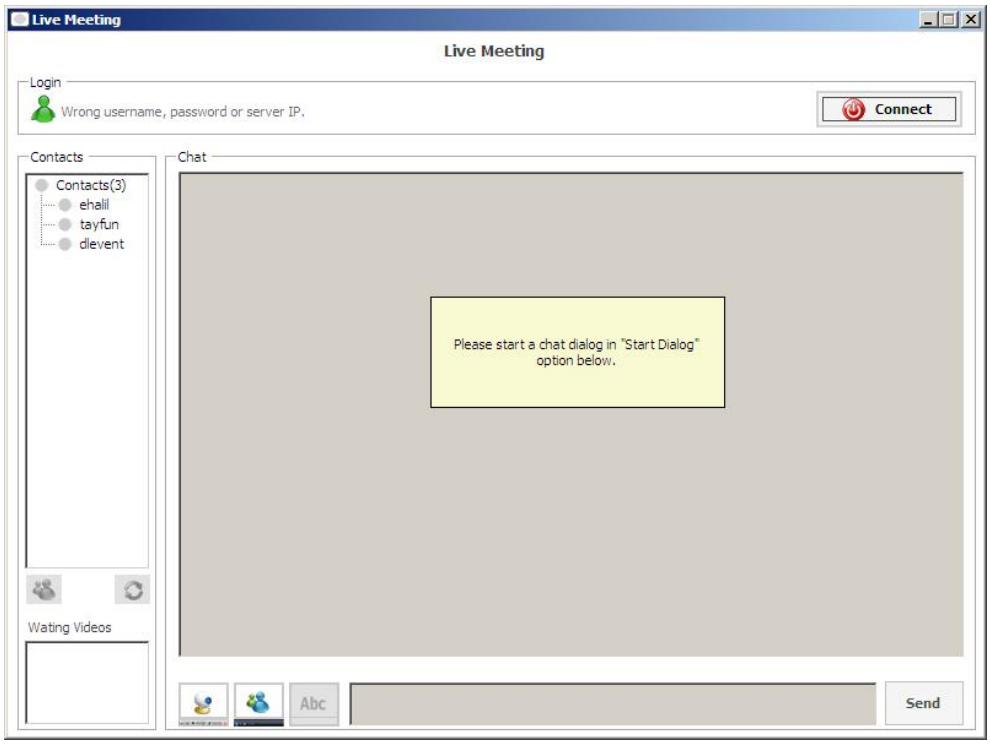

Figure A. 3: Textual Dialogue Interface

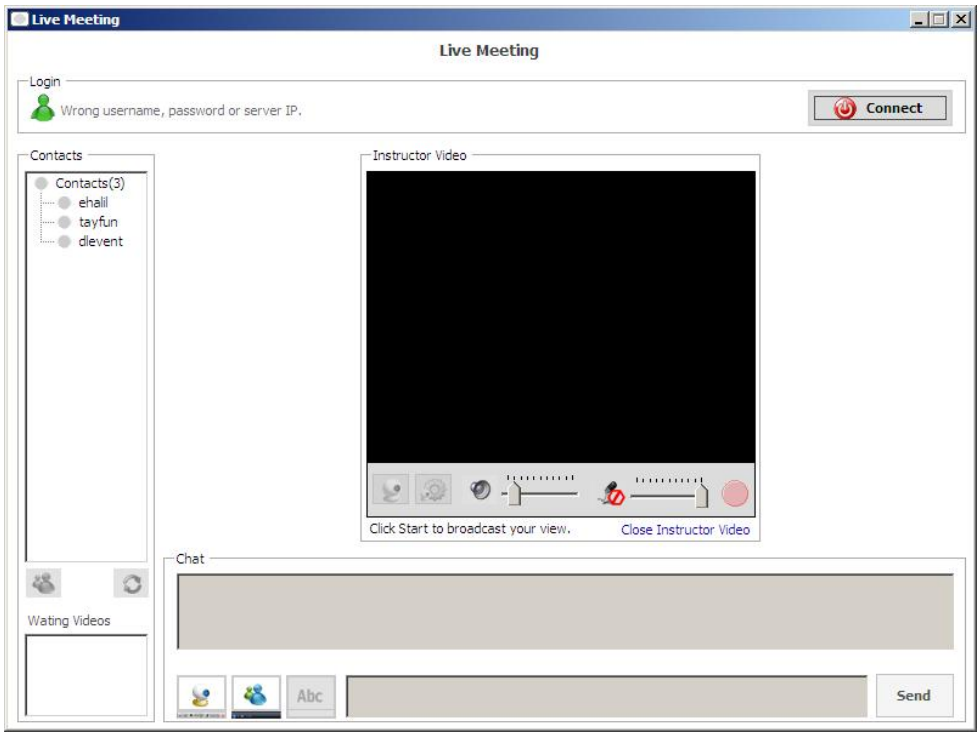

Figure A. 4: Only-Instructor-Video Interface

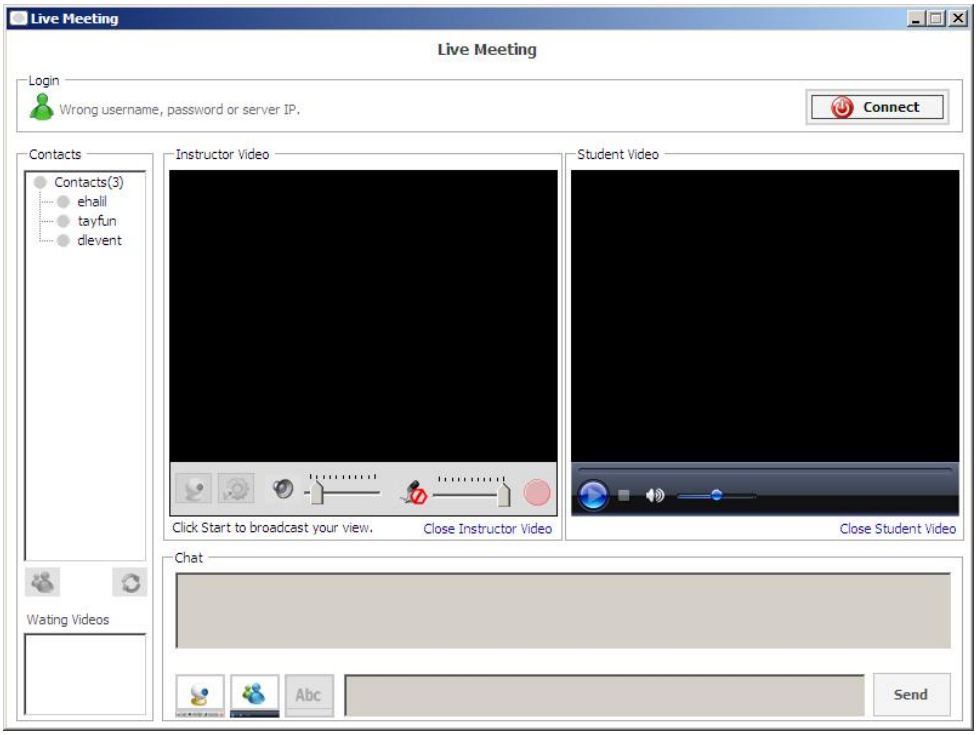

Figure A. 5: Instructor and Student Videos Interface

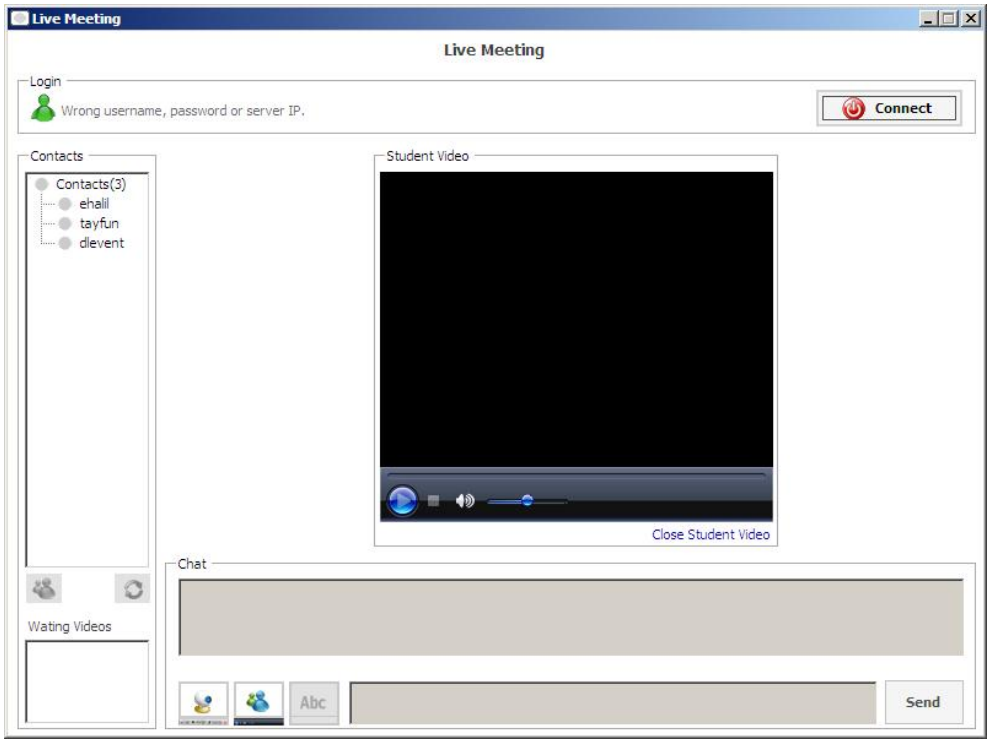

Figure A. 6: Only-Student-Video Interface

APPENDIX E

QUESTIONNAIRE 1: SYNCHRONOUS COMMUNICATION PERCEPTION QUESTIONNAIRE

Part I Likert-type Items		
13. The video quality was acceptable		
14. The video size was adequate		
15. The video was good as being live in the same classroom		
16. The audio quality was acceptable		
17. The audio was good as being live in the same classroom		
18. Communication via Live Meeting-Student encouraged me to think critically about the subject matter		
19. Live Meeting-Student did not obstruct my communication with the instructor		
20. I thought communicating via Live Meeting-Student was just as effective as face-to-face communication		
21. I was able to interrupt and ask question easily		
22. Adding video into communication would improve the communication		
23. Adding audio into communication would improve the communication		
24. I would be willing to take a course which utilizes a communication tool such as Live Meeting-Student		
Part II Semantic Differential Items		
I found communication with Live Meeting-Student was...		
25.	Useless	Helpful
26.	Informative	Confusing
27.	Complex	Primitive
28.	Supportive	Unhelpful
I found Live Meeting-Student was…		
29.	Useless	Helpful
30.	Unappealing	Attractive
31.	Secure	Unsecure
32.	Comforting	Disturbing
Open-ended Item		
33. Additional Comments about Live Meeting-Student?		

APPENDIX F

QUESTIONNAIRE 2: WEB-BASED SUPPORT PERCEPTION QUESTIONNAIRE

Items in 5-scale Likert Type
1. The web site, as a whole, was useful to my learning
2. Access to the web site was available when needed
3. The web site was clearly organized
4. Communication tool(s) at the web site I used (forum, chat) was/were worthwhile.
5. I would consider myself an active user of the web site throughout the course (i.e., referred to materials, used interactive communications if applicable)
6. I would consider the instructor an active user of the web site throughout the course.
7. The instructor encouraged student use of the web site
8. It was easy to navigate within the web site
9. Directions/support services are needed to use the web site.
10. I would recommend a course that uses the web site to other students.
11. I would consider taking a course that only used the web site and had no class meetings.
12. I felt the web site enhanced communication and collaboration with other students.
13. I enjoyed using the web site as a supplement to my course.
Open-ended Items
14. What was your primary purpose for logging on to the web site during this course?
15. Did your use of the web site increase or decrease throughout the semester? Why?
16. What was the feature of the web site that you liked the most?
17. What was the feature of the web site that you liked the least?
18. Additional comments about the web site?

APPENDIX G

QUESTIONNAIRE 3: COLLABORATIVE LEARNING PERCEPTION QUESTIONNAIRE

Items in 5-scale Likert Type
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 LM-S very frequently to communicate with the instructor.
4. I had no difficulties in accessing the web site of the course.
5. I was able to receive immediate feedback through chat and forum.
6. The forum and chats increased my motivation towards the subject.
7. Working as a group increased my motivation towards the subject.
8. The atmosphere of the group encouraged hard work for everybody.
9. The number of people in my group was appropriate.
10. I enjoyed working with my group mates.
11. We could not accomplish this project unless we worked together.
12. Working as a group made me understand things from different perspectives.
13. Learning together was very beneficial to me.
14. Working as a group 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 gained better skills to create high-quality windows applications.
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.
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.
Open-ended Item
29. Please type your additional comments on your group work, into the following box:

19th Item is reverse coded.

APENDIX H

QUESTIONNAIRE 4: ONLINE INSTRUCTOR PERCEPTION QUESTIONNAIRE

Items in 5-scale Likert Type
1. The teacher returned e-mails/posts within 24 hours.
2. The teacher followed up student problems and tried to find out solution.
3. The teacher posted timely bulletins about changes and updates to course.
4. The teacher posted the syllabus, course materials, and discussion topics at the beginning of the course.
5. The teacher could cope with all the questions raised by the students and respond in time.
6. The teacher managed and guided student interaction and discussion.
7. The teacher moderated discussion and modeled desired methods of communication.
8. The teacher fostered group learning.
9. Minimum 10% of the discussion postings were from the instructor.
10. The teacher provided public and private acknowledgment to students who contributed to discussion.
11. The teacher contacted the students privately or by e-mail to ask noncontributing students to participate in discussion.
12. The teacher engaged students, fostered sharing of participants' knowledge, questions, and expertise.
13. The teacher was proficient with all the systems used in the course?
14. The teacher helped students troubleshoot technical systems used in the course and referred to appropriate help sources, as needed.
15. The teacher provided students with clear grading criteria.
16. The teacher reminded the students of the upcoming assignments.
17. The teacher provided written examples of assignments/projects.
18. The teacher provided resource ideas for completing assignments.
19. The teacher assisted students who were having problem completing the assignments.
20. The teacher acknowledged the receipt of assignments within 24 hours.
21. Additional Comments

APPENDIX I

RESULTS OF OPEN ENDED ITEMS AT QUESTIONNAIRES

Table A. 1: Responses of 14th item at WBS-PQ

Q14. What was your primary purpose for logging on to the web site during this course? (n=24)	
1	studying course notes that instructor used in lesson, learning my grades and watching lecture videos again
2	It was very useful for me if i catch or not follow the lesson
3	to learn our grades
4	Ders notları siteye girmek için öncelikli amacımdı, tabii ki ödevleri öğrenmekle birlikte.
5	I look at the grading part also for example there is a project that we have to do, i look at the forum part to ask question to instructor or whether there is a question asked by friends which i want to ask the instructor.
6	To reach the resources lecture notes , powerpoints, word documents and to watch a lecture that I missed since I did not attend the class.
7	to get homework and lecture notes.
8	to access the course materials.
9	Lecture notes
10	taking course materials, documents, homeworks
11	Lecture
12	lecture notes
13	to watch lectures again
14	to look for sources about the course
15	To take the lecture nots and when I could come to class to learn from the video.
16	Well, I wanted to get the materials that the instructor used in lecture :)
17	to find course materials and other supportive materials and look my grades
18	To download the lecture, to follow the schedual, and to learn the grade from exams, labs, and other activities if there are any.
19	it is very useful to study lesson
20	Learning my grades...
21	uploading a work
22	to download lecture notes and check if there any news about the course.
23	Getting homeworks and to send them.
24	To reach supportive materials and to do my homework.

Table A. 2: Responses of 15th Item at WBS-PQ

	Q15 Did your use of the web site increase or decrease throughout the semester? Why? (n=22)
1	no it was stable, I used it every time when I needed it and generally I needed to use it.
2	increase becouse. the web site become e-source fou me to stufy
3	Başlarda ders notlarını almak için giriyordum. Sitenin güncel tutulması, "Acaba bugün sitede farklılık var mı?" sorusunu aklıma getirdiği için siteye girişimi artırdı.
4	not decrease or incerease
5	It has increased becaused almost everyweek a new things which are important for me added in the web. So I always wondered what added website at the moment.
6	it decreased. because during the first 2 months of the semester courses were not so hard so i had the chance to study this course regularly. when the exams had started, i used the website less than before.
7	especially the time when we take the exam, my use of the website increased. becasue I took the course material and watched videos, took and did lab homeworks again.
8	Increased. Because the documents in it were very helpful and well prepared for the lesson. There were every single details for the course in these documents.
9	increase because I started to use forum part later
10	yes, it increase because lecture help to me for studying course in site
11	yes it increased since after a while I started to enter the site to read or write something for in the forum
12	did not change
13	Same
14	I increased the use of the web site throughour the semester because with time it became more powerful about the sharing with ideas. Since we had to do our projects, people started to ask more questions. More questions mean more idea for me :)
15	it does not increase or decrease. i singed in regularly.
16	The use of the website to me for the whole semester is the same. Because there were nothing different from the beginning of the term.
17	increase because I enjoyed everytime
18	not increase or dicrease, it is stable...
19	steady....
20	Yes, beacuse the homework load was changing throughout the semester.
21	increase. because i have to follow lesson materials and do my homeworks via web site.

Table A. 3: Responses of 16th item at WBS-PQ

	Q16. What was the feature of the web site that you liked the most? (n=22)
1	lecture videos and to be able to load homeworks by using it
2	I think, videos should be downloaded, therefore when we have not internet we can use the lesson materials.
3	the lecture note
4	Ders notları
5	instant mess.
6	To reach the lecture notes and to watch the lecture that I missed.
7	it has lecture notes, especially the videos.
8	all course materials are there accordintg to the date.
9	Not complicated.
10	always available, it was not any technical problem like metu.online
11	I usually used lecture part. I liked videos of class
12	lecture notes
13	it is simple in use. and it include all materialse we use in the lecture hours. samples, video..
14	to have video materials
15	Vecture note part
16	It wasnt complex to use it that I liked so much. Also, reaching the videos that we were in class is so good.
17	the design of the web site is very good, i can find everythigh easily.
18	Homework, Lecture, Grading, and Self-Study
19	Video and lecture parts
20	anouncing the notes
21	Lecture notes and grading
22	Getting homeworks with an explanation that means the set of instruction that says me what i had to do.

Table A. 4: Responses of 17th item at WBS-PQ

	Q17. What was the feature of the web site that you liked the least? (n=15)
1	sometimes without entering password I can use the web site
2	we cannot download the video from the site. I think this is the least one
3	Videoların indirilememesi.
4	no
5	Password. It was very important but for a long time I could not change my password.
6	in fact there is not a feature that I liked least.
7	not being recorded of videos.
8	I like all the features.
9	we can not download the videos so when the internet is fair I couldn't anything
10	Well, I think changing the password was really hard for me :). Because I didn't know why the web site doesn't allow me. There must be some warnings like "you have to enter strong password to change"
11	nothing.
12	No
13	navigation bar(at left side-to simple)
14	news
15	Forum part.

Table A. 5: Responses of 18th item at WBS-PQ

	Q18. Additional comments about the web site. (n=8)
1	Sadece ders notlarını düzgünce bulmak bile bizler için büyük bir nimetken, derste sunduğunuz örnekleri ve hatta kaydettiğiniz videoyu yerleştirmeniz derse olan ilgimizi artırdı (kendi adıma artırdı). Bu sitenin derslerin bir kolu olması yararlı ve güzeldi (sadece web sitesi tabanlı bir öğretim olsaydı, sitenin bu durumda çok da yarar sağlayacığını düşünmüyorum). Bir de, keşke, ödevler ve "self-study"deki örnekler dışında, konu ile ilgili yapılmamış alıştırmalar olsa (Belki forum da bu şekilde daha etkin kullanılabilir).
2	this web site says us " we esteem you ,please study :)"
3	The web site very helpful for a lecture.
4	I think the website is very good, useful, simple. my only complaint about the website is that the videos are not recorded. for this reason, I do not watch the videos whenever I want, only with an internet connection...not including this, I think the website is very good. I like it.
5	I think if there become a page showing which news information add in forum, homework page etc it will be good since when I enter I must click all buttons again to look at if there is a new news.
6	That web site is so wonderful that I have used for lectures :)
7	I think all courses web sites must be like this web site, because its user design is better and more easier to use.
8	No

Table A. 6: Responses of 21st item at OI-PQ

	Q21. Please type your additional comments about the instructor (n=9)
1	He is a good instructor and helpful but if you notice this characterictics of him.
2	Everything was appropriate for this course to me but the evaluation was a little bit unfair. Because even some people's projects doesn't work, they got better grade then the one's working efficiently.
3	I am happy with my instructor.. he is a very good person, he is very kindful, easy to commmunicate, helpful, etc. he is an expert on the subject. for this reason, we are very lucky. also he is very good at the lesson. he communicated very well. I like him...
4	thanks for everything:)
5	Öğrencilerine değer veren, bildiklerini paylaşmada bencil olmayan hocamızdır. Teşekkürler.
6	It is better if the students acknowledged from where they lost points.
7	Well, This is so easy question for me :). I am sure that my university needs more my instructor :). His ability about programming is wonderful. Also, his thinking about the facing with problem excellent. He is so good at programming. He knows how to tackle with problem. Moreover, you know somebody can be very good at programming but s/he cant tell what s/he did it or how did it. However, My instructor is not only good programmer but also he knows how to tell the students. He explains the solutions and problems clearly. And lastly, the instructor is so kind that makes communication better. When I ask him a question he always answered politely. His face always smile that enhance me to talk with him :). Actually what I mean is that if I wanna be a instructor, I just wanna be instructor as him :). Thanks for everything :)
8	He is a good instructor.
9	Instructor was a master on the subject.

CURRICULUM VITAE

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EDUCATION

Degree	Institution	Year of Graduation
PhD	Computer Education and Instructional Technology, Middle East Technical University, Ankara, Turkey *"The Preservice Teachers' Perceptions About Online Communication in Blended Learning: A Case Study"*	In Progress
MSc	Computer Education and Instructional Technology, Middle East Technical University, Ankara, Turkey, *" Blending Online Instruction With Traditional Instruction in The Programming Language Course: A Case Study"*	2003
BSc	Computer Education and Instructional Technology, Middle East Technical University, Ankara, Turkey	2000
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WORK EXPERIENCE

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2008 - Present	Computer Education and Instructional Technology, Başkent University Ankara, Turkey	Instructor, Lecturer
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Turkish (Native), English (Foreign)

PUBLICATIONS

1. Ersoy, H & Erbuğ, Ç. (2005). "Usability of Synchronous Communication Software in Instructional Context". Proceedings of HCI International 2005, Las 22-27 July, Las Vegas, Nevada, USA: Lawrence Erlbaum Associates.

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