FACTORS AFFECTING FACULTY INTENTION TO USE COURSE
MANAGEMENT SYSTEMS IN A PRIVATE UNIVERSITY

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submitted by **CAN KÜLTÜR** in partial fulfillment of the requirements for the degree of **Doctor of Philosophy in Computer Education and Instructional Technology Department, Middle East Technical University** by,

Prof. Dr. Canan Özgen   _____
Dean, Graduate School of **Natural and Applied Sciences**

Prof. Dr. M. Yaşar Özden   _____
Head of Department, **Computer Edu. and Instructional Tech.**

Assoc. Prof. Dr. Soner Yıldırım   _____
Supervisor, **Computer Edu. and Instructional Tech. Dept., METU**

Examining Committee Members:

Prof. Dr. Ömer Geban   _____
Secondary Science and Mathematics Education Dept., METU

Assoc. Prof. Dr. Soner Yıldırım   _____
Computer Education and Instructional Technology Dept., METU

Assoc. Prof. Dr. Kürşat Çağıltay   _____
Computer Education and Instructional Technology Dept., METU

Assist. Prof. Dr. Yeşim Çapa Aydın   _____
Educational Sciences Dept., METU

Assoc. Prof. Dr. Yasemin Gülbahar   _____
Computer Edu. and Instructional Tech. Dept., Başkent University

Date: <u>10.02.2009</u>

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last Name : Can Kültür

Signature :

ABSTRACT

FACTORS AFFECTING FACULTY INTENTION TO USE COURSE
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Kültür, Can

Ph.D., Department of Computer Educations and Instructional Technology
Supervisor: Assoc. Prof. Dr. Soner Yıldırım

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This study aimed to investigate the factors affecting faculty intention to use course management systems (CMS). The study was conducted in a private university with a mixed-method approach. First, 260 responses to a questionnaire was analysed by using structural equation modeling technique in order to examine the provided model. Second, interviews with selected 14 faculty members were conducted to understand the interrelationships. The findings indicated that, faculty intention to use CMS is mostly related with seeing value in using CMS including both personal and task/course related issues. In addition, the use of CMS should be perceived as easy which is directly influenced by the computer self-efficacy of the instructors. Discrimination of perceived personal benefits and task/course related usefulness is found to be important. Course/task related perceived usefulness is found to be weak without perceiving them personally beneficial. Availability of training and support is found to be weakly related to initial intention, however it appeared as an important variable for continuing to use CMS. 'Communicating the vision through leadership', 'promoting CMS', and 'sharing experiences and real life examples' emerged as powerful approaches to facilitate use of CMS. Institutional policies regarding issues like 'academic

freedom' should be considered carefully while supporting the use of CMS. Moreover, to support institutional change it is important to be aware of the existence of different faculty profiles, which should be considered separately in relevant decisions.

Keywords: Course management system, technology acceptance model, change management, higher education, structural equation modeling.

ÖZ

ÖZEL BİR ÜNİVERSİTEDE ÖĞRETMENLERİNİN DERS YÖNETİM
SİSTEMİ KULLANMA NİYETLERİNİ ETKİLEYEN FAKTÖRLER

Kültür, Can

Doktora, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü

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Bu çalışmanın amacı üniversitede öğretmenlerin ders yönetim sistemlerini (DYS) kullanma niyetlerini etkileyen faktörleri araştırmaktır. Özel bir üniversitede gerçekleştirilen çalışmada karma yöntem ilkeleri takip edilmiştir. İlk önce toplanan 260 anket verisi ile önerilen model yapısal eşitlik modelleme yöntemi ile test edilmiş. İkinci aşamada seçilen 14 öğretmen ile görüşmeler yaparak faktörler ve ilişkileri daha detaylı olarak incelenmiştir. Değerlendirmeler, öğretmenlerin DYS kullanma niyetlerinin kişisel ve derse özgü konularda bir fayda görmeleri ile çok ilişkili olduğunu göstermiştir. Algılanan kullanım kolaylığı ve dolaylı olarak etkileyen bir unsur olarak kişinin DYS kullanabileceğine inanması DYS kullanma niyeti ile ilişkili bulunmuştur. Algılanan bireysel fayda ile derse özgü faydanın ayrıştırılması anlamlı olmaktadır çünkü derse özgü konular bireysel olarak da faydalı olarak algılandığında etkili görünmektedir. Eğitim ve destek mekanizmalarının varlığı öğretmenlerin DYS kullanmaya başlama niyetlerinde etkili bulunmaz iken kullanmaya devam etmek için son derece önemli bulunmuştur. 'Liderlik ve vizyon paylaşımı', 'sistem tanıtımı' ve 'deneyimlerin gerçek örnekler üzerinden paylaşımı' gibi yaklaşımlar öğretmenlerin DYS kullanma niyetlerini etkileyen güçlü yaklaşımlar olarak açığa çıkmıştır. DYS

kullanımı desteklenirken kurumsal politikaları da etkileyebilecek, akademik özgürlük gibi, kritik konuların, farklı öğretmen profillerinin varlığının ve değişen özelliklerinin dikkate alınması kurumsal değişim yönetimi açısından faydalı olacaktır.

Anahtar Kelimeler: Ders yönetim sistemi, teknoloji benimseme modeli, değişim yönetimi, yüksek öğrenim, yapısal eşitlik modeli.

To my lovely daughter

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CHAPTER 1

INTRODUCTION

This section presents the rationale behind the research by introducing the background of the study, purpose of the study, the research questions, significance and the limitations of the study. It also includes definitions of the key terms used in the study.

1.1. Background of the study

In this age of knowledge economy, information lifetime is decreasing and knowledge production is increasing rapidly. With the emergence of such issues as "new knowledge economy," "environmental change," "changing policies," "changing society needs," and "changing student characteristics," higher education institutions appear to be under pressure for change. Le Grew (1995, cited in Bates, 2000) argues for a transformation in postsecondary education. His characterization of this shift encompasses the transitions from 'industrial society' to 'information society', 'once-only education' to 'flexible', and 'open curriculum and local focus' to 'global networking'.

In the context of change through flexibility, 'virtual universities,' 'blended learning programs,' 'distance education programs,' or 'virtual campuses' can be given as examples for new concepts or approaches. They are becoming more important for the future of higher education. These examples can be considered as different approaches but all have a systemic nature. They contain different components and interrelated subsystems.

One of the other forces critical for the changes in higher education is technological force. Gürüz (2003) states that "There is worldwide agreement that technology may be the single greatest force for change in higher education" (p. 27). Advancement in telecommunication technology is one of these technological forces. Since education is strongly related with communication and interaction between students and instructors, telecommunication technologies are accepted as potential technologies that offer solutions for problems of education and enhancement to teaching-learning processes. In the past, almost all newly-introduced telecommunication technologies and their integration into the instructional processes were welcomed. The same was true for the inventions of the radio, television and video. The same is true for the current use of the web and mobile technologies. This trend shows that any new technology to-be - introduced in the future is likely to be used in the educational system, too.

In the current state of technology, one of the important concepts in the integration of technology into teaching-learning processes in higher education is the integration of course management systems (CMS). A course management system can be defined as an internet-based software that manages student enrollment, tracks student performance, and creates and distributes course content (Ullman & Rabinowitz, 2004). As a technological advancement, a CMS gives a chance to design courses in a new way so that instructors are not limited to fixed lecture hours in order to interact with their students. Such course designs have a potential to support student centered learning and may result in a potential change from once-only education to flexible delivery of learning.

Morgan (2003a) claims that "Course management systems (CMS) play an increasingly critical role in higher education's technology infrastructure" (p. 15). As a concept, a course management system may have different values in different roles in higher education. Being a pedagogical tool, a performance support system, a communication environment, a web page development tool, or being a change agent can be given as examples for these different values. Whatever its

value is, a CMS is a type of information system. As an information management system, its institutional usage means that numerous different factors should be considered for the sustainability and success of these kinds of systems.

In general, information management systems are enterprise software packages, which are used by many users to handle all data in different related processes. Nowadays, there are CMSs (like Moodle) that can be downloaded, installed, and used individually by instructors. While considering the use of CMSs, it is important to discriminate individual use from institutional use. It is natural to expect that certain critical factors that affect the success of such an individually and institutionally used system will be different.

As different from its individual use, institutional use of a CMS requires that some institutional policies and mechanisms be in place in order to support end-users like instructors and students. As leaders, university administrators should pay attention to these policies and mechanisms for successful integration of a CMS. They should consider some critical issues, a few examples of which can be listed as 'dissemination of institutional goals and policies', 'establishing of training and support mechanisms', 'sustainability of the technical infrastructure', 'motivators and barriers for the users', 'institutional/departmental procedures' or 'issues related to organizational culture'. For an ideal system, in the broadest term, it can be said that (1) students and instructors should be ready as users, (2) tools and technology infrastructure should be accessible and should provide a satisfactory level of features, and (3) the CMS should be integrated to organizational procedures and culture.

Investigations into this topic may have different focuses from different viewpoints. These can be (1) actors of CMS use, (2) context of CMS use, (3) interaction styles selected while using CMSs, and (4) technical environment and features of CMSs. Investigations may focus on different major actors (user groups) of CMSs, which are students, teachers, managers (university

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administration) and system administrators. The processes regarding technology integration and performance of use in the course context, departmental context or institutional context can be other areas of focus of investigations. In the selected context, the interaction styles that can be categorized as one-way interaction from instructors to students and two-way interaction between instructors and students or among the students are other focus areas of investigation. Finally, the tools, software or hardware required for infrastructure, and their features comprise the other focus areas for investigation.

When the topic is course management systems, a variety of research focusing on students, faculty members, and administrators, software features or organizations can be found in the literature. Considering the studies already conducted on the impact of CMSs on students, Harrington, Staffo, and Wright (2006) believe that research that focuses on the faculty side of the equation is in great need. Morgan (2003a) states that "identifying the factors that encourage faculty to start using technology in their teaching is a constant challenge facing university administrators" and she adds "administrators need to identify the factors that cause or contribute to CMS use so that they can better support the technology and educate faculty in its use" (p.29). In her study, she observed that the practice of relying on faculty to adopt technology at their own speed is not sufficient and strong leadership from top management is required (Morgan, 2003a). This brings university leaders to a point whereby focusing on supporting faculty for their intention to use CMSs in their courses is beneficial and meaningful for their administration processes.

As explained before, integration of CMS technology can be investigated in different contexts. For instance, it can be discussed in the context of its integration into courses or in the context of instructors' intention. While deciding on the context of the investigations, the strategies (top-down or bottom-up) implemented by university administrators can also be considered. For example, for university administrators, knowing the factors that affect instructors' intention to use can be

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more critical when a voluntary based bottom-up strategy is implemented. On the other hand, knowing how to adapt the courses can be more critical for instructors and managers when a top-down strategy is pursued.

Introducing the use of CMS in a university as a new information system and its use by a large number of instructors and students may require or result in a cultural change, a structural change or a political change. Because of the critical position of CMS technologies, higher education administrators can use them as change agents. Since there are different factors to consider, knowing where to focus on will be of utmost importance for administrators. In her study, Morgan (2003b) reported that two thirds of the faculty increased their use of CMS and only five percent of the faculty decreased their use. Interpreting this finding, the researcher thought that if instructors' use of CMS increases over time, it should be more meaningful to focus and make effort to convince them of the value of starting to use CMS. In this case, understanding the factors that may affect instructors' intention to use CMS turns into a critical question.

With a similar need for change, a number of Turkish Universities have launched online or blended learning programs and made major investments in CMS infrastructure in order to support their students' and instructors' teaching-learning processes. This trend is consistent with the reports published by the Turkish Council of Higher Education. Gürüz (2003), in his report, named as 'Higher education in the global knowledge economy', states that the demand for higher education has been and will be on the rise in the conceivably near future. Turkey's Higher Education Strategy Report, which was also published by The Turkish Council of Higher Education in February 2007, also points to the massiveness in higher education and indicates that a greater number of students in a greater range in age will require higher education in the future. As a result of such a need, there will be a demand for more instructors. In the same report, the role and importance of technology in the vision of education are emphasized and it is clearly stated that Turkey should show progress in developing e-learning applications since

distance education and e-learning approaches are some of the strategies selected to increase the capacity in the higher education field (HEC, 2007, p. 190).

The conceptual arguments discussed up to this point which form the background of this study can be summarized as; (1) Distance learning and e-learning approaches will have serious roles in Turkish higher education system. (2) Institutional use of CMS (as a critical technology) has a great potential to support the required changes, to implement the determined strategies and reach the vision of education. (3) Success of institutional use of CMS depends on many issues where instructors' intention and university administrators' policies to support them seem to have greater importance. With these arguments, the researcher believed that findings about the factors that affect instructors' intention to use CMS technology would help directly university administrators and indirectly instructors and students by providing knowledge necessary for developing institutional policies and strategies.

One difficulty in studies on new technologies, like CMS, is the variety in the features provided by software packages. There are numerous different CMSs in the market. Moreover, some universities prefer to use in-house solutions. This variety in systems makes it difficult to generalize findings from studies on CMS use. Even in a single university, it can be difficult to generalize findings when different CMS packages are used. In such cases, researchers may be forced to exclude software dependent issues from their research questions. Another solution for similar situations is to investigate the research topic through case studies in a specific context. This study was conducted with the contribution of instructors and faculty members who delivered courses at Bilkent University and a pilot study was conducted in the Middle East Technical University. These universities are two of the well-known universities that have sufficient institutional experience in CMS implementation.

Bilkent University started to use a course management system in the spring term of 2004 with a pilot course. The number of courses increased in the following semesters. The administrators had decided to pursue a bottom–up strategy whereby instructors would start to use CMS voluntarily. They started off by launching eCampus, a course management system that was developed by a Turkish company. After three years, the university administration decided to try a new course management system. In the fall semester of 2007-2008 academic year, an open source course management system, Moodle, was selected to provide service. The number of courses that were offered (all actual and trial courses) in this new system was more than 400 in one academic year (two semesters). The university aimed to provide CMS technology to instructors in order to support and enhance the quality of their teaching-learning process. Compared to online or distance learning approaches, most of the instructors used CMS from a blended learning point of view. Another aim of the university was to provide a communication platform for different purposes such as research groups, student clubs or departmental communication. A bottom up strategy was pursued for diffusion of this technology and instructors started to use it on voluntary basis.

The expectation of the researcher from this study was to understand where to focus on in order to facilitate successful diffusion of CMS technology in a university setting. Another expectation was to show instructors' expectations to university administrators and to shed light on relevant critical issues that should to be considered while determining the investments, strategies and tactics to achieve successful diffusion of this technology. Below, the purposes of this study are described in detail.

1.2. Purpose of the study

In this study, the broadest goal was to support universities' change process by supporting the diffusion of CMS technology. With this goal in mind, the main purpose of this study was set as investigating and examining some interrelated

factors that were thought to be affecting the faculty intention to use course management systems in a selected private University.

As a result of this study, the researcher aimed to show the critical factors to the university administrators so that they could support faculty members and develop their policies in a more beneficial way.

The researcher also had technology related aims like understanding how a diffusion of technology occurs in a specific context. It was also expected that the results of this study would show critical issues and provide an example for similar future investigations.

In this study, the researcher aimed to understand and show;

1. The importance of selected factors (like computer self-efficacy, perceived usefulness, perceived ease of use, availability of training and support, perceived personal benefit) in the instructors' behavioral intention to use CMSs.

2. The interrelationships between these factors and their impact on each other.

3. The degree to which the data collected from the selected university explain the presumed model.

4. The environment, context, and underlying issues that may be related to these factors and instructors' intention to use CMSs in their courses.

Below, the specific research questions are presented. Answering these questions that are presented in the following section was believed to be necessary to achieve the purposes of this study.

1.3. Research questions

In this study, the researcher aimed to understand the drives those are directing instructors to use CMS. He tried to find answers to the question "What are the key factors affecting the faculty members' behavioral intention to use CMSs". To answer this question, the researcher proposed a model based on his experiences through utilizing "technology acceptance model" (Davis, 1989). The factors considered to be effective in behavioral intention to use CMSs were; 'Computer self-efficacy,' 'Perceived usefulness,' 'Perceived ease of use,' 'Perceived personal benefits,' and "Availability of training and support". In this model, there were 10 research questions about the relationships among the factors. These research questions are;

1. Is there a relationship between 'computer self efficacy' and 'behavioral intention to use CMS' through the factors 'perceived usefulness of CMS', 'perceived ease of use', and 'availability (expectation) of training and support'?

2. Are there relationships between 'behavioral intention to use CMS' and 'perceived personal benefit', 'perceived usefulness', 'perceived ease of use' and 'availability (expectation) of training and support'?

3. Are there relationships between 'perceived ease of use' and 'perceived usefulness of CMS' and 'availability (expectation) of training and support'?

4. Is there a relationship between 'perceived usefulness of CMS' and 'perceived personal benefit'?

In addition to these four questions based on the examined model, the researcher aimed to explore other related issues derived from the findings of the model test. The fifth question pointing to this need can be expressed as;

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5. What are the expectations and perceptions of instructors found to be critical or questionable regarding to the findings of correlational analysis?

1.4. Significance of the study

As expressed in The Turkish Higher Education Strategy Report (2007), the massiveness in higher education increases in all countries at different rates and it is clear that new solutions are needed for the future of higher education. For the future of Turkish higher education, distance learning, e-learning and the universities' integration of relevant technologies into their teaching-learning processes are stated as critical strategies. Course management systems are the infrastructures proving the environment to apply these strategies. This study and its findings with its focus on CMSs is valuable in supporting the governmental policies and strategies. In the broadest term, it is also valuable in supporting solutions of the problem of massiveness in higher education field.

The same report makes a point that Turkey's status of following the latest technology related innovations in the field of higher education is not satisfactory and the traditional and old techniques dominate the field (HEC, 2007, p. 189). In this context, this study is valuable as an effort to fill this gap between developed countries and Turkey's higher education system.

Another critical concern pointed out in the same report is the vision of education. It is stated that it is important to move from teacher-centered to learner-centered education and this vision should be related with educational technologies (HEC, 2007). As explained before, CMSs can be used as change agents to support the change process in institutions and instructors' approaches. After starting to use CMSs, instructors can move from teacher-centered to learner-centered instruction or they can move from the traditional delivery of learning to flexible delivery of learning methods. In this context, this study is valuable with its focus on instructors' intention to use CMS and it will be necessary in internalization and dissemination of the vision of education.

While applying the strategies and managing the intended change process, knowing the factors and their effects on the faculty intentions will be critical especially for administrators. The findings of this study will provide evidence of the instructors' requirements, expectations and perceptions, and will communicate these to the university administration. Through better communication, it is natural to expect better administrative support and better policies. This study is valuable in terms of the communication between instructors and university leaders, and in terms of supporting university administrations' efforts on institutional policies.

At November 2008, Turkish Council of Higher Education approved the Sakarya University's application to open an undergraduate program with a blended learning structure. News about this progress had published generally at the first and second day of November 2008 and can be found from the web portal http://www.tumgazeteler.com/?a=4174006. This is the first approval for a blended undergraduate program and it shows the importance placed to flexible delivery of learning and adoption of distance education technologies. It also shows that similar programs will be approved and be a part of future universities. Therefore, it is very important to be prepared. Morgan (2003b) states that CMSs are increasingly important parts of academic systems in higher education and she adds that CMSs pose challenges to administrators who need to make decisions about their use. In Sakarya University and similar cases, it should be expected that adaptation problems will be encountered. In these terms, the findings of this study will be beneficial to overcome the problems of these programs.

In universities, instructors' role and position is critical for institutional use of new technologies. The importance of focusing on instructors' intentions is due to their critical position and role. Although it will cost more, administrators can move towards their aims to some extent just with the support of instructors. On the other hand, without the support of instructors, it seems hard to reach satisfying results. In the literature, there is a great need for studies focusing on faculty members'

intention to use CMS in Turkish Universities. This study is important with respect to filling this gap in the literature as an example for other future studies.

Another importance of this study is that the findings of this study may provide data and evidence for the stakeholders who are searching for ways to support instructors in terms of motivating, training and setting the appropriate environment.

In addition to seeking answers from the instructors' viewpoint, the study itself is expected to become an example for other studies, which may focus on issues related to other stakeholders. For instance, similar studies can be designed from the viewpoint of students or technology providers.

New technologies and change are always either rejected, or accepted after a period of resistance. The findings of this study may be important in overcoming the resistance of some stakeholders and instructors.

Many CMS related investigations include details about the selected software package. Including the features of CMS in research design may be critical since they may be related with the results. On the other hand, this makes it harder to generalize the results. In this study, the software was examined in terms of general expectations and the results can be accepted as software independent. In this context, the findings can be significant for other universities although they might be using different software packages.

In addition to administrators and faculty members, the companies in education sector who provide tools and services may find the results of this study necessary in their efforts to improve the quality of their services.

1.5 Definition of terms

'Course Management System' (CMS) is a software package used for delivering course materials, tracking the student activities and managing course related issues through the web.

'Learning Management System' (LMS) is another term, which is used interchangeably with course management systems. Some differentiate LMS (and LCMS) from CMS. In this study, the term course management system is used.

'Technology Acceptance Model' (TAM) is a model that explains the main factors underlying the acceptance of a new technology.

'Availability of training and support' refers to knowing the availability of institutional training and support mechanisms. It may also be interpreted as the perception or expectations related to the availability of institutional training and support mechanisms.

'Computer self-efficacy' refers computer self-efficacy in terms of CMS use.

'Perceived usefulness of CMS' refers to the degree to which a person believes that using CMS would enhance his/her course related performance. In this study, it does not refer to personal benefits or usefulness in personal issues.

'Perceived ease of use of CMS' refers to the degree to which a person believes that using CMS would be easy to use not only in terms of using software but also handling environmental issues.

CHAPTER 2

LITERATURE REVIEW

This section includes the review of previous research on the concepts and principles that form a basis for this research. Basically, this review of literature focuses on (1) higher education and pressures on modern academy, (2) use of information technology in higher education, (2) course management systems and its use in higher education, (3) models to understand change and technology adoption, and (4) faculty use of course management systems and the factors affecting their use.

2.1 Higher education and pressures on modern academy

Higher education has a critical role for the future of societies in our global and modern world. Langenberg and Spicer (2001) say, "higher education serves the broadly accepted functions of creation, transmission, preservation, and application of knowledge" (p.4). In our era of knowledge society and knowledge economy, this means higher education institutions will have greats effects on and will be affected by the society needs and demands.

"All providers of higher education today are faced with the challenge of building a system of higher education which will be equipped to meet the needs of society in the next century" (Ford et al., 1996, p.1). The needs of society result in various higher education institutions. Langenberg et al. (2001) reported that thirty-six hundred institutions of higher education in the United States were classified into ten broad types by the Carnegie Foundation for the Advancement of Teaching. Moreover, they predicted that this diversity would be increased with the

continuing growth of a knowledge-based society, changing demographics in learners, competition from for-profit entities, and the growth of opportunities to commercialize research findings. Their prediction was valuable because recent classification of The Carnegie Foundation for the Advancement of Teaching includes 4391 institutions in 34 categories, which shows an increase.

Societal demands underlying the increase of this diversity of higher education institutions can turn into pressures for change. Bates and Poole (2003) explain such pressures linked to globalization, the new knowledge society, and the changing needs of workforce faced by universities and colleges and they add as an emerging challenge the issue of handling more students with less funding for higher education institutions. Ford et al. (1996) give reasons underlying this situation by pointing out that, "within a relatively short period of time, we have moved from an elite to a mass system of higher education" (p.1).

Ford et al. (1996) present provoking issues on the learning institutions to incorporate new teaching and learning methods and to develop new learning environments. These issues are; (1) 'Massification of education', (2) 'competition and control for both student and research income', (3) 'changing student profile and expectations' and (4) 'provision of learning resources like the ones supporting learning at a distance, or richer information environments'.

Parallel to these example pressures, massiveness of education, competition in the international arena, impacts of lifelong learning, impacts of technological development, new types of competitors were emphasized as critical issues for the higher education strategies in Turkey (Gürüz, 2003). Massiveness of educations is related with the increased number of higher education students and lack of faculty, which forces higher education institutions to change them so that they can respond to the societal demand. In Turkey, emergence of new and advanced technologies has been found to lead to the increasing demand for higher education targeting the jobs that require tertiary-level qualifications even at the entry level (Gürüz, 2003).

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Assessing the UNESCO statistics, Gürüz (2003) stated that in higher education there is a transition from elitist to mass, and interpreted this phenomenon as universal in developed countries. He also predicts that, "the demand for tertiary education will further increase worldwide" (p.18).

Competition in international arena is another critical issue that is forcing higher education institutions to change. As a result of globalization and the internationalization at the graduate level, an increase in the number of self-paying students studying in institutions abroad at the undergraduate level was observed (Gürüz, 2003). As a new challenge, institutions of higher education faced with the competition for students at the international level.

Collis and Van der Wende (2002) stated that higher education institutions are directly influenced by the outside world. According to them, "main sets of external pressures are related to new competitors for the university and also with respect to information and communication technology" (p.15). Similarly, De Boer (2004) believes that the field of higher education is rapidly changing in terms of the use of information and communication technology and in new cohorts of students.

Especially, technological developments are accepted to be powerful pressures on higher education institutions. Some authors found the technology as the single greatest force for change in higher education by enabling the development of distributed learning and producing what may be the most challenging period in the history of higher education (Oblinger, Barone, and Brian, 2001; Green, Eckel, and Barblan, 2002).

Drucker (2001, cited in Gürüz, 2003) predicts that a growing number of older people will participate in the labour force in many different ways. Growing interest in 'lifelong learning', and particularly, in the integration of study and employment are found to be reinforcing issues in the increasing participation of

older people (Ford et al., 1996). Lifelong learning is explained by Gürüz (2003) as a knowledge-driven economy not only requiring higher skills in the workforce, but also continuous updating to adapt to changing demand and creation of new knowledge. He mentioned the expectation for the expansion of lifelong learning and continuing education as "leading to a blurring between initial degrees and continuing education certificates, and perhaps also between secondary and tertiary levels both in developed and developing countries, but more so in the former" (p. 24).

As a result it can be concluded that understanding the societal needs and their impacts on higher education is critical for providing high quality of teaching and learning that will be discussed in the next section.

2.2 Need for quality, change and use of technology

In such a competitive international higher education arena, providing high quality of teaching and learning in higher education is a critical issue for the university or college administrators. Naturally, it is important for the development of the society on one hand and on the other side it is important for the survival of the higher education institutions.

However, providing high quality of teaching and learning turns into a challenging issue in an environment that is under pressures such as 'massification of education', 'lack of faculty and other resources' or 'competition'. Bates and Poole (2003) indicated the greatest challenge as the need to maintain or even improve the quality of teaching and learning that universities and colleges face today. And in their book they tried to show use of technology in order to help maintaining or improving the quality of teaching and learning.

Interpreting the challenge of quality for web2.0 tools, Collis and Moonen (2008) stated that the perception of quality in higher education is affected by many factors and the inconsistencies in quality perceptions, even from those

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representing a single actor group, could result in barriers to successful implementation.

White and Glickman (2007) pay attention to innovation and flexibility to overcome the pressures explained above. They suggested administrators to balance the fiscal pressures of running a large organization influenced by external forces such as rankings and increased competition for students and faculty and internal stresses produced by boards and accrediting agencies who are demanding more transparency, accountability, and tangible evidence of success, are best served by seeking continued innovation in curricular programs, delivery mechanisms, support services, and operations.

Institutions should seek 'continued innovations' according to White and Glickman (2007) where their definition of 'innovation' in the higher education context is "Some new way of doing things, or a change that improves administrative or scholarly performance, or a transformational experience based on a new way of thinking" (p. 97).

Higher education is evolving and improving to meet the existing challenges. Some of the ways White and Glickman (2007, p. 98) believed to be necessary are (1) "closer examination of quality," (2) "novel uses of technology," (3) "ways to reach learners with disabilities," and (4) "curricular innovation".

As a part of solution, use of technology is expected to have a critical role. Similar to Bates and Poole or White and Glickman, many people suggest and give priority to 'innovations' and 'use of technology' to overcome the existing problems and the pressures on higher education institutions. For example, regarding the future of higher education, Economist Intelligence Unit (2008) conducted a study and recently published a paper, which reports the results of a survey including nearly 300 chief officers and technology leaders inside and outside of higher education. In this report, they pointed to the most critical question facing the academic world

as "what it will mean to be an educated person in the 21st century". Their study indicated that the skill-sets of the future workforce, as well as its approach to work in general would change by the effect of technological changes. As a result, they suggested that societies around the world will need to consider how to make the most of the new opportunities and thus ensure that they remain competitive in the global marketplace.

With similar concerns about the existing and future states of diversity in higher education institutions, Langenberg and Spicer (2001) defined the modern campus and stress the use of technological tools and flexibility in their definition. According to them modern campus is "a learning environment of unprecedented flexibility and effectiveness that respects and treasures the academic values and traditions of the past while embracing the technological tools that enable it to connect teachers and learners in myriad new ways" (p.15).

As seen from these examples, to overcome the pressures on and the problems of higher education, people expect to have innovations and expect to use technology directly or indirectly while developing solutions. Change and innovation are two terms that are closely related to each other. Moreover, different people expressed that it is impossible to avoid from this change and the use of technology.

Davidson-Shivers (2002), mentioned three factors affecting how higher education institutions operate as (1) 'reduced resources', (2) 'decline in and competition for enrollments', and (3) 'diversity among students'. Moreover she emphasized the use of instructional technology as a solution in order to face these challenges.

Although technology is not a magic answer according to Maid (2003), she also underlines the reason of using it by maintaining that; "The single most important reason we integrate technology into our classes is that we have no choice. Our students, our society, and our culture demand it. To not do so is to not give our students the best education we can." (p.40). She interprets technology as a social

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and cultural norm that has to be integrated into teaching and value it as being one of the most powerful tools to look closely at how to teach in order to become more effective teachers, no matter what medium worked in.

2.3 Use of information technology in higher education

"The rapid growth of information technology (IT) and communications networks has created wonderful opportunities for meaningful change in higher education" says Eisler (2001, p.71) and adds that, "Nearly all campus employees and students now require access to a computer and computer networks. Colleges and universities have become dependent on technology for daily essential operations in administrative processes, communication, scholarship, research, and learning" (p.77-78).

Bates (2003) provides a classification of technologies, which differ according to key structural characteristics and are important for instructional purposes. It is clearly seen from Table 2.1 that there are lots of various technologies appropriate for instructional use. Table 2.1 represents a classification of the technologies available at 2003 and does not include recent technologies. For example, Web 2.0 became a collective term for a mass movement in society according to Collis & Moonen (2008). They evaluate this technology as a movement toward new forms of user engagement supported by Web-based tools, resources, services and environments.

Web 2.0 applications are technically web sites but they should be taken as a new technology since the underlying mechanisms, idea behind and its characteristics vary. Collis and Moonen (2008) explain this type of information technology as a second generation of Web-based services emphasizing online collaboration and sharing.

Web 2.0 or other specialized web applications such as CMS, LMS or LCMS can be described as interactive web sites. However, interpreting their characteristics,

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these recent technologies can be added to Bates' classification. Even, adding new categories or sub-categories can be considered since collaboration can be separated from communication dimension. These technologies are simply web sites, but it would be confusing when we categorize them as 'web sites', which was placed in one-way broadcasting category.

Table 2.1. A classification of Educational Technologies

Technologies				
	Broadcast (one-way) Applications		**Communication (two-way) Applications**	
Media	*Synchronous*	*Asynchronous*	*Synchronous*	*Asynchronous*
Face-to-face		Books		Mail
Audio	Radio	Audiocassettes	Telephone tutoring Audioconferencing	
Video	Broadcast TV Cable TV Satellite TV	Videocassettes	Videoconferencing	
Digital Multimedia	Webcasting Audiostreaming Videostreaming	Web sites CD-ROMs DVDs Learning objects Multimedia clips	Chat MUDs Web conferencing	E-mail Discussion forums

Source: Bates (2003, p.55)

Collis and Moonen (2008) claim that "changes in society are interconnected with technology, particularly network technology, and thus technology use needs to be significant in institutional quality perspectives" (p.104). They find Web2.0 applications as important technologies for higher education because of their features, which provides ways to be heard, to connect, to find and share, and to build identity. They suggested that the empowerment involved needs to be

considered within higher education, or else the disassociation of 'school' from the 'real world' will grow.

Another example for recent technologies can be course management systems, portal technologies, or mobile technologies. From these technologies, course management systems will be discussed in detail in the following sections.

At this point, "Current, early-twenty-first-century interpretation of the modern campus with particular focus on the various forms of IT that underlie activities and processes on such a campus" (Langenberg & Spicer, 2001, p13) may help to see one picture of IT usage in a modern campus (Figure 2.1).

As seen from the table 2.1 and figure 2.1, the use of IT in higher education is unavoidable and it is very critical for reaching the goals of higher education institutions. Dodds (2007) explains this through the contribution of IT to innovation in university life. Research, learning, administrative activities, and other important areas such as collaboration and community building are examples that IT contributes. Dodds (2007) suggested that university administrators can create an environment in which innovation can grow by starting with a clear vision, being thoughtful about business practices, and providing excellent IT infrastructure and services,

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                              ┌─────────────────┐
    ┌──────────────┐     ┌──────────┐  │   Enterprise    │
◄───┤Teaching/Learning├──►│ Research ├──┤  management     ├──►
    └──────────────┘     └──────────┘  └─────────────────┘
```
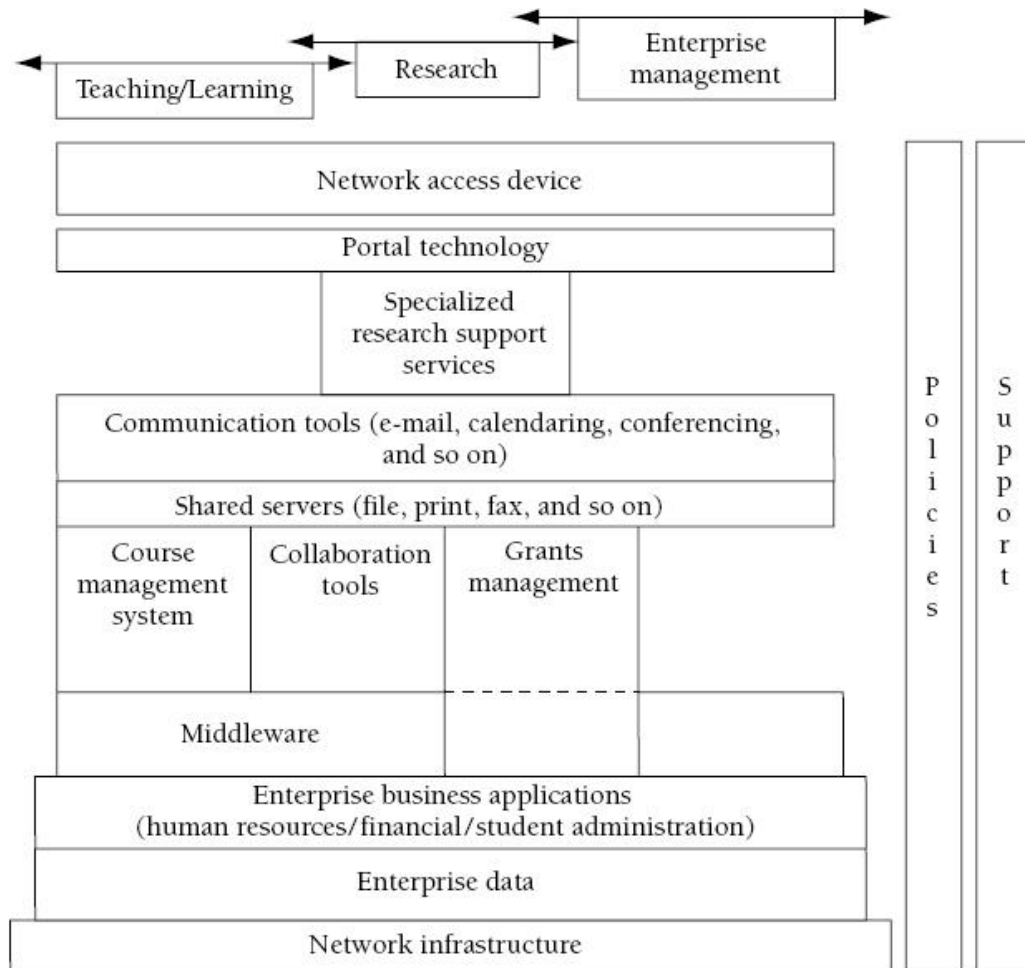
Source: Langenberg and Spicer, 2001, p13)

Figure 2.1. Components of the Modern Campus

In the following section courseware and course management systems will be
focused as a kind of information and communication technologies that are
designed with the aim of supporting teaching learning processes.

2.4 Electronic courseware and course management systems

According to Privateer (1999) destiny of higher education are shaped by micro-
information technologies, which are proved to be powerful forces. He also
compared it with the effect of Gutenberg's movable type on the production and

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dissemination of information in Western culture. There are various kinds of technologies with different uses in universities.

Electronic courseware is one of the general terms used for similar technologies in higher education. Minielli and Ferris (2005) state that, electronic courseware, or online course software programs, can be called with different names like 'learning content management system', 'learning management system', 'virtual learning environments' or 'course management systems'" (para. 5). According to them, although these systems share many features, their usage may vary by nation or industry. So, making distinctions between these systems and the terminology is worth to consider. Minelli and Ferris (2005) distinguish the three most common iterations of electronic courseware as below;

- Learning Content Management Systems (LCMS): "software systems for creation, storage, management and usage of learning content." (para. 7)

- Learning Management Systems (LMS): "similar to learning content management systems, but they include authoring, classroom management, competency management, knowledge management, certification, mentoring, chat boards and discussion boards" (para. 8).

- Course Management Systems (CMS): "instructional technology software created for educational use – primarily as course support, or as vehicles for online learning". (para. 13)

Well known e-Learning consultancy company Brandon Hall Research distinguishes learning content management system (LCMS) and learning management system (LMS) according to their objectives. The objective of LMS is given as managing learners, monitoring their progress and performance through activities. Contrary the objective of LCMS is given as managing content or learning objects. (Brandon Hall Research, 2007)

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Considering LMS as a part of LCMS, Carliner's (2005) comparison of LMS with CMS is based on their designs and their targets. He distinguishes LMS from CMS according to the difference between education and training, and states that academic classroom courses are supported by CMSs whereas corporate training is supported by LMSs.

Minielli and Ferris (2005) pointed out to the CMSs' domination on higher education where LCMs and LMSs were found in business or industry. Carliner (2005) supports this argument by maintaining that, "CMSs are ideal for managing classroom courses in universities and other academic environments" (Section 3 para 1.)

It is clear that defining electronic courseware turns into a difficult issue because of similar terms being used with different interpretations of tools and approaches. In addition, Morgan (2003a) finds it difficult to define since they are evolving so rapidly. She sees CMS as "a suite of software tools, usually organized around a class or unit of instruction" (p.16). She defines CMS as "the academic equivalent of an enterprise resource planning (ERP) system, and the primary way that most faculty come to use technology specifically for teaching and learning" (p.9).

2.4.1 Importance of CMS for higher education

Course management systems have a strategic position for higher education. Warger (2003) states that "In only a few short years, course management systems have become an essential feature of instructional technology at institutions of higher education" (para.1).

In the course management system strategy document of Indiana University, it is stated that, "A university's CMS is arguably the largest single service directly used by students and faculty" (Wheeler, 2002, p.16). Similarly, according to Morgan (2003a), 'course management systems' is one of the four major developments since 1970. These developments promoted higher education's

evolution through promoting increased access and challenged the existing traditions through breaking the higher education modes and methods (p.84). Morgan (2003a) also believes that there will be a bright future for CMSs and says that they will change 'power relationships', and will 'cut new channels and create new issues and opportunities' (p.88). These arguments show that use of CMS can be very critical for the Universities.

Collis and Van der Wende (2002) claimed that, "Institutions are gradually 'stretching-the-mould'" and explained this as "they change their procedures and models as a process of change from within. These changes, however, are gradual and usually slow" (p.7). De Boer (2004) notes that technology, particularly course management systems, is important for the dimensions, which underlies the change in higher education. De Boer (2004) added that "CMSs, if appropriately designed, are very flexible for educational use and good tools within a 'stretching-the-mould' scenario" (p.223). In addition to this change scenario, it is important to see that "for most faculty members, course management systems have been the primary entry point into using technology for instruction" as Morgan (2003a, p.9) said.

Witnessing all these arguments which highlights or underlines the importance of CMS, if higher education institutions are in need of change because of the pressures due to the societal needs, they have to pay attention to course management systems. All these explanations show that, it will take time but by paying effort, CMSs can be started to use more meaningfully.

Langenberg and Spicer (2001), predicts that, in the future CMSs will be more integrated to other tools or systems and "will become increasingly sophisticated and adaptive, sensing when a student is having difficulty with a concept and providing additional resource materials" (p.14).

2.4.2 Use of CMS in higher education

In the literature, there is a great need for studies that focuses on faculty use of CMS. There are a few comprehensive, large-scale studies; Glenda Morgan (2003) has studied faculty use of course management systems in the University of Wisconsin System. She conducted a study in which 730 faculty members from 13 colleges and universities were responded to a survey, the web server logs were examined, and 140 faculty and instructional staff were interviewed. This study is one of the most comprehensive research studies about faculty use of CMS. Woods, Baker and Hopper (2004) was conducted another research where responses of 862 faculty members from 38 institutions using Blackboard LMS to supplement face-to-face instruction were examined.

CMS use in higher education can be examined according to different viewpoints such as 'adoption processes', 'CMS features used', 'functional use', or 'pedagogical use'.

According to instructors' approaches and goals

CMS use can be interpreted according to instructors' approaches and goals. Ullman and Rabinowitz (2004) argue that CMSs could be used in accordance with two distinct mental models. The first model is "to supplement a conventional course experience" and the second model is "to organize a conventional course experience"(para.3). They believe that, CMS could help reinvent teachers' teaching style and teachers could make the technology fit into their old lecture-based teaching styles.

Morgan's (2003b) findings show that 'supplementing lecture materials', 'increasing transparency and feedback', and 'increasing contact with and among students' are listed as most important goals of faculty for using CMSs. On most higher education institutions, CMSs are used to support traditional classroom courses (Warger, 2003).

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Another distinction about the instructors' approaches can appear as the selection of distance education (fully-online), face-to-face classroom teaching or the distributed learning (mixed mode / blended learning) approaches. In Morgan's (2003a) study, it was found that over 80 percent of the faculty use CMS in order to enhance face-to-face classes, and 27 percent of faculty use CMS in order to teach fully online classes. Similarly, Maid (2003) pointed out that in many campuses, faculty using technology, both locally and at a distance, in their courses are encouraged to use the CMS packages purchased by the institutions.

According to CMS functionalities

Besides instructors' approaches, CMS features or functionalities can be another way of interpreting the CMS use. Malikowski, Thompson, and Theis, (2006) said "Faculty members primarily use a CMS to transmit information to students (p.10). Similarly, Hanson and Robson (2004) reported that "CMSs are used primarily as templates for organizing class materials. Considered very important by those who perceive course management systems as providing educational benefit, they are seen as unnecessary by others" (p.10). Collis and Moonen (2008) referred to De Boer's summarization of the literature, which was as well as an international survey research that he was involved and noted that,

> "Web technology in higher education was being primarily used for support of logistical processes rather than for pedagogical change. The current use of VLEs (virtual learning environments) or CMSs (course management systems) in higher education is dominated by their functionalities related to content and information provision" (Collis & Moonen, 2008, p. 96)

Following Morgan's study, Woods et al. (2004) conducted another large-scale study and reported that course administration and management purposes are the main uses of CMS. They observed that faculty used CMS primarily to post course syllabi, send email, and post grades. More interactive course administrative functions were not used by majority of faculty.

These findings can be interpreted just as results of implementations or CMSs can be criticized as being focused to manage learners rather than having a focus on promoting rich, interactive learning experiences. (Bonk, Kim, & Zeng, 2006). In addition to such uses, alternative ways of using CMSs are also possible. Using CMS for collaborative work like project groups, to create virtual communities or using it as departmental communication area or as online material repository can be given as examples.

2.5 Distributed learning and flexibility in higher education

Distance or distributed education is one of the most complex issues facing higher education institutions (Oblinger et al., 2001). A generally accepted definition of distributed learning is "learning that can occur either on or off campus, providing students with greater flexibility and eliminating time as a barrier to learning" (Oblinger et al., 2001; Gürüz, 2003). According to Gürüz (2003), distance learning, which is a form of distributed learning, focuses on students who may be separated in time and space from their peers and instructor.

Parallel to transformations in the society, the value given to flexibility increases. White and Glickman (2007) claim, "Flexibility afforded by new technologies can facilitate gains in many facets of an institution's operations, provided that the institutions are willing and able to adopt the technologies" (p. 98). From this point of view it can be said that university administrators should consider online and distributed/blended learning approaches when they are making plans and developing strategies for the future of their institutions. There are quite a lot of findings showing that these approaches (especially blended learning) are important approaches for the future of higher education.

For example, Molenda and Sullivan (2003) stated that there is a growing acceptance of the notion of 'blended learning', referring to the mixing of face-to-face episodes with online episodes. Similarly, Nijhuis and Collis (2005) claim that "students in higher education are increasingly demanding flexibility in selecting

courses within various curricula to fit their personal goals, as well as flexibility in the ways of participating in these courses"(p.1035). Mixture of on-campus and flexible learning can be an ideal mode for delivery especially for the new types of learners. This was an argument discussed by De Boer (2004). Based on the results of their survey, Bonk and Kim (2006) comment that blended learning is a permanent trend in both higher education and workplace learning settings.

As seen from these few explanations, there is a confusing and overlapping terminology. Bates (2001) solves this confusion while explaining the term 'distributed learning' as;

> "Distributed learning describes a mix of deliberately reduced face-to-face teaching and online learning (for instance one face-to-face lecture or seminar a week, with the rest of the teaching and learning done on-line, replacing the traditional three face-to-face lectures a week). Unfortunately, especially in the USA, the term 'distributed learning' is also commonly used to include fully distance courses taught totally on-line. It might be more helpful to describe the mix of reduced face-to-face teaching and on-line teaching as 'mixed mode'. Another term, used in Australia, is flexible learning. While 'flexible learning' may encompass on-line learning, it can also include face-to-face teaching delivered in the workspace, and other flexible delivery methods." (p.22)

Bates (2001) also finds these semantic differences confusing and claims that regarding the differences as a continuum that starts from 'pure' face-to-face teaching (no on-line learning) to 'pure' distance teaching (fully online) on the end will be helpful (Figure 2.2).
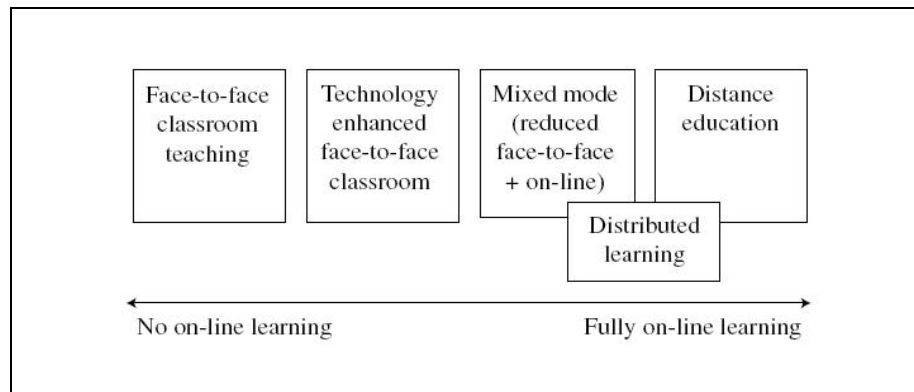
Figure 2.2. Continuum of online learning applications

Hurst (2001) underlines the changing demands and asks if distance learning is dying or not. He describes the change in the term as a metamorphosis. He stated that the change is more complex than discarding the old term distance learning and adopting a new term such as distributed learning. He predicted that in a few years, instead of talking about distance or distributed learning the technologies would be contributing to the mix of tools and methods used to support learning, on campus and off.

CMSs can be used with all approaches described above. It is important to interpret the change of demands and needs of society, students, instructors, institutions and technology providers. They generally are all affected from each other. Current trends and expectations seem to be flexibility and distributed (blended) learning. More pedagogical use of CMS was expected but the adoption of faculty and utilizing the provided features to increase the quality seem to be 'stretching the mould' (means will take time). It can be predicted that expectations from and the provided features of CMS will change a lot.

Moodle can be an example or evidence of such changes expected from the future CMSs. Moodle is an open source software package (CMS) for producing internet-based courses and web sites. The design and development of Moodle is guided by

'social constructionist pedagogy' and provides lots of flexibility to the instructors. De Boer's, Hurst's and Bates' arguments can be reconsidered with such an example for the future of CMSs.

Regardless of CMS selection, studies show that doing research on faculty use of CMS is critical. In the next section models explaining the technology adoption and diffusion will be focused.

2.6 Adoption, Diffusion, Institutionalization

Faculty intention to use CMS can be studied with different viewpoints and they may have different scopes. McQuiggan (2006) emphasizes to grouping these viewpoints and categorizes them into two major perspectives as micro-level theories and macro-level theories. Micro-level theories focus on the individual adopter, whereas macro-level theories focus on the institution and systemic changes. Innovations with a broad range of technologies and practices may also be the focus of macro-level theories according to him.

When the topic is 'change,' 'adoption,' 'starting to use,' or 'managing change', it is natural to expect resistance of the target groups. Over the years many studies were conducted to understand various types of resistance factors as Surry and Ely (2007) said. They also points out the 'personal', 'attitudinal' and 'organizational' categories of barriers to the use of web based learning in higher education according to. So, either in understanding why people use or why they do not use educational technology, it is important to consider factors or issues in the context of both institutions and individuals.

According to Lynch (2002, cited in Bennett and Bennett, 2003), the biggest obstacle to the application of technology in teaching has been the faculties' reluctance to use it. McQuiggan (2006) considered both micro-level and macro-level approaches in her research and concluded that, "a clearer understanding of which factors actually lead to adoption will help universities create an

environment to foster that adoption process" (p.1166). She emphasized to better understanding of 'faculty needs', 'their teaching challenges' and 'their work habits'.

Interpreting these findings together, it seems that understanding individuals and the factors affecting individual intention to use CMS and being aware of institutional factors would be meaningful. There are various models, which explain the technology use from the individual's point of view. Technology acceptance model (TAM) as one of the most credible model is explained in the following section.

2.6.1 Technology Acceptance Model (TAM)

Technology acceptance model (TAM) introduced by Davis (1995) is one of the most cited theoretical frameworks, which is used to predict acceptance and use of the technology by focusing on perceived ease of use and perceived usefulness as core motivational factors affecting the behavioral intention to use the new technology. (Compeau, Higgins, & Huff, 1999; Venkatesh, 1999; Lee, Cho, Gay, Davidson & Ingraffea, 2003; Park, Lee & Cheong, 2007; Ong, Lai & Wang, 2004; Wu, Wang & Lin, 2007).

Legris, Ingham and Collerette (2003, p.202) made a critical review of TAM and stated that "TAM has proven to be a useful theoretical model in helping to understand and explain use behavior in IS implementation". They underlined the proven quality of the tools used with the TAM. Being tested in many empirical researches, these tools yield reliable statistical results. Leong (2003, p.3) interpreted the use of TAM similarly and found TAM as an extensively tested and widely accepted model in the field of IT. According to Leong, researchers prefer TAM because of its theoretical bases and its good predictive validity.

TAM is an adaptation of the social psychology theory of reasoned action (TRA) proposed by Fishbein and Ajzen to explain and predict the behaviors of people in

a specific situation (Legris et al., 2003; Venkatesh, 1999). Davis (1989) adapted TRA and introduced two determinants that are crucial to understand user acceptance. He defined perceived usefulness as "the degree to which a person believes that using a particular system would enhance his/her job performance'' and defined perceived ease of use as "the degree to which a person believes that using a particular system would be free of physical and mental effort" (p. 320).

Davis (1989) explains 'perceived usefulness' as "people tend to use or not use an application to the extent they believe it will help them perform their job better" and he points out that raises, promotions bonuses, and other rewards are generally used to reinforce good performance of individuals. He suggested that higher perceived usefulness will lead to a positive use-performance relationship.

According to Davis (1989) 'perceived ease of use' means "even if potential users believe that a given application is useful, they may, at the same time believe that the systems is too hard to use and that the performance benefits of usage are outweighed by the effort of using the application". He also explains this variable by saying that "All else being equal, we claim an application perceived to be easier to use than another is more likely to be accepted by users." (p. 320).

Venkatesh (1999) discriminates process expectancy and outcome expectancy. He places 'perceived ease of use' as process expectancy. However, he places 'perceived usefulness' as an outcome expectancy". Moreover, he adds that "Perceived usefulness is expected to be influenced by perceived ease of use because other things being equal, the easier a technology is to use, the more useful it can be" (p.240).

Davis (1989, p. 333) compared the strengths of these variables and reported the relative strength of the usefulness-usage relationship compared to the ease of use-usage relationship as one of the most significant findings. Moreover he added that

"usefulness was significantly more strongly linked to usage than was ease of use".
The image below shows the original technology acceptance model (Figure 2.3).
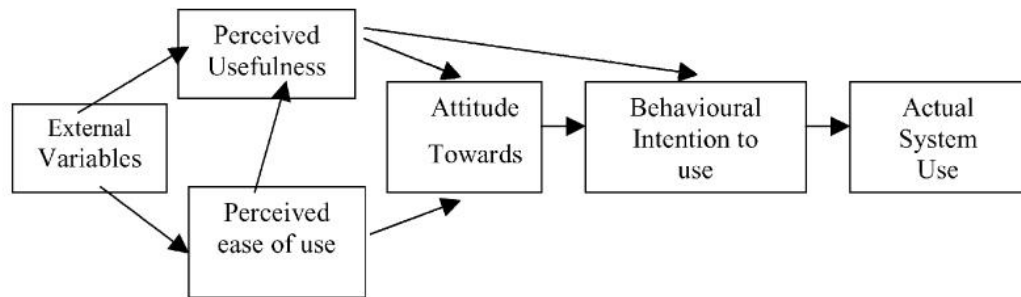
Figure 2.3. Original Technology Acceptance Model (TAM)

As seen from the model (Figure 2.3), 'perceived usefulness' (PU) and 'perceived ease of use' (PEOU) are affected from 'external variables' and they affect 'attitude towards the use' (AT), 'behavioral intention to use' (BI) and "actual system use" (U) consequently. The arrows in the model show the relationships between the variables.

Legris et al. (2003) explained that there are different versions of TAM and when evaluated 22 selected articles, they couldn't find even a single study that incorporated all these relations, but they saw that all relations are measured in at least one study. They assessed the factors in the model one by one and reported their findings to show how researchers applied TAM in their studies. They reported that;

> "Out of the 22 studies, only seven included both AT and BI. Three included only AT, while eight included only BI. This leaves four studies that ignored both AT and BI, measuring only the direct effect of PU and PEOU on use" (Legris et al., 2003, p. 196).

It is clear that, most of the studies included both AT and BI together, or only BI in the model they used. Figure 2.4 shows a version of TAM where 'Attitude towards use' is neglected.
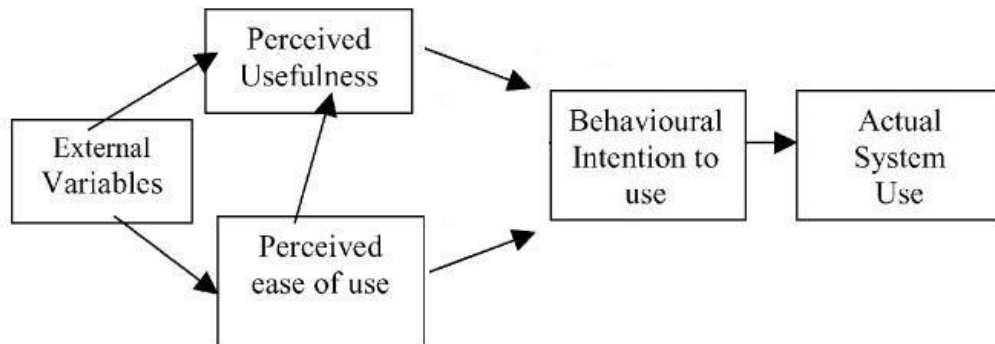
Figure 2.4. TAM excluding "Attitude Towards Use" variable

The removal of 'attitude toward using technology' from the model is explained by its partial mediator effect of perceived usefulness on behavioral intention to use based on empirical evidence (Venkatesh, 1999). He gives claims that this can be a result of "people intending to perform a behavior in the workplace even if they did not have a positive attitude (affect) toward the behavior" (p.240).

As a modification to original TAM, 'actual system use' variable can also be excluded. Legris et al. (2003) reported that the researchers' approach toward the "actual system use" variable changes widely. They reported that, use was measured through self-reporting in eleven of the 22 studies and was not measured in other 10 studies. Also they reported that the method to evaluate use shows differences in the studies. Normally, two or three questions about the frequency of use and the amount of time spent while using the system were questioned.

The Figure 2.5 below shows a version of TAM where "attitude to use" and "actual system use" variables are excluded as described above.
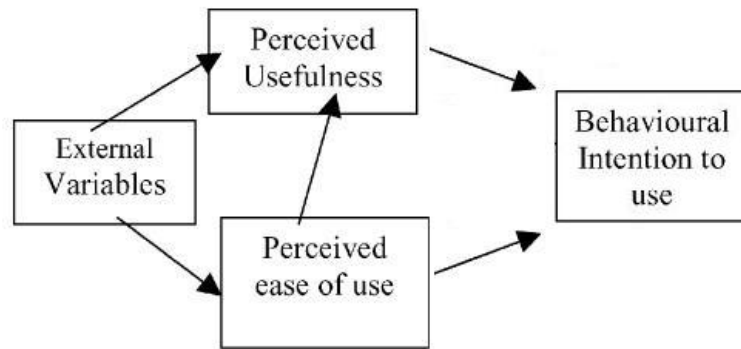
Figure 2.5. TAM without 'Attitude to use' and 'Actual system use' variables

6.2.2 Criticism of TAM

Davis (1989) argued that variables that are potential to affect PU, PEOU, and Use should be explored. Dishaw and Strong (1999, cited in Lee et al., 2003, p.52) underlines one of the weaknesses of TAM as "its lack of explicit inclusion of external variables". Lee et al. (2003) gave examples from many scholars in order to show that various extentions of TAM had been developed and proposed by adding different external variables.

Assessing the selected 22 articles out of more than 80, Legris et al. (2003) provided a list of external variables used in these articles. They could not find a clear pattern with respect to the choice of external variables considered. Assessing the research results they stated that external variables could provide a better understanding of what TAM factors and guide the actions required to influence a greater use. This should be considered as marginal contributions to the explanation of the variance in system use.

McFarland and Hamilton (2006) underscores that TAM model supplies general information on users' opinions of the system and refers to Goodhue (1995, cited in McFarland & Hamilton, 2006) who concluded that ''there are so many different

underlying constructs, it is probably not possible to develop a single general theoretical basis for user evaluations'' (p.428).

As another important limitation of TAM, given by Legris et al. (2003), is in considering IS to be an independent issue in organizational dynamics. Because research in the field of innovation and change management suggests that technological implementation is related to organizational dynamics, which will have a strong impact on the outcomes (p.202). Orlikowski and Hofman (1997) acknowledge that the interdependent relationships among three dimensions are critical for an effective change process. These dimensions are reported as (1) the technology, (2) the organizational context (including culture, structure, roles and responsibilities), and (3) the change model used to manage change.

This argument supports the suggestion of Legris et al. (2003) who say that "it may be difficult to increase the predictive capacity of TAM if it is not integrated into a broader model that includes organizational and social factors" (p.202).

Considering all these arguments, it is clear that it would be meaningful to extend or utilize TAM according to the context or social environment regarding the aim of the study. In the following section factors affecting faculty use of CMS is explained in order to form a basement for the extension of TAM.

2.7 Factors affecting the faculty use of CMS

Faculty members should be accepted as critical arbiters of CMS efficacy according to Wheeler (2002) who also differentiates CMS from other enterprise systems by its canvas-like ability for faculty creativity. He anticipated that an acceleration of faculty adoption, which would be a critical antecedent to student use, could be achieved if the CMS serves faculty needs and pedagogical objectives.

For the success of higher education institutions, instructors have a crucial role such as the critical role of these institutions for the future of society. As Wheeler's explanation above, faculty adoption and intention to use CMS is an important issue to be considered by the administrators. However, there is a lack of research that focused on the faculty use of CMS technology. (Harrington et al., 2006; Morgan, 2003a)

In previous studies, data about CMS use are primarily gathered through surveying or interviewing faculty members who utilize these systems. One exception is Morgan's study. When counting the use of CMS features, web server logs for some courses or the CMS Web sites are analyzed (Malikowski et al., 2006). The findings from Morgan's (2003a) study can be summarized as;

- "80 percent of CMS use occurs in the course of face-to-face instruction, either to enhance regularly scheduled classes or to create hybrid courses". (p.73)

- "The extend to which faculty use the full range of CMS tools is less than may have anticipated, but use is growing quickly". Faculty tend to first adopt the static content tools that let them post announcements, syllabi, text etc. Once they become familiar they start to use assessment, gradebook and communication tools. (p.74)

- Faculty start to use CMS in response to (1) administrative leadership, (2) learning from peers, (3) training by campus learning technology centers, (4) greater faculty awareness of and comfort with technology, and their identification of the CMS as a solution to a particular pedagogical challenge, (5) student requests, (6) desire for cost savings or a way to organize online course delivery, and (7) improvements in CMS ease of use and in power and reliability of particular CMS tools. (p.74)

- Faculty members respond much better to efforts to facilitate their CMS use than they do directives that the technology must be used. They need to be persuaded. (p.74)

- Some factors clearly serve to slow faculty adoption rates. Factors identified as inhibiting their CMS adoption include (1) lack of time to learn and to use CMS, (2) problems with students' CMS use, (3) inflexibility of software, (4) inability of the CMS to map to teaching or organizational goals (p.74)

- Administrative leadership plays a strong role in shaping and encouraging faculty CMS use. Practice of relying on faculty to adopt technology on their own speed is not sufficient. Strong leadership from above is required. Faculty members respond better to facilitation of their CMS use, or to active involvement of senior leadership than they do to decrees or directives from above. (p.74)

- Training in CMS use is essential to encourage higher levels of faculty use and more effective uses of technology. Twenty-nine percent of faculty cited training as an important factor in their initial adoption or expended use of a CMS.

- Some training models work better than others. Training is most effective when it (1) occurs as close to the faculty as possible, (2) is carried out on as small a scale as practicable, (3) utilizes peer training and mentoring, and (4) show faculty real examples of CMS uses. (p.75)

- Faculty members want trainings focused on technology rather than pedagogical strategies. (p.75)

- Faculty members place a high value on CMS management functions. They consistently appreciate how CMS facilitate communication, grade keeping, assessment and evaluation, and class management. They use CMS primarily as an administrative tool rather than as a tool anchored in pedagogy or cognitive science models. Acknowledging that CMS can be used effectively in many ways will likely speed faculty adoption. (p.11, p.75)

- Using CMS invites faculty to rethink pedagogical aspects of their course, which results in a sort of 'accidental pedagogy'. (p.75)

- Faculty members use CMS to increase transparency of their course and student accountability. (p.75)

- Fifty-nine percent of faculty believe that their CMS use contributes to greater contact between them and their students. (p.76)

- Using CMS lets faculty include more interactive materials and exercises in their courses. (p.76)

- Student requests not only don't encourage CMS adoption but in fact discourage it. (p.76)

- Some faculty resist due to a perception that these tools diminish their control over their teaching and environment. (p.77)

- Providing content to students without fringing on copyrights does not seem to be a major concern for faculty. To the extend that faculty members are concerned about copyrights, many see the CMS as a way to protect their own intellectual property. (p.77)

- Faculty concerns about student privacy are much more pronounced. The convenience and security of being able to post student grades online using CMS gradebook is a strong factor to start and continue using a CMS. (p.77-78)

- CMS change management (changing version of the CMS or changing from one product to another CMS) and the impact of CMS upgrades on faculty shouldn't be understated. (p.78)

- Compared to faculty who increased their use of CMS (which is nearly two-thirds of the surveyed faculty members), just 5 percent of the surveyed faculty reduced their usage. The major underlying reasons are given as "time consuming technology," and "inflexibility and difficulties to use CMS". (Morgan, 2003b, p.3)

Another comprehensive study on faculty use of web-based courseware was conducted by Woods et al.(2004). The researchers examined responses from 862 faculty members at 38 institutions. They found that faculty attitudes were positive when it came to the classroom management functions of blackboard (CMS) but neutral or otherwise undecided in terms of its instructional or psychosocial benefits. (Woods et al., 2004)

There are other studies focusing on the CMS features that faculty prefer to use or focusing on instructional issues. Three studies below can be given as examples of such studies.

In their study, Malikowski and Theis (2006) analyzed thirty-seven randomly selected online courses and reported that 'content files,' 'grade book,' 'asynchronous discussions,' 'drop box,' and 'quiz questions' are the most used features of the CMS. From a different point of view, Malikowski et al. (2006) examined external factors: 'the college in which course was offered,' 'class size,'

and 'the level of a class' for the use of CMS in resident collage courses. In this study, only 'college in which a course was offered' is found to be significantly related to the faculty use of CMS.

In another study, Harrington, Staffo and Wright (2006) conducted interviews with seven faculty members to determine uses and attitudes toward CMS in terms of improving instruction. Their study show that (1) communication and organization play key roles in course improvement, (2) university's commitment and support is critical in securing faculty involvement, (3) discussion boards and student tracking may be the primary non-assessment methods for determining student learning, (4) bottom-up pressure from students desiring content online is more important than pressure from above, and (5) extended class (24/7 access) may be the most important feature of an online class component.

2.8 Facilitative conditions for better adoption

Besides the factors investigated, some approaches are also observed or focused, since they facilitate the process for successful adoption. Surry and Ely (2007), explained eight facilitative conditions for adoption of instructional technology. These conditions are briefly;

1. Dissatisfaction with the status quo
2. Knowledge and skills exist
3. Availability of resources
4. Availability of time
5. Rewards and/or incentives exist
6. Participation.
7. Commitment
8. Leadership.

These conditions can be interpreted as 'faculty shows a better level of technology adoption' when they perceive that

1. Others are moving ahead while they are standing still.

2. They have knowledge and skills required by the ultimate user of the innovation.
3. Required resources such as software, hardware or audio-visual media are available.
4. They can find necessary time to acquire and practice knowledge and skills.
5. There are rewards and/or incentives regarding their adoption of Technology.
6. They have a role in the decision making process and in communication among all parties involved in the process.
7. It is clear that there is endorsement and continuing support for the innovation.
8. Leaders and leading organizations are giving importance and showing progress on the use of the requested technology.

2.9 Model development (Utilization of TAM)

In this study, TAM is utilized in order to explore the relationships among variables. The purpose of this utilization was to understand the drives directing people to use CMS.

Previous research repeatedly reported that extending TAM with external variables and other organizational, social or cultural constructs according to the context and social environment would result in better findings. This situation was explained in a more detailed way at the 'Criticism of TAM' section above. In the following sections 'Computer (CMS specific) self-efficacy', 'Perceived personal benefit' and 'Availability of training and support' constructs will be explained since they are used in the examined model (based on TAM).

2.9.1 Computer Self-Efficacy (CSE)

Self-efficacy is an important construct in social psychology and first defined by Albert Bandura. It is explained as the belief that one has the capability to perform a particular behavior by Compeau and Higgins (1995) who defined the construct of 'computer self-efficacy' as the judgment of one's capability to use a computer. They underlined some issues about this definition. One issue was that the

capability to use is about what one could do in the future, but not has done in the past. Second issue about the definition was the inclusion of judgments of the ability to apply skills, such as formatting diskettes or entering formulas in a spreadsheet, to broader tasks.

Since efficacy beliefs are theorized to be situation-specific, Davis (1989) believed that the self-efficacy paradigm does not offer a general measure applicable to TAM. He claims that self-efficacy research provides one of several theoretical perspectives in which perceived ease of use and perceived usefulness function are taken as basic determinants of user behavior.

Shih (2006) made explanations about the determinants of PEOU, which are modeled and empirically tested in previous studies. The findings states that individual CSE is a strong determinant of PEOU, however objective usability influences ease of use only after direct experience with the system. Interpreting these findings, it can be concluded that user-acceptance can be increased through a training mechanism aimed at improving user CSE. (Shih, 2006)

In the field, it is possible to find numerous studies (Shih, 2006; Ong, Lai & Wang, 2004; Wu et al., 2007), which shows extended TAM versions those include computer self-efficacy as an external factor. However, application specific computer self-efficacy can be more meaningful. Hwang and Yi (2002) categorized CSE as 'General GSE' and 'Application-specific CSE'. CSE is evaluated as a multilevel construct that operates at two distinct levels. First one is general computing level and second one is specific application level.

General CSE refers to individual judgment of efficacy across multiple computer domains. Application-specific self-efficacy is defined as an individual perception of efficacy in using a specific application or system within the domain of general computing (Hwang and Yi, 2002). In a model proposing the relation of general CSE and application-specific self-efficacy to ease of use, it is observed that

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application-specific self-efficacy is a more powerful and direct determinant of ease of use than general CSE (Agarwal, Sambamurthy, & Stair, 2000).

Depending on the explanations taken from the relevant literature, it seems that including interpreting the "computer self-efficacy" construct as "application-specific computer self-efficacy" would be meaningful.

So, for this study the description of "computer self efficacy" turns into "Users individual perception of efficacy in using course management system"

2.9.2 Perceived Personal Benefit

Perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his/her job performance. (Davis, 1989). In this definition it is clear that usefulness is related with job performance.

David (1989) explains 'perceived usefulness' as "people tend to use or not use an application to the extent they believe it will help them perform their job better" and continues his explanation by saying that; "Within the organizational context, people are generally reinforced for good performance by raises, promotions, bonuses, and other rewards" (p.320).

In this explanation again the raises, promotions, bonuses and other rewards are related to good performance. But what about the rewards those are not related with good performance?

Poona and Swatman (1999) categorized the benefits into 4 groups with two dimensions (as a 2x2 table). First dimension includes 'short term' and 'long term' and the second dimension includes 'direct benefit' and 'indirect benefit'. Perceived usefulness represents benefits related to job performance but not represents the whole kinds of benefits. Some scenarios can be given easily from a social environment where an information system acceptance is expected.

Course management system is a sort of ERP according to Morgan (2003a). This means CMSs have characteristics of information systems, which are generally used with more than one user and roles. As a result, social issues and social environment should be considered.

In this study researcher decided to make a distinction between personal benefits and job performance related benefits.

Considering that the CMS is an information system, this distinction would result in such scenarios;

- A person may intent to use a technology not because of the perceived usefulness (related to job performance) but because of perceived personal benefits (social, political, organizational, but not job or task related).

- A person may believe that using the provided technology will be useful for his/her job performance but he/she may reject to use it because of personal reasons.

Compeau et al. (1999) made a similar distinction while testing a model of individual reactions to computing technology in a longitudinal context. They defined 'outcome expectations as the perceived likely consequences of using computers" and distinguished the two dimensions of outcome expectations as;

- "Performance-related outcomes are those associated with improvements in job performance (efficiency and effectiveness) associated with using computers." (Compeau et al., 1999, p.147)

- "Personal outcome expectations relate to expectations of change in image or status or to expectations of rewards, such as promotions, raises, or praise" (1999). (Compeau et al., 1999, p.147)

A simple example to the need of separating perceived personal benefit from task related benefits (perceived usefulness) could be the case expressed by Bennett and Bennett (2003). They say that; "According to a recent study by the Higher Education Research Institute at UCLA, many faculty members are hesitant to embrace technology because it is perceived as a source of stress." So, a person can reject a technology because of stress he /she feels although it would be useful in terms of their jobs.

Venkatesh (1999) takes 'perceived usefulness' and 'extrinsic motivation' similarly. He underlined that perceived usefulness is outcome expectancy and a measure of extrinsic motivation from a TAM perspective. Moreover he puts emphasis on the role of intrinsic motivation in training since it leads to beneficial outcomes.

Venkatesh's expressions support the decision of separating usefulness/benefit concept into two. In addition, if perceived usefulness does not cover intrinsic motivations, or in other words if the issues perceived as useful which includes intrinsic motivation are excluded, then adding 'perceived personal benefit' construct to the model should be considered more seriously.

Wilson (2003) reported results of a survey about faculty perceptions and uses of instructional technology. This survey included all fulltime faculty members from six public universities in South Dakota. One of the results states that 'internal incentives have the most significant impact on faculty'. In short, neglecting an internal incentive, just because of not being related to job performance, may mean missing a very strong factor for the faculty use of technology.

Here it is important to underline that the name 'perceived personal benefit' is not selected to refer intrinsic motivation related issues. It covers them but also may cover other issues related to extrinsic motivation. The criterion is being personal and not being related to job performance.

As a last point, the relationship between perceived usefulness and perceived personal benefit is placed in the model. This relationship represents that "when something is perceived as useful in terms of job performance, it may also perceived as personally beneficial". So, perceived usefulness may have an indirect effect through perceived personal benefit.

2.9.3 Availability of Training and Support

Training and support are two different constructs that are critical for an effective technology diffusion process. Regarding the faculty intention to use CMS, the way they should be designed may affect the outcome. However, the developed model aims to explain the perceptions and expectations of the individuals. These perceptions/expectations may be critical for instructors' intention to use CMS. Here, it is important to underline that the concept of 'training and support given to users' is not same with the 'availability of the training and support (that can be given to users). Knowing the 'availability of training and support' is very similar to 'perceptions/expectations about training and support'.

Availability of training and support mechanisms is found to be one of the critical factors for the initial adoption of CMS. Depending on its design, it is concerned, by the instructor, as a possible barrier or enabler in the adoption of CMSs. It may also mean the more extensive usage by the faculty already using them (Morgan, 2003b). This finding clearly shows that novices and experts both may require training and support.

Langenberg and Spicer (2001) mentioned support as the most critical, and most difficult component of a campus technology architecture due to the need for staff to 'design, implement, integrate, and maintain' all of the components of a modern campus. Similarly, Harrington, Staffo, & Wright (2006) note that for each interviewee the key issue for continued use of a CMS was institutional support and commitment. In their study, interviewees stated that they would not have placed a single page online without support.

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These findings show the importance of availability of training and support.
However, their quality and how they are implemented is also critical. In this
manner, Kenneth Green, the director of The Campus Computing Project, predicts
that the number of faculty willing to invest time and effort to integrate technology
into their courses may begin to level off due to inadequate institutional support
and recognition for their efforts (Bennett & Bennett, 2003).

According to Venkatesh (1999) ease of use perceptions are significantly affected
by training during the early stages of learning and use. Moreover, he adds that
"Traditional training methods in information systems research have tended to
emphasize imparting knowledge to potential users, while not paying sufficient
attention to intrinsic motivation during training." (p.240)

Compeau and Higgins (1995) believe that support may have different influences
on faculty. They claim that the support of the organization for computer users
could affect individuals' judgments of self-efficacy by increasing their ability and
thus, their perceptions of their ability. According to them, support mechanisms
may also influence outcome expectations and may therefore provide dues about
the likely consequences of using the computer.

According to these arguments and findings above, it can be concluded that
availability of training and support mechanisms are very important in terms of
starting to use or continuing to use CMS. It is important to provide trainings and
support session regarding the resources and needs of the instructors.

CHAPTER 3

METHODOLOGY

This chapter presents detailed description of the research methodology. Throughout this chapter, context of the study, research questions, design of the study, the research method, data collection methods and instruments, pilot study and its findings, development of the data collection instrument, sampling, data analysis and the validity and reliability issues are presented.

3.1. Research questions and the examined model

The aim of this study was to examine the factors affecting the faculty intention to use course management system use in higher education and to understand what drives are directing instructors to use CMS.

In order to address the main point of this study, the researcher constructed a conceptual model (Figure 3.1), which presents the examined factors and the relationships among them. This model was constructed through utilization of the Technology Acceptance Model (TAM), which is a well-known and respected model in the literature.

As shown in the model (Figure 3.1), there were five factors considered to directly or indirectly affect the behavioral intention to use CMS. The model shows 10 interrelationships between these factors that represent the research questions. Each of these relationships was part of a sub-question of this study.

As previously explained in the model development section, TAM was utilized and some new constructs were used in the developed model. The idea behind the selection of these new variables was related with the focus and the method of this study. Since 'intention to use CMS' was the focused point, personal issues, perceptions and expectations about the personal or institutional aspects are selected. For example, 'availability of training and support' variable represents the expectations or perceptions about being able to reach training and support services. Regarding the aims and data analysis method of the study, the variables that would provide unity were selected since simpler models would be better to examine and to interpret the findings.
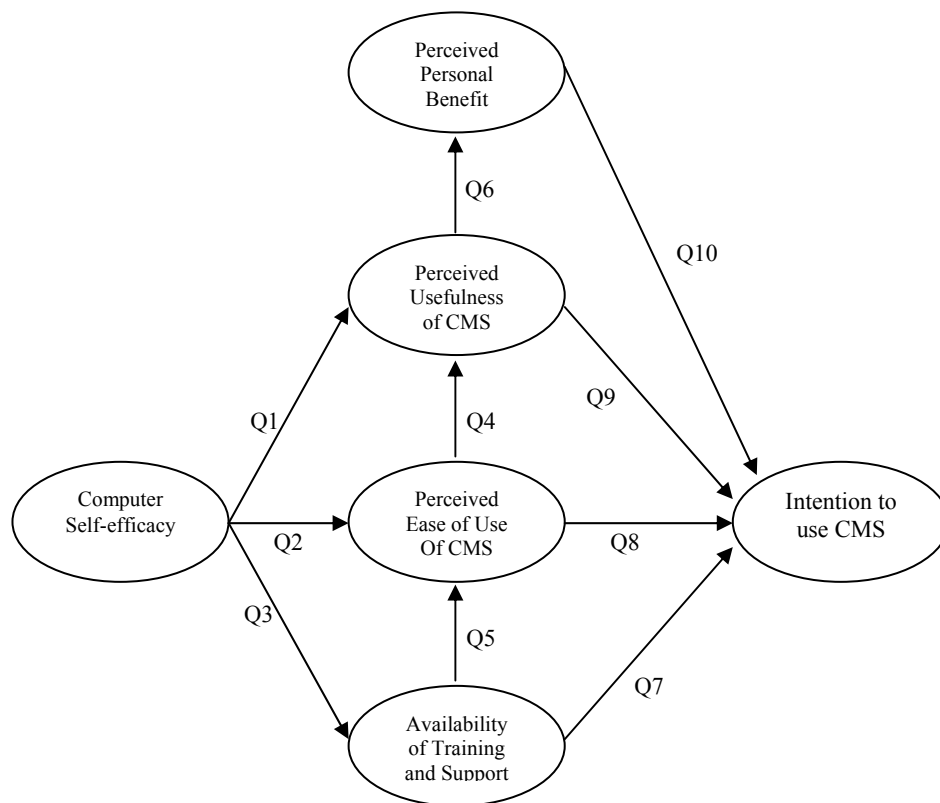
Figure 3.1. The Conceptual Model of the study (showing direct effects)

The research questions about the relationships between factors of the model were;

Q1: Is there a relationship between 'computer self-efficacy' and 'perceived usefulness of CMS'.

Q2: Is there a relationship between 'computer self-efficacy' and 'perceived ease of use of CMS'.

Q3: Is there a relationship between 'computer self-efficacy' and 'availability (expectation) of training and support'.

Q4: Is there a relationship between 'perceived ease of use' and 'perceived usefulness of CMS'.

Q5: Is there a relationship between 'availability (expectation) of training and support' and the 'perceived ease of use of CMS'.

Q6: Is there a relationship between 'perceived usefulness of CMS' and 'perceived personal benefit'.

Q7: Is there a relationship between 'behavioral intention to use' and 'availability of training and support'.

Q8: Is there a relationship between 'behavioral intention to use' and 'perceived ease of use of CMS'.

Q9: Is there a relationship between 'behavioral intention to use' and 'perceived usefulness of CMS'.

Q10: Is there a relationship between 'behavioral intention to use' and 'perceived personal benefit'.

Q11: Is there a relationship between 'behavioral intention to use' and 'computer self-efficacy' (Indirect effects)

3.2. Research Method

The research method selected for the study was mixed method. Mixed method studies are the studies in which both quantitative and qualitative approaches are

used and combined into the research methodology of a single study (Tashakkori & Teddlie, 1998). The aims of combining these different approaches are to understand the research problem in a better and more reliable way and to maximize their strengths and minimize their weaknesses. With this point of view, mixed-method research is presented as a third paradigm in educational research (Johnson & Onwuegbuzie, 2004).

Mixed method designs can be categorized into four major types according to their characteristics (Creswell & Plano-Clark, 2006). These major types are named as (1) Triangulation designs, (2) Embedded designs, (3) Explanatory designs, (4) Exploratory designs.

As explained by Creswell and Plano-Clark (2006), in the triangulation and embedded (nested) types of mixed method designs, qualitative and quantitative data are collected at the same time in the research procedure. In contrast, in the explanatory and exploratory types of designs, quantitative and qualitative data are collected at different phases of the study. In addition to the time of data collection, other characteristics of these design types should also be considered in order to meet the researchers' expectations.

Triangulation type of mixed-method design can be used for analyzing qualitative and quantitative data separately and for validating quantitative findings with qualitative findings by comparing or combining the results. In the end, the results of different forms of data collection are interpreted together.

Embedded (Nested) type of mixed-method design can be used when one form of data plays a smaller role than the other form of data. Also it can be used to collect data for different questions in different forms. For instance, quantitative data can be used to answer a question and qualitative data can be used to answer another question.

Explanatory type of design can be used typically when qualitative data is collected after quantitative data is collected. The aim is generally to explain quantitative results in more depth with qualitative data. In this type of mixed-method design, the quantitative data is more emphasized than the qualitative data.

Contrary to explanatory designs, in the exploratory mixed-method designs greater emphasis is given to qualitative data collection. In the first phase of the study, some constructs are explored, identified or classified through qualitative data collection. Then, in the second phase, these constructs can be studied through quantitative data collection.

Based on these characteristics of mixed-method design types, explanatory type of design was found to be more appropriate for this study. The researcher's aim in this study was to examine the model using quantitative data. As a follow up study, a qualitative data collection phase is included in the research design in order to understand interesting or unexpected results of this examination. In comparing the importance of two forms of data, the researcher's emphasis was on the quantitative data. As a result, the other three types of mixed-method designs (triangulation, nested and exploratory) did not meet the researcher's expectations.

Mixed-method research can also be categorized according to the priority and the time order of the approaches (Johnson & Onwuegbuzie, 2004). Figure 3.2 shows Johnson and Onwuegbuzie's explanation of these models. In this figure 'qual' stands for qualitative, 'quan' stands for quantitative, '→' stands for sequential and '+' stands for concurrent. Capital letters denote high priority or weight.

There are more detailed classifications as Hanson et al. (2005 p. 216) explained. According to them, the primary types of mixed-method designs vary according to

(1) "its use of an explicit theoretical or advocacy lens"

(2) "approach to implementation" (sequential or concurrent data collection
    procedures)

(3) "priority given to the quantitative and qualitative data" (equal or unequal)

(4) "stage at which the data are analyzed and integrated" (separated,
    transformed, or connected) and

(5) "procedural notations"

		Time Order Decision	
		Concurrent	Sequential
Paradigm Emphasis Decision	**Equal Status**	QUAL + QUAN	QUAL → QUAN QUAN → QUAL
	Dominant Status	QUAL + quan QUAN + qual	QUAL → quan qual → QUAN QUAN → qual quan → QUAL

*Source: Johnson and Onwuegbuzie (2004)

Figure 3.2. Mixed-method design matrix.

As explained before, the researcher decided to collect quantitative and qualitative

data in different phases. In these terms of classification, time order decision for

this study was 'sequential'. Hanson et al. (2005) categorized sequential designs

into three main types; sequential explanatory, sequential exploratory, and

sequential transformative. They explain the sequential explanatory type as below:

> "Sequential explanatory designs do not use an explicit advocacy lens. In
> these designs, quantitative data are collected and analyzed, followed by
> qualitative data. Priority is usually unequal and given to the quantitative
> data. Qualitative data are used primarily to augment quantitative data. Data
> analysis is usually connected, and integration usually occurs at the data
> interpretation stage and in the discussion. These designs are particularly
> useful for, as its name suggests, explaining relationships and/or study
> findings, especially when they are unexpected." (Hanson et al., 2005,
> p.229).

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In this study, quantitative data collection and analysis were decided to have a higher priority than qualitative data collection and analysis. The main focus of the study was on examining the model that includes five factors. Therefore, reaching a large number of participants, collecting and analyzing the data quantitatively were some of the critical concerns of the researcher.

Firstly, in the quantitative phase of the study, the hypothesized model was examined through the analysis of the data collected through a questionnaire. Secondly, in the qualitative phase of the study, the factors and the results of the first phase of the study were questioned through interviews.

In the first phase, the researcher's expectation was to examine the presumed model, and see the big picture. In order to gather more detailed information in the second phase of the study, the researcher intended to determine some focal points depending on the results of the first phase. Therefore, the researcher developed a questionnaire, which included rating scales and one open-ended question at the end. The aim of the open-ended question was to explore the unexpected factors that may have effects on the participants' intention to use CMS.

The data collection model that includes quantitative and qualitative data at the same time is named as "within-stage mixed-model design". This is one of the other viewpoints of mixed method design models. Johnson and Onwuegbuzie (2004) explained this kind of design model by giving an example. They state, "a within-stage mixed-model design would be the use of a questionnaire that includes a summated rating scale (quantitative data collection) and one or more open-ended questions (qualitative data collection)" (p.20).

The approach of the researcher in the first phase of data collection perfectly fits the explanation of 'within-stage mixed-model design'. However, in order to simplify the study and this report, the first phase was referred to as the quantitative phase, although it also can be referred to as mixed method design

model. The rationale behind this decision comes from the interrelationship between the focuses of the phases and the aim of the open-ended question in the questionnaire. The focus of the first phase was on the quantitative part of the questionnaire and the answers to the open-ended question were not used to examine the researcher's model. In addition, the open-ended question asked in the first phase would be accepted as part of the second phase because the aim of asking this question was to support qualitative data collection process by exploring unexpected factors.

After analyzing the quantitative data, examining the model and finding the focal points and factors, the researcher decided to focus on the unexpected findings and investigate some other factors that are questionable. To support or criticize these findings, semi-structured interviews were designed for the qualitative phase of the research design.

3.3. Phases of the study and the steps followed

Quantitative and qualitative phases explained above were the major phases when we consider the methodology of the study. On the other hand, overall research design can be divided into a few other major phases and a set of steps in these phases. The researcher followed the phases and steps listed below which are presented in Figure 3.3:

1. Development of model according to literature and the aims of the study
2. Selection of the participants
3. Quantitative data collection and analysis phase
   a. Development of the questionnaire
   b. Reviews and revisions of the questionnaire
   c. Pilot study for the reliability and the validity of the questionnaire
   d. Revisions of the questionnaire based on the pilot study
   e. Expert reviews of the revised questionnaire
   f. Selection of participants

g. Collecting data from the selected participants

h. Analysis of the quantitative data and examining the model

4. Qualitative data collection and analysis phase

a. Analysis of responses to the open-ended question in the survey.

b. Determining the themes and factors from first phase.

c. Development of semi-structured interview questions

d. Expert review and revisions of the interview questions

e. Interviewing and revisions of the interview questions

f. Content analysis of the interview data (Transcription, coding, …)

5. Integration of the results gathered through both phases
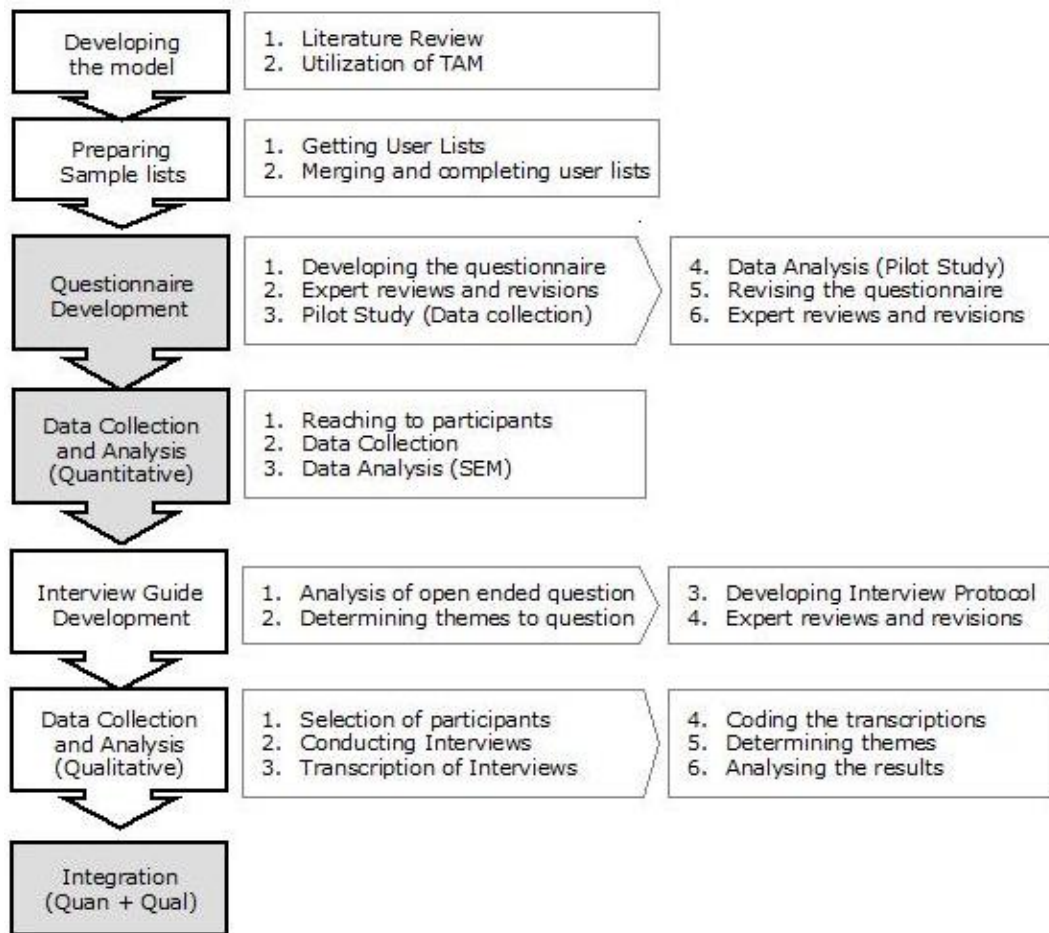
Figure 3.3. Phases and their steps of the study

3.4. Selection of data sources

When considering the purpose of the study and the profile of the target participants, the researcher realized that the number of candidate Universities that would be appropriate for conducting such a study was very limited. Most of the Turkish Universities that use course management systems institutionally were at the initial stages of their CMS implementation. Since utilization and dissemination of such systems take time and change in higher education is generally a slow process, in order to reach the appropriate sample size, the researcher decided to focus on the universities, which have used a CMS for at least a few years. The number of such universities was very limited.

In initial phase of the design of this study, the researcher aimed to reach the faculties of different appropriate universities. However, after realizing that these universities used different CMSs and had different mechanisms or strategies, the researcher decided that integrating the results of different universities and reaching general outcomes would not be feasible or even possible. The researcher decided that if data would be collected from different universities, the focus of the study would also change from the faculty point of view to a broader institutional point of view. Since this was not the purpose of this study, the researcher decided to reach the faculty of one of the appropriate universities and selected Bilkent University, which was not in the initial stages of its CMS implementation.

The rationale underlying the selection of Bilkent University can be listed as below;

1. Bilkent University started to use CMS institutionally at 2003-2004-spring semester (2004 January), which means 4.5 years of experience.

2. Bilkent University has institutional experience of two different CMSs (Moodle and eCampus).

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3. The number of faculty using (or at least tried once or more) one of these CMSs was high in Bilkent University.

4. Some of the participants would probably had experience in using two different systems.

3.5. Context of the study

As stated before, the participants of this research were selected from Bilkent University. Regarding the use of course management systems, it would be critical to consider the environment (Bilkent University) as the context of this study in order to understand and interpret the findings.

Bilkent University is a private university, which consists of 9 faculties, 5 vocational or applied schools and a total of 49 departments under these faculties and schools. The total number of faculty in the University is over 1000, of which nearly 300 work in the School of English Language. The number of students is nearly 12,000.

Bilkent University is well known for its publication and research focus, and the researcher observed that university administration also encourages better teaching and makes an effort to support faculty development. One of the vice-provost's responsibilities includes improving teaching skills of the faculty and organizing events and arranging activities and the environment for this purpose.

Bilkent University used a few custom developed information systems named as STARS (Student Academic Information Registration System), AIRS (Academic Information Review System), SAPS (Student Academic Performance Monitoring System), SRS (Student Review System), and BAIS (Bilkent Academic Information System). Some of these systems included features that can be found in most course management systems. Class roster, attendance, assessments and grading, managing online assignment, forums and course/class specific messaging

can be given as examples for such features. All Bilkent Faculty used at least the grading facility of these systems. There were other institutional experiences of similar technologies (before institutionally starting to use a CMS). For instance, there were courses delivered through video conferencing technologies. However, a limited number of instructors were familiar with such technologies.

Bilkent University started to use course management systems institutionally in 2003-2004 spring semester, which means that it was the 5th year when the researcher was in the process of collecting data for the study. In the 4th year of CMS use, the university administration decided to use a second CMS. The first CMS project was named as e-Campus, which had been developed by a Turkish IT company. The second CMS was Moodle, which is a worldwide, open source course management system.

The critical features of eCampus system include material delivery, assignments, conferences, gradebook and messaging. There were also some special tools like webquests. The course pages have a standard structure and almost all teachers and students use the same interface. Figure 3.4 shows screenshot of the first version of BeCampus.

Later a second version of BeCampus with new features was developed from scratch. For example a powerful grouping mechanism and question bank modules were added. The interface also changed due to new technology and design. Still this version had standard structured course pages. Figure 3.5 shows a screenshot from second version of BeCampus.

Moodle as a third CMS in Bilkent University was more flexible. It is widely used and supported in different countries as an open-source course management system. Although the basic structure is common, lots of options support personalization and different ways of using CMS. Screenshot from Bilkent Courses Online in which Moodle was used is presented at Figure 3.6.
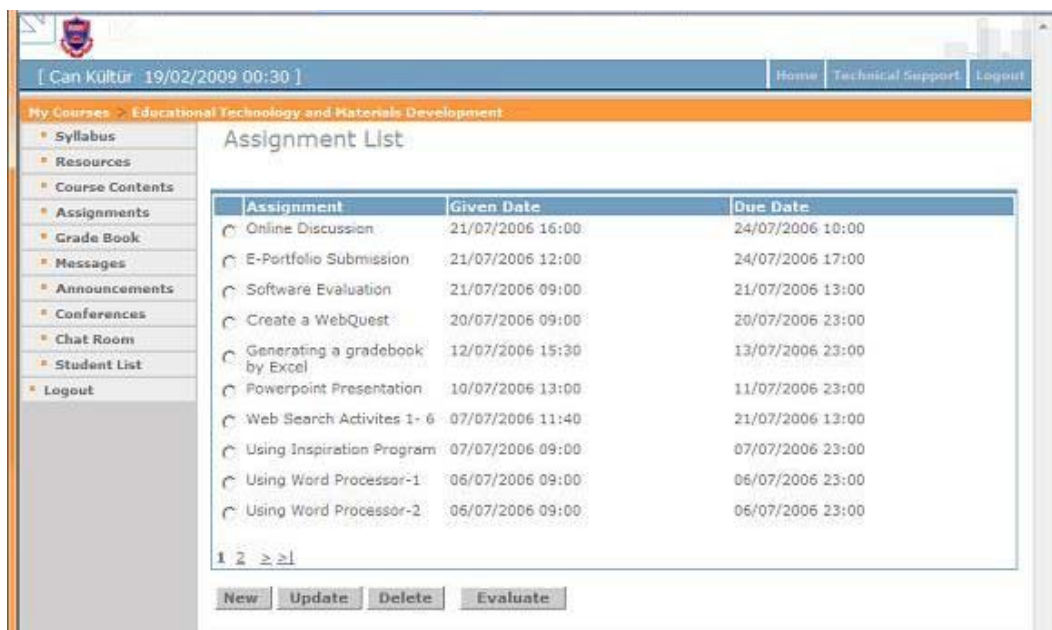
Figure 3.4. Screenshot of BeCampus (first version)
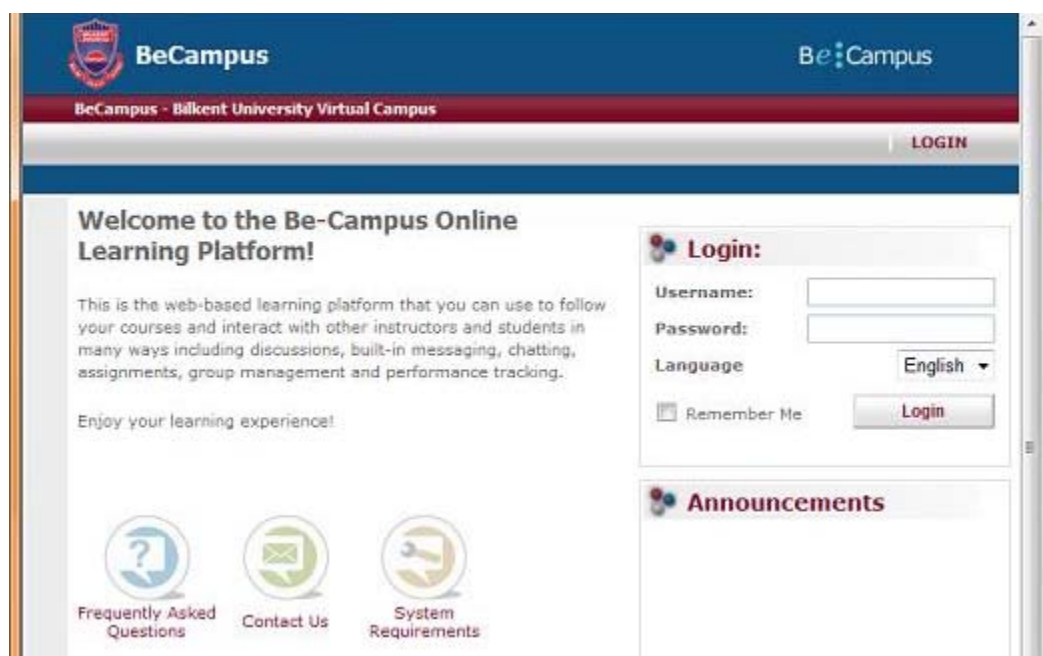
Figure 3.5. Screenshot of BeCampus (second version)
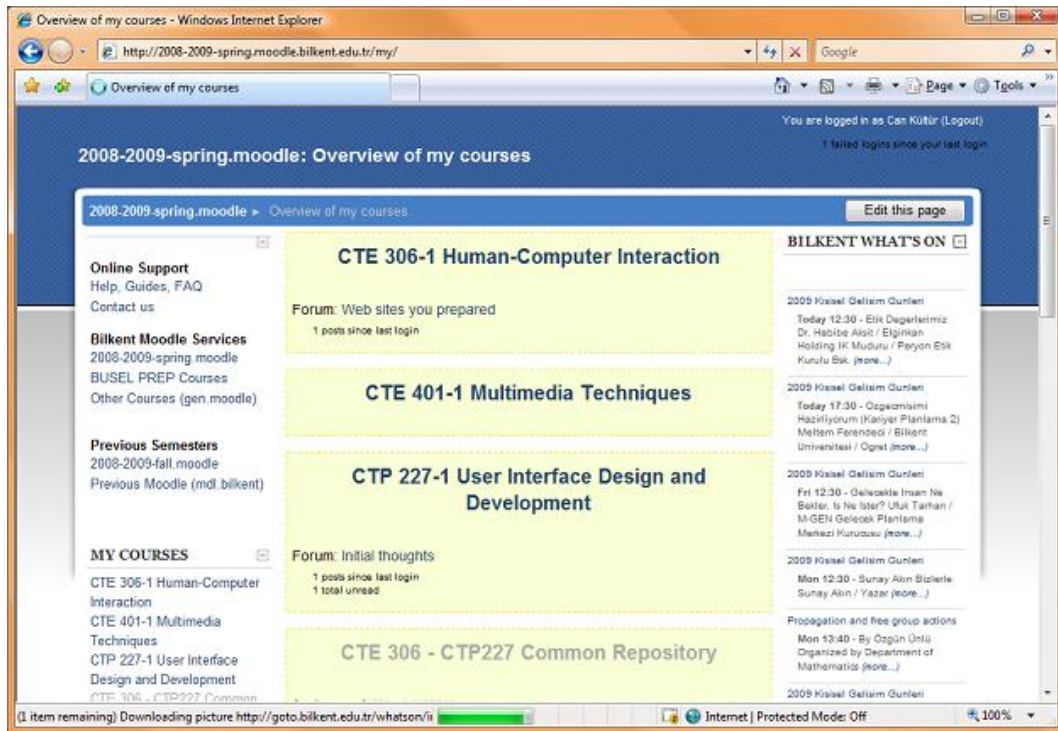
Figure 3.6. Screenshot of Bilkent Courses Online (Moodle).

The organization and infrastructure for these two systems were different. The first CMS (e-Campus) was hosted and technically supported by the company that had developed it. As a result, the instructors reached the company staff individually when they were in need of support. After using e-Campus in pilot courses, the university administration decided to integrate the CMS with BAIS (Bilkent Academic Information System) in order to handle student account management, course enrollments and authentication automatically. The second CMS (Moodle) was hosted by the computer center of the university. Different from the previous organization, the university administration decided to have an official unit to support faculty and students while they were using these systems. The name of this unit was "Bilkent University Educational Technology Services" (BETS).

The major institutional aim of using CMS was to support the courses, integrate the latest technologies into the teaching-learning process and improve the quality of

education. A bottom-up strategy was dominant from the beginning. Opening virtual classes on CMS was always on voluntary basis.

Leadership was also a critical issue in understanding the context. The provost of the university was one of the volunteers and at the same time one of the powerful models for the CMS users. Starting from the second semester of installation, he experienced the use of CMS in his courses and in the 3rd year of his experience, he shared his way of using CMS with the faculty through departmental meetings.

From the institutional point of view, focusing on some critical events and figures can help to evaluate the diffusion of CMS technology in Bilkent University. The researcher was one of the developers and implementers of the projects (both systems) in question. The critical events observed by the researcher between 2003 and 2008 are briefly listed as follows:

- In 2003-2004 spring semester, only one course was opened as a pilot study. The instructor of this course lived in another city and periodically visited Bilkent University a few times during the semester. This instructor had had experience in using course management systems in another university and his way of using CMS focused on online discussions and online interaction with the class. During the following semesters, 7 and then 11 courses were opened. The number of courses was increased on voluntary basis. Based on the emerging needs, the software company added special or new features to the CMS at the end of each semester or academic year.

- Upon request, department specific presentations and training sessions were organized by the company, which had developed the CMS (eCampus).

- During these years, at the end of each semester or academic year, general evaluations and revisions were undertaken. The first revisions integrated

CMS with the BAIS system, developed for managing student registrations, course offerings and students' course enrollments.

- At the beginning, there was no official unit on the University side responsible for monitoring the use of CMS. However, there were a few individuals who were responsible for communicating with the software company. These few (one or two) individuals responsible for communicating with the software company changed in time. The researcher observed that the dissemination strategies also changed with the change of these individuals. The first strategy was mainly to start with small steps but to announce and describe the service in all departments at the end of semesters. The second strategy of the people in charge was to use the system in their own department first, until they became confident of the service delivered, so no promotion events were organized during that period.

- The software company decided that in the long term their product might not meet the requests. As a result, they decided to upgrade the infrastructure and technology of the CMS. They designed a new CMS from scratch and developed it with a new programming language. This major change brought new and better features to the software but caused numerous new problems on the user side. Satisfaction from the technical support decreased as time passed. This state of service discouraged the faculty and they started to give up or decreased their use of CMS.

- Some Bilkent faculty had been using Moodle for years. These people were computer literate and their attempts were individual rather than institutional. Regarding the difficulties in e-Campus, university management decided to try Moodle as a new course management system.

- The software company was a member of Bilkent Foundation in the beginning. Later, this company was sold. The researcher does not know if this event had an effect on the decision to replace the existing CMS (eCampus) with Moodle. However, from his observations, the researcher concluded that Moodle's richer features and the unsatisfactory support of the existing CMS were critical in this decision.

- The Provost of Bilkent University also tried Moodle as a course management system and requested it as a new service of the computer center. Meanwhile, upon some requests from the departments, he started to deliver presentations about active learning and demonstrated the way he used CMS in his courses. At the same time, he also announced the new Moodle service. The researcher attended one of these presentations and observed that the focus of the presentation was on active learning strategies and the difference from conventional strategies. In these presentations, the focus on the CMS was just related to its function as an effective tool.

- Some of the faculty who were interested in using course management systems and other instructional technologies in their courses came together and formed a volunteer group to support the use of Moodle.

- In one year's time, this group turned into an official unit (named as Bilkent University Educational Technology Services) which started to manage the infrastructure, organize events, trainings, workshops, and give online and individual support to Bilkent faculty and students. As requests increased, this unit formed a student chapter to support users.

- BETS decided to integrate CMS (Moodle) to STARS in order to make it easier to manage accounts, opening of the regular departmental courses and student enrollments parallel to STARS system. After a while, they saw

that new services were needed for the courses that were part of the STARS system. This showed that the faculties were in need of using CMS in different areas, which can be evaluated as an indication of high adoption rate for the future.

As a result of these events, during 2007-2008 academic year, integrating CMS became popular and the number of interested faculty increased very quickly. This study was designed and the data were collected in such a context and status of the institution.

3.6. Role of The Researcher

The researcher was an insider in this research and had critical roles in the whole implementation process within the context described above. The researcher had seven years experience of developing and implementing instructional technologies with different roles. He worked as a software engineer, as a project and team manager in development and implementation of eCampus, In this period he also coordinated the communication between Bilkent University and the company developing eCampus CMS.

Later, he started to work in Bilkent University and started to use eCampus as an instructor and naturally support its use in University. When provost decided to try Moodle as an alternative CMS, five faculty members including the researcher from different departments came together to support Moodle implementation. The researcher took responsibilities in coordination of promotion and support activities, providing technical support and system administration, design and implementation of trainings, and development of policies for a sustainable system.

As a result, the experiences and an important pace of his know-how come from his active involvement in almost all phases of CMS implementations of Bilkent University. Methodology and the interpretation of the findings of this study could not be uninfluenced by his status in the existing system.

3.7. Selection of Participants

In this study, nested-sequential sampling design was selected as a model of sampling. Nested-sequential sampling is one of the mixed sampling designs described by Johnson and Christensen (2008). According to their formulation, it refers to "the collection of quantitative and qualitative data one after the other, but with the qualitative sample being a subset of quantitative sample" (p. 247).

In the quantitative phase of the study, the researcher decided to use criteria based sampling methodology and prepared some criteria to reach the target group. The researcher tried to reach every person who met these criteria and who worked in Bilkent University.

To select interviewees in the qualitative phase of the study, the researcher decided to use maximum variation sampling and opportunistic sampling approaches to reach some of the participants in the sample that responded to the questionnaire according to the grouping criteria decided by the researcher.

The target population of this study was instructors that had used, had been using or at least had tried to use a CMS in their courses. It was known that teaching assistants usually help instructors in developing web sites, answering student questions, or reading assignments. As a result, they may have a critical viewpoint and a potential for using CMS from the teachers' point of view. Therefore, the researcher decided to include teaching assistants in the sampling. The elimination criteria for this selection were only "not having a CMS account" and "not having tried to use CMS (although he/she has an account)".

The first attempt to reach participants was to apply to the Provost Office of Bilkent University and obtain permission to conduct this study. The permission forms can be seen in appendix A.

As a second step, the lists of instructors who had accounts and courses on e-Campus and Moodle implementation of the University were gathered from system administrators of these systems. After merging these two lists, the potential participants were categorized according to their departments and their use of e-Campus/Moodle systems. The total number of the people in these lists can be seen in Table 3.1.

Table 3.1. Number of instructors who had accounts in CMSs.

	Number of instructor accounts
eCampus instructor accounts (from 2004 January to 2008 May)	425
Moodle instructor accounts (from 2007 September to 2008 May)	414

Some of these instructors were not working in Bilkent University while the researcher was collecting data. Some others were part-time instructors and unreachable. In addition, while preparing the exact list, the researcher realized that some instructors had more than one user accounts for trial purposes. As a result, determining the number of potential reachable participants and preparing an exact list of CMS users was very difficult or even impossible.

With these potential lists of the faculty, the researcher visited deans, school directors or department chairs and gave information about the study before delivering the questionnaires. The researcher had collected feedback about the list of potential participants and revised the list in order to be sure that the survey is distributed to the correct people. In addition to the institutional written permission, the researcher obtained verbal permissions of the school or department chairs personally. The only exception was the School of English Language because of their departmental policies. They gave permission for data collection after discussing it in their regular committee meetings. After obtaining

permissions, the questionnaires were delivered and collected by the researcher with the help of department secretaries.

As shown in Table 3.2, a total of 470 questionnaires were distributed. Of these, 266 were responded, representing a return rate of 56.59 percent. Six of the responses were not accepted and not used in the study, because of such reasons as late return or high number of blank items. Thus, 260 responses of 470 questionnaires were used in the study. This represents a return rate of 55.32 percent. These return rates can be accepted as minimum return rates because during data collection, some of the instructors who did not fill in the questionnaire stated that they did not use a CMS or that they had only tried it for a very short time. Despite the controls during the participant list preparation, the researcher believes that the number of distributed questionnaire was more than the target instructor group.

Table 3.2. The number of distributed and responded questionnaires.

	Number of questionnaires	Response Rate
Distributed	470	-
Responded	266	56.59 %
Accepted	260	55.32 %

The distribution of the accepted participants according to their academic position can be found in Table 3.3. The only person with the academic position 'other', had stated her position as "Line manager". This was not a problem since the researcher knew that the people in the list were at least teachers or teaching assistants.

Table 3.3. Academic position of participants

	N	Percent
Professor	14	5.4
Associated Professor	10	3.8
Assistant Professor	46	17.7
Instructor	168	64.6
Assistant	21	8.1
Other	1	0.4
Total	**260**	**100.0**

The medium of instruction in Bilkent University is English. There were a lot of foreign instructors in various departments. The number of participants according to their native language can be seen in Table 3.4.

Table 3.4. Data collected from Turkish and foreign instructors.

	Delivered to	Percent	Responded by	Percent
Turkish Instructors	355	75.53	219	84.23
Foreign Instructors	115	24.47	41	15.77
Total	**470**	**100.0**	**260**	**100.0**

For the interviews (phase 2), a total of 14 instructors were selected through maximum variation sampling and opportunistic sampling approaches. The researcher aimed to reach people from different disciplines, who had different levels of CMS experience. In addition, the researcher tried to keep the number of female and male participants similar. Attention was also paid to ensuring to include participants from departments with different characteristics such as more frequent CMS use or disciplines of varying nature (art, science, engineering, etc). Table 3.5 shows the distribution of the interviewees according to these criteria.

Table 3.5. Distribution of the Interviewees' characteristics.

Criteria	Distribution of Interviewee	
Gender	Males	8
	Females	6
CMS Experience	Beginner to intermediate	9
	Intermediate or above	5
Department (Disciplines)	Engineering	
	Electric and Electronics Engineering	2
	Computer Engineering	1
	Social Sciences	
	Economy	1
	International Relations	1
	Psychology	1
	Education	
	Computer Teacher Education	1
	Graduate School of Education	1
	Science	
	Chemistry	1
	Art, Design and Architecture	
	Communications and Design	1
	Business Administration	
	Management	1
	Applied Schools	
	Business Information Management	1
	Faculty of Academic English	1
	Vocational School	
	Computer Technology and Programming	1

The researcher decided to conduct a second interview from department of electric and electronics engineering since he had decided that the interviewee might not be representative according to the observations of him.

3.8. Data Collection Procedures

As described before, data were collected in two phases; (1) through a survey, and (2) through the follow-up interviews.

Data collection through the survey included the activities of quantitative data collection procedures. The steps followed in this phase were;

- Developing the questionnaire,
- Peer and expert reviews,
- Language check,
- Ethics committee review and approval,
- Pilot test,
- Revising the questionnaire according to pilot test,
- Peer and expert reviews,
- Distributing questionnaire,
- Follow-up on distributed questionnaires,
- Collecting the responses.

Data collection through interviews in this study included other set of activities and steps, which were;

- Developing the interview guide,
- Peer and expert reviews,
- Language check,
- Conducting interviews,
- Revising the interview guide for the next interviews,
- Transcribing interviews,
- Coding and analyzing the results.

3.9. Data Collection Instruments

3.9.1 Development of the questionnaire

The main aim of the questionnaire was to collect data in order to examine the factors in the presumed model. To reach this aim, Likert-scale type questions were prepared. The responses were collected on a five-point scale format, which ranged from "strongly agree" to "strongly disagree." The middle point was stated as "Uncertain." With regard to this option, the researcher decided to neglect the option of "Not Appropriate," since the questions were about the perceptions of the participants.

While developing the survey, items from the literature were used where appropriate. The items about 'perceived ease of use,' 'perceived usefulness,'

'computer self-efficacy,' 'behavioral intention to use,' and 'availability of training and support' were adopted from other relevant studies.

Items about perceived usefulness (PU) and perceived ease of use (PEOU) were taken and adapted from Davis's research (1989). Another study by Legris et al. (2003) focused on the uses of technology acceptance model (TAM) and reported how researchers enhanced TAM for different studies. They reported that most of the researchers preferred 4 items of the original 6 items of PU and PEOU. In this study, items about perceived usefulness and perceived ease of use were taken and adopted according to the general preferences of the researchers. The reliability reported in the 22 articles (covering 28 measurements) that Legris at al. selected were very high (mostly greater than 0.9).

Items about behavioral intention to use were adopted from the research by Ong, Lai and Wang (2004) where the reported reliability coefficient was found to be 0.92. Items about training and support were adopted from the study of Wu et al. (2007). The reliability coefficient of this factor in their instrument was reported as 0.83. Similarly, items related to computer self-efficacy were taken and adapted from the scale developed by Compeau and Higgins (1995).

In addition to these adoptions, the researcher developed the items for the factor of perceived personal benefit. These items were developed in terms of social benefits, in terms of benefits related to personal or professional development and in terms of materials or incentives.

The questionnaire consisted of 5 major sections. These sections were; (1) Information about the research and the researcher, (2) Informed consent form, (3) Demographic data, (4) Items related to the factors examined, and (5) Open ended question to support the second phase of the study.

The demographic data section included 15 items about the participants' characteristics (e.g. department, gender, academic position), CMS experience, their way of using CMS, and their preferences regarding the use of CMS. These items were not necessary to examine factors but the researcher decided to collect these data to be sure about the profile of the participants who responded to the questionnaire. A few respondents were excluded from the data analysis phase depending on the data collected from this section.

The other section including the items of the examined factors consisted of 26 five-point Likert-type items. These 26 items were grouped under the related variables: (1) Computer Self-Efficacy, (2) Perceived Ease of use of CMS, (3) Perceived Usefulness of CMS, (4) Availability of Training and support, (5) Perceived personal Benefits, and (6) Behavioral Intention to Use CMS.

In different phases of the questionnaire development expert opinions were asked for the completeness and content validity of the instrument. In the first steps of the questionnaire development process, the researcher visited 4 experts (3 psychologists and 1 senior educational scientist) and asked their opinions and criticism about the initial (draft) form of the questionnaire and the factors examined. They made suggestions but also found the basis of the questionnaire, the idea and the level of examining the factors meaningful and feasible.

After developing the first complete version, in one and a half month's time, the questionnaire was criticized and revised by 11 different experts from different points of view. The aim of these reviews was to provide content validity. Four of these experts were from the fields of educational sciences or instructional technology. Two of these experts were from the field of psychology. Four of these experts reviewed only the language of the questionnaire. Two of the four experts who checked the language were native speakers and the other two were experienced English teachers. One expert from the field of statistics reviewed the questionnaire and its items in terms of statistics and data analysis.

After 17 reviews and revisions by 11 different experts at different levels, a pilot study was conducted. According to the results of the pilot study, some items were revised and the final version of the questionnaire was administered in Bilkent University.

3.9.2 Reviews and Revisions of the questionnaire

Before the pilot study, the researcher focused on the development of the data collection instruments and prepared the lists of candidate participants. The researcher made 17 reviews with the help of 11 experts from different fields. According to these reviews, the researcher made revisions on the data collection instruments.

Summaries of the reviews according to different viewpoints can be found below:

- Reviews of educational scientists and instructional technologists: Four experts reviewed and criticized the instruments and gave feedback, which resulted in addition and removal of items to the questionnaire, rephrasing the existing items of the questionnaire and decreasing the time required to fill in the questionnaire.

- Psychologists' reviews: Some of the examined concepts or factors such as perceived benefit, reward, or gains were related with the field of psychology. In addition, most of the responses collected were the perception of the participants. At different levels of questionnaire development, two experienced psychologists reviewed the questionnaire and gave critical feedback about how the items were understood, potential threats, and more appropriate use of psychology related concepts and terms.

- Review of the language used: Two native speakers and two senior English teachers reviewed the wording and the language used in the

questionnaire. According to their feedback, the items were revised and checked again iteratively, until there was no critical feedback and the researcher was confident about the language of the instrument.

- Statistician's review: One experienced statistician reviewed the questionnaire and did not see a need for revision on the items. As a result, the questionnaire items were confirmed in order to prevent potential problems that can occur while analyzing the data.

3.9.3. The Pilot Study

Middle East Technical University (METU) was selected for the pilot study. The rationale underlying this choice was that it is a well-known University with years of experience in using a custom developed CMS. In addition, METU is an English-medium university like Bilkent University. Moreover, Bilkent University and METU are both pioneer universities, which means that faculty profiles in these universities are also similar. For the pilot study, it was critical to find a university with similar characteristics such as the same medium of instruction, similar institutional experience, and similar faculty profile.

METU used a custom developed CMS, which was named as "Netclass". METU Informatics Institute and Computer Center supported this system together. METU used CMS for various purposes. For instance, one purpose was to provide distance education programs on this system and the other purpose was to provide a platform to support regular courses offered by the departments.

Selection of participants for the pilot study

In order to reach the METU instructors and assistants who used or tried CMS in their courses, the researcher contacted the distance education unit and then the system administrators. They provided two lists (one for instructors and one for

assistants) which included the users who had logged in the CMS within the last 40 days (as of March 1, 2008). Since the data in the lists was not complete, the researcher worked on them. After finding the departments of instructors through web search, the researcher managed to prepare a list of users according to their departments.

The researcher aimed to collect data from different departments in order to ensure inclusion of a variety of viewpoints and needs. Departments of Chemistry, Industrial Engineering, Electrical and Electronics Engineering, Psychology, Educational Sciences, Physical Education, Computer and Instructional Technology Education and Information Systems (an interdisciplinary masters program) can be given as examples to this variety.

The researcher distributed 92 questionnaires and the attached informed consent form to the instructors and assistants from 12 different departments/programs, 69 of whom returned the questionnaire. The response rate for the pilot study was 75 percent. Two of the returned questionnaires were excluded from the data analysis, which changed the valid response rate to 72.8 percent.

When the gender of the participants was examined, it was seen that 39 out of 67 (58.2%) participants were male whereas 28 out of 67 (41.8%) were female in the pilot study. The age of these participants ranged between 23 and 63. The descriptive data about the age and academic positions of the participants can be seen in Table 3.6 and Table 3.7.

Table 3.6. Age of participants (pilot study)

	Mean	Std. Dev.	Median	Min.	Max.
AGE	38.06	11.28	35	23	63

Table 3.7. Academic positions (pilot study)

	N	Percent
Instructors (sum of below)	41	61.2
Professors	*16*	*23.9*
Associated Professors	*9*	*13.4*
Assistant Professors	*9*	*13.4*
PhD or others	*7*	*10.4*
Assistants	26	38.8
Total	**67**	**100**

Data Analysis of the pilot study

The researcher completed the quantitative data analysis of the pilot study through descriptive statistics and explanatory factor analysis. In addition, open-ended questions, comments written on the questionnaire, the researcher's observation and oral feedback collected from some of the participants were used as a basis for revising the instruments before starting the actual study.

After completing the data collection stage, an explanatory factor analysis was run using the SPSS package program in order to check the working items about the factors and to provide construct validity. The factor loadings of the items are listed in Table 3.8. In this table, item named as 'Computer self-efficacy-1' is removed from the questionnaire. The researcher decided that the loadings of 'Training & Support - 1' was natural and would not cause a problem when it was kept in the survey. The researcher decided to revise perceived personal benefits related items 1, 2, 7 and 8 according to the results of exploratory factor analysis.

Table 3.8. Factor loadings after the analysis of pilot study

	Component				
	1	2	3	4	5
Comp Self Efficacy - 1	-.027	**.663**	.106	.240	.153
Comp Self Efficacy - 2	.146	.045	**.825**	.033	-.068
Comp Self Efficacy - 3	.126	.099	**.856**	-.035	-.012
Comp Self Efficacy - 4	.187	.047	**.794**	.041	.021
Perceived Usefulness - 1	**.758**	.211	.193	-.075	-.036
Perceived Usefulness - 2	**.848**	.110	.207	.087	.223
Perceived Usefulness - 3	**.833**	.200	.197	.064	.196
Perceived Usefulness - 4	**.829**	.042	.245	.038	.227
Perceived Usefulness - 5	**.507**	.370	.121	.014	.107
Perceived Usefulness - 6	**.562**	.399	-.021	-.002	.109
Perceived Ease of use - 1	.255	**.693**	.156	.021	.080
Perceived Ease of use - 2	.387	**.665**	-.082	-.133	.068
Perceived Ease of use - 3	.203	**.808**	.136	.170	.160
Perceived Ease of use - 4	.439	**.584**	-.198	-.027	-.077
Perceived Ease of use - 5	.193	**.572**	.361	.033	.176
Perceived Ease of use - 6	.269	**.713**	-.017	-.031	-.229
Training & Support - 1	.213	**-.511**	.298	.092	**.407**
Training & Support - 2	.088	.071	-.185	-.051	**.806**
Training & Support - 3	.284	.156	.164	.189	**.730**
Training & Support - 4	.223	.001	-.024	-.039	**.821**
Perceived Personal Benefit - 1	**.526**	.153	.214	.338	.283
Perceived Personal Benefit - 2	**.642**	.240	-.161	.281	.014
Perceived Personal Benefit - 3	-.024	.305	.107	**.672**	.183
Perceived Personal Benefit - 4	.387	.152	-.212	**.521**	.053
Perceived Personal Benefit - 5	.150	-.114	.009	**.799**	-.119
Perceived Personal Benefit - 6	.137	-.060	.039	**.824**	-.001
Perceived Personal Benefit - 7	**.737**	.173	.006	.281	.159
Perceived Personal Benefit - 8	**.593**	.059	.188	.222	.080

The rotation method used in the exploratory factor analysis was "Varimax with Kaiser Normalization". The results of KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) and Bartlett's Test gathered from SPSS are presented in the table below (Table 3.9).

Table 3.9. KMO and Bartlett's Test (Factor analysis of pilot study)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.663
Bartlett's Test of Sphericity	Approx. Chi-Square	1010.684
	df	378
	Sig.	.000

Brownlow, Cozens, Hinton and McMurray (2004) explain that it is essential to check sampling adequacy and sphericity to see if it is worth proceeding with the factor analysis. They also explain that as a general rule of thumb the KMO value should be greater than 0.5 for a satisfactory factor analysis. They add that Barlett's test of sphericity indicates that it makes sense to continue with the factor analysis when its significance value is lower than 0.05. As shown in Table 3.9, there is no problem with continuing with factor analysis since the KMO measure was .663, which exceeds .50, as the required value and the significance value was lower than 0.001.

The results of the factor analysis, the feedback provided by the instructors and the observations of the researcher were evaluated together with the help of an expert. The items and the format of the questionnaire were modified accordingly. These modifications are summarized below;

- 4 out of 30 items in section three of the questionnaire were removed. These were 1 CSE related item, 2 PU related items, and 1 PEOU related item.

- 4 out of the remaining 26 items were revised. All of these items were related with perceived personal benefit.

- 2 out of 17 questions about demographics of the participants were removed.

- 5 out of the remaining 15 questions about demographics of the participants were revised.

The researcher checked the reliability of the questionnaire by calculating the Cronbach's alpha coefficients. The Cronbach's alpha coefficients of the factors are given in Table 3.10.

Table 3.10. Cronbach's alpha coefficients of factors

	Cronbach's alpha (→ if an item was deleted)	N of items
Computer Self Efficacy	0.690 (→ 0.810)	4
Perceived Usefulness	0.889	6
Perceived Ease of Use	0.853	6
Availability of training and support	0.740	4
Perceived Personal Benefit	0.812	8

The results reported by the SPSS program showed that only the reliability of computer self-efficacy factor was not satisfactory. The calculations showed that Cronbach's alpha coefficient would increase from 0.690 to 0.810 when the first item of computer self-efficacy factor was deleted. Exploratory factor analysis also showed that this item was not highly correlated with that factor. As a result, the researcher decided to remove the first item. Thus, the reliability of each factor showed a satisfactory level.

Following the analysis of the pilot study and removal or modification of some items of the questionnaire, two experts (one experienced English teacher and one native speaker) reviewed the language of the questionnaire twice at different times. The final state of the questionnaire can be found in the Appendix B. In this questionnaire section 1 includes items related to demographics and section 2 includes items related to the model examined. Items from 1 to 3 are about CMS specific computer self-efficacy, items from 4 to 7 are about task/course related

perceived usefulness, items from 8 to 12 are about perceived ease of use, items from 13 to 16 are about availability (expectation) of training and support, items from 17 to 24 are about perceived personal benefit and items from 25 to 26 are about behavioral intention to use.

Responses to open-ended question were investigated through content analysis. 16 of 67 participants answered the open-ended question. Some of the concepts referred to in these responses were; flexibility, direct assistance, lack of time, reliability of the system, availability of technical support, course content and material adaptation, departmental tutorials, periodic instructional seminars about use of CMS, and institutional pressure. These findings were used while developing the interview protocol and provided a base for the qualitative phase of the study. The following section explains the details of this process.

3.9.4. Development and revisions of the interview protocol

The researcher prepared an interview protocol. This protocol included questions that were related to the factors addressed in the questionnaire and the issues extracted from the responses to the open-ended question. Two experienced researchers (associate professors) reviewed the questions in the interview protocol and gave feedback on wording and style. According to their feedback, the researcher revised the questions in order to prevent directing and affecting the interviewees. All the questions asked during the interviews can be found in appendix C.

Since the researcher aimed to collect information to confirm or explain the results of the first phase, the initial interview questions and the focused themes were similar to the factors examined in the first phase. In addition, depending on the responses collected through the open-ended question, such issues as, time needed, were also questioned. During the interviews, when a new concern appeared from the responses, the researcher revised the list of questions before the next interview and started to ask these new factors or concepts. For instance, the concept of

leadership occurred repeatedly and the researcher included leadership and management related questions to the interview protocol.

3.10. Data Collection

Before starting to collect data, the researcher applied to the ethics committee to obtain approval for the questionnaire and prepared the informed consent form.

With the approval of the ethics committee, the researcher also applied for the official permission of the provost office. In addition to this permission, the researcher visited the deans, school directors or the department chairs and obtained verbal permissions for the data collection procedure while briefing them about the study.

Since there were a limited number of instructors from each department who used or tried CMSs, the questionnaires and informed consent forms were delivered to the target participants one by one with the help of department secretaries. Following the delivery of the questionnaires, the researcher sent a few reminder email messages.

In the second phase (qualitative phase) of the study, the researcher interviewed 14 selected instructors. The first 9 interview processes took between 30 and 55 minutes. Then, the researcher worked on the responses. After a few weeks, the researcher interviewed 5 more instructors. These interview processes took between 20 and 35 minutes. All interviews were recorded with a voice recorder with the permission of the interviewee.

3.11. Data Analysis of Quantitative Phase

The quantitative data collected through the questionnaire was analyzed through a number of methods.

Descriptive statistics was used for the representation of demographic characteristics of the participants. Means and frequencies were calculated by using the SPSS package program.

Before analyzing the collected data, Cronbach's Coefficient alpha test was used to assess the reliabilities of the scales for each factor in the model.

The data collected through the scales were analyzed by applying the Structural Equation Model (SEM) technique. Lisrel 8.3 program was used to complete these analyses. SEM technique was used in order to examine the proposed model and to see whether variables were interrelated through a set of linear relationships or not. The researcher decided to use the two-step approach, comprising a measurement model and a structural model.

Confirmatory factor analysis was used for assessing the reliability and validity of the measurement model. It was used to test if the empirical data were consistent with the presumed model and to show how well the observed variables served as a measurement instrument.

Structural model was validated through SEM, in order to analyze the relationships between the latent (unobservable) and observable variables.

3.11.1. Structural equation modeling (SEM)

Structural Equation Modeling (SEM) is a general and powerful multivariate analysis technique. In their book, Schumacker and Lomax (2004) reported that "various theoretical models can be tested in SEM that hypothesize how sets of variables define constructs and how these constructs are related to each other" (p.2). According to them, SEM can be applied in three different approaches, which are (1) confirmatory approach, (2) alternative models approach, and (3) model generating approach.

The results of the quantitative data analysis of this study were generated through confirmatory type two-step approach of SEM technique. First, measurement model was tested and second the structural model was tested. Schumacker and Lomax (2004) state that measurement model is used for "specifying the relationships among observed variables underlying the latent variables" (p.106) where it provides convergent and discriminant validity. They also add that structural model is used for "specifying the relationships among the latent variables as posited by theory" (p.106).

Dilalla (2000) highlights some key issues by stating that "the model must be specified a priori and be theoretically based" (p.440). Dilalla also emphasizes the importance of justification and the required decisions related to the topics such as 'type and normality of the data', 'sample size', 'handling missing data', 'deciding to covariance or correlation matrices' and 'method of estimation of the unknown parameters'. The researcher took these issues into consideration in order to avoid reaching a biased or incorrect set of results.

3.11.2. Justification of SEM technique applied

The hypothesized model was developed based on the theory and previous findings. Especially, technology acceptance model (TAM) was utilized while developing the examined model. This model was developed through the addition of other constructs. The theoretical background of the factors used in the model and the relationships between them were explained in detail in the literature review chapter.

All of the questionnaire items evaluated through SEM technique were asked in a positive way and the responses were collected as continuous data. Before preparing data matrices for these statistical tests, the researcher checked the distribution of data through 'multivariate normality tests' by using Lisrel software package. Appendix E includes the results of this test. The distribution of data did not match normal distribution although deviation from normality was not too

extreme. Du Toit, Du Toit and Hawkins (2001) explained that normalizing the variables before the analysis is one of the ways to handle continuous and non-normal data. This option was also suggested by Şimşek (2007) who listed a few methods for handling such cases where the data were continuous and the distribution was not normal. The researcher decided to normalize the variables before the analysis and then generated covariance matrices to be used in the data analysis.

The method of estimation is another issue to run the tests. Raykov, Tomer and Nesselroade (1991) recommended the maximum likelihood (ML) or the generalized least squares (GLS) procedures for continuous multivariate normally distributed variables and for handling slight to moderate departures from normality. Schermelleh-Engel et al. (2003) also reported that ML should be applied when all variables are measured on an interval scale, when they are normally distributed, and when the sample size is sufficiently large. According to them, by showing that the deviation from normality is not too extreme, ML may also be used for models with variables that are not normally distributed since this method is relatively robust to violations of the normality assumption. As a result, the researcher decided to use maximum likelihood estimation procedure, which was also the default option in Lisrel program.

The next issue that should be taken into consideration was the sample size. There were different considerations for deciding on the minimum sample size. Dilalla (2000) reported that there is no clear-cut rule to follow. MacCallum, Browne and Sugawara (1996) published methods for determining the sample size for covariance structure modeling through power analysis. Their article includes tables that give the minimum sample sizes needed according to the selected levels of degrees of freedom (df). For example, minimum sample size to achieve power of 0.80 when df is equal to 95 is 136 and when it df is equal to 100 it decreases to 132. The researcher compared the df value, which was 307, and sample size of the

study, which was 260, with this table and it was clear that the sample size of the study was much higher than the required minimum sample size.

In the literature, there are also different recommendations related to minimum sample sizes as 100, 150 or 200. For example, according to Anderson and Gerbing (1988, cited in Dilalla, 2000) "for most studies sample sizes of at least 150 should be adequate". In short, the sample size was clearly higher than the required minimum sample size according to different criteria.

Treatment of missing values was another issue, which would be critical to reach reliable results. First of all, the researcher analyzed all the data and deleted 2 of the samples whose responses included many missing values. Schumacker and Lomax (2004), in their book, suggested six options to deal with the missing data. The first two of them were listwise and pairwise deletion of subjects. However, they also point out the "possibility of losing a large number of subjects, thus dramatically reducing the sample size" (p. 25). According to them, when only a small number of missing values are present in the data, mean substitution works best as a solution.

In the data collected, there were 29 subjects who had at least one missing value. This comprised 11.15% of the sample size. On the other hand, only 2 of 26 variables included 8 missing values over 260 as the maximum number of missing values in a variable. This means that 3.08% of those two variables were missing values. The next maximum rate of missing values in a variable was 2.31% and only one variable has this much missing values. The remaining 23 variables included missing values less than 1.92% of the collected data. As a result, the researcher decided to use mean substitution to handle missing values and replaced the missing values of 260 subjects with the means of the relevant variable. The analysis of the missing value can be found in the Appendix D.

Another decision is about preparation of input data matrix. Loehlin (1992, cited in Dilalla, 2000) claims that "most scholars recommend use of covariance matrix in the analysis because the methods (like maximum likelihood or generalized least squares) to solve SEM were based on theories that were derived using covariance rather than correlation matrices". In this study, in line with these recommendations, the researcher decided to generate covariance matrix while preparing the data for the analysis.

3.12.3 Assessing model fit

When evaluating a model, Dilalla (2000) finds it important to examine several fit indices and underpins not relying on a single index. To assess the model fit, two groups of indices were used; (a) Absolute fit indices and (b) Comparative fit indices.

Absolute fit indices compare observed versus expected variances and covariances. Three of these indices were used in this study. These were chi-square (χ^2) test statistics, standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA).

As a second group, comparative fit indices compare the absolute fit of the model to an alternative model. The indices used in this study were comparative fit index (CFI), normed fit index (NFI), and non-normed fit index (NNFI) as a generalized version of Tucker and Lewis Index (TLI).

For the studies similar to the type of this research, Schermelleh-Engel, Moosbrugger and Müller (2003) briefly explained and summarized fit indices as below:

> "As the χ^2 test is not only sensitive to sample size but also sensitive to the violation of the multivariate normality, it should not serve as the sole basis for judging model fit. It is recommended to evaluate several indices simultaneously, which represent different classes of goodness-of fit

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criteria. The following criteria form an adequate selection of indices which are frequently presented in current publications: χ^2 and its associated p value, χ^2/df, RMSEA and its associated confidence interval, SRMR, NNFI, and CFI. The fit indices RMSEA, NNFI and CFI are sensitive to model misspecifications and do not depend on sample size as strongly as χ^2, therefore they should always be considered. It is also recommended to use SRMR, supplemented by NNFI, CFI, or RMSEA derived from ML and GLS estimation (NNFI and RMSEA are less preferable at small sample sizes), and SRMR, NNFI, and CFI derived from WLS estimation." (p. 51)

Chi square (χ^2) test statistics

The χ^2 test statistic is used for hypothesis testing to evaluate the appropriateness of a structural equation model (Schermelleh-Engel, Moosbrugger, & Müller, 2003). Chi-square statistics has been criticized for being sensitive to sample size. It rejects nearly all models when the sample size is large. Schermelleh-Engel et al. (2003) referred to Jöreskog and Sörbom's suggestion to use χ^2 not as a formal test statistic but rather as a descriptive goodness-of-fit index. Their suggestion was to compare the magnitude of χ^2 with the expected value of the sample distribution like the number of degrees of freedom. For a good model fit, the ratio χ^2 /df should be as small as possible. According to them, a ratio less than 2 is indicative of a "good" data-model fit where a ratio between 2 and 3 is indicative of "mediocre" (acceptable) data-model fit.

Absolute fit indices

Absolute fit indices compare observed versus expected variances and covariances.

Root Mean Square Error of Approximation (RMSEA) is defined as a measure of approximate fit in the population and is therefore concerned with the discrepancy due to approximation (Schermelleh-Engel, Moosbrugger & Müller, 2003). It is one of the measures of overall model fit. In addition to this definition, Schermelleh-Engel, Moosbrugger and Müller referred to Steiger's (1990), and Browne and Cudeck's (1993) studies while stating that a RMSEA value less than or equal to 0.5 represents a "close fit". They also added Hu and Bentler's (1999)

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suggestion of accepting 0.6 as a cut-off criterion for RMSEA values despite the generally accepted 0.5 cut-off value. Hoyle (2000) also referred to Browne and Cudeck's proposal for 0.05 as a close fit, 0.08 as a marginal fit and 0.10 as a poor fit indicator.

Dilalla (2000) defined standardized root mean square residual (SRMR) index as the average discrepancy between the observed and the expected correlations across all parameter estimates. Referring to Hu and Bentler, Schermelleh-Engel, Moosbrugger and Müller (2003) gives a rule of thumb as the SRMR value should be less than .05 for a good fit, whereas values smaller than .10 may be interpreted as mediocre / acceptable.

Comparative fit indices

Comparative fit indices are used for comparing the absolute fit of the model to an alternative model. Some critical indices of this category were explained by Dilalla (2000) and by Schermelleh-Engel, Moosbrugger and Müller (2003) as explained below.

Comparative fit index (CFI) compares the tested model to a null model having no paths that link the variables, therefore making the variables independent of each other. Scores less than 0.9 are considered to be unacceptable. Higher values indicate a better model fit.

Nonnormed fit index (NNFI) is an extension of Tucker-Lewis index (TLI). According to Schermelleh-Engel, Moosbrugger and Müller (2003), NNFI value that is 0.95 or more indicates an acceptable fit, whereas this cut-off value is 0.90 or more according to Dilalla (2000). Dilalla also states that NNFI or TLI performs best with maximum likelihood (ML) method, which was the selected estimation method in data analysis of this study.

3.12. Data Analysis of Qualitative Phase

The qualitative data were collected in two phases: first through an open-ended question in the distributed questionnaire and second through interviews. In the first phase, 80 out of 260 respondents answered the open-ended question. In the second phase, the researcher conducted 14 interviews. Different methods of content analysis were used while analyzing these two sets of data.

In their book, Yıldırım and Şimşek (2006) summarize different models and classifications of the process of qualitative data analysis and explain that there are three important concepts for all researchers: (1) describing, (2) analyzing, and (3) interpretation. They also refer to different approaches such as Miles and Huberman's model, Dey's model and Straus and Corbin's model. To illustrate, Miles and Huberman's model explains the data analysis process as the steps of 'data reduction', 'data display' and 'drawing conclusion and verification'. As an alternative example, Dey's model explains the process as sequential steps of 'describing', 'classifying', and 'connecting'. Yıldırım and Şimşek highlight that although there are different approaches, in all models a high level of importance is given to description of data and exploration of themes.

According to Yıldırım and Şimşek (2006), data description refers to explanation of the collected data regarding the research questions. In this step, what was expressed and which constructs were talked about can be reported. In short, this step helps to answer 'what' type of questions. The analysis step refers to extraction of hidden concepts, themes and their interrelationships. In this step, the researcher seeks answers to 'why' and 'how' types of questions. The interpretation step focuses on the question of "what all these expressed and observed issues mean" (Yıldırım and Şimşek, 2006, p. 222). In this step, the meaning is important and it depends on the researcher's interpretation of the data in the relevant context.

Using Miles and Huberman's content analysis model, the researcher analyzed the responses given to the open-ended question. There were 80 responses to the open-ended question. The researcher coded the responses and then categorized these codes and assigned second level more general codes. For instance, the codes like 'user-friendliness' and 'features of CMS' were considered under 'software (stability, user-friendliness, features)' code. Then, according to these second level codes, the researcher counted the number of relevant responses given by different respondents and prepared tables to display these data. As a result of an examination of the frequency of arguments made, the importance of some arguments made by the respondents became visible. As a result, the researcher drew some conclusions from the themes and the potential areas to be questioned during the interviews.

The data gathered through 14 interviews were also analyzed through content analysis. First, the recordings of the interviews were transcribed as separate documents for each interviewee. On the transcribed data, the themes that emerged from the data were highlighted or noted in the margins of the paper. Then the recurring patterns were extracted through scanning these themes and highlighted expressions. After a period of time, the researcher read these transcripts again and revised the previous coding when necessary.

In their book, Yıldırım and Şimşek (2006) explain Strauss and Corbin's (1990) three types of data coding, which are (1) "coding according to pre-determined concepts or themes," (2) "coding according to concepts extracted from the data," and (3) "coding in a general framework" (p. 229). The first type can be used when there is a conceptual framework underlying the study and when it is possible to determine relevant concepts before starting to analyze the data. In contrast, the second type can be used when there is a lack of structure to guide the coding of the data. The third type is a combination of the first two types. Thus, there is a conceptual framework to guide the coding procedure, and also the data gathered from the interviews may result in adding some new concepts or themes.

The transcripts of the 14 interviews were recorded and coded separately (i.e., person A, person B, …) according to the concepts extracted from the data. Although the questions of the interviews were organized according to a conceptual framework, this initial coding was not based on this predetermined framework. The aim was to avoid bias in the next step, which was revising the conceptual framework with the newly emerging themes. Later, the researcher re-organized the transcriptions according to the themes of this new framework. After re-organization, these theme-based transcriptions (i.e. Training, Leadership, …) were printed again and coded from scratch according to the revised conceptual framework. At the end, the findings were interpreted. This process of analysis is shown in Figure 3.7.
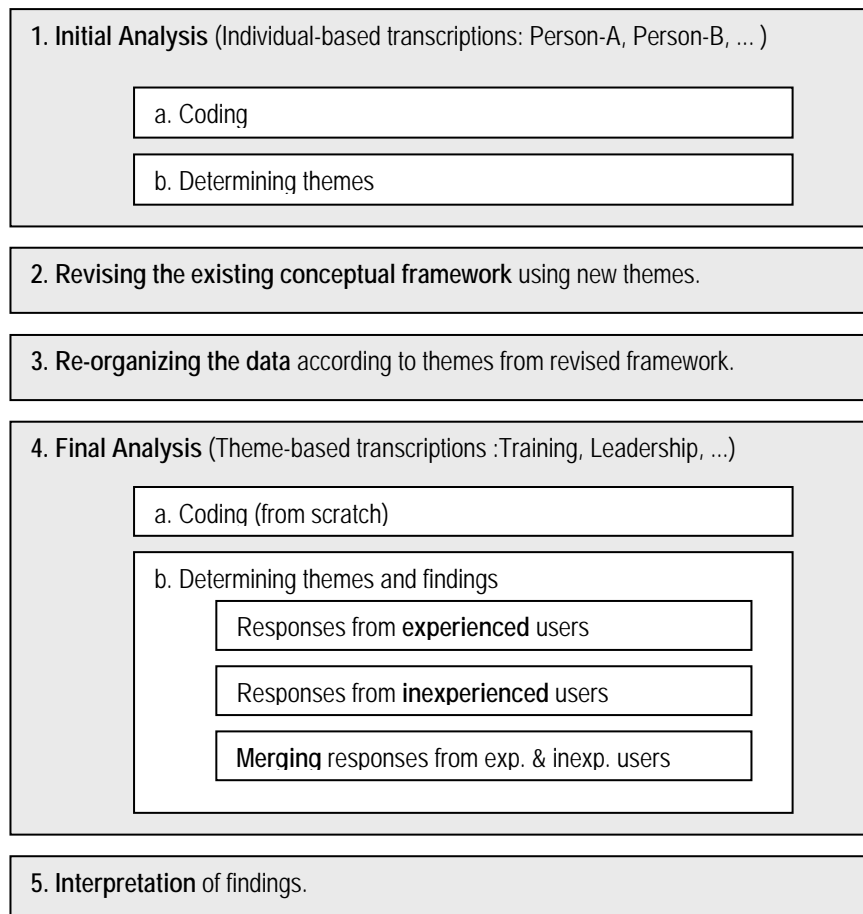
Figure 3.7. Steps followed through content analysis of interviews

As seen in Figure 3.7, while determining the themes and interpreting the relevant findings, the researcher decided to evaluate the responses in two groups; (1) from experienced CMS users, and (2) from inexperienced CMS users. Then, the results for these groups were compared and merged as findings for that theme. This way of interpretation was much more practical, since the arguments of interviewees in the same subgroup were relatively similar to each other.

3.13. Validity and Reliability

While conducting a research study, validity and reliability are the two most important psychometric properties that should be considered in using a test or assessment procedure as expressed by Johnson and Christensen (2008). They define reliability as "the consistency or stability of the test scores" and validity as "the accuracy of the inferences, interpretations or actions made based on test scores" (pp. 143- 144).

Reliability and validity of data collection instruments and validity of the study, which are critical for proving the terms that explain processes, can be different for qualitative and quantitative approaches. In mixed-method research, qualitative and quantitative approaches are combined and this results in a need for employing various methods to ensure validity and reliability.

In this study, the following strategies were used to provide validity of the data collection instruments:

- The questionnaire and interview protocols were developed after a literature review. Whenever possible, items or scales were used or adopted from the instruments developed in the previous studies. This strategy supports content validity and reliability of the questionnaire.

- Each of the items and instructions in the data collection instruments were reviewed by experts with different points of view. As described in more

detail previously, the questionnaire was reviewed 17 times by 11 experts from different disciplines before the pilot study. After the pilot study, 2 experts reviewed the last version of the questionnaire. The interview guide was reviewed by 2 experts (associate professors) from the field of education. This strategy supports construct and content validity of the study.

- The pilot test was conducted to decrease the researcher's bias, and to test the questionnaire items. The factors of the examined model were also tested through this pilot test.

- After completing each interview, the researcher reviewed the questions in the interview protocol, in order to check whether questioning new factors or issues would be necessary for the following interview.

- After completing the ninth interview, the researcher stopped for a while and worked on the transcriptions in order to make necessary revisions in the interview protocol.

To provide reliability of the data collection instruments, the following strategies were used;

- The questionnaire and interview protocol were developed after doing a literature review.

- The pilot test was conducted to check reliability of the questionnaire.

- Questions on the questionnaire and the interview protocol were relevant to the aim of the research.

To provide validity of the study the following strategies were used;

- The data collection methods, data analysis, and literature review were used to verify interviews and categorization of the data gathered. (Triangulation)

- Confirmatory factor analysis was conducted to provide construct validity of the study.

- Detailed description of the context of the study was provided (thick descriptive data).

- A complete description of methodology was given.

- Selection of data sources, sampling techniques used and the criteria for selecting participants were provided.

3.14. Assumptions of the study

In this study, the researcher made some assumptions while designing and conducting the research.

- Some of the items in the data collection instruments were taken from other studies with the assumption that the validity of the instrument will be higher.

- It was assumed that if the data collection instruments were not in English, 30% of the potential samples would be excluded from the study.

- The factors in the examined model were selected by the researcher based on the literature and with the assumption that; (1) they would provide unity, (2) they would be consistent with others, and (3) they would be complimentary to each other.

- Since factors affecting intention to use is investigated and expected number of experienced users was low, it was assumed that being experienced or novice CMS user will not cause serious problems in terms of examining the model.

- It was assumed that the factors that might not be covered by the quantitative phase would be covered by the qualitative phase.

- It was assumed that qualitative phase of the study would increase the validity of the quantitative phase of the study.

- It was assumed that development of data collection instruments in English would not cause problems since the medium of instruction in Bilkent University is English.

- The researcher assumed that the system administrators of the CMSs used in Bilkent University supplied a complete list of instructors and teaching assistants who had accounts.

- It was assumed that the department secretaries delivered the questionnaires according to the list of instructors given to them.

- It was assumed that no responded questionnaires were lost when they were sent through the internal postal services.

- It was assumed that all respondents filled in the questionnaire voluntarily without any pressure from department secretaries or chairs.

- It was assumed that holding interviews with 5% of the respondents (14 instructors from 260 respondents) would be satisfactory to reach the aims of qualitative phase of the study.

3.15. Limitations of the study

The limitations of this study are;

- The data were collected only from Bilkent University. This can be a limitation in sampling. There were a few reasons underlying this limitation. Compared to the universities in other developed countries, the rate of using course management systems was low in Turkish universities. In these limited number of appropriate universities, the number of instructors who used or at least had tried to use a CMS was also low. Since including different universities in the study would force the researcher to change the focus of the study, the researcher decided to limit the data sources of the study to one selected university.

- Since data were collected from a private university, the findings of this study may not be directly implied to state universities. This can be a limitation of this study.

- In this study, the questionnaire items were general in terms of the selected CMS package. CMS specific features and similar detailed issues were not included. This generalization can be accepted as a limitation of the study. The researcher decided that gathering data from a general point of view would be more necessary for the higher education field because even selecting the same CMS does not mean similar uses of it by different universities. The variety of strategies in universities and the different styles and needs of instructors would also result in different ways of using CMSs.

- The number of factors examined in the model can be thought as a limitation of this study. Numerous other factors can be studied through other investigations. Covering all the factors would not be feasible for

such a study. The researcher decided that the number of factors to include would be limited but also would be sufficient to provide unity.

- The potential samples for the study were limited to those who had accounts and those who were registered as a teacher to at least one course opened in the CMSs used in Bilkent University ("eCampus" or "Moodle"). The researcher was also aware that there might be a number of instructors who had accounts but did not have any experience of using a CMS.

- The response rate was limited to the policy of data collection, which was volunteer participation.

- The language of the questionnaire used in the study was limited to the use of English. This can be accepted as a limitation. There were a few reasons underlying this decision. The medium of instruction in Bilkent University was English and there were many foreign instructors in this University. Even for the Turkish instructors, the concepts related to CMS that were new to them had been introduced in English. The briefings, guides and workshops were provided in English. The implementation and user interface of the CMSs used in Bilkent University were also in English. Therefore, even for the Turkish instructors, the CMS concepts in English would be more familiar than corresponding Turkish terms. The researcher decided that the questionnaire would be much more valid if it was prepared in English.

- In the questionnaire two items were used for collecting data about behavioral intention to use CMS. This is a limitation of the study since the suggested number for each variable is three.

- Validity of the results of the qualitative phase is limited to the interpretation skills of the researcher.

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- Validity of this study is limited to the validity and reliability of the instruments used in the study.

- Validity of this study is limited to the honesty of the instructors' responses to the instruments used in this study.

- Variation of the interviewees for the qualitative phase was limited to 14 instructors from 13 departments. This number was amounts to about 5% of 260 respondents.

- Most of the respondents were from School of English Language. It is not a threat since the number of instructors in that school was nearly 1/3 of all instructors in the university. Although this is not a problem, interpreting the results may be limited with this situation.

CHAPTER 4

FINDINGS

This chapter presents the findings of the study concerning the research questions explained in previous chapters. In this chapter, firstly, demographics of the participants are provided. Secondly, the results of the quantitative data of the study are provided based on the research questions and the examined model. Lastly, the results of interviews conducted in the qualitative phase of the study are provided.

4.1. Demographics

Generally, background information of the participants is important in order to understand the overall picture of the studies. Moreover, they are generally necessary for evaluating the results. The researcher collected some characteristics of instructors in order to be sure that the results of the study will represent a population with those characteristics. Gender, age, academic position, department and schools of the samples will be explained in the following sections.

In the survey study, 98 were male whereas 157 were female out of a total of 260 participants in the study. 5 participants did not answer the gender question. The age of participants was in a range of 22 to 72, where the average age was 37,83 (Table 4.1).

Table 4.1. Age of the participants

	Mean	*Standard Deviation*	*Median*	*Minimum*	*Maximum*
AGE	37.83	9.645	37.00	22	72

The researcher grouped the participants according to their age and gender. The distribution of the participants in these groups can be found in Table 4.2.

Table 4.2. Gender and age groups of the participants

		Gender		**Total**
		Male	**Female**	
Age groups	25 or less	5	19	24
	26-30	12	27	39
	31-35	15	33	48
	36-40	20	40	60
	41-45	17	21	38
	46-50	13	3	16
	51-55	8	8	16
	56 or more	8	6	14
Total		**98**	**157**	**255**

The researcher aimed to reach particularly the instructors, however, he also included teaching assistants and specialists (8% of participants) since they used the CMS from the instructors' point of view. Below, Table 4.3 shows the academic positions of the participants and their numbers.

The only person accepted as "other" category stated her position as "line manager". The positions stated as "senior lecturer" and "PhD" was included in the "instructor" group. The position stated as "specialist" was included in the "assistant" group.

Table 4.3. Academic position of the participants

	N	Percent
Professor	14	5.4
Associated Professor	10	3.8
Assistant Professor	46	17.7
Instructor	168	64.6
Assistant	21	8.1
Other	1	.4
Total	260	100.0

Schools and Departments of the participants

Since the study focused on the institutional viewpoint, the collected data needed to include viewpoints from different disciplines. The number of participants and their percentage according to their faculty or schools are given in Table 4.4 and Table 4.5. Table 4.4 also presents rates of instructors for each academic unit.

Table 4.4. Sample distribution according to faculty or schools

Faculties, Applied Schools and Vocational Schools	N	%	Instructor rate in Un.
Faculty of Art, Design and Architecture	9	3.46%	7.23%
Faculty of Business Administration	13	5.00%	3.00%
Faculty of Economics, Administrative and Social Sciences	17	6.54%	10.12%
Faculty of Education	17	6.54%	4.65%
Faculty of Engineering	32	12.31%	8.47%
Faculty of Humanities and Letters	6	2.31%	5.89%
Faculty of Music and Performing Arts	2	0.77%	5.27%
Faculty of Science	13	5.00%	6.61%
School of Applied Technology and Management	22	8.46%	5.37%
School of English Language	105	40.38%	30.79%
Voc. Sch. of Computer Technology and Office Management	17	6.54%	3.93%
Voc. Sch. of Tourism and Hotel Services	3	1.15%	2.17%
Faculty of Law	0	0%	2.38%
School of Applied Lang.	0	0%	4.13%
Missing Data	4	1.54%	
Total	**260**	**100%**	

* N: participants responded to questionnaire

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Table 4.5. Sample distribution according to departments/programs

Departments/Programs (Code and Name)		N	%
COMD	Communication and Design	7	2.69%
GRA	Graphic Design	1	0.38%
IAED	Interior Architecture and Environmental Design	1	0.38%
MAN	Management	13	5.00%
ECON	Economy	7	2.69%
IR	International Relations	4	1.54%
POLS	Political Science	1	0.38%
PSYC	Psychology	5	1.92%
GSE	Graduate School of Education	6	2.31%
MA TEFL	Teaching English as a Foreign Language	2	0.77%
ME	Education Management	1	0.38%
TE	Teacher Education	1	0.38%
--	Faculty of Engineering	1	0.38%
CS	Computer Engineering	11	4.23%
EE / EEE	Electrical and Electronics Engineering	17	6.54%
IE	Industrial Engineering	3	1.15%
AMER	American Culture and Literature	1	0.38%
PHIL	Philosophy	4	1.54%
ELIT	English Language and Literature	1	0.38%
MUSIC	Music	1	0.38%
THEA	Performing Arts	1	0.38%
CHEM	Chemistry	3	1.15%
MATH	Mathematics	2	0.77%
MBG	Molecular Biology and Genetics	4	1.54%
PHYS	Physics	4	1.54%
BIM	Business Information Management	11	4.23%
CTIS	Computer Technology and Information Systems	11	4.23%
IDMYO	School of English Language	3	1.15%
PREP	School of English – PREP	62	23.85%
ETS	School of English – ETS	5	1.92%
FAE	School of English – FAE	35	13.46%
BM	Bureau Management and Executive Assistantship	1	0.38%
CAA	Accounting	3	1.15%
CAD	Commerce and Administration	3	1.15%
CTP + CTE	Computer Technology and Programming Comp. and Instructional Tech. Teacher Education	17	6.54%
THM + THS	Tourism and Hotel Management Tourism and Hotel Services	3	1.15%
---	Missing Data	4	1.54%
	Total	**260**	**100%**

As seen from the Table 4.4 and Table 4.5, an important percentage of the participants were from School of English. This was natural because the number of instructors in this school was nearly 30% of all instructors in the University. In addition, as a departmental policy, the school managers had been encouraging the use of CMS in their courses for at least 4 years.

Perceived level of CMS expertise

Since the expectations from use of CMS and goals of instructors may vary within a great range, it is difficult to evaluate the level of expertise and use of CMS. The distribution of participants according to their self-evaluation of CMS-expertise level is given in Table 4.6.

Table 4.6. Level of CMS expertise of the participants

		N	*Percent*
Beginner		80	30.8%
Intermediate		153	58.8%
Expert		25	9.6%
Missing data		2	0.8%
	Total	260	100%

It is important to underline that the system is used voluntarily and most of the participants could be accepted as enthusiastic and willing to use such technologies. In general terms, tendency of starting to use CMS with simple steps was observed by the researcher and it is usually hard to feel as an expert when CMS provides lots of options. Considering these arguments, it would be meaningful to expect a tendency of selecting 'intermediate' option, although the responder might be a beginner or an expert. As a result, the researcher interpreted this finding so that at most 9 or 10 percent of the participants can be accepted as expert users. Intermediate users and beginner users might be evaluated together

and acceptance or rejection of CMS might be expected in this group of participants.

4.2. Data analysis of the quantitative data

The quantitative data were evaluated through structural equation modeling technique as explained in the methods chapter. The researcher applied confirmatory type two-step approach of SEM technique, in which measurement model and structural model were evaluated sequentially. Below, the results of these evaluations are presented as different sections.

4.2.1. Evaluation of the measurement model

As the first step of the selected SEM technique, the measurement model was evaluated with the aim of describing how well the observed variables served as a measurement instrument. In this step, two confirmatory factor analyses were conducted by using Lisrel 8.3 program.

The outputs of Lisrel 8.3 program provided chi-square statistics and different goodness of fit statistics such as comparative fit index (CFI), non-normed fit index (NNFI), Root mean square error approximation (RMSEA), Standardized root mean square residual (SRMR), goodness of fit (GFI), Adjusted Goodness of fit index (AGFI) and Parsimony goodness of fit index (PGFI).

The path diagrams and the standardized coefficients for the initial assessment of the measurement model are given in Figure 4.1. As seen in Figure 4.1, the chi-square coefficient was more than twice the degree of freedom, and the RMSEA value was 0.071. These results may be evaluated as mediocre fit, which was not close to the good fit criteria.

In addition to goodness of fit statistics, the outputs also include recommended modifications. These modifications cause a decrease in chi square values and an increase in goodness of fit values. The researcher evaluated these suggestions and

decided to correlate the errors between two pairs of observed variables, since the issues they questioned were related to each other.

The first pair of items whose errors were correlated were; (1) 'I believe that educators should use CMS for their professional development' and (2) 'Using CMS has a potential to change educators professional status in a positive manner'. Justification for the researcher's decision for error correlation was that professional development and professional status may be interpreted as closely related to each other.

The second pair of items whose errors were considered as correlated were; (1) 'Administrators' recognition of my use of CMS is valuable to me' and (2) 'Incentives would increase my use of CMS'. Justification for the researcher's decision for this error correlation was that generally administrators give incentives and so they should be related to administrators' recognition.

The path diagrams and the standardized coefficients for both measurement models are given in the two figures below. To separate them, measurement models before and after modifications will be called as initial model and final model. Below, Figure 4.2 shows the initial model and Figure 4.3 shows the final model.
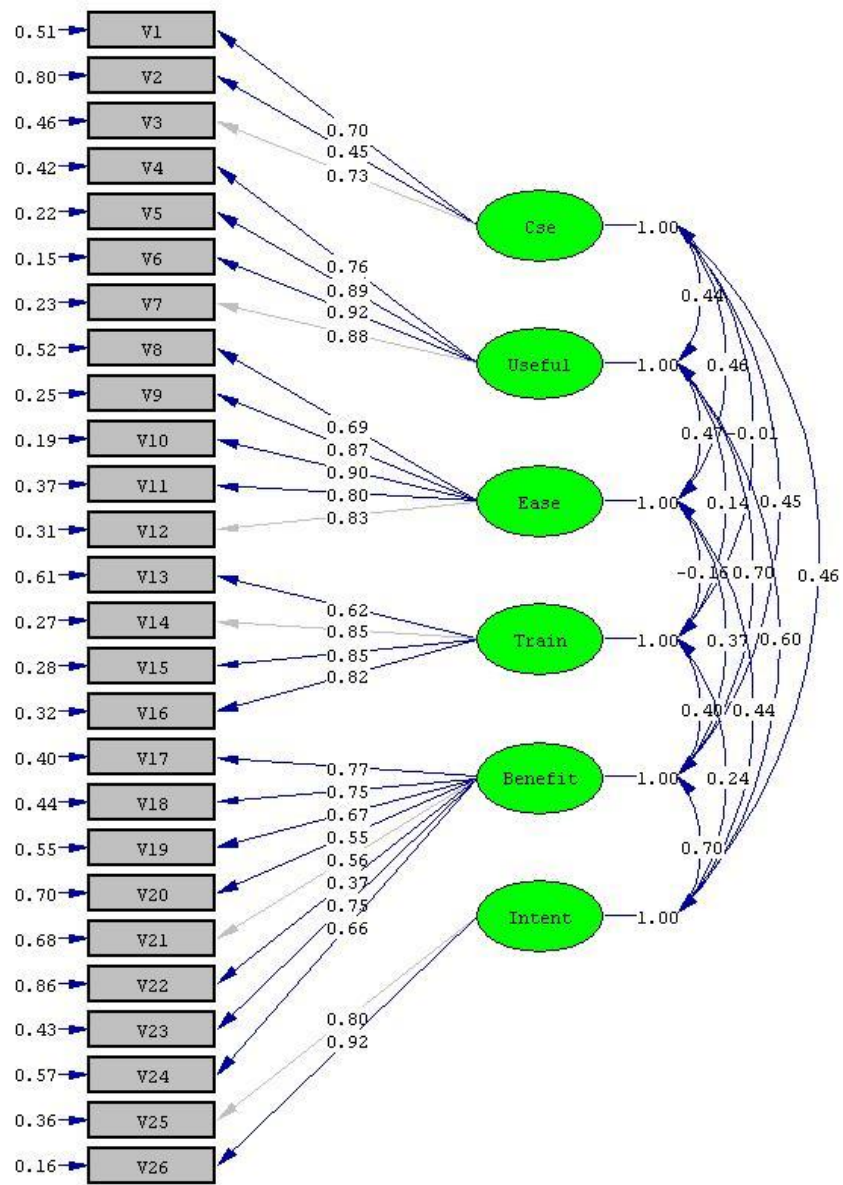
Chi-Square=657.97, df=284, P-value=0.00000, RMSEA=0.071

Figure 4.1. Measurement model (initial state before modifications)
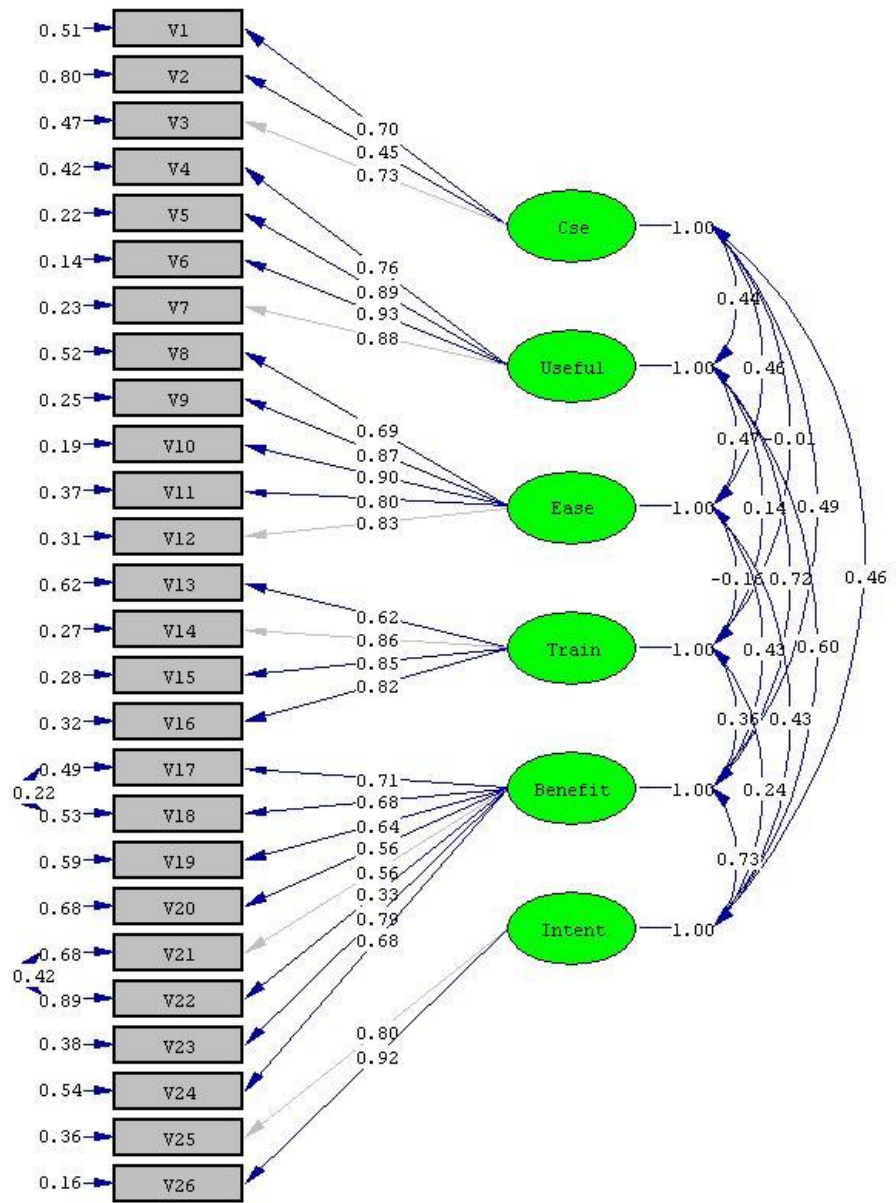
Chi-Square=523.46, df=282, P-value=0.00000, RMSEA=0.057

Figure 4.2. Measurement model- revised (final state after modifications)

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Recommended criteria of the selected indices for assessing model fit in order to be used while comparing the values are summarized in Table 4.7. References to these criteria were previously explained in methods chapter.

Table 4.7. Recommended indices for assessing model fit

Goodness of fit indices	Criteria for Good or Acceptable Fits	
chi-square test (χ^2)	Good fit:	$0 \leq \chi^2 \leq 2df$:
	Mediocre fit:	$2df < \chi^2 \leq 3df$
p value	Good fit:	$0.05 < p \leq 1.00$
	Mediocre fit:	$0.01 < p \leq 0.05$
normed chi-square (χ^2/df)	Good fit:	$\chi^2/df \leq 0.2$
	Mediocre fit:	$0.2 < \chi^2/df \leq 0.3$
RMSEA	Good fit:	$0 \leq RMSEA \leq 0.05$
	Mediocre fit:	$0.05 < RMSEA \leq 0.08$
SRMR	Good fit:	$0 \leq SRMR \leq 0.05$
	Mediocre fit:	$0.05 < RMSEA \leq 0.1$
CFI	Good fit:	$0.90 \leq CFI \leq 0.05$
	Mediocre fit:	$0.05 < CFI \leq 0.1$
NNFI	Good fit:	$0.90 \leq NNFI \leq 1$

Since depending on one model fit index was not recommended, fit values of the confirmatory factor analysis for the selected fit indices were assessed together and have been given in Table 4.8. As can be seen in this table, the measurement model can be accepted as a mediocre fitting model.

Table 4.8. Fit indices for the measurement model (CFA results)

	CFA-1 (before modifications)	CFA-2 (after modifications)	Evaluation of fit indices (After error-correlation modifications)	
df	284	282		
χ^2	657.97 (P=0.0)	523.46 (P=0.0)		
χ^2/df	2.317	1.856	1.856 < 2	→ Good fit
RMSEA	0.071	0.057	0.057 < 0.06	→ Mediocre fit
SRMR	0.071	0.066	0.066 < 0.10	→ Mediocre fit
CFI	0.91	0.94	0.94 > 0.9	→ Good fit
NNFI	0.90	0.93	0.93 > 0.9	→ Good fit

4.2.2. Evaluation of the structural model

Concluding that the measurement model shows a mediocre fit, the researcher started the assessment of the structural model. The outputs of Lisrel program for the evaluation of structural model can be found in Appendix F. Below; the goodness of fit indices for assessing the overall structural model is displayed (Table 4.9).

Table 4.9. Fit indices for the structural model

	Fit indices for the structural model	Evaluation of fit indices (After error-correlation modifications)
df	287	
χ^2	577.93 (P=0.0)	
χ^2/df	2.014	2.014 > 2 → Near limits of mediocre fit
RMSEA	0.063	0.063 > 0.05 → Mediocre fit
SRMR	0.10	0.10 <= 0.10 → Near limits of mediocre fit
CFI	0.93	0.93 > 0.9 → Good fit
NNFI	0.92	0.93 > 0.9 → Good fit

Using a cut-off rule of .05, the RMSEA was high to indicate a good fit but it was at a mediocre level. SRMR fit index is found to be at the limits of mediocre fit. Evaluating the fit indices given in Table 4.9, it could be said that the model represents a mediocre fit. Below, the path diagram that includes the estimation coefficients for the structural model (Figure 4.3) is given. The other details like coefficients about observable variables are presented in Appendix F.

Figure 4.3. Estimate coefficients for structural model

Chi-Square=577.93, df=287, P-value=0.00000, RMSEA=0.063
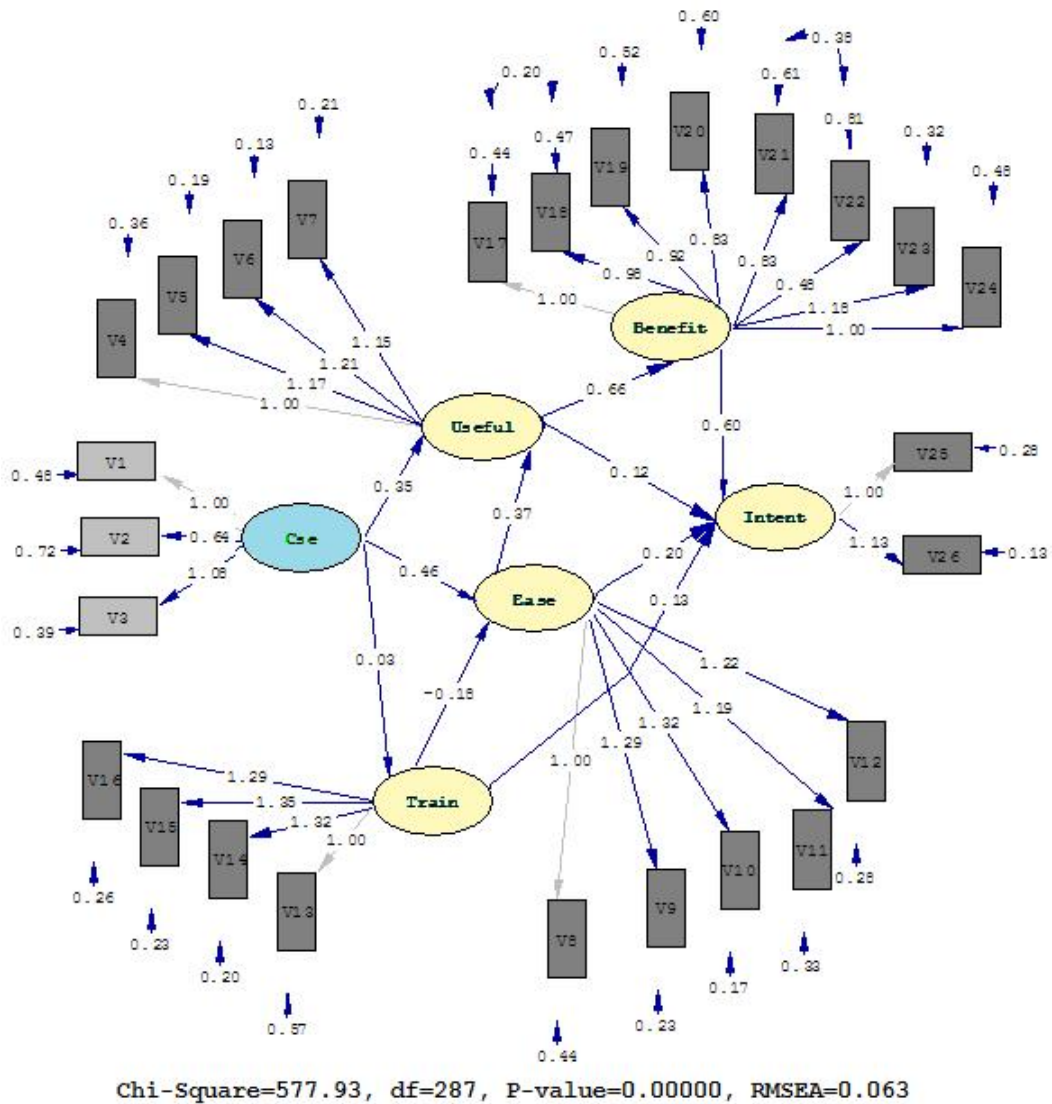
In the following tables, direct effects, indirect effects and total effects among latent variables are given in Table 4.10, Table 4.11 and Table 4.12. In these tables estimation coefficients were used and the relationships that were not significant are marked with an asterix ('*').

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Table 4.10. Direct interrelationships between the latent variables

	Useful	Ease	Train	Benefit	Intent
CSE →	0.35	0.46	0.03 *	-	-
Useful →	-	-	-	0.66	0.12 *
Ease →	0.37	-	-	-	0.20
Train →	-	-0.18	-	-	0.13 *
Benefit →	-	-	-	-	0.60

(* : Not significant)

Table 4.11. Indirect interrelationships between the latent variables

	Useful	Ease	Train	Benefit	Intent
CSE →	0.17	-0.01 *	-	0.34	0.36
Useful →	-	-	-	-	0.39
Ease →	-	-	-	0.24	0.19
Train →	-0.07	-	-	-0.04	-0.07
Benefit →	-	-	-	-	-

(* : Not significant)

Table 4.12. Total effects on the latent variables (direct & indirect effects)

	Useful	Ease	Train	Benefit	Intent
CSE →	0.52	0.46	0.03 *	0.34	0.36
Useful →	-	-	-	0.66	0.52
Ease →	0.37	-	-	0.24	0.39
Train →	-0.07	-0.18	-	-0.04	0.06 *
Benefit →	-	-	-	-	0.60

(* : Not significant)

The factors affecting intention to use CMS can be expressed with a mathematical expression where 'total effects' on variables are used as coefficients of the equation.

Intention to use CMS = 0.60 * Personal benefit + 0.52 * Usefulness + 0.39 * Ease of use + 0.36 * Computer self-efficacy + 0.06 * Availability of training & support.

Table 4.13. T-Values and factor loadings (direct effects) for structural model

Path			T-Values	Factor Loadings
Intent	←	Benefit	5.34 **	0.60
Intent	←	Useful	1.32	0.12
Intent	←	Ease	2.84 **	0.20
Intent	←	Train	1.86	0.13
Benefit	←	Useful	9.08 **	0.66
Useful	←	Ease	4.32 **	0.37
Useful	←	Cse	3.73 **	0.35
Ease	←	Cse	5.38 **	0.46
Ease	←	Train	-2.47 *	-0.18
Train	←	Cse	0.43	0.03

$* \ p < 0.05$ $** \ p < 0.01$

Findings presented in Table 4.13, indicated that three of the ten interrelationships between the determinants of the model were not significant at the 0.05 level. These relationships (between the pairs of latent variables) were Intent-Useful, Intent-Train and Train-Cse relationships. These relationships were also pointed out by the 3rd, 7th and 9th research questions in Chapter 3. On the other hand, the findings showed that there were also significant relationships between the latent variables of the model. The relationships pointed out by research questions 1, 2, 4, 5, 6, 8 and 10 were significant. These significant findings show that

- Computer self-efficacy is significantly in relationship with perceived usefulness.

- Computer self-efficacy is significantly in relationship with perceived ease of use.

- Perceived ease of use is significantly in relationship with perceived usefulness.

- Availability of training and support is significantly in relationship with perceived ease of use.

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- Perceived usefulness is significantly in relationship with perceived personal benefit.

- Behavioral intention to use is significantly in relationship with perceived ease of use

- Behavioral intention to use is significantly in relationship with perceived personal benefit

The results will be discussed in detail in the discussion chapter. Yet, the researcher deems it critical to make some evaluations at this point to see the focal points of the interviews. These evaluations are listed below;

- 'Perceived usefulness' of CMS did not show a high direct effect on the intention to use CMS (factor loading = 0.12). This was surprising because 'perceived usefulness' was one of the critical factors taken from TAM. On the other hand, 'perceived personal benefit' showed a high impact on the 'intention to use CMS' (factor loading = 0.60) and 'perceived usefulness' showed a high impact on 'perceived personal benefit' (factor loading = 0.66). The researcher decided to question the discrimination between 'perceived usefulness' and 'perceived personal benefit' through the interviews.

- Availability of training and/or support mechanisms was considered to be in relation with computer self-efficacy of instructors and their intention to use CMS. Levels of both relationships were found to be low. This was also surprising for the researcher who then decided to investigate the training and support concepts through the interviews.

4.3. Data analysis of qualitative data

The qualitative data collected through interviews were evaluated through content analysis as explained in the method chapter. The researcher conducted interviews with 14 instructors from different departments. These interviews included a set of questions with the aims of

- Confirming findings from the quantitative phase,

- Extracting unexpected critical factors which may not be included in the examined model, and

- Understanding the underlying reasons regarding the findings from the quantitative phase.

All of the questions asked during the interviews can be found in the interview guide in appendix C.

Each instructor was expected to have a few different reasons to use a CMS. Their context and previous experience could be critical to understand their intentions. In this study, 8 of the 14 interviewees used the CMS as an instructor for the first time and the other 6 instructors were experienced in using at least two different CMSs.

In the following sections, the results of these interviews are presented under different themes or sections. In the following sections, expressions from these interviews are presented mostly in Turkish and English. Some of them are presented in English since one the interviewees was a native speaker and the interview was conducted in English.

4.3.1 Reasons for starting to use CMS

At the beginning of the interviews, the researcher questioned when and how the interviewees were first introduced to CMS-like technologies and their context.

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Then, the researcher directly asked why they had decided to use CMS. Later, questions on the issues related to the constructs of the examined model were asked.

In addition to the reasons that were stated directly, new reasons or repetition of the existing ones could be found in the responses given to the questions of other issues. The researcher decided to report the direct responses separately since these responses would also include the value of selection of the interviewees.

In the interviews, the researcher observed that, naturally, the reasons of instructors changed in time (at the point of starting to use and after a while). Some reasons lose their importance and new reasons can gain importance after experiencing some facilities of using CMS. Starting from the 3rd interview, the researcher decided to ask for their arguments to persuade their colleagues to use CMS. This question was asked at the end of the interviews in contrast to the direct question about their reasons, which was asked at the beginning. In this way, the researcher aimed to catch the critical reasons not only for their starting to use, but also for their continuing to use CMS. Another advantage of this question and its timing was that it became possible to elicit the reasons which appeared to be more meaningful after using CMS for a period of time.

The reasons for using CMS which were directly stated at the beginning and at the end of the interviews were grouped and summarized as below:

- Leadership and getting informed through a vision were effective on the instructors' decision. Eight out of 14 interviewees referred to the provost's presentations and their positive effect. This issue is explained in more detail in the following sections.

- Enhancing the communication and increasing interaction (in or out of the class) are critical for the instructors. Eight out of 14 interviewees referred to communication and interactivity issues among their reasons to use

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CMS. In their view, CMS provides interactivity and gives a chance to enhance communication with students when compared with the one-way communication of web pages. In addition, 6 interviewees selected this argument to persuade their colleagues to use CMS.

- Sharing and delivering course materials to students more effectively seems to be important in instructors' use of CMS. Five out of 14 interviewees expressed this issue directly as a reason to use CMS. Five interviewees selected this argument to persuade their colleagues.

- Another reason stated by the interviewees was to motivate students by using multimedia or more visual materials and to increase the quality of the course materials and the course. This issue seems to be related with the feeling of a need for changing the course design and materials. Five interviewees gave reasons related to the quality of course design or course materials like using more multimedia and changing the course design. If the reasons stated as "increasing interactivity in the class" were considered to be related to this reason, this number would be higher. Four interviewees selected similar arguments to persuade their colleagues such as "having a chance to include activities that would normally be difficult to apply in class due to lack of time", or like "makes it possible to give courses in so many different ways especially if you are not happy with the existing design".

- Feeling the need for an effective platform was given as another reason to use CMS. Two interviewees stated that it is much easier compared to the traditional way of managing and updating course web pages. Two interviewees selected this argument to persuade their colleagues.

- Organizing the course materials and activities all in one place was stated as another reason to use CMS. Two of the interviewees found that CMS helps them to keep materials in an organized way. Two interviewees selected this argument to persuade their colleagues.

- Economic use of such resources as photocopies, paper or time (which means savings from photocopying, delivery and collection) was given as a reason to use CMS. Two out of 14 interviewees stated savings as their reasons. One interviewee selected this argument to persuade their colleagues.

- Just trying (in order to see its effects on course and students) was another reason stated by 2 interviewees. One of them stated that the cost of trying to see the interest of the students seemed low. The other interviewee tried CMS in place of using web editors.

- Willingness of the colleagues who delivered the same courses in partnership with the interviewee was stated as another reason to use CMS. Two out of 14 interviewees said that they started to use CMS since their partners or coordinators encouraged them. Three interviewees stated that briefly showing how they used it in their courses was effective to persuade their colleagues.

- Reusability of the course materials in the long term was stated as a reason by one of the interviewees. She stated that after a while, it becomes much easier and time saving for the instructors.

- Improving the image of the instructor was given as a reason by one of the interviewees. He stated that using new technologies is a way of showing the value of instructors.

- Being a new member of faculty or giving a course for the first time can be a reason to use CMS according to one interviewee. He stated that he was a new member of faculty in the university and was giving the courses for the first time. As a result, he planned to create course web pages and design the course from scratch. He decided to try CMS although he did not have detailed information about it. The researcher also related this response with one of his observations from the quantitative phase of the study. While delivering the survey, an instructor had said, "he would decide to

use CMS if he had heard of the existence of it at the time he started to teach at his department a few months ago". However, it was too late for him since he had already prepared course web pages. He expressed that he would prefer to use his web pages at least for a while.

Some other arguments used for persuading colleagues but not stated directly as a reason can be summarized as below:

- According to four of the interviewees, CMS makes life easier and saves time, and knowing this would persuade colleagues. Some of their arguments included; "It makes it easier to manage assignments, discussions, grading, giving feedback, … "; "Deadlines are automatic and it would prevent much of the late submissions"; "You will make a little more effort at the beginning, but then your life will become much easier", and "I would emphasize the way it saves time".

- According to 2 interviewees, CMS helps instructors to organize themselves and force themselves to design their course in a more systematic way.

- Two interviewees said that they would emphasize the chance of tracking the students' online actions before and after classes in order to persuade their colleagues.

It is important to evaluate these arguments and reasons as selected and directly expressed arguments. In the following sections, other results gathered from the interviews are summarized under different topics.

4.3.2. Perceived usefulness and perceived personal benefits

During the interviews, the researcher asked various questions regarding the benefits of using the CMS. In these questions, the researcher aimed to understand the thoughts of instructors about (1) course related benefits of using CMS, (2) personal benefits of using CMS, and (3) discrimination between the course related benefits and personal benefits.

When perceived usefulness of CMS and perceived benefits were questioned as a general question, interviewees generally started with course related or student-centered usefulness and most of them did not refer to personal benefits until the researcher asked the personal benefits separately. In addition to this, 6 of the 14 interviewees directly stated the incentives, being approved by the administration or anything related to their reputation as points that were not effective in their decision to use CMS.

Usefulness of CMS and personal benefits perceived by instructors encompass the following issues. These issues are explained from the most frequently repeated to least.

Use of CMS was perceived to be useful and beneficial in terms of the following:

- Enhancing communication and interactivity
  (+ Student monitoring and tracking)
- Organization and delivery of the course materials
  (+ Reusability of these course materials)
- Personal development and keeping up with the age of technology
- Improving course design and course process (like decreasing the load and stress on the lecture hours)
- Saving time
- Other benefits

CMS helps enhancing communication and interactivity with or between students. Instructors believe that CMS is useful because it provides two-way communication (especially when compared to course web pages). In addition to course related communication, some instructors believe that CMSs are also necessary as a communication platform for their research groups and for communicating with colleagues. Half of the interviewees referred to this argument in their answers. Some instructors particularly emphasized increase in the communication between students.

Instructors value the CMS facilities since they are necessary in organizing course materials. CMS provides mechanisms to deliver all materials from a single place in an organized manner. In addition to the availability of the course material, some instructors believe that CMS also supports organization of course design and teaching-learning processes. With the help of CMSs, courses start to have a more systematic, user friendly and open format. Instructors' organizing themselves can also be included in organization of the course process. An instructor expressed this as below:

> "İnsanın daha çok organize olmasını sağlıyor. Tabii ki hepimiz derse girmeden bir hazırlık yapıyoruz ama moodle olunca daha ciddi bir sorumluluk. Ben öğrencilere diyorum ki, derse gelmeden önce moodle'dan okuyacaksınız, bu durumda ben de öğrencilerin birşeyler okuyup gelmelerini istiyorsam önceden birşeyleri oraya koymam gerekiyor."

> "It helps one to become more organized. Of course we get prepared before we go to lectures but it becomes a more serious responsibility when we use Moodle. I ask my students to reach the documents from Moodle and read them before coming to class. In this case, first I have to upload something there."

A few instructors directly said that reusability of the materials was a benefit for them. An accumulation of the course materials in an organized way would appear as instructors continue to use the CMS in their courses.

Personal development and keeping up with the age of technology was another important benefit. Instructors perceived CMS as beneficial for their personal development in different ways. Although a few instructors thought that CMS has no value in terms of personal development, others thought that it helps personal development in technological ways like using a technology, or it forces them to think about applying new methods.

As a general issue, improving the performance of the instructor and the course process is referred to as a benefit of using CMS. Some expressions of some of the interviewees can be listed as below:

> (1) "Zamanımız limitli, örneğin gelecek hafta tatil ama ben birşeyler ekledim. Böylece dersteki yükümü ve stresimi azaltıyor"

> "Our time is limited. For instance, next week is holiday but I uploaded some documents to CMS. In this way, it decreases my workload in the course and my stress."

> (2) "Öğretmenlerin daha araştırıcı olacağını düşünüyorum, daha fazla daha güncel materyali öğrencilere sunma ihtiyacı duyacaklar bu teknoloji vasıtası ile."

> "I think that instructors will do research more. By using this technology, they will feel the need to deliver more up-to-date materials to the students."

> (3) "Bana kitaplar vs eski bir yöntem olarak görünüyor, bu yüzden daha motive oluyorum, yaptığım işten daha çok zevk alıyorum. Beni daha çok araştırmaya da sevkediyor."

> "I see books etc. as old methods. So, I become more motivated and I enjoy my work more. It also encourages me to research more."

> (4) "Derste yapamadığınız şeyleri de oradan faydalanarak yapabiliyorsunuz"

> "By using CMS, you can develop activities that you cannot do or complete in the classroom"

Saving time and making life easier can be seen as other benefits of using CMS. Most instructors stated that, at the beginning, it would take time, but after making that investment, they would start to save time and it would feel more practical to complete their tasks when using CMS.

Another issue was monitoring, tracking and documenting students' in-class or out-of class activities. This feature was expressed to be valuable since it helps to evaluate not only the product but also the process of learning.

Most interviewees said that they would not use CMS to have some reputation or in order to get the provost's or administrators' approval. Similarly, most of them also stated that they had not started to use CMS with the idea of getting some incentives or that those incentives were secondary in their minds. They mostly expressed that this may be a valid reason for many instructors, but not for them.

Some other arguments that seem to be benefits of using CMS can be found below:

- Using CMS may increase the motivation of the students.

- It is a way of showing instructors' level of using technology, as a positive aspect, in their annual faculty evaluations.

- It helps in the collection of assignments on time and online, since the due-date mechanisms can be strict.

- Not dealing with papers or photocopies is perceived as a gain.

4.3.3. Availability of Training and Support mechanisms

The results obtained from the analysis of the quantitative data showed that the relationship between availability of training or support and intention to use CMS was not strong. Similarly, the relationship between computer self-efficacy and availability of training and support was not strong. Through the interviews, the researcher tried the understand instructors' perceptions of training and support by focusing on (1) the importance given to the training and support mechanisms and their effects on the decision of using CMS, and (2) the expectations from training and support services.

The interview results showed that the importance given to the training sessions varied according to different instructors. As expected, most of the instructors accepted the value of training sessions. However, only 4 out of 14 interviewees thought that training sessions were very critical for everybody who would be using CMS. On the contrary, 2 out of 14 interviewees said that training sessions were not critical. Others (8 out of 14 interviewees) gave importance to the training sessions but they also specified specific conditions in their responses. The examples for these varying arguments made by the instructors are listed below:

- "Training sessions are important especially for people who are not comfortable with using computers". (A similar argument was "Training sessions are important but they should be organized according to computer literacy level of the attendees".)

- The importance of training sessions will change according to instructor profiles and their levels.

- Training sessions will be necessary to reach people who are uncertain about whether or not to use CMS. They will not be critical for other user profiles.

- Training sessions are important but in practice, generally the pedagogy adopted in the IT training sessions is weak.

The expectations of the interviewees from training sessions can be summarized as below:

- Training sessions should be focused on the very basics of CMS and they should aim just at getting people to start to use it with the basics.

- Training sessions should be organized one or two weeks before the beginning of the courses.

- Training sessions should include hands-on activities and they should be held as workshops (especially for the people who are not comfortable with using computers).

- Training sessions should be organized according to computer literacy level of the attendees.

- The suggestions for the training sessions were expressed as;

  o Two hours of focused, simple, and to the point training session will be enough.
  o A maximum of 4 hours will be enough to start using CMS.
  o A one-day workshop (8 hours) will be satisfactory. There is no need to go into details. It can be divided into two half days.
  o Three sessions each lasting 2 to 3 hours will be enough. (These 3 sessions can be arranged as 1 session for each week or as 3 days in a week).

The interview results showed that the existence of institutional support mechanisms had a positive effect on instructors. They feel more comfortable and act more bravely when they know that they can request help in cases when they encounter problems. However, the expectations about institutional support may vary according to different profiles. The expectations from support mechanisms can be summarized as;

- The speed of feedback and timing of the support services are important for the instructors.

- It is important to introduce the support mechanisms to users. One interviewee said that he had the assumption that there would not be satisfactory support and tried to solve his problems by himself.

- The people who give support should be visible to users. Reaching these people through different channels like the phone or email will be important.

- User guides should be prepared as relevant to the implemented system.

- The language used in the user guides should be clear for everybody. Technical language will make it difficult to understand.

- Individual support is good to have but it will be costly. Request for such a service changes according to instructors.

- Generally, asking a colleague who is known as a good CMS user is the first attempt of the users.

The impact of availability of training and support services on the decision of using CMS may vary. Some instructors thought that these mechanisms were critical to start to use CMS whereas others thought that they were critical to continue using CMS. The interviews showed that there are a few different arguments underlying these expectations and decisions. These arguments can be listed as;

- It is important to feel the need and the way that using CMS can help meet this need. Then, instructors may learn the rest by themselves.

- It is important to attend training sessions and try the features before starting to use it in the courses.

- It is important to start using CMS. For this reason, getting introductory level training and support will be more critical at the beginning of the semesters.

- Seeing examples is more critical than getting training and support.

- For the decision of using CMS, institutional reliability is more critical than institutional support.

These arguments and similar others represent the importance of varying profiles of the instructors. Being aware of the individual differences may help developing different mechanisms to support users before and after starting to use CMS.

An interviewee who had great experience of using CMS made the statement in the last item in the above list of arguments. According to him, institutional reliability is more critical than institutional support when deciding to use CMS. This argument also includes the importance of efforts made to decrease the need for support. His expression about this issue is presented below:

> Kurumsal destekten cok kurumsal güvenilirlik. Ben kuruma güvenebilir miyim bu konuda. Bu sistemi sonuna kadar götürecek mi yoksa sistem bir yerde çökecek mi? Eğer bir kaç kez sistem sizi ortada bırakıyorsa öğretmenler inancını yitirir. O zaman da çok zordur onları tekrar alıştırmak. Biz de eCampus-Moodle geçişi sırasında bazı insanları kaybetmişizdir. İnsanları önce eCampus'da motive edip sonra da "şimdi Moodle" deyince, o zaman "ben şimdi bekleyeyim, hepsini oturtunca kullanırım" diyorlar. Şu an insanlara sorduğunuzda "herşey otursun, smooth olsun ondan sonra kullanırım" diyorlar. Bir de güvenilirlik sistemin herzaman calışması demek. Ben size mail atarım "şöyle bir sorunum var yardımcı olur musunuz" diye ama öğrenci sayfaya girerken çok vakit kaybeder. Destek öğretmeni rahatlatır ama sistemin gerçekten çalışması da işe yaramasını sağlar.

> Institutional reliability is more critical than institutional support. Can I trust my institution while I am using CMS? Will the institution support this system until the end or someday will it fail? If the system leaves you a few times instructors' faith in the system will deteriorate. In that case, it will be very difficult to get them accustomed to it again. When our university was moving from eCampus to Moodle, some of the instructors gave up. If you motivate people for eCampus first and then say, "now we use Moodle", then the instructors will say, "Now, I will wait. When it becomes stable and smooth, I can use it". In addition, reliability means the system will function regularly. I can send an email to you and say, "Could you please help me about the problem I have…" But, the students will lose

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time until they can reach the relevant pages. Support will help instructors but a regularly functioning system will make it effective and satisfactory.

Among all their varying thoughts and arguments, instructors have a consensus on the importance of seeing example courses and example uses of CMS. Nearly all interviewees referred to the activity in which the provost and other seven instructors shared their experiences and their way of using Moodle. Two different arguments arose from the thoughts on that activity; (1) The timing and aim of sharing example uses, and (2) the scope of examples needed.

Timing and aim of activities for sharing the examples could be taken as two arguments.

- Seeing the real courses as examples of CMS use seems to be one of the best ways of promoting to initiate the instructors' intention to use CMS in their courses. Therefore, such activities can be used to diffuse the idea of using CMS or to motivate instructors.

- Seeing the real courses as examples of CMS use seems to be one of the best training and support activities to achieve better performance of using CMS. Therefore, such activities can be more beneficial when instructors have had a little experience of using CMS. In this way, they can follow the other instructors' methods easily and get inspired in applying new techniques.

The scope and variety of the examples also appeared as an important issue in the interviews. When the context and the complexity of the examples do not match with the context and experience level of the instructors, they may feel that the use of CMS is irrelevant or they may fear the complexity of the technology and may reject the idea of using it. On the contrary, when there is a match, the instructors seem to be motivated, inspired, and encouraged. In order to explain these situations, the statements of some interviewees are presented below:

(1) Mesela, Bay A'nin ne kadar başarılı kullandığını görünce isteklendim. (* The name of the colleague was changed with "Bay A")

For instance, I felt motivated when I saw how successfully Mr. A was using it. (* The name of the colleauge was changed with "Mr. A")

(2) Seeing sample courses is really important. I attended the presentation about other instructors' use of CMS and I found it really good seeing others' ways. It helped me changing my courses.

(3) Bölüm tanıtımından sonra genel bir tanıtım oldu. Farklı hocalar uygulamalarını anlattı. O bayağı hoş bir etkinlikti. Ama dersin içeriği ile çok bağlantılı idi. Mesela mühendislik bölümü hocası çıkmış anlatıyor popup quizler falan yaptığını. Bizim popup quiz yapmak için computer lab'da olmamız lazım. Computer lab'da değiliz. Onlar da biraz komik kaçıyor ama dersin içeriği ile bağlı. Orada sosyal bilimler'e denk gelen işletmeden, ingiliz dili edebiyatından hocalar da vardı. Onlar gibi. Bizim o kadar fancy şeyler yapmamız mümkün değil.

After the departmental presentations, a general presentation was organized. Different instructors presented their applications. That was quite a nice organization. But it was very closely related to the content of the course. For instance, an instructor from the engineering department talked about popup quizzes or similar activities. To use CMS for popup quizzes we have to be in the computer labs. But we are not. Such cases seem irrelevant and funny, but it depends on the content. There were other instructors from the fields similar to social sciences; from the department of management or from English language and literature. I mean like them. It is impossible for us to do such fancy things.

(4) Yeni başlayan birisi için ilk önce eğitim almak daha etkili olur. Yavaş yavaş orta seviyelere çıkan birisi için bu değişik örnekleri görmek çok önemli oluyor.

It will be more effective to get training first for a first time user. Seeing these different examples is very important for someone who has slowly reached the intermediate level.

To sum up, it can be said that when there was sufficient alternatives for different profiles of the participants, sharing examples is one of the most effective activities to persuade and support the instructors.

4.3.4. Leadership, Administration and Policies

From the interviews, leadership arose as a concept and an important factor for faculty intention to use CMS. While talking about their reasons for starting to use CMS, 10 of the 14 interviewees referred to the departmental presentations given by the provost. Its effect on the instructors' decision to use CMS was obvious. Three of the remaining four instructors had previously used other CMSs. In addition, three of these four instructors also expressed that the provost's presentations were motivating.

The focus of these presentations was on active learning and the provost shared his experiences about using CMS in the context of better teaching-learning strategies. The data gathered from the interviews showed that the instructors perceived his positioning and messages in different ways, as presented below:

(1) As a role model and instructor, the provost pays attention to active learning and uses new technologies as an effective tool for active learning.

(2) From the highest position responsible for academic issues, the provost requests or at least draws attention to the use of CMS as an important component of future courses.

(3) As an instructor and administrator at the same time, the provost pays attention to teaching, active learning strategies and use of new technology although he has limited time because of his administrative tasks.

Since leadership arose as an important factor, the researcher decided to ask a few more questions in order to understand the instructors' requests and perceptions

considering the importance of leadership, institutional policies and managerial support. The results obtained from these questions are summarized as the sections below.

What were the effects of the provost's presentations? Would it be the same if any other instructor had made the same presentation?

Nearly all the interviewees seem to be affected positively by the provosts' presentation in terms of content and/or in terms of leadership. Just two of the interviewees stated that they felt a sort of pressure or direction. In this situation, it is important to give importance to these few people because it should be highlighted that the interviewees were selected from the users who were volunteers and could be accepted as enthusiastic to teach with CMS. An interviewee who had previous experience in the use of a few different CMS expressed this situation as his observations about his colleagues;

> "Öğretmenin bakış açısına bağlı: 1. Okul birşey empoze etmeye çalışıyor. Yapmam gereken birşey daha çıktı. 2. Ben böyle birşey yapmak istiyordum bak bu gerçekten önemliyiş. O zaman ben de bu işe hemen başlayayım."

> "It depends on the instructors' viewpoint: 1. The University is trying to impose something. Now, there is another task that I should perform. 2. I was planning to do something like this and now I see that it actually is important. So I'll start working on it immediately."

In addition to these two different arguments, the same person also pointed to a third viewpoint of experienced users. According to him;

> "Üniversitede o düzeyde bu işi ciddiye alıyorlar diye düşündüm. Ben bu yolda ilerlemeye devam edeyim dedim. Ama sonra beklentiniz artıyor. Madem çok önemli gerekli kaynakları da saglayın diyorsunuz. Bir anlamda rahatlıyorsunuz, bu sistemi herkese duyuruyorlar diyorsunuz, bir yandan da beklentiniz artıyor."

"I thought that the use of CMS was taken seriously at the provost level. I decided to continue working in this direction. But then your expectations increase. You think that if it is so important, they have to provide the necessary facilities and resources. On the one hand, you get relaxed and say that they are introducing the system to everybody, on the other hand, your expectations increase".

Mentioning the strong influence, also there were some criticisms about the effect of the provost. One of the interviewees said that

I think it is more motivating to see instructors other than provost level. I was more motivated by other instructors' presentations. For other instructors, knowing provost is supporting this system will effect positively. It gets people using Moodle. Whether people are doing it willingly is a different question. It will increase the use of Moodle, but the reason will not be the right reason for some of the instructors.

Effect and power of the position:

Some of the interviewees think that being introduced to a new technology or a new technique by a person from university administration would have a greater impact on the instructors' intention to use CMS. It seems to vary according to instructor profiles. Some of the comments are listed below in order to show this influence and variety of viewpoints or profiles;

(1) "Abdullah Bey bölümlerde 4-5 yılda bir toplantı yapıyormuş. O toplantıda nasıl daha iyi öğretmen olabiliriz diye bir sunumdu. Geniş bir bölümünü Moodle'a ayırdı. Bu kadar, okulun baş yöneticisinin, öğretmeninin önerdiği bir şeye bakmamak olmadı. … Abdullah Bey'in tanıtımı olmasaydı sanırım yine niyet ederdim ama birşekilde sistemin tanıtılması gerekirdi".

"Abdullah Bey (the provost) hold meetings with the departments once every 4 -5 years. And that meeting was a presentation about how we can be better teachers. A great part of the presentation was devoted to Moodle. It would not be nice not to consider what the head manager and the head teacher of the university was pointing to. ... I would probably still think of trying it if Abdullah Bey had not made that presentation, but somehow the system would need to be promoted".

(2) "Abdullah Bey sunmasaydı, olumlu olarak aynı etki olmazdı. Benim gibi kişiler için bu mesajın en üst düzeyden verilmesi önemli."

"If the provost had not made the presentation, it would not have had the same positive effect. For people like me, it is important to get the message from the top level".

(3) "Daha ciddiye alıyorlar. Bilkent'te bir hiyerarşi var. Provost ne derse dikkat edelim gibi bir algı var. Özel üniversitelerde herzaman patronun düşüncesi önemli oluyor. Bölüm başkanı aynı sunumu yapsa o kadar etkili olmazdı."

"People take it more seriously. There is a hierarchy in Bilkent. There is a general perception like "We have to pay attention to whatever the provost says". In private universities, what the top level administrators think is always considered as important. If the same presentation had been made by department chairs, it would not have had the same effect."

(4) "Başka bir öğretmen yapsaydı benzer bir etki yaratabilirdi ama en üst düzeyde olması daha önemli."

"If it had been presented by another instructor, it might have had a similar effect but it is more important to be done by someone from the top level".

Effect and power of content or message (from a role model):

Some of the interviewees referred to the power of the content of the presentations over their intention to use CMS. Some of these interviewees also referred to the power of position but emphasized the content and the instructor identity of the provost. In order to show the emphasis on the content contrary to the position and the variety of viewpoints, some comments from the interviews have been listed below. In addition to the provost's personal presentations to departments, the second activity, which includes 7 other instructors' use of CMS, were also referred to in these comments.

(1) "Tanıtımın içeriği etkili oldu açıkcası, ama provostun sunumu özellikle güzeldi. Onu provost olarak değil, öğretim üyesi olarak dinledim. Ama onun öğretim üyesi olarak iyi bir örnek olması etkili olabilir. İyi ve gerçek örnekler önemli. Rektör de olsa öğretim üyesi de olsa iyi yapanları görmek önemli."

"Actually, the content of the demonstration was effective, but the provost's presentation was especially good. I listened to him as a member of faculty not as a provost. But, his being a good example of faculty may be effective. Good and real examples are important. Whether it was rector or a faculty, it is important to see good implementers."

(2) "Abdullah Bey'in bölüm tanıtım toplantısına ve sonra diğer öğretmenlerin yaptığı tanıtıma katıldım. Değişik ders işleme imkanları sağlayabileceğinden etkilendim."

"I have attended the provost's departmental meeting and then the other introduction activity by the other instructors. I was affected by the possibility of applying alternative course designs".

(3) "Abdullah Bey'in tanıtımı olumlu etkiler, çünkü zaten kendisi iyi bir öğretmen olarak biliniyor."

"The provost's presentation makes a positive effect, because he is also known as a good instructor."

As part of the content and context of use, seeing the applicability of a system also seems to be critical according to the interview results. The instructors' comments listed below show that seeing the applicability was important. They also show that the message with the power of the position is much more efficient on some instructors' intention to use.

(4)İkinci büyük toplantı uygulanabilirlik açısından çok etkili oldu. İlk toplantı "yapmanızı istiyorum" idi. Diğeri yapılabilirliğini gösterdi.

The second main meeting was very effective in terms of applicability. The first meeting communicated the idea "I want you to use it", the second showed that it was applicable.

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(5) Provost kendi kullanımını anlattı, hoca olarak nasıl kullandığını anlattı. Bende şöyle bir izlenim oldu; "Provost bu kadar işinin arasında bu işle uğraşmış, faydasını görmüş. O yapabildiyse biz de yapabilir, faydalar edinebiliriz" diye düşündüm. Bende hiç "provost geldi yapın" dedi gibi bir izlenim olmadı.

"The provost shared his way of using it, he told how he used it as an instructor. It left me with this impression, "the provost, although he has lots of other work to do, worked on this system and benefited from it. If he has achieved this, then we can do this and benefit from it, too." I didn't think like "the provost came and told us to do it".

(6) "Ben kendi adıma çok etkilenmiştim çünkü Abdullah Bey'i provost olarak daha çok idarecilik yönü ile tanıyordum ama o sunum esnasında aslında Abdullah Bey'in de benim gibi bir hoca olduğunun farkına vardım. Hatta, belki de benden çok daha fazla dersine önem veren bir hoca olduğunu farkettim. Gecenin ikisinde öğrencilerini forum ortamında takip ettiğini görünce çok etkilenmiştim. Koskaca provost, bu kadar işinin içinde, dersi ile ilgili bu kadar özenli şeyler yapıyorsa, benim de mutlaka yapmam lazım diye düşündüm. Beni çok fazla etkiledi. Başka bir kişi yapsa o kadar etkili olamayabilirdi. Gene hayranlık duyardım. Ne kadar iyi kullanıyor derdim. Hem hocalık yapıyorum, hem idari iş yapıyorum diye söylenen bir insandım. Ben o hafta kendimi kötü hissettim açıkcası. Sonuçta yapılabilir hale geldi."

I was affected a lot myself because I knew Mr. Atalar mostly with his provost identity, but in that presentation, I realized that he was also an instructor like me. In fact, may be he cared about his courses more than I did. I was influenced by his use of forums to follow the students' activities at 2:00 am. I thought that, "If the provost could be so meticulous in his work within all his heavy workload, then I need to do something like that too". He affected me very much. If any other person had introduced it, it may not have had the same effect. I would still have appreciated and said, "They use is so well". I used to be person who complained about doing extra administrative work in addition to being an instructor. That week I actually felt bad. Then, using CMS turned into an applicable issue for me.

Is it overemphasized? What are the effects?

While conducting the interviews, the researcher observed that some instructors thought that CMS had become too popular and it was overemphasized. Since the

researcher was suspicious about the effect of a possible overemphasis, he decided to question it. The results are summarized as the items below:

- According to most of the interviewees (8 interviewees), the use of CMS was not over-emphasized. Three of eight interviewees also mentioned that it would be positive if the use of CMS was over-emphasized.

- Two of the interviewees said that it was overemphasized and they had felt a degree of pressure to use it.

- One interviewee rephrased the argument by saying that "it was not over-emphasized but everything was too fast". Many workshops or activities were organized in a short period of time. Moreover, a quick adaptation was expected from instructors. He also said that any suggestion from the university administration level might turn into pressure by the time it reaches instructors.

Should the administrators evaluate instructors' use of CMS?

Evaluation is one of the critical processes of administration. Therefore, the researcher decided to question it in terms of leadership and relevant policies.

When asked, the majority of the interviewees (8 over 14) expressed that administrators should not evaluate the use of CMS. According to them, evaluation of the performance of the course is much more important than evaluation of the methods used in those courses. There are mechanisms to evaluate the courses and instructors like "student course evaluations" or "faculty annual evaluation forms". The use of CMS can be evaluated in these mechanisms and there is no need for a separate evaluation.

Three out of 14 interviewees were not sure about the benefits and risks of the evaluation in an academic environment. Recognition of effort was on one side,

and threatening academic freedom or de-motivating the instructors was on the other.

Similarly, according to 2 out of 14 interviewees, evaluation of CMS usage was not so critical and it could be evaluated through the existing mechanisms. This implies that it could be evaluated but it would not have a high impact in the evaluations.

Only one interviewee said that administrators should evaluate the use of CMS.

Some expressions about the evaluation of instructors are presented below:

> (1) "Some instructors have been teaching for such a long time that they are so comfortable what they teach. It is difficult for them to learn a new style of teaching. If it was evaluated, I think there have to be a lot of university support and departmental support not for only using CMS but helping instructors to learn new methods of teaching. Otherwise it will not be fair."

> (2) Takip etmek çok zor olacaktır çünkü çok rahat bir şekilde göstermelik birşeyler yapılabilir. Bu tamamen öğretmenin kendi vicdanı ile, ne kadar vermek, ne kadar almak istediği ile ilgilidir.

> It will be very difficult to track because it is very easy to do something fake. This is completely related with the instructor's conscience and how much he/she wants to give or take.

> (3) Bence değerlendirilen herşey onu plastikleştirir. Sistem o öğretmenleri tanımaya çalışırsa zaten bütün öğretmenler o öğretmenlere dönüşür. Çünkü sistemin baskısı olmuş olacak. Dolayısı ile aradaki farkı bir daha göremezsiniz. Hiçbir öğretmen o listede olmamayı göze alamaz. O zaman tamam değerlendiriyoruz ama niteliğini nasıl değerlendireceğiz noktasına gelecek. Halbuki gerçek anlamda öğretmen bunu kendisi için ve öğrencileri için yapmalıdır.

> I believe that everything that is evaluated will become plasticized. When the system tries to recognize the instructors using CMS, all instructors will turn into those instructors. Because there will be a pressure of the system. As a result, it will not be possible to see the difference any more. No

instructor can take the risk of not being in that list. Then, you will find yourself in need of evaluating the quality. In fact, a real instructor should do this for himself/herself or for his/her students.

Is there anything that university administrators or department chairs should do to support the use of CMS?

According to the interviewees, the support, training events and promotion of the system was satisfactory in the university. The university or departmental administration should support instructors and consider some issues as their responsibilities. The frequently repeated issues in the interviews can be summarized as below:

- Administrators should introduce the CMS infrastructure and give necessary information in the orientation period of new faculty members.

- Department chairs should encourage and motivate instructors for effective use of new techniques and technologies like CMS.

- Technical and physical infrastructure should be sufficient. University administrators should make investments for servers and relevant systems; deans should consider supplying satisfactory number of technology-enhanced classes (having a computer and projector) or computer labs not only for instructors but also for students.

- Workshops or events to share instructors' ways of using CMS should be repeated annually and they should be organized by a specific unit or university administration.

In addition to these, the interviewees also explained some other concerns with the expressions below:

(1) Moodle sistemini aşırı aktif kullandığınızda öğrencilerin de işi artıyor. Altı ders alan öğrencilerin hepsinde de yoğun bir Moodle kullanımı sözkonusu olursa bu sefer öğrencilerde de ters tepki yaratabilir. Belki kritik dersler belirlenip onlarda daha ağırlıklı kullanılabilir. Bölümler öğrencilerin işyüklerini ortak bir şekilde hesaplayıp ona gore bir politika belirleyebilirler.

When you use the Moodle system extremely actively, then the workload of students increases. If Moodle is used intensively in the six courses of the students then it could lead to adverse reactions on the part of the students. Some critical courses can be determined and Moodle can be used more actively in those courses. Departments can calculate the workloads of the students and may develop policies accordingly.

(2) Çok deneysel bir şekilde ders işlemek isteyen öğretmenler çekinebilir. Ben kafamda tasarlarken değişik modeller ortaya çıkıyordu. Bir kısmının sanki çok başarılı olma şansı yüksek olmayabilir. Böyle bir risk alındığı zaman bunun olumsuz sonuçlanması durumunda universitenin buna toleranslı baktığının daha net bir şekilde anlatılması. Gerçi Abdullah Bey'in yaptığı sunumda onun çok farklı bir şekilde kullandığını görünce böyle bir fikir doğuyor. Değişik bir şekilde kullanılmaya açık olunduğu, üniversitenin buna olumlu baktığı anlaşılıyor ama belki bu daha net bir şekilde söylenebilir. Kurumsal olarak belki açıkca yazılabilir.

Instructors who want to use it experimentally may hesitate. When I was planning in my mind, different models appeared. Some of them seem to have a low chance of not being quite successful. When such a risk is taken, it is necessary to clearly communicate that the university views this with tolerance in cases of failure. Actually, from the provost's presentation a similar idea can be gathered when one observes how differently he used it. It can be understood that the university is open to different uses and is positive to such cases. However, this may be explained in a more clear way. May be it can be written officially.

4.3.5. Ease of use and contextual factors

The quantitative results showed that ease of use of CMS was strongly related with both perceived usefulness (direct effect = 0.37) and intention to use (direct effect = 0.20 and total effect = 0.39). Similarly, interview results showed that user-friendly interfaces and reliability of the system were among the greatest expectations of the instructors. A further expectation expressed by the instructors

was flexibility of the system. Another concern that might be encountered regarding ease of use of the system was integration with the institutional information systems. An experienced CMS user expressed that the efforts for integrating student enrollments or other critical issues with the university's existing systems was a wonderful attempt. A few other interviewees also gave importance to this integration and said that having everything in one place and integration was very helpful.

The researcher questioned the effect of course content and class size on the intention to use CMS. Nearly all interviewees mentioned that CMS could be used in any course but with a different frequency. The way of using CMS can change according to the content but in one way or another it can be meaningful for all courses. A few instructors stated that in courses where writing a lot of formulas is required it may be difficult to use CMS, but still it can be used for communication.

Similarly majority of the interviewees thought that the class size would not be too critical for the use of CMS, but for larger classes the use of such technologies would be more meaningful. Some of these instructors stated that if their class was too small, they might decide not using the CMS for that course.

These results show that ease of use is a critical factor and the contextual differences may not be a strong threat for perceived easiness. On the other hand, it is important to underline that ease of use not only refers to user interface design of the CMS but also refers to environmental issues such as system integrations, ease of access to computer labs or technology-supported classes.

CHAPTER 5

DISCUSSION

5.1. Summary and Interpretation of Research Findings

The aim of this study was to examine a model in order to explain the faculty intention to use CMS in higher education. Through examining this model, the results briefly indicated that instructors' intention to use CMS was directly and indirectly affected by perceived personal benefit, perceived usefulness of CMS, perceived ease of use, and availability of training and support. The model also included another factor, application based computer self-efficacy, which had an indirect effect on CMS use.

As described in the results chapter, the assessment of the model showed a mediocre level of fit. This result supports the researchers' point of view represented in the model. According to the results, behavioral intention to use CMS can be expressed with the equation below. This equation is represented in a mathematical format just to compare the power of impacts of variables and to show that intention to use is affected from all variables considered. This representation means that instructors intention to use CMS is mostly related with perceived personal benefits and perceived usefulness which then is followed by ease of use of CMS and instructors' application specific computer self-efficacy. Availability of training and support seems to be slightly related to the intention to use CMS. The formula includes total effects calculated through SEM technique as coefficients of the variables.

$$\text{Intention to use CMS} = 0.60 * \text{Perceived Personal benefit}$$
$$+ 0.52 * \text{Perceived Usefulness (course/task related)}$$
$$+ 0.39 * \text{Ease of use of CMS}$$
$$+ 0.36 * \text{Computer self-efficacy (CMS related)}$$
$$+ 0.06 * \text{Availability of training \& support}$$

The interviews, which were conducted in order to understand the weaknesses and strengths of the interrelationships of factors in the model, showed that some other critical constructs or approaches are worth considering for a better faculty intention to use CMS technology. Leadership, promotion and sharing example uses can be given as examples of these constructs and approaches. Moreover, the interview results showed that some of these constructs could have different meanings for the faculty with different profiles. Below, these findings are discussed under different sections.

Comparison with Technology Acceptance Model

Variables from TAM and a few others are used while developing the examined model. It was remarkable that the direct relationship between perceived usefulness and the behavioral intention to use was found to be weak when the relevant findings of this study were compared with the technology acceptance model (excluding the newly added factors). Davis (1989, p. 333) reported, "One of the most significant findings is the relative strength of the usefulness-usage relationship compared to the ease of use-usage relationship." Moreover he added that, "usefulness was significantly more strongly linked to usage than was ease of use" (p. 333). These seem to be conflicting with the literature but this situation can be explained through discrimination of direct, indirect and total effects with the interpretation of including another variable 'perceived personal benefit', which will be discussed in the following section.

Other relationships were significant and explain the relationships similar to the technology acceptance model. As an external variable of TAM, computer self-

efficacy was related with both perceived usefulness and perceived ease of use. Perceived ease of use had a significant relationship with perceived usefulness, and it also had a significant relationship with behavioral intention to use CMS. Figure 5.1 shows the interrelationships between the factors taken from TAM. The values in Figure 5.1 are the estimation coefficients (direct effects) obtained in this study. In this diagram, weak relationships were shown as dot-lines. This weakness is explained in the following section since Figure 5.1 does not include another factor related with that explanation.

Similar to TAM, the results of this study showed that instructors' perception of easiness of a system affects the usage and is affected by their self-efficacy in using CMS and computers. Moreover, perceived ease of use directly affects perceived usefulness and as a result indirectly affects the usage of CMS through perceived usefulness. The interview results support these findings. For example, user-friendly interface, reliable services and flexibility of the software were issues that were emphasized and given importance by the instructors.
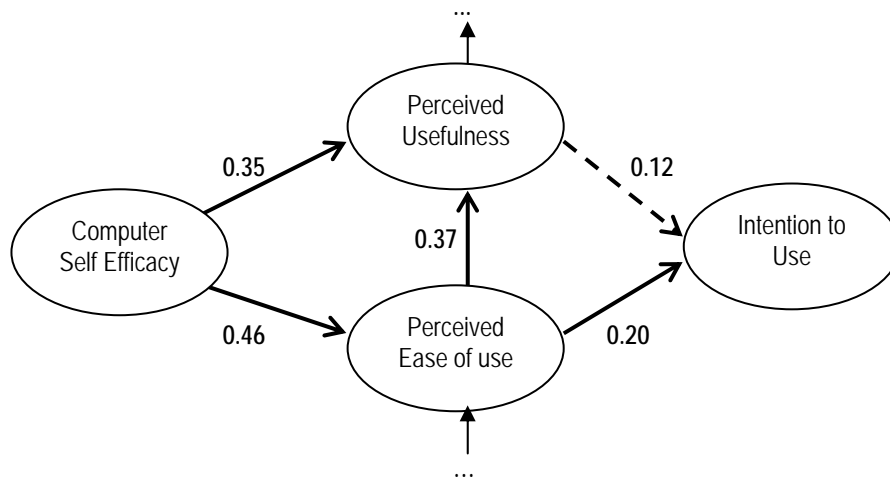
Figure 5.1. Results about factors taken from technology acceptance model

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Perceived usefulness and perceived ease of use are affected by computer self-efficacy of the instructors. During the interviews, many interviewees thought of categorizing the instructors, according to their comfort in using technology or computers. They believed that their colleagues who were not comfortable with using computers would resist using CMS.

Perceived personal benefit and perceived usefulness

While explaining the technology acceptance model, Davis (1989) reported that usefulness had a greater correlation with usage behavior than ease of use. In this study, the researcher tried to discriminate perceived personal benefits from task (course) related perceived usefulness. As seen in Figure 5.2, although the direct effect of perceived usefulness is weak, there is a strong relationship between perceived usefulness and perceived personal benefit.
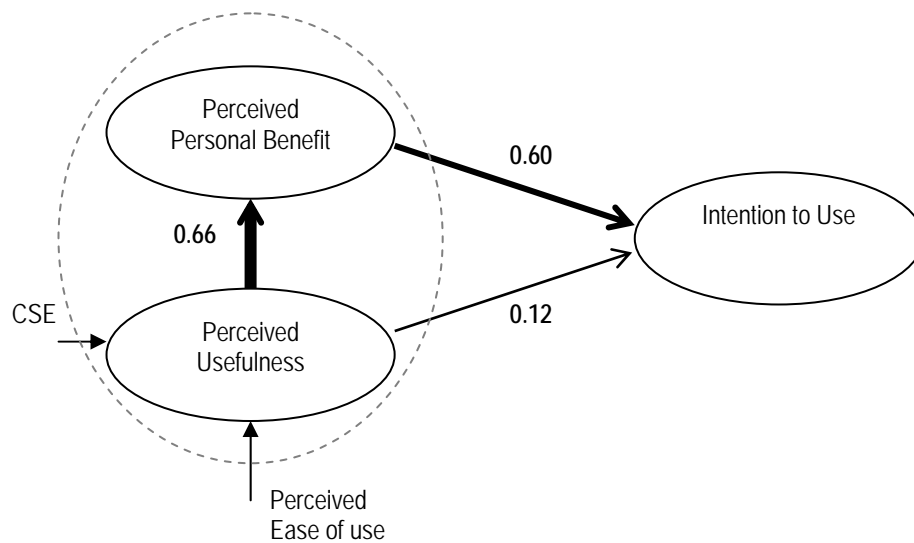
Figure 5.2. Discrimination of PU and PPB

Considering this strong relationship, it can be said that perceived usefulness has a weak direct effect on usage but has an important indirect effect through perceived personal benefit. These two factors can also be thought as one general factor because of this strong relationship. From this point of view, the findings show consistency with the technology acceptance model. The indirect effects also support this explanation. As shown in Table 4.11 the indirect effect of perceived usefulness on intention to use CMS is found to be 0.39, which shows a strong relation.

As explained in model development section (chapter 2), separating task/course related usefulness from personal issues by adding the 'perceived personal benefit' factor seems to be meaningful. On the one hand, it can be thought that personal benefit and usefulness are closely related with each. On the other hand, a differentiation should be considered since majority of the influence of perceived usefulness appeared to be indirect through the 'personal benefit' factor and its direct influence was relatively low. In interpreting this result, it can be speculated that the task related features that were perceived as useful should also be perceived as personally beneficial to be effective on behavioral intention to use CMS. In other words, without seeing benefits for themselves, instructors may reject to use CMS, although they accept that it can be a necessary instrument for their courses.

The findings from the interviews showed a contrasting result that most of the instructors placed relatively more importance to course related usefulness than personal benefits. Four of the six most frequently made arguments for benefit and usefulness were course related arguments. These findings can be related with a few points such as (1) selected interviewees' values and tendency to perceive task/course related issues as personal benefits, (2) varying profiles of the interviewees and respondents, (3) or with the desirability of being seen as an instructor who uses CMS for course related reasons but not for personal benefits.

It should be seriously considered that some interviewees expressed the importance of personal benefits and stated them as reasons for use. Moreover, some interviewees also expressed that they felt a sort of pressure for using CMS. Since most of the participants of this study and interviewees were voluntarily using CMS, arguments about pressure to use CMS should be considered seriously although just a few interviewees made reference to it. Starting to use CMS voluntarily may be accepted as evidence of seeing personal benefits in the course/job related issues. Therefore, considering these few arguments, it can be expected that when there is a sort of administrative pressure or a top-down strategy (instead of voluntary use) is applied, the importance given to personal benefits may increase. At that point, the value of separating personal benefit from course related usefulness might be clearer. Morgan (2003) underlines that faculty members' responses to efforts to facilitate their CMS use were much better than they do directives. She concluded that 'faculty members need to be persuaded' and 'Administrative leadership is important and practice of relying on faculty to adopt technology on their own speed is not sufficient'. These arguments show that a sort of pressure may be necessary but it is more important to do this through persuading instructors or through facilitation. Further studies may be designed to understand the level of pressure that is necessary for faculty intention to use or their adoption of CMS.

Availability of Training and Support

Another factor examined in the model was the perceived availability of training and support, which can also be considered as the level of expectations from training, and support. This was considered to be effective in CMS usage, with the idea that many of the instructors might not have relevant skills and enthusiasm for integrating CMS into their courses. Instructors those are brave to start CMS by themselves are expected to have high CMS specific CSE. But generally the number of such instructors is not expected to be high especially at the early periods of adoption of a new technology. Most instructors may require training and support to go on using or to decide starting to use CMS. Especially in the

context of institutional use, when the use of CMS is encouraged at the management level, getting no support or training may be given as reasons for not using CMS. Thus, availability of training and support is considered to be critical for CMS usage. As discussed in chapter 2, Morgan (2003b), Harrington, Staffo and Wright (2006) expressed great importance about training and support that is parallel with this study.

As reported in the results chapter, availability of training and support is significantly related with perceived ease of use. However, its relationship with the intention to use CMS is weak and it is nearly unrelated with the computer self-efficacy of the instructors. Figure 5.3 shows the relationships between training and support and the other factors.
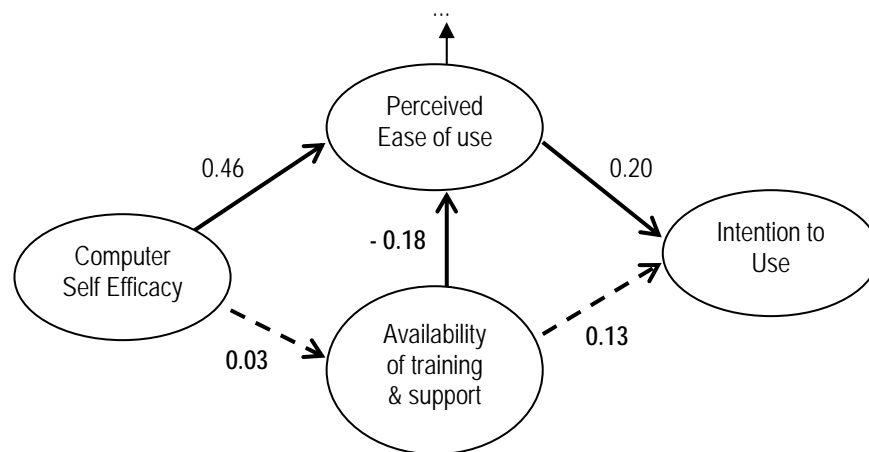
Figure 5.3. Interrelationships about the availability of training and support

Training and support expectations and effect of knowing their availability were questioned during the interviews since the researcher was expecting to see stronger relationships. Despite the weak relationships found in the quantitative data analysis, interviewees generally emphasized the importance of training and

support mechanisms and a set of varying arguments as summarized in the results chapter. One of the most frequently mentioned arguments was related with variety of expectations and needs, which changes according to the profile of the instructors.

These contradictory findings can be explained by interpreting the role of training and support mechanisms. As a factor, training and support may not be meaningful in terms of deciding to use CMS but it may be meaningful in terms of continuing to use CMS or in terms of not giving up using CMS. During the interviews, the importance of promotion and seeing real courses or successful examples were the topics that appeared repeatedly. This will be discussed later but it is important to emphasize that promotion and seeing example courses may influence people's decision to start using CMS but training and support mechanisms become critical after deciding to use CMS. Parallel to this conclusion, Haymes (2008) offers three strategies to overcome resistance to technological change. Initial one says that first technology must be evident to user as potentially useful in making his life easier which is possible through promotions without training sessions. Second, technology must be easy to use and an onion approach should be applied. Initial layer of features should be fairly simple to use. Applying such a strategy means people will start (means decide to start) first and later, as the layers of onion, the support and training should be applied. However, Morgan (2003a) said that 29% of faculty stated that training was effective for their initial adoption of CSM. Further study can be designed to understand the conditions underlying such different results.

Availability of (or expectations from) training and support mechanisms is nearly unrelated with computer self-efficacy. In other words, two instructors with different levels of computer self-efficacy will have similar levels of expectations regarding training and support. It will not matter whether they think that it is mandatory or disregarded. However, it is important to know that they will think in similar lines. Evaluating this interpretation and the interview results together, it

can be concluded that regardless of computer self-efficacy, instructors give importance to (and expect a sort of) training and support mechanism. However, the expectations about details of training and support can change according to different instructor profiles. This finding is consistent with the most of the literature. Nearly all studies emphasized the importance of training, it can be concluded that different settings or studies does not change the importance of training and support.

Another interesting finding is the negative value of the relationship between 'perceived ease of use' and 'availability of training and support'. At the beginning of the study, it was claimed that knowing the possibility of getting support and training would encourage instructors and may have an influence on the decision of using CMS. Similarly, it would have a positive impact on perceived ease of use of the system. However, the negative value of this relationship shows a different viewpoint, which states that instructors may perceive the availability of training and support mechanisms as evidence of the difficulty to use CMS.

Perceived Ease of Use

Perceived ease of use is one of the important factors related to the CMS usage. This finding is parallel with TAM studies as explained before. It has both direct and indirect effects on the intention to use. Ease of use can be considered in several terms such as 'having a user-friendly software', 'providing a reliable system and infrastructure', 'providing a flexible system' and 'providing satisfactory level of features'. It is also important to see the ease of use not only in the context of software use but also in the context of implementation process. Morgan (2003a) also emphasized that CMS is a sort of ERP and discussed the issues regarding that it is an information systems. She presented some factors which serves to slow or fasten the adoption. For instance, one interviewee expressed that writing a lot of mathematical formulas can be difficult and can discourage instructors from using CMS. Similarly, some interviewees said that they should not be competing for computerized classrooms. Therefore, not only

the software but also the infrastructure, environment and relevant services should be easy to reach and easy to use.

Powerful approaches affecting CMS usage

The examined model aims to explain intention to use with five interrelated factors. In addition to these factors, some powerful approaches were observed during the interviews and extracted from the interpretations. The concepts related to leadership, promotion, sharing example courses and awareness of different profiles help to interpret the findings and to reach some practical conclusions.

In this study, it was observed that the provost's departmental meetings and a follow up event organized to share experiences seem to have motivated many members of faculty. This is consistent with the findings of Morgan (2003a), which say, "strong leadership by campus executives and department chairs plays in shaping and encouraging faculty to use CMSs" (p.10). She also reported that 7 percent of the respondents were started to use CMS due to departmental or administrative pressure. In Bilkent University case, some aspects of these activities seem to be critical. These departmental meetings included promotion of 'active learning' and presented CMS as a necessary tool. The emphasized subjects in these presentations were (1) comparing conventional methods with active learning, (2) the characteristics of new generation learners (digital natives), (3) the provost's experiences and benefits, and (4) briefly introducing the availability of CMS and relevant support mechanism. The second organized event was before the next semester began. The provost and 7 other instructors shared their experiences. Each instructor presented a different use or feature of CMS. These instructors had different field of interests and different backgrounds.

Leadership and various policies were questioned in order to understand the faculty expectations and the effects of these activities. The important conclusions based on the interpretations of these findings can be listed as the following: (1) Promotion of the system is important, (2) Sharing experiences is important, (3)

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There are rather different faculty profiles, and (4) Leadership in different contexts is needed.

Although it may not be a direct reason, promotion of the system is an important approach. Promotion of the second CMS (Moodle) was much more effective than the first one (eCampus). One of the underlying reasons can be the focus of promotions. First CMS was promoted as a necessary tool and generally the promotion was focused on the features of the software, but the promotion of second CMS was focused on active learning and being a good teacher. Software was introduced as a part of it. Since perceived personal benefit and perceived usefulness together is effective on the intention to use, a promotion activity that is focused on teaching-learning processes can be more meaningful in terms of seeing the benefits. Another underlying reason can be the power of presenter. The provost was the presenter and it is clear that the first message taken by the faculty was "this is important". The sources of this power of promotion change according to different profiles of faculty. The power of the presenter can come from (1) being the provost, (2) being a role model, or (3) having a well-designed message. In summary, an efficient promotion of CMS can be a practical approach to support perceived personal benefits, perceived usefulness and perceived ease of use.

Another effective approach without being a reason is sharing the experiences and presentation of real example courses. One of the critical aspects of the provost's meetings was sharing real life examples. The second event included more example courses of different instructors. All interviewees were in consensus about the value of seeing example courses. One of the critical issues of sharing example courses is providing a satisfactory number of alternative uses. Since faculty with different profiles may have different needs, it is important to cover examples from different levels of use for different contexts. Some interviewees suggested that events for sharing experiences should be organized in a regular manner. For instance, it can be organized annually. Organizing such activities and sharing

experiences will be a practical approach to support perceived personal benefits, perceived usefulness, and perceived ease of use. Moreover, it may support computer self-efficacy since seeing colleagues' work may turn it into a more achievable task. Also, shared experiences may result in inspirations, which mean a sort of training and support. This approach observed in this study is parallel with Morgan's (2003a, p.12) findings which expresses that, "having another faculty member to demonstrate how they use CMS in an actual class" as an important element of faculty training on CMS" and also she says that "faculty start to use CMS in response to learning from peers".

From the organizational change viewpoint, leadership is always an important factor. Carr, Hard and Trahant (1996) state that "Without continuous, committed, active leadership organizational change does not succeed" (p. 115). One question is who will lead the necessary activities: Should it be the provost as happened in the Bilkent University case, or are there other possible stakeholders that should be considered within the concept of organizational leadership?

Some of the faculty members were influenced from the provost as a role model or as a successful instructor more than his manager identity. Some other members of faculty expressed that if the department chairs had made the same presentations, they would not have created the same effect. One more time, this situation can be explained with varying profiles of the instructors. From the interviews it was seen that the same message can have different meanings for different profiles. Messages given by a university administrator can result in more powerful messages and show the importance given by the administration. This may result in feelings of reliability, being owned and being supported institutionally on the one hand and feeling some sort of pressure on the other. Messages given by a successful instructor can result in inspirations, realizing usefulness and benefits of using CMS, and feeling its achievability (in terms of CMS/computer self-efficacy and ease of use).

In Bilkent case, leadership, being as a role model and being as a top-level administrator at the same time, was effective on many of the faculty members' decision to use of CMS. Having both an instructor and a manager identity resulted in conveying stronger messages and reaching faculty with different profiles. Similar to this result, after his visits to several institutions Bates (2000) noted that, "… where technology was being used successfully for teaching, strong leadership was a critical factor. Without leadership and a strong sense of support change in an organization, the barriers of inertia will be too great" (p.43).

Even with such a strong leadership, the role of the support team is also critical. Carr et al. (1995, cited in Luo, 2006) argued that leadership must develop an infrastructure to support and facilitate the change implementation. A team working on improving ease of use, organizing workshops, and providing support should be considered as part of leadership.

People generally make investment when they value something. This can be expected to be even more true especially in an environment one of the characteristics of which is academic freedom. In such environments, both change sponsors (like provost in Bilkent case) and change agents (like support team in Bilkent case) should pay attention to both motivate people and avoid discouraging events or policies. Sometimes suggestions from leaders can be perceived as an attack on academic freedom or can turn into arguments that force them into doing something. While developing policies to support technology diffusion and its use by the faculty, it is important not to lose their interest due to some negatively powerful approaches. As reported in the results chapter, evaluation of CMS usage by itself can be given as an example to these risky approaches.

These approaches seem to be necessary and can be thought as an upper layer of the model. Relating these approaches with the factors included in the model will help understanding the faculty intentions to use CMS technology. While explaining all these approaches and factors in the model, different profiles of the

faculty appeared as another issue. Another powerful approach, which can be thought of as a third layer or as another dimension, will be determining the faculty profiles, knowing about their characteristics and providing alternatives for each group of faculty. For instance, while sharing example courses, different samples from different levels can be presented in order to reach a wide range of faculty. Another example can be organizing different workshops according to time limitations and expectations of the faculty.

Summary

All interpretations of the questionnaire and interview results lead to a viewpoint that can be summarized as below;

Intention to use CMS is mostly related with seeing some value in using CMS including both personal and task/course related reasons. In addition, the use of CMS should be perceived as easy which is directly influenced by the computer self-efficacy of the instructors. These factors may encourage instructors to start using CMS. However, it is also critical to have institutional training and support mechanisms for a more meaningful use or to prevent people from giving up their decision to use. As powerful approaches, promoting the system to faculty, organizing events to share experiences and real life examples, and communicating the vision through leadership would facilitate use of CMS. Some issues and related policies, which may differ according to the institutions, like 'reliability' or 'academic freedom' should be considered carefully while trying to support the use of CMS. To support relevant institutional change it is important to be aware of the existence of different faculty profiles. Similar to comfort in using computers, other criteria can be used to understand expectations and characteristics of different faculty profiles. These profiles should be considered while organizing any event or while developing supplementary tools or materials.

5.2. Implications and suggestions for the practitioners

Based on the findings and discussions, the following recommendations are offered for supporting faculty in order to make them use CMS technology. Some of the recommendations below have not been directly related with the concepts discussed above but they have been related with the expectations of instructors, which were gathered through interviews.

While deciding on activities and developing relevant policies in the universities, it is important to consider all factors and relevant approaches explained in this model. For instance, a user-friendly CMS may have a great effect but will not mean a satisfactory diffusion of new technology when other factors are neglected.

First of all, stakeholders (like university administrators, department chairs) should help faculty to see and feel the personal benefits and task related usefulness of using CMS. Here, it is also important to underline that for most of the instructors, perceived (task/course related) usefulness may also be meaningful in terms of personal benefits.

It is better to determine the contexts and discriminate different profiles of the faculty. These profiles should be determined according to some criteria regarding the use of CMS technology and the relevant goals of the institution. These profiles could be necessary for almost all of the following activities for better CMS use by the faculty.

University administration should make investments on the software, infrastructure and services provided. User-friendliness of the CMS, reliability of the software, reliability of the infrastructure, and flexibility of the CMS are important issues that should be solved through careful selection of CMS (or careful design and development of CMS). Besides CMS selection, setting up an official support team may also help. While selecting or developing a CMS, it is important to have

alternative CMS features to enhance communication and delivery of course material, since the points were the most requested facilities in the study.

Promotion of CMS should be carefully designed. It should clearly show its benefits to the faculty and the useful aspects that it can provide to their courses. Focusing on outcomes and teaching-learning processes would be better than focusing on the features of CMS. Presenting successful and real life examples, including the cost of using CMS in such a course, will increase the strength of the promotion. For the new faculty, the best time for this promotion is the faculty orientation programs and it would be better to explain the importance given by the university or departmental administration.

Basic training sessions for the CMS software should be designed in the simplest form, preferably repeated 7 to 15 days before the start of each semester. The aim of the introductory level training should just aim to make the faculty start to use the system. This means that only the basic features like CMS interface, uploading a document, giving link to a web site, and starting a forum should be covered. This suggestion was already implied in Bilkent University and feedback taken from instructors who attended the workshops was very positive.

It is better to have an official team or people who provide support and organize necessary training sessions. The instructors should be notified about the existence of such a team. Instructors prefer to know the individuals from whom they will request support than sending messages to a mail-list. Thus, publishing information about the members of the support team may be motivating for them.

Although there is an official support team, many instructors may prefer to ask their colleagues in their own departments, who are good at using CMS and close to them. Department chairs can firstly encourage and support enthusiastic instructors to start using CMS in their courses and have role models in their departments.

The university administration should encourage instructors to share their experiences about the use of CMS technology. Shared examples should target different profiles and different levels of CMS use.

Administrators should develop policies for supporting faculty in their use of CMS. While developing policies, evaluating the use of CMS is a critical decision. It is better to evaluate CMS usage while evaluating the course. A specific evaluation of CMS use may result in fake uses of CMS. Copyright issues, workload calculations and similar items should be involved while developing relevant policies.

5.3. Recommendations for further research

This research provides bases for future studies whose aims will include CMS related issues. It can also be used as an example for studies whose research design include mixed-method approach or apply the structural equation modeling technique.

Research studies on better adoption of CMS are needed in the field of higher education. This study was focused on the instructors' intention to use CMS. Issues for the phases after deciding to use CMS, or other user types can be focuses of similar studies. For instance, students' adoption to CMS usage can be studied.

One of the discussions above was related with the profiles of instructors. In order to support instructors' intention to use CMS in their courses, some services should be defined and started. In order to increase satisfaction and institutional achievement, the profiles of the instructors should be determined. The way or the criteria for determining these profiles can be a research topic.

Separating perceived personal benefit from perceived usefulness (task/course related) as factors affecting intention to use was one of the contributions of this study. At the same time, there is a strong relationship between them. In a further

research, the conditions and criteria that can be used to discriminate 'personal benefit' and 'task related usefulness' can be investigated.

The factors affecting students' intention to use CMS can be another research question. Students do not decide to use CMS by themselves, but their instructor decides whether or not to use CMS as part of the course. Therefore, students' expectations from using CMS and the factors affecting their willingness to use CMS can be interesting subjects for the future studies.

The present research can be repeated in a wider range by reaching faculty from different universities. In this way, the expectations of the instructors and the factors affecting them can be compared on the basis of the varying strategies employed by universities.

The expectations of faculty from the instructional technology team that gives CMS support can be another research topic.

Further studies may be designed to understand the level of pressure from administrators that is necessary to understand faculty intention to use CMS.

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APPENDIX A

APPROVAL FORMS

FORM 1: BILKENT UNIVERSITY PROVOST OFFICE APPROVAL

Bilkent Üniversitesi Akademik İşler Rektör Yardımcılığına,

Ankara

02.05.2008

Yürütmekte olduğum doktora çalışmasında "Üniversitede ders vermekte olan akademik personelin ders yönetim sistemlerini (course management system) kullanmaları ve benimsemeleri konusunda etkin olan faktörler" konulu bir araştırma yapmaktayım. Bu çalışma kapsamında üniversitemizde görev yapmakta olan ve derslerinde eCampus, Moodle ve benzeri sistemleri kullanmış ya da bir süre denemiş akademik personelden hazırlamış olduğum bir anket aracı ile veri toplamak istiyorum. Anket çalışması sonucunda çıkan sonuçları irdelemek amacı ile 10-15 kişi ile de yüzyüze görüşme yapmayı planlıyorum. Etkin olarak veri toplamak için planladığım dönem Mayıs 2008 - Temmuz 2008 dönemidir.

Hazırladığım anketin etik kurul onayı alınmış olup ilgili belge ve anket ilişiktedir. Çalışmaya başlayabilmem için gereğinin yapılmasını saygılarımla arz ederim.

Can Kültür

Bölüm Başkan Yardımcısı

Bilgisayar Teknolojileri ve Programlama Bölümü

Bilkent Üniversitesi

7.5.08

FORM 2: HUMAN SUBJECTS ETHICS COMMITTEE APPROVAL

Tarih: 22.04.2008
Sayı: FBE: 2008/·ʒ

GÖREVLENDİRME VE İZİN

Bilgisayar ve Öğretim Teknolojileri Eğitimi EABD doktora programı öğrencisi Can Kültür'ün 05 Nisan 2008- 01 Mart 2009 tarihleri arasında *"Yüksek Öğretim Kurumlarında Görev Alan Akademik Personelin Ders Yönetim Sistemlerini Kullanmasını Etkileyen Faktörler"* başlıklı araştırmasına ilişkin ODTÜ ve Bilkent Üniversitelerinde uygulama yapmak için görevlendirme başvurusu incelenmiş; ilgili danışman görüşüne dayanarak adı geçen öğrencinin isteği doğrultusunda görevlendirilmesine oybirliği ile karar verilmiştir.

Prof. Dr. Canan Özgen
FBE Müdürü

Prof. Dr. R.Sezer Aygün
FBE Müd. Yard.

Prof.Dr.Ali Kalkanlı
FBE Müd. Yard.

KATILAMADI

Prof. Dr. Cahit Eralp
Üye

Prof. Dr. Vedat Toprak
Üye

KATILAMADI

Doç.Dr.Cem Topkaya
Üye

APPENDIX B

FINAL STATE OF THE QUESTIONNAIRE

Dear Colleague,

I am a full time instructor at Bilkent University and I am currently investigating the use of "Course Management Systems (CMS)" as a part of my doctoral studies.

By the permission of Prof. Atalar, I invite you to spend about 15 minutes in completing this questionnaire. You have been selected for receipt of this questionnaire because of your previous use (actual or trial use) of CMSs such as Moodle, eCampus, Atutor, Blackboard, etc.

As you know, CMS is a tool that allows instructors to share resources and manage interactions with students through the web. And no one knows the practical problems facing the instructors' use of CMS better than instructors. Analysis of this questionnaire will contribute to my doctoral research as well as eventually providing valuable information for university instructors and administrators.

Your anonymity is guaranteed and you don't need to write your name on the questionnaire. But, **I would appreciate it if you fill and sign the attached "Informed Consent Form" and give to the department secretary or to the person who brought this questionnaire to you**. This information will be used for reporting about the findings of this study to you and for managing the collection of data.

If you need any assistance with any of the questions, I can be contacted by phone or email.

I would like to take this opportunity to thank you for your valued cooperation and time in completing the questionnaire.

Thank you,
Sincerely,

Can Kültür

Instructor, Department of Computer Programming and Technology
Bilkent University

SECTION I: Demographic Information

1. Age: _____
2. Sex: ○ Male ○ Female
3. Academic position:
    ○ Professor   ○ Associate Professor   ○ Assistant Professor
    ○ Instructor   ○ Assistant   ○ Other _____
4. Your department (or its code): _____
5. During a semester, how many hours do you teach per week?
    ○ less than 5   ○ 5 to 9   ○ 10 to 14
    ○ 15 to 19   ○ 20 or more
6. Do you teach the same course(s) in more than one section due to the class size?
    ○ Yes   ○ No   ○ Sometimes
7. How long have you been using (or did you use) a course management system?
    ○ Tried in order to decide but did not use   ○ One semester or less
    ○ Two semesters   ○ One to two years
    ○ More than two years
8. How would you describe your competency level in using a course management system?
    ○ Beginner   ○ Intermediate   ○ Expert
9. How often do you use course management systems in your courses?
    ○ Every semester   ○ One semester per year ○ Never
10. Please mark/write the course management system(s) you used/tried (You can mark more then one choice)
    [ ] Moodle (e.g. Bilkent University Online Courses)
    [ ] eCampus (Bilkent University Virtual Campus)
    [ ] ATutor
    [ ] NetClass (Metu-Online)
    [ ] Blackboard (or WebCT)
    [ ] Other(s)
    _____
11. What were the underlying reasons for your trying/using CMS? (You can mark more then one choice)
    [ ] Educational purposes (e.g. 'Improving students learning')
    [ ] Simpler delivery of learning resources and course outlines
    [ ] Improving communication between the instructor and students
    [ ] Following departmental or institutional policies
    [ ] Other reasons (please be specific):
    _____
12. How would you rate your use of technology (instructional tools and software other than CMS) in your classes?
    ○ None   ○ Low   ○ Moderate   ○ High
13. Please rank the three methods that you most frequently use in your courses; you can write the letter corresponding to the method (like A for Lecturing and B for Questioning) into the blank lines.

A) Lecturing	F) Projects	**From most to least**
B) Questioning	G) Tutoring	**frequent**
C) Discussions	H) Brainstorming	(one method for each line)
D) Reading assignments	I) Student presentations	1. _____
E) Written assignments	J) Group work	2. _____
		3. _____

SECTION II: In this section please indicate your thoughts about the statements below. In each line please mark only one of the boxes from "Strongly Agree" to "Strongly Disagree". While answering the questions below please consider Bilkent Moodle, eCampus and other course management systems (CMS) that you have tried or used for a period of time.	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. If I had only the "system manuals" for reference, I could complete the course related tasks (e.g. Delivery of online materials, online discussions, giving assignment) using CMS.					
2. If I had seen someone else using it before trying it myself, I could complete the course related tasks using CMS.					
3. If I had just the "built-in-help facility" for assistance, I could complete the course related tasks using CMS.					
4. Using CMS enables me to accomplish course related tasks more quickly.					
5. Using CMS improves my performance on the course related activities.					
6. Using CMS increases my productivity on the course related activities.					
7. Using CMS enhances my effectiveness on the course related activities.					
8. Learning to use CMS is easy for me.					
9. I find it easy to get CMS to do what I want it to do.					
10. My interaction with CMS is clear and understandable.					
11. I find CMS to be flexible to interact with.					
12. I find CMS easy to use.					
13. Personalized training for CMS software should be available to me					
14. A specific person (or group) should be available for assistance with technical CMS difficulties when needed					
15. A specific person (or group) should be available for assistance with instructional CMS difficulties when needed					
16. Guidance (e.g. Help desk, online support) should be available to me.					
17. I believe that educators should use CMS for their professional development.					
18. Using CMS has a potential to change educators professional status in a positive manner.					
19. I believe that using CMS will result in working and communicating closer with other CMS users.					

20. My colleagues believe I am an innovative teacher because I use CMS.					
21. Administrators' recognition of my use of CMS is valuable to me.					
22. Incentives would increase my use of CMS					
23. I believe that teaching is more enjoyable when I use CMS.					
24. Using CMS gives me a chance to use valuable teaching and learning strategies that I wouldn't normally use.					
25. Having easy access to CMS, I would use (or already use) it in my courses.					
26. I intend to use (or continue to use) CMS for my future courses.					

SECTION III: If you intend to use CMS in your future courses, please answer questions 1 and 2

1. What will be the underlying reasons? (You can mark more then one choice)
   [ ] Educational purposes (e.g.' Improving students learning')
   [ ] Simpler delivery of learning resources and course outlines
   [ ] Improving communication between the instructor and students
   [ ] Following departmental or institutional policies
   [ ] Other reasons (please be specific): _____
2. How will the CMS be used in your course? Please mark any appropriate choice(s) below
   [ ] As a course web page
   [ ] Blended Learning (Using a blend of face to face teaching with online learning)
   [ ] Online Learning (The whole course is taught online)
   [ ] Others: _____

SECTION IV: If you want to add something about the factors affecting the Instructors' use of course management system; please write them in the box below

Thank you for your cooperation
Can Kültür

APPENDIX C

LIST OF INTERVIEW QUESTIONS

Araştırma Konusu : Üniversite öğretmenlerinin kurumsal olarak sağlanan ders yönetim sistemi kullanmalarını etkileyen faktörleri nasıl açıklayabiliriz?

Görüşmeci   : _____

Tarih ve saat (başlangıç - bitiş) : _____

<u>GİRİŞ</u>

Merhaba, benim adım Can Kültür ve Bilkent Üniversitesinde Bilgisayar ve Öğretim teknolojileri öğretmenliği bölümünde görev yapmaktayım. Üniversitede öğretmenlerinin kurumsal olarak sağlanan ders yönetim sistemi kullanmalarını etkileyen faktörler ile ilgili bir araştırma yapmaktayım ve sizinle üniversitemizde de kullanılan Moodle ve eCampus gibi ders yönetim sisemleri hakkında konuşmak istiyorum. Bu görüşmede amacım Moodle gibi sistemleri kullanan veya denemiş öğretmenlerin, ilgili faktörler hakkında ne düşündüklerini ortaya çıkartmaktır. Bu görüşmede bir süre önce aynı amaç ile dağıttığım anket sonuçlarını değerlendirirken ortaya çıkan sorulara da cevap arayacağım. Bu araştırmada ortaya çıkacak olan sonuçların, öncelikle bu üniversitede olmak üzere öğretmenlerin bakış açısını, ihtiyaçlarını üniversite yönetimine duyurulması, ve onları en çok etkileyen unsurlara öncelik verilmesi konusunda ilgili birimlerin faaliyetlerinde değerlendirileceğini ümit ediyorum. Bu nedenle konu hakkındaki düşüncelerinizi ve beklentilerinizi öğrenmek istiyorum.

Bana görüşme sürecinde söyleyeceklerinizin tümü gizlidir. Bu bilgileri araştırmacılar dışında herhangi bir kimsenin görmesi mümkün değildir. Ayrıca araştırma sonuçlarını yazarken, görüştüğüm bireylerin isimlerini kesinlikle rapora yansıtmayacağım.

Başlamadan önce bu söylediklerimle ilgili belirtmek istediğiniz bir düşünce ya da sormak istediğiniz bir soru var mı?

Görüşmeyi izin verirseniz kaydetmek istiyorum. Bunun sizce bir sakıncası var mı?

Bu görüşmenin yaklaşık 30 – 45 dakika süreceğini tahmin ediyorum. İzin verirseniz sorulara başlamak istiyorum.

SORULAR

GİRİŞ SORULARI
- Ders yönetim sistemi gibi bir teknolojiyi ilk ne zaman ve nasıl duydunuz?
- Kısaca CMS tecrübenizden bahsedebilir misiniz?
    - Hangi sistemleri kullandınız?
    - Ne kadar zamandır kullanıyorsunuz?
    - Kendinizi hangi düzeyde görüyorsunuz?
- Şu anda verdiğiniz derslerinizde CMS kullanıyor musunuz?
    - Cevap Hayır ise
        - Kullanmama kararınızın belirgin bir sebebi var mı?
- Bu sistemleri kullanmaya başlamanızın sebebi ne idi?
    - Bu zaman zarfında kullanımınız nasıl değişti? (artış, azalma ?)
        - Bu değişimin nedeni nedir?

YARARLILIK, KAZANÇ HAKKINDA SORULAR
- Derslerde CMS kullanmanın öğretmenlere faydalı olacağını, farklı katkıları olacağını düşünüyor musunuz?
    - EVET → Ne gibi faydaları var sizce?
        - İşlerine yönelik faydalılık
        - Bireysel kazanımlar (gerekirse örnek verilebilir yöneticilerin,öğrencilerin, meslektaşların gözündeki imaj, teşvik, terfi)
    - HAYIR → Neden? Zararı veya ciddi maliyeti olacağını düşünüyor musunuz?
- CMS kullanmak öğretmenlere zaman kazandırır mı?
- Öğretmenlerin var olan iş yükleri ve görevleri CMSyi kullanıp kullanmamaları kararını sizce nasıl etkiler?
- CMS kullanmanın öğrencilerinize nasıl bir katkısı olacağını düşünüyorsunuz?
    - Öğrencileriniz CMS'nin faydasına inanmazsa veya isteksiz davranırsa ne yaparsınız? (CMS kullanmaktan vaz gecer misiniz?)

YAZILIM KOLAYLIĞI
- Bir CMS'yi etkin olarak kullanmaya başlamanız için yazılım minimum neleri garanti edilmelidir? (Gerekirse hatırlatıcı: Hatalar, güncellemeler, arayüz, özelliklerin yeterliliği, esneklik, (stability))
- Bilgisayar ekipmanı ve bunların yeterlilikleri CMS kullanımını etkiler mi? Nasıl?

EĞİTİM / DESTEK SORULARI
- CMS kullanımı ile ilgili eğitim almak CMS kullanmaya başlamak açısından ne kadar önemlidir?
    - Ne zaman alınmalı?, Ne kadar süre ayırabilirsiniz?

    o Bir öğretmenin dersine CMS'ni kullanmaya başlaması için en az ne kadar bir süre hazırlanması gerekir?

    o Nasıl bir süreç olmalı? Ne tür bilgiler almalıdır? Bu tarz egitimlerin faydalı oldugunu dusunuyor musunuz?

- Sistemin öğretmenler tarafından benimsenmesi için nasıl bir destek mekanizması gerekir? (bireysel, kurumsal)

    o Bu destek mekanizmalarının o sistemi kullanmaya karar verilmesi aşamasında etkili midir?

- CMS kullanımı sırasında karşılaşacağınız bir problemi kendiniz çözemez iseniz ne gibi destek materyal ya da servislerine ihtiyaç duyarsınız?

    o İlk olarak hangilerine başvurmayı tercih edersiniz?

    o Sizce diğer öğretmen arkadaşlarınız da benzer şekilde mi davranır?

- Bu sistemi kullanma kararında diğer meslektaşlarınızın yaptığı işleri görmek, örnek dersler görmek sizce öğretmenleri nasıl etkiler?

    o Kapsamlı örnekler bir direnç yaratır mı?

- Örnek dersler görmenin etkisini eğitim ve destek mekanizmalarnin etkisi ile karşılaştırabilir misiniz?

- Sistemin kurum içerisindeki kullanımını (Ne kadar kullanılıyor, kimler kullanıyor, nasıl kullanılıyor?) takip etmek ister misiniz?

    o Yaygınlaşma için önemli bir etkisi olur mu?

DİĞER SORULAR

- Sizce öğretmenlerin CMS kullanımları, yöneticileri tarafından değerlendirilmeli mi?

    o Neden? Bu değerlendirme(me)nin amacı ne olmalı?

- Universite yönetimine / bölüm başkanlıklarına düşen görevler var mıdır? (etkinligi artirmak icin, ogretmenlerin daha rahat adaptasyonu icin ne yapmalıdırlar?) (siz bölüm başkanı olsanız...)

- Üniversite genelinde politikalar yayınlanmalı mıdır?

    o Bölümlere ait ayrıca politikalar olmalı mıdır?

- Provost'un sunumu, özendirme ve tanitim sizce insanların bu sistemi kullanmasını nasıl etkiliyor?

- CMS kullanımının Over-emphasize edildigini dusunuyor musunuz? Sizce nasıl bir etki yaratıyor?

- Öğretmenlerin ders tarzlarını ve tasarımlarını değiştirmeleri gerektiğini düşünüyor musunuz?

    o Bu durum genelde öğretmenleri motive mi eder yoksa vaz mı geçirir?

- Dersin içeriği CMS kullanma kararını etkiler mi? Nasıl?

- Sınıf büyüklüğü o derste CMS kullanıp kullanmamak için önemli midir?

- Belirtmek istediğiniz, önemli bulduğunuz başka bir husus var mıdır?

- Bir arkadaşınızı bu sistemi kullanmya ikna etmek veya onu özendirmek isterseniz ona ne soylersiniz?

- Sizce bu teknolojileri kullanmaya başlayacak kişiler ilk ne yapmalıdır?

APPENDIX D

MISSING VALUE ANALYSIS

Code of Questionnaire Item	Count of missing values	Percentage of missing values
F1CSE	4	1.54%
F2CSE	4	1.54%
F3CSE	3	1.15%
F4USEF	1	0.38%
F5USEF	1	0.38%
F6USEF	1	0.38%
F7USEF	3	1.15%
F8EASE	0	0.00%
F9EASE	5	1.92%
F10EASE	3	1.15%
F11EASE	4	1.54%
F12EASE	1	0.38%
F13TRAIN	4	1.54%
F14TRAIN	1	0.38%
F15TRAIN	1	0.38%
F16TRAIN	2	0.77%
F17BENEF	1	0.38%
F18BENEF	2	0.77%
F19BENEF	1	0.38%
F20BENEF	8	3.08%
F21BENEF	8	3.08%
F22BENEF	6	2.31%
F23BENEF	5	1.92%
F24BENEF	4	1.54%
F25INTEN	4	1.54%
F26INTEN	2	0.77%
	Average:	**1.17%**

APPENDIX E

MULTIVARIATE NORMALITY TEST RESULTS

```
Total Sample Size =    260
Univariate Summary Statistics for Continuous Variables
```

Variable	Mean	St. Dev.	T-Value	Skewness	Kurtosis
V1	2.359	0.960	39.606	0.486	0.042
V2	2.336	0.945	39.872	0.468	-0.197
V3	2.288	0.902	40.903	0.604	0.201
V4	2.162	0.969	35.979	0.824	0.391
V5	2.309	0.933	39.918	0.612	0.369
V6	2.286	0.948	38.870	0.413	-0.129
V7	2.210	0.889	40.090	0.569	0.299
V8	2.104	0.857	39.587	0.875	0.902
V9	2.518	0.966	42.024	0.455	-0.237
V10	2.315	0.864	43.192	0.639	0.278
V11	2.461	0.933	42.515	0.388	-0.184
V12	2.367	0.909	41.969	0.510	-0.150
V13	2.445	1.117	35.298	0.439	-0.679
V14	1.668	0.755	35.646	1.344	2.718
V15	1.903	0.960	31.979	1.066	0.720
V16	1.787	0.808	35.639	1.162	1.740
V17	2.000	0.887	36.337	0.601	-0.077
V18	2.136	0.884	38.969	0.339	-0.358
V19	2.181	0.862	40.804	0.478	0.015
V20	2.948	0.825	57.619	0.224	0.220
V21	2.548	0.947	43.365	0.534	-0.078
V22	2.567	1.018	40.663	0.536	-0.212
V23	2.384	0.931	41.309	0.313	-0.243
V24	2.414	0.922	42.225	0.538	0.127
V25	1.840	0.688	43.149	0.729	1.469
V26	1.702	0.730	37.584	0.955	1.201

```
Test of Univariate Normality for Continuous Variables
          Skewness           Kurtosis        Skewness and Kurtosis

Variable Z-Score P-Value    Z-Score P-Value   Chi-Square P-Value

      V1    2.462   0.014     0.352   0.725         6.186   0.045
      V2    2.424   0.015    -0.521   0.603         6.145   0.046
      V3    2.692   0.007     0.838   0.402         7.948   0.019
      V4    3.021   0.003     1.340   0.180        10.922   0.004
      V5    2.706   0.007     1.285   0.199         8.973   0.011
      V6    2.291   0.022    -0.250   0.803         5.311   0.070
      V7    2.628   0.009     1.106   0.269         8.130   0.017
      V8    3.085   0.002     2.410   0.016        15.327   0.000
      V9    2.394   0.017    -0.686   0.493         6.200   0.045
     V10    2.752   0.006     1.049   0.294         8.672   0.013
     V11    2.226   0.026    -0.465   0.642         5.174   0.075
     V12    2.514   0.012    -0.333   0.739         6.429   0.040
     V13    2.357   0.018    -3.221   0.001        15.928   0.000
     V14    3.543   0.000     4.600   0.000        33.714   0.000
     V15    3.296   0.001     2.068   0.039        15.143   0.001
     V16    3.388   0.001     3.627   0.000        24.630   0.000
     V17    2.687   0.007    -0.055   0.956         7.222   0.027
     V18    2.086   0.037    -1.245   0.213         5.902   0.052
     V19    2.445   0.014     0.265   0.791         6.047   0.049
     V20    1.669   0.095     0.891   0.373         3.581   0.167
     V21    2.562   0.010    -0.059   0.953         6.568   0.037
     V22    2.565   0.010    -0.581   0.561         6.918   0.031
     V23    2.007   0.045    -0.715   0.474         4.538   0.103
     V24    2.570   0.010     0.620   0.535         6.990   0.030
     V25    2.891   0.004     3.285   0.001        19.149   0.000
     V26    3.178   0.001     2.903   0.004        18.530   0.000


Relative Multivariate Kurtosis = 1.172
Test of Multivariate Normality for Continuous Variables

          Skewness                 Kurtosis              Skewness and Kurtosis

   Value  Z-Score P-Value    Value  Z-Score P-Value      Chi-Square P-Value
   ------ ------- -------    ------- ------- -------      ---------- -------
  138.068  27.003   0.000   130.999   14.530   0.000        940.303   0.000
```

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APPENDIX F

OUTPUT FILE FOR STRUCTURAL MODEL

```
                          DATE:  3/ 1/2009
                           TIME: 22:08

                        L I S R E L  8.30
                               BY
                   Karl G. Jöreskog & Dag Sörbom

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The following lines were read from file C:\ANALIZ\YAPMODEL.SPL:

YAPMODEL - Examining Model
Observed Variables:
V1-V26
Covariance Matrix from File VERI_NSO.COV
Sample Size: 260
Latent Variables: Cse Useful Ease Train Benefit Intent

Relationships:
V1 = 1*Cse
V2 = Cse
V3 = Cse
V4 = 1*Useful
V5 = Useful
V6 = Useful
V7 = Useful
V8 = 1*Ease
V9 = Ease
V10 = Ease
V11 = Ease
V12 = Ease
V13 = 1*Train
V14 = Train
V15 = Train
V16 = Train
V17 = 1*Benefit
V18 = Benefit
V19 = Benefit
V20 = Benefit
```

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```
V21 = Benefit
V22 = Benefit
V23 = Benefit
V24 = Benefit
V25 = 1*Intent
V26 = Intent

Benefit = Useful
Useful = Ease Cse
Ease = Train Cse
Train = Cse
Intent = Benefit Useful Ease Train

Let the Errors between V21 and V22 Correlate
Let the Errors between V17 and V18 Correlate

Path Diagram
End of Problem

Sample Size =    260
```

YAPMODEL - Examining Model   Covariance Matrix to be Analyzed

	V4	V5	V6	V7	V8	V9
V4	0.87					
V5	0.59	0.89				
V6	0.63	0.73	0.89			
V7	0.57	0.69	0.72	0.88		
V8	0.27	0.24	0.26	0.20	0.85	
V9	0.34	0.31	0.28	0.24	0.57	0.90
V10	0.34	0.35	0.33	0.33	0.51	0.70
V11	0.38	0.36	0.38	0.37	0.40	0.60
V12	0.31	0.26	0.28	0.25	0.52	0.62
V13	0.04	0.11	0.07	0.09	-0.21	-0.15
V14	0.00	0.13	0.10	0.13	-0.08	-0.12
V15	0.01	0.12	0.08	0.10	-0.14	-0.14
V16	-0.04	0.10	0.07	0.07	-0.10	-0.11
V17	0.36	0.42	0.44	0.47	0.08	0.13
V18	0.33	0.41	0.40	0.41	0.06	0.12
V19	0.25	0.29	0.34	0.31	0.04	0.12
V20	0.35	0.30	0.35	0.28	0.19	0.23
V21	0.25	0.25	0.29	0.26	0.14	0.17
V22	0.10	0.10	0.15	0.13	-0.01	-0.01
V23	0.39	0.46	0.49	0.46	0.23	0.32
V24	0.30	0.40	0.41	0.43	0.19	0.24
V25	0.33	0.37	0.38	0.42	0.22	0.25
V26	0.36	0.38	0.42	0.40	0.22	0.29
V1	0.28	0.25	0.22	0.21	0.30	0.28
V2	0.23	0.19	0.16	0.14	0.13	0.08
V3	0.31	0.28	0.24	0.24	0.25	0.28

Covariance Matrix to be Analyzed

	V10	V11	V12	V13	V14	V15
V10	0.87					
V11	0.64	0.90				
V12	0.64	0.63	0.88			
V13	-0.14	-0.07	-0.18	0.91		
V14	-0.04	-0.03	-0.08	0.40	0.78	
V15	-0.10	-0.03	-0.10	0.48	0.59	0.84

```
V16     -0.06    -0.06    -0.11     0.44     0.57     0.56
V17      0.14     0.20     0.12     0.30     0.30     0.30
V18      0.15     0.19     0.13     0.29     0.21     0.25
V19      0.10     0.14     0.08     0.28     0.23     0.26
V20      0.29     0.23     0.27     0.12     0.08     0.06
V21      0.23     0.16     0.18     0.14     0.14     0.13
V22      0.02     0.05    -0.01     0.23     0.16     0.18
V23      0.37     0.33     0.29     0.17     0.11     0.09
V24      0.28     0.28     0.24     0.13     0.15     0.15
V25      0.27     0.24     0.21     0.09     0.18     0.09
V26      0.33     0.25     0.25     0.07     0.18     0.09
 V1      0.28     0.24     0.24    -0.08    -0.04    -0.10
 V2      0.08     0.15     0.07     0.17     0.15     0.08
 V3      0.26     0.21     0.23    -0.02     0.03     0.02
```

        Covariance Matrix to be Analyzed

```
         V16      V17      V18      V19      V20      V21
        ------   ------   ------   ------   ------   ------
V16      0.81
V17      0.27     0.85
V18      0.21     0.61     0.87
V19      0.19     0.47     0.53     0.87
V20      0.10     0.34     0.30     0.22     0.89
V21      0.18     0.28     0.34     0.30     0.44     0.90
V22      0.24     0.20     0.20     0.24     0.29     0.54
V23      0.12     0.44     0.44     0.42     0.45     0.43
V24      0.14     0.40     0.37     0.39     0.31     0.34
V25      0.14     0.37     0.31     0.34     0.24     0.22
V26      0.17     0.41     0.35     0.34     0.30     0.31
 V1     -0.09     0.13     0.11     0.13     0.24     0.20
 V2      0.11     0.19     0.22     0.19     0.11     0.24
 V3      0.00     0.20     0.16     0.15     0.16     0.14
```

        Covariance Matrix to be Analyzed

```
         V22      V23      V24      V25      V26       V1
        ------   ------   ------   ------   ------   ------
V22      0.91
V23      0.25     0.90
V24      0.20     0.51     0.89
V25      0.06     0.40     0.33     0.81
V26      0.11     0.47     0.39     0.59     0.79
 V1      0.07     0.26     0.19     0.16     0.23     0.90
 V2      0.18     0.22     0.25     0.24     0.26     0.26
 V3      0.00     0.29     0.22     0.20     0.25     0.46
```

        Covariance Matrix to be Analyzed

```
          V2       V3
        ------   ------
 V2      0.89
 V3      0.30     0.88
```


YAPMODEL - Examining Model

Number of Iterations = 20

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```
LISREL Estimates (Maximum Likelihood)

    V4 = 1.00*Useful, Errorvar.= 0.36  , R² = 0.59
                              (0.035)
                               10.31
    V5 = 1.17*Useful, Errorvar.= 0.19  , R² = 0.79
         (0.075)              (0.022)
          15.54                 8.50
    V6 = 1.21*Useful, Errorvar.= 0.13  , R² = 0.85
         (0.075)              (0.019)
          16.28                 6.92

    V7 = 1.15*Useful, Errorvar.= 0.21  , R² = 0.77
         (0.075)              (0.023)
          15.30                 8.81

    V8 = 1.00*Ease, Errorvar.= 0.44  , R² = 0.48
                             (0.042)
                              10.54

    V9 = 1.29*Ease, Errorvar.= 0.23  , R² = 0.75
         (0.10)              (0.026)
          12.80                8.53

   V10 = 1.32*Ease, Errorvar.= 0.17  , R² = 0.81
         (0.100)             (0.023)
          13.21                7.38

   V11 = 1.19*Ease, Errorvar.= 0.33  , R² = 0.63
         (0.100)             (0.034)
          11.87                9.77

   V12 = 1.22*Ease, Errorvar.= 0.28  , R² = 0.69
         (0.099)             (0.030)
          12.32                9.30

   V13 = 1.00*Train, Errorvar.= 0.57  , R² = 0.37
                              (0.054)
                               10.56

   V14 = 1.32*Train, Errorvar.= 0.20  , R² = 0.74
         (0.13)              (0.028)
          10.29                7.05

   V15 = 1.35*Train, Errorvar.= 0.23  , R² = 0.72
         (0.13)              (0.031)
          10.22                7.48

   V16 = 1.29*Train, Errorvar.= 0.26  , R² = 0.68
         (0.13)              (0.032)
          10.04                8.26

   V17 = 1.00*Benefit, Errorvar.= 0.44  , R² = 0.49
                                (0.045)
                                 9.76

   V18 = 0.98*Benefit, Errorvar.= 0.47  , R² = 0.46
         (0.074)               (0.047)
          13.33                  9.89
```

```
V19 = 0.92*Benefit, Errorvar.= 0.52  , R² = 0.41
      (0.099)               (0.051)
       9.30                  10.26


V20 = 0.83*Benefit, Errorvar.= 0.60  , R² = 0.32
      (0.099)               (0.057)
       8.35                  10.60


V21 = 0.83*Benefit, Errorvar.= 0.61  , R² = 0.32
      (0.10)                (0.058)
       8.26                  10.63


V22 = 0.48*Benefit, Errorvar.= 0.81  , R² = 0.11
      (0.099)               (0.072)
       4.88                  11.17


V23 = 1.18*Benefit, Errorvar.= 0.32  , R² = 0.64
      (0.10)                (0.038)
      11.41                  8.39


V24 = 1.00*Benefit, Errorvar.= 0.48  , R² = 0.47
      (0.10)                (0.048)
       9.92                  9.94


V25 = 1.00*Intent, Errorvar.= 0.28  , R² = 0.64
                            (0.039)
                             7.32


V26 = 1.13*Intent, Errorvar.= 0.13  , R² = 0.83
      (0.088)               (0.039)
      12.81                  3.31



 V1 = 1.00*Cse, Errorvar.= 0.48  , R² = 0.47
                         (0.066)
                          7.18


 V2 = 0.64*Cse, Errorvar.= 0.72  , R² = 0.19
      (0.11)             (0.070)
       5.59              10.40


 V3 = 1.08*Cse, Errorvar.= 0.39  , R² = 0.56
      (0.15)             (0.068)
       7.28               5.66



Error Covariance for V18 and V17 = 0.20
                                  (0.037)
                                   5.45
Error Covariance for V22 and V21 = 0.38
                                  (0.052)
                                   7.24



 Useful = 0.37*Ease + 0.35*Cse, Errorvar.= 0.36  , R² = 0.30
          (0.085)     (0.094)               (0.052)
           4.32        3.73                   6.85

  Ease =  - 0.18*Train + 0.46*Cse, Errorvar.= 0.31  , R² = 0.24
           (0.073)       (0.086)               (0.052)
           -2.47          5.38                   5.87
```

```
  Train = 0.030*Cse, Errorvar.= 0.33   , R² = 0.0011
         (0.069)                (0.065)
          0.43                   5.12


 Benefit = 0.66*Useful, Errorvar.= 0.20   , R² = 0.53
         (0.072)                (0.036)
          9.08                   5.49


  Intent = 0.12*Useful + 0.20*Ease + 0.13*Train + 0.60*Benefit,
         (0.092)        (0.071)     (0.068)       (0.11)
          1.32           2.84        1.86          5.34
                                          Errorvar.= 0.23   , R² = 0.54
                                                    (0.036)
                                                     6.35



           Variances of Independent Variables

                  Cse
                --------
                  0.42
                 (0.08)
                  4.99



           Covariance Matrix of Latent Variables

             Useful    Ease     Train    Benefit   Intent    Cse
            ------    ------    ------    ------    ------    ------
   Useful    0.51
     Ease    0.22      0.40
    Train   -0.02     -0.05      0.33
  Benefit    0.34      0.14     -0.01      0.42
   Intent    0.31      0.19      0.02      0.32      0.50
      Cse    0.22      0.19      0.01      0.14      0.15      0.42



                   Goodness of Fit Statistics

                  Degrees of Freedom = 287
       Minimum Fit Function Chi-Square = 577.65 (P = 0.0)
  Normal Theory Weighted Least Squares Chi-Square = 577.93 (P =
         Estimated Non-centrality Parameter (NCP) = 290.93
     90 Percent Confidence Interval for NCP = (226.22 ; 363.42)

               Minimum Fit Function Value = 2.23
         Population Discrepancy Function Value (F0) = 1.12
     90 Percent Confidence Interval for F0 = (0.87 ; 1.40)
    Root Mean Square Error of Approximation (RMSEA) = 0.063
     90 Percent Confidence Interval for RMSEA = (0.055 ; 0.070)
      P-Value for Test of Close Fit (RMSEA < 0.05) = 0.0030

          Expected Cross-Validation Index (ECVI) = 2.73
     90 Percent Confidence Interval for ECVI = (2.48 ; 3.01)
              ECVI for Saturated Model = 2.71
             ECVI for Independence Model = 16.63

Chi-Square for Independence Model with 325 Degrees of Freedom = 4256.01
                 Independence AIC = 4308.01
                   Model AIC = 705.93
                  Saturated AIC = 702.00
```

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```
                    Independence CAIC = 4426.59
                         Model CAIC = 997.82
                     Saturated CAIC = 2302.80

             Root Mean Square Residual (RMR) = 0.087
                     Standardized RMR = 0.10
                 Goodness of Fit Index (GFI) = 0.85
            Adjusted Goodness of Fit Index (AGFI) = 0.82
          Parsimony Goodness of Fit Index (PGFI) = 0.70

                 Normed Fit Index (NFI) = 0.86
               Non-Normed Fit Index (NNFI) = 0.92
          Parsimony Normed Fit Index (PNFI) = 0.76
               Comparative Fit Index (CFI) = 0.93
               Incremental Fit Index (IFI) = 0.93
                Relative Fit Index (RFI) = 0.85

                     Critical N (CN) = 155.98


           The Modification Indices Suggest to Add the
        Path to    from      Decrease in Chi-Square    New Estimate
    V4         Train              8.0                   -0.20
    V11        Useful             9.4                    0.20
    V17        Train             17.6                    0.29
    V19        Ease               7.9                   -0.23
    V19        Train             10.3                    0.28
    V22        Ease               8.2                   -0.24
    V23        Ease              12.3                    0.25
    Useful     Train             12.7                    0.27
    Useful     Benefit            9.7                   -0.64
    Ease       Useful            12.7                    1.29
    Train      Useful            12.7                    0.25
    Train      Benefit           32.2                    0.41
    Train      Intent            30.2                    0.57
    Benefit    Train             22.9                    0.29
    Benefit    Intent            20.5                    1.29
    Benefit    Cse               11.6                    0.24


    The Modification Indices Suggest to Add an Error Covariance
      Between    and     Decrease in Chi-Square    New Estimate
    Ease       Useful            12.7                    0.46
    Train      Useful            12.7                    0.09
    Benefit    Useful             9.7                   -0.12
    Benefit    Train             22.2                    0.10
    V9         V8                 9.0                    0.07
    V11        V8                14.1                   -0.10
    V12        V11               10.1                    0.08
    V19        V18               20.2                    0.14
    V20        V19               10.5                   -0.12
    V21        V17                8.0                   -0.07
    V21        V20               10.9                    0.11
    V25        V7                 8.1                    0.05


    The Problem used    98272 Bytes (=  0.1% of Available Workspace)

                      Time used:     0.203 Seconds
```

CURRICULUM VITAE

PERSONAL INFORMATION

Surname, Name :   Kültür, Can
Nationality: Turkish (TC)
Date and Place of Birth: 21 April 1974, Adana
Maritul Status: Married
Email: kultur@bilkent.edu.tr

EDUCATION

Degree	Institution	Year of Graduation
MS	METU Computer Education and Instructional Technologies	2001
BS	METU Computer Engineering	1996
High S.	Adana Anatolian High School	1991

WORK EXPERIENCE

Year	Place	Enrollment
2006 – Present	Bilkent University	Instructor / Vice Chair
2005 – 2006	Turkish General Staff	Project Officer
2002 – 2005	Meteksan IT Group	Group Manager
2000 – 2002	Monad Software and Consultancy	Software Engineer
1998 – 2000	Barmek Electronics Trade & Industry	Computer Engineer
1996 – 1998	Bilgi Yönetim Sistemleri	Software Engineer
1/1996 – 9/1996	Tubitak Bilten Multimedia Lab.	Parttime-programmer

FOREIGN LANGUAGES

English

PUBLICATIONS

1. Kultur C., Cagiltay K., Kucuk M.E., Ozden M.Y., Oytun E. (2004). "Moving Toward SCORM Compliant Content Production at Educational Software Company: Technical and Administrative Challenges". 27th Annual proceedings for 2004 National Convention of the Association for Educational Communications and Technology. Chicago, USA

2. Kültür C., Albayrak M. Oytun E., Tonguç G. (2003). "E-content production and importance of procedures in web based education". III. International EducationalTechnology Conference & Fair. Gazimağusa - Turkish Republic of Northern Cyprus. (http://www.tojet.net/ietc2003.asp)

3. Kültür C., (2001). Master of Science Thesis. "Perceived effectiveness of a computer based drill program on graduate students' selection of precise statistical technique in an introductory research method course: A case study". Ankara, Turkey.