INSTRUCTIONAL TECHNOLOGY ADOPTION OF MEDICAL SCHOOL FACULTY IN TEACHING AND LEARNING: FACULTY CHARACTERISTICS AND DIFFERENTIATING FACTORS IN ADOPTER CATEGORIES

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

BY

NEŞE ZAYİM

IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN

THE DEPARTMENT OF COMPUTER EDUCATION AND

INSTRUCTIONAL TECHNOLOGIES

JANUARY 2004

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ABSTRACT

INSTRUCTIONAL TECHNOLOGY ADOPTION OF MEDICAL SCHOOL FACULTY IN TEACHING AND LEARNING: FACULTY CHARACTERISTICS AND DIFFERENTIATING FACTORS IN ADOPTER CATEGORIES

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January 2004, 154 pages

Despite large investment by higher education institutions in technology for faculty and student use, instructional technology is not being integrated into instructions in the higher education institutions including medical education institutions. While diffusion of instructional technologies has been reached a saturation point with early adopters of technology, it has remained limited among mainstream faculty. This investigation explored instructional technology patterns and characteristics of medical school faculty as well as contributing factors to IT adoption. The primary focus was to explore differences between early adopting faculty and mainstream faculty based on Rogers' diffusion of innovations and adopter categories theories.

A mix-method research design, a quantitative methodology(survey) in conjunction with qualitative methodology(in-dept interviews) was employed for the purpose of gathering data about characteristics and adoption patterns of medical school faculty who are early adopting and mainstream. A hundred and fifty-five teaching faculty from basic science and clinical science disciplines at a Faculty of Medicine in a state university completed the survey. In-dept interviews were conducted with faculty who are early adopting and mainstream.

The findings provided an evidence for similarities between adoption patterns of medical school faculty and other higher education faculty; relatively new tools associated with instruction were not adopted by majority of the faculty. As expected, some differences were found between early adopters and mainstream faculty in terms of individual characteristics, adoption patterns, perceived barriers and incentives to adoption and preferred methods of learning about technology and support. Implications of the findings for instructional technology policy and plans were reported.

Keywords: Diffusion of Innovations, Instructional Technology, Medical Education

ÖZ

TIP FAKÜLTESİ ÖĞRETİM ÜYELERİNİN EĞİTİM-ÖĞRETİM SÜRECİNDE TEKNOLOJİ KULLANIMI: ÖĞRETİM ÜYESİ NİTELİKLERİ VE ADAPTÖR GURUPLARI ARASINDAKİ AYIRT EDİCİ FAKTÖRLER

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Ocak 2004, 154 sayfa

Yüksek öğretim kurumlarında teknolojik altyapıya ayrılan yatırımlarda artış görülmesine rağmen, öğretim üyeleri ve öğrencilerin eğitim-öğretim sürecinde teknoloji kullanımı yeterince yaygınlaşmamıştır. Diğer yükseköğrenim kurumlarındaki olduğu gibi tıp eğitimi veren yüksek öğrenim kurumlarında da teknoloji kullanımı öncü öğretim üyeleri arasında yaygınlaşırken, öğretim üyelerinin büyük çoğunluğu arasında yeterince yaygınlaşamamıştır. Bu çalışmada tıp fakültesi öğretim üyelerinin teknoloji kullanım örüntüleri, bireysel ve profosyenel nitelikleri ile teknoloji kullanımlarını etkileyen faktörler araştırılmıştır. Bu çalışmanın birincil amacı Rogers'ın "Yeniliğin Yayılımı" kuramlarını temel alarak, teknolojiyi eğitim-öğretim sürecine entegre eden, entegrsyon sürecinde kararsız yada direnç gösteren tıp fakültesi öğretim üyeleri arasındaki farklılıkları ortaya çıkarmaktır.

Tıp fakültesi öğretim üyelerinin bireysel nitelikleri ve teknolji kullanımı örüntülerine yönelik verilerileri toplamak amacıyla nitel(anket) ve nicel araştırma(görüşme) yöntemleri birlikte kullanılmıştır. Anketi Türkiyede bir devlet üniversitesinin tıp fakültesindeki yüzellibeş öğretim üyesi yanıtlamıştır. Görüşmeler anketi yanıtlayan öğretim üyelerinden teknolojiyi eğitim öğretim sürecinde kullanan ve sınırlı kullananlar ile gerçekleştirilmiştir.

Bulgular, tıp fakültesi öğretim üyelerinin teknoloji kullanımı örüntüleri ile diğer yüksek öğrenim kurumlarındaki öğretim üyelerinin kullanım örüntüleri arasındaki benzerliklere işaret etmektedir. Beklendiği gibi, teknoloji kulanan ve sınırlı kullanan öğretim üyeleri arasında kullanım örüntüleri, bireysel karakteristikler, algılanan güçlükler ve motive eden faktörler ile teknoloji hakkında bilgilenme ve destek konusundaki tercihleri arasında bazı farklılıklar bulunmuştur. Bu bulgular doğrultusunda teknoloji politikaların ve teknoloji planlarının geliştilmesine yönelik öneriler yapılmıştır.

Anahtar Kelimeler: Yeniliğin Yaygınlaşması, Öğretim Teknolojileri, Tıp Eğitimi

To my mother

ACKNOWLEDGEMENTS

I am very grateful to my dissertation supervisor Asst. Prof. Dr. Soner Yıldırım and co-supervisor Prof. Dr. Osman SAKA, who provided expertise, guidance , support and encouragement during my doctoral program.

I would like to thank Yasemin Gülbahar for her friendship, support and hospitality.

I am very grateful to my colleagues in the department of Biostatistics, Dr. Hakan Gülkesen, Filiz İşleyen and Özgür Tosun, for their assistances, support and encouragements during my study in Akdeniz Üniversity. Special thank to Dr. Uğur Bilge for his coaching in going over my written work.

I would like to thank the administrators of the Akdeniz University, for their support and collaborations. I am very grateful to the faculty of Akdeniz Üniversity who participated in my study for taking the time to help me with this study.

I would like to thank the Akdeniz Üniversitesi Güçlendirme Vakfı for their financial support to my doctoral research.

I would like to thank the Department of Computer Education and Instructional Technologies for their support and collaborations.

Finally, my journey toward completing a Ph.D. would not have been successful without the loving support of my family and my friends. I would like to thank my mom, my brother and my sister for their support and love.

Thanks to everyone in my life for being there.

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CHAPTER 1

INTRODUCTION

"Buying a typewriter does not make one a better writer. Similarly, just buying new information technologies does not make an organization better at managing knowledge. What is critical is acceptance and effective utilization of the technologies."

Yogesh Malhotra, BRINT Institute

Rapidly developing technologies and massive growth in medical information is placing a special demand on healthcare professionals in information age (Haux at al, 1998,Masys, 1998, Carlile & Sefton, 1998). There is no debate on the need for students graduating from institutions of higher education to be technologically competent in order to be employable. The need for technologically competent health professions in information age is also reflected in a report by the American Associations of Medical Colleges' Better_Health 2010 Advisory Board as:

> Those who graduate from health professions programs in 2010 will live out their carriers in careers in an information-rich practice setting. They will remain effective by learning the principles and skills that are needed in order to operate in such setting (p.14).

However, despite the major advance in science and technology of health care, the training of physicians is little different today from what it was half-century ego (Barnett, 1989; Lichty, 2000; Gupta at all, 2001). As stated by Barnett (1989), "the structure of medical education still consist of primarily of lectures in which profession of teachers relate large quantities of scientific materials to passive student audience" (p.187). Medical education needs a fundamental change of focus from simply delivering content to developing the ability "learning to learn" and "learning for life" to manage changes in information age (Carlile& Sefton, 1998).

During the past two decades, a number of reports have called on medical schools to incorporate instructional technology into their educational program in order to meet challenges of medical education.. The report, Educating Medical Students: Assessing change in Medical Education-The Road to Implementation (ACME_TRI,1992) states that " to practice medicine in twenty first century medical students should be given a strong grounding in the use of computer technology to develop their abilities as life-long learners . It is also stated that medical schools should improve faculty knowledge about the use of instructional technology, provide resources and promote the use of instructional technology.

Most recently, the Association of American Medical Colleges (AAMC) strongly recommended the use of Medical Informatics technologies for education in the report, MSOP II (Medical School Objectives Project Report II) Contemporary Issues in Medicine: Medical Informatics and Population Health (AAMC, 1998).

Even though the reports of such organizations encourage medical school decision makers to initiate instructional technology programs, progress is slow (Lichty, 2000). The findings of the research (Moberg & Whitcomb, 1999) conducted for the purpose of gaining insight into the effects of ACME-TRI report at 125 U.S. medical schools indicate that medical schools as a group had made limited progress in accomplishing the recommend educational technology goals .

1.1 Background of the Problem

In the past few years . higher education institutions have invested heavily in infrastructure to support diffusion and adoption of technology (Green 1999,; Jacobsen, 1999). However, despite large investment by higher education institutions in technology for faculty and student use, instructional technology is not being integrated into instructions in the higher education institutions including medical education institutions (Geoghegan, 1994; Spotts, 1999; Surry, 1997; Albright,1996; Carlile&Sefton, 1998). There are many reasons both technical and societal, why innovative technologies have not been widely adopted, however , the major reason for this lack of utilization is that most university-level technology strategies ignore the central role that faculty play in the change process (Surry, 2000).

The Association for Educational Communications and Technology (AECT) Instructional Technology (IT) defined instructional technology as a complex, integrated process involving people, procedures, ideas, devices and organizations, for analyzing problems and devising, implementing, evaluating and managing solutions to those problems involved in all aspects of human learning (Seels&Richey, 1994). Despite the IT definition of the AECT which emphasize that IT is more than products, much of the conversation about technology in education continues to focus on products: computers, software, networks and instructional resources (Green, 2000). Certainly, adequate technology infrastructure use is a necessary condition for IT integration. But major problem is getting faculty to adopt these technologies once they are made available. As stated by Green (2000),"Real IT challenge in education involves people, not products". Goeghegan (1994) put this challenge best:

> One of the most basic reasons underlying the limited use of instructional technology is our failure to recognize and deal with the social and psychological dimension of technological innovation and diffusion: the constellation of academic and professional goals, interest, and needs, technology interest, patterns of work, sources of support, social networks, etc., that play a determining role in faculty willingness to adopt and utilize technology in the classroom

As stated by Bates (2000), "because of the central role that faculty members play in the work of the universities and colleges, any change , especially in core activities such as teaching and research, is completely dependent on their support" (p.95). Therefore, it is important for higher education institutions to understand factors involved in faculty members' IT adoption. Gaining an understanding about different characteristics, motivations and needs of faculty members and considering these factors in IT decision result in successful adoption of IT in teaching and learning. Thus, this study examined medical school faculty' characteristics, IT adoption patterns, perceptions about barriers and motivators to adoption as well as differences between adopter groups.

1.2 Purpose of Study

The purpose of the current study is to explore IT adoption patterns and characteristics of medical school faculty and contributing factors to IT adoption and diffusion. The primary focus is to explore differences between faculty who adopt and reluctant or resist to IT adoption and, to determine if faculty characteristics contribute to prediction of faculty adopter category. Rogers' adopter categories and innovation decision process will be used to analyze the differences in IT adoption of medical school faculty.

1.3 Significant of the Study

Rapid advances in information technology urge the educational reform. This reform created a need for more research in educational application of technology as well as in the adoption and diffusion of instructional technology.

Studies of diffusion and adoption help to explain the what, where, and why of technology acceptance or rejection in education (Holloway, 1996). According to Surry (1995), the study of diffusion theory is beneficial to instructional technology field because of three reasons: First, the study of diffusion could rectify the situation that most instructional technologist lack of the knowledge of why their products are or are not adopted. Second, it helps instructional technologist to be prepared to work effectively with potential adopters. Third, it helps to develop a systematic model of adoption for instructional technology field.

Since the emphasis in medical education continues to center on creating physicians with the skills and abilities to be life-long learners, the challenge for medical education institution is to encourage faculty members in integrating technology for teaching and learning. In order to predict how to encourage faculty adaptation of instructional technology, we need to better understand what differentiate categories of adopters from each other and, we need to understand influences and barriers to diffusion of instructional technology among faculty of medical schools. But there are limited number of research regarding adoption and diffusion of instructional technologies in the field of medical education. The present study explores characteristics and perceptions of medical school faculty regarding the adoption of instructional technologies in medical education. It attempts to identify the factors that differentiate early adopters and mainstream medical faculty of instructional technologies. Thus, this study (1)contributes to the overall body of knowledge related to the adoption and diffusion of instructional technologies in medical education (2)provides evidence about the adoption and diffusion of instructional technology in medical education which corroborates Rogers'(1995) theoretical framework (3) contributes to the limited literature related to adoption and diffusion of instructional technologies in higher education institution in Turkey.

1.4 Definitions of the Terms

Adoption: A decision to make full-scale use of a new idea as the best course of action available (Rogers, 1995).

Diffusion of innovations: The process of communicating through planned strategies for the purpose of gaining adoption.

Faculty: Professors and assistant professors teaching in the basic science and clinical science disciplines at a Faculty of Medicine in a state university.

Instructional technology: 11 types of computer-related software and tools and, a mix of 12 types of computer- related and other technologies used for instructional purposes.

CHAPTER 2

REVIEW OF LITERATURE

This chapter will review the previous research and foundational theories, which provide a framework for adoption of instructional technology in medical education. The first section begins with a examination of Rogers' (1995) diffusion of innovation theory which provide a theoretical framework for this study.

The second section presents the literature that examines patterns of instructional technology use of higher education faculty including medical school faculty.

The third section reviews the literature related to factors affecting faculty adoption of instructional technologies. These include individual characteristics of faculty and organizational barriers and incentives as well as preferences for learning and support.

2.1 Theoretical Framework

Rogers (1995) defines an innovation as an idea, practice or object that is perceived as new by the individual. As stated by Surry (1997), instructional technology is a field of innovation because of products and practices developed by technologist require dramatic shifts in the way of thinking, delivering, administering and assessing instruction and training. Rogers (1995) defines diffusion as "the process by which an innovation is communicated though certain channels over time among the members of a social system" (Rogers, 1995 p.5). Diffusion research investigates the factors that influence the diffusion process. Studies of diffusion and adoption help to explain the what, where, and why of technology acceptance or rejection in education (Holloway, 1996). Therefore, Roger's (1995) theory of the diffusion of innovations provides a theoretical framework for present investigation. The innovation in present investigation represents instructional technology which include computer-based tools and processes and diffusion represents the extent to which medical school faculty on a state university have adopted instructional technology in teaching and learning.

The following sections elaborate Rogers' (1995) the most widely-used theories of diffusion of innovation.

2.1.1 Diffusion of Innovation

Rogers (1995) defines an innovation as an idea, practice or object that is perceived as new by the individual and, diffusion as the process by which an innovation is communicated through certain channels over time among the members of a social system. Four major factor interacting to influence the diffusion of an innovation are the innovation itself, communication, time and social system (Rogers, 1995).

2.1.1.1 Innovation

Perceived characteristics of an innovation have influence on adaptation rate of an innovation and innovation-decision process. Rogers (1995) lists five characteristics of an innovation :

1)Relative Advantage: is the degree to which an innovation is perceived as better than the idea it supersedes.

2) Compatibility: is the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential adopters.

3) Complexity: the degree to which an innovation is perceived as difficult to understand and use.

4) Trialability: the degree to which an innovation may be experimented on a limited basis.

5)Observability: is the degree to which the results of an innovation are visible to others. New ideas that are easy to see its results will be adopted more quickly.

2.1.1.2 Communication Channels

Rogers (1995) defines communication as “a process in which participants create and share information with one other in order to reach a mutual understanding” (p.6). Diffusion is a special type of communication, in which the messages are about a new idea. “A communication channel is the mean by which messages gets from one individual to another” (Rogers, 1995, p.36). Rogers (1995) state that mass media channels are more effecting in creating knowledge of innovation, whereas interpersonal channels are more effecting when forming and changing attitude toward an innovation. Most individuals evaluate an innovation, rather on the basis of scientific research by experts, through the subjective evaluations of near-peers who have adopted the innovation (Rogers, 1995).

2.1.1.3 Social System

Rogers (1995) defines a social system as “a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal” (p.379). Diffusion occurs in a social system. The social and communication structure of a system can facilitate or impede the diffusion of innovation in the system (Rogers, 1995). The norms of a system, which are established behavior patterns for the members of a social system, also affect diffusion of an innovation in a social system.

2.1.1.3. Time

Time dimension involved in diffusion in the innovation-decision process by which an individual passes several stages, in the innovativeness of an individual-that is relative earliness/lateness in adopting a new idea and in an innovation' rate of adoption in a system

2.1.2 Innovation-Decision Process

According to Rogers (1995), an individual's decision about an innovation is rather than an instantaneous act, it is a process that occurs over time, consisting of a series of actions and decisions. Innovation-decision process is "the process through which an individual (or other decision-making unit) passes from first knowledge of innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision" (Rogers, 1995, p.163). Rogers (1995) conceptualized a model of innovation-decision process (Figure-1). This conceptualization consists of five sequential stages that potential adopters go through when interacting with an innovation:

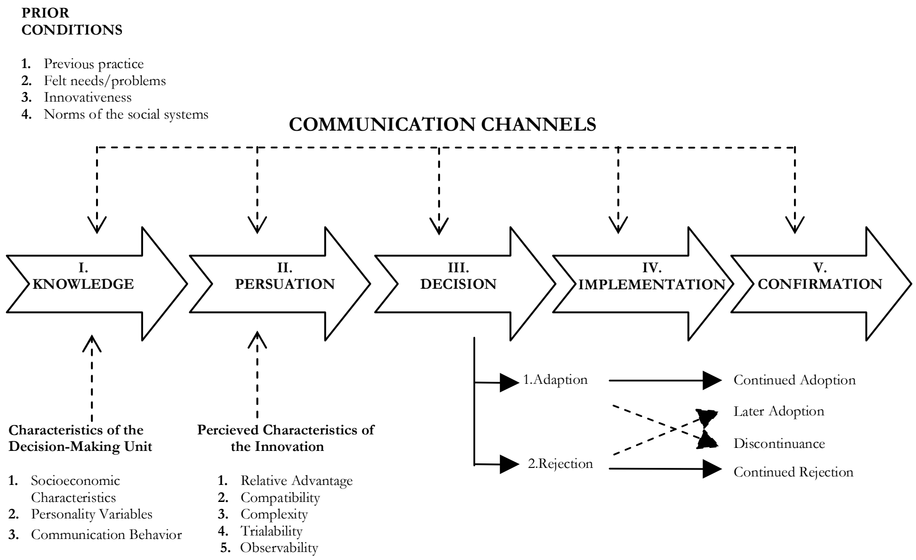

Figure-1.Innovation-Decision Process (Rogers,1995)

According to Rogers (1995), the innovation decision process is essentially information-seeking and information-processing in which the individual is motivated to reduce uncertainty about the advantages and disadvantages of an innovation.

Innovation decision process begins with the knowledge stage which occurs when potential adopters is exposed to an innovation's existence and gain basic understanding of what and how it functions. Question such as "What is the innovation", "How does it works? and "Why does it works?" are the main concern of an individual about an innovation. After gaining awareness-knowledge, information that an innovation exists, an individual seeks how-to knowledge, information necessary to use an innovation properly. If an adequate level of how-to knowledge is not obtained prior to trial and adoption, there is a greater possibility of rejection or discontinuance. Another type of knowledge that an individual seeks, principles knowledge, is information dealing with functioning principles underlying how the innovation works.

At the Persuasion Stage, individuals form a favorable or unfavorable attitude toward the innovation. In this process individuals seek innovation-evaluation information to reduce uncertainty about innovations' consequences. Innovation-evaluation information sought from near-peers whose subjective opinion of the innovation is most convincing than scientific evaluation of innovation (Rogers, 1995)

At the Decision Stage, an individual engages in activities that lead to a choice to adopt or reject an innovation. Adoption is a decision to make full use of an innovation. Most individuals who try an innovation then move to an adoption decision, if the innovation has at least a certain degree of relative advantage (Rogers, 1995). Rejection is a decision not to adopt an innovation. Each stage in innovation-decision process is a potential rejection point. Rejection can occurs at the knowledge stage after gaining initial awareness-knowledge or even at the confirmation stage after a prior decision to adopt. Two different type of rejection, active or passive, can occur in the innovation-decision stage: Active rejection occurs after trying the innovation out on limited basis. Passive rejection, also called nonadoption, consists of never really considering the use of the innovation.

At the Implementation Stage, an individual puts an innovation into use. Implementation involves overt behavioral change rather than mental exercises involved in stages until implementation stages. Length of the implementation period depends on the nature of innovation. The end point is the point at which the new idea becomes institutionalized and regularized part of the adopters' ongoing operations.

At the Confirmation Stage, individual seek reinforcement of the innovation-decision already made, or reverses a previous decision if exposed to conflicting messages about innovation.

2.1.3 Adopter Categories

Another theory discussed by Rogers is "Adopter Categories". This theory states that individuals in a social system do not adopt an innovation at the same time, a certain percentage of individuals are relatively earlier or later in adopting new idea. Innovativeness, the degree to which an individual is relatively earlier in adopting new ideas than other members of a social system, is the criterion for adopter categorization in this theory. According to Rogers' (1995) theory, distribution of various adopter categories forms a normal, bell-shaped curve (Figure-2).

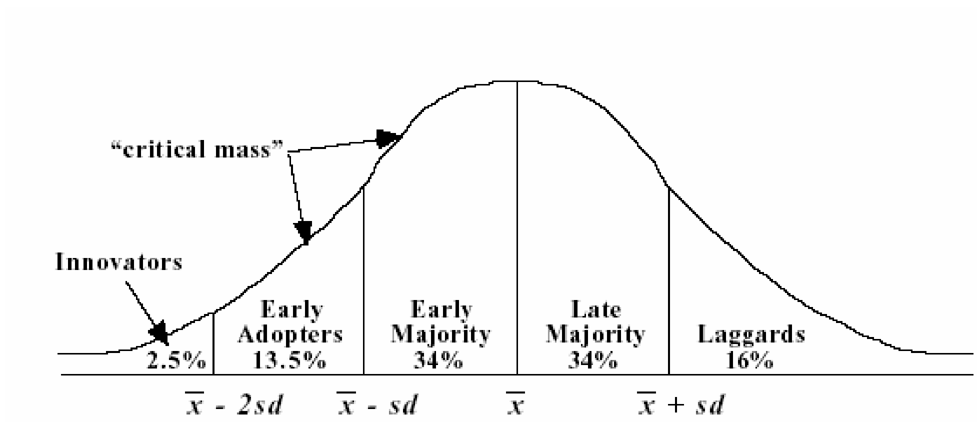

Figure-2: Adopter Categorization on the Basis of Innovativeness (Rogers, 1995)

Innovator are venturesome. Their interests in new ideas lead them into more cosmopolite social relations. Communication patterns and friendship among innovators are common even though they are geographically separated. They have ability to understand and apply technical knowledge. Innovators are able to cope with a high degree of uncertainty about an innovation at the time of adoption. The innovators plays a gate keeping role in the flow of new ideas into a system by importing the innovation from outside of the system's boundaries.

Early Adopters are more integrated part of the social system than innovators. The segment of the diffusion curve between 10 to 20 percent adoption is "critical mass" or the "heart of the diffusion process" because they decrease uncertainty about a new idea by adopting it and then providing objective or subjective evaluation of innovation to peers through interpersonal networks (Rogers, 1995). They have greatest degree of opinion leadership in systems in most system. The early adopters is respected by his or her peer. Potential adopters look to them for advice and information about the innovation.

Mainstream- Taken together, Early majority (EM) and Late majority(LM) accounts for 68% of the population. The EM adopt new ideas just before the average member of a system. They interact frequently with their peers, but seldom hold position of opinion leadership in a system. Their innovation-decision period is relatively longer than of the innovators and the early adopter.

LM adopt new ideas just after the average member of a system. LM' adoption of an innovation may be both an economic necessity and the result of increasing network pressure from peers. LM do not adopt until most others in their system have done so. System norms must definitely favor an innovation before the LM are convinced and, the pressure of peers is necessary to motivate adoption. Most of the uncertainty about an innovation must be removed before late majority feel that it is safe to adopt.

Laggards are the last in a social system to adopt a new idea. Laggards are the most localities in their outlook of all adopter categories. They interact primarily with other who also have relatively traditional values. The point of reference for the laggards is the past, that is, decisions are often made in terms of what has been done previously. Resistance to innovation an the part of laggards may be entirely rational from their viewpoint, as their resources are limited and they must be certain that a new idea will not fail before they adopt.

Individuals who adopt an innovation at different points in diffusion process differ from one other in terms of social and psychological characteristics (Rogers, 1995). Those characteristics determine individuals' willingness to adopt an innovation and their leadership functions. In comparing earlier adopter to later adopters, Rogers (1995) generalized characteristics of adopter categories under three headings: (1) Socioeconomic Characteristics, (2) Personality values, (3)Communication behaviors (p.269) (Table-1).

Table-1. Rogers' Generalization of Adopter Categories

Characteristics	Generalizations
Socioeconomic Characteristics	Earlier Adopters • Are not different from later adopters in age, • Have more years of formal education, • are more likely to be literate, • have higher social status • have a greater degree of upward social mobility, • have larger units than later adopters
Personality Characteristics	Earlier Adopters • have greater empathy, • may be less dogmatic • have a greater ability to deal with abstractions, • have greater rationality, • have greater intelligence, • have a more favorable attitude toward change, • are less fatalistic(ability to control his or her future) • have higher aspirations than later adopters
Communication Behavior	Earlier Adopters • have more social participation, • are more highly interconnected through interpersonal network in their social system, • are more cosmopolite • have more change agent contact • have greater exposure to mass media communication channels, • have greater exposure to interpersonal communication channels • seek information about innovation more actively, • have greater knowledge about innovation • have a higher degree of opinion leadership than later adopters

2.2 Instructional Technology Adoption Patterns of Higher Education Faculty

Research in the area of instructional technology diffusion reveals that there is a increment in faculty use of technology in higher education institution (Green, 1999; Jerant, Matian & Laslo, 2003). Despite research that technology is being used by more faculty, technology is not being integrated into teaching and learning process(Goeghegan, 1994; Spotts&Bowman, 1993, Albright, 1996, Surry; 2000). Goegehan (1994) stated :

> In fact the best evidence we have today suggest that desktop computing is being widely used by faculty and, more importantly it is being used in support of teaching. The problem is that this support is for the most part logistical in nature: preparation of lecture notes, handouts, overhead transparencies, and other types of printed and display material that substitute for the products of yesterday's blackboard and typewriter technologies (p.2).

Goeghegan (1994) also suggest that diffusion of instructional technology has been reached the saturation point with early adopter of instructional technology, but limited adoption by mainstream faculty.

Findings from research studies provide evidence to Goeghegan' assertion. Jacobsen (1998) conducted a study of faculty at the University of Calgary and the University of Alberta, in Canada. The purpose of this study was to investigate the characteristics and adoption pattern of faculty who adopt and use technology in the classroom. Seventy-six faculty who participated in this study were placed into adopter categories depending on their use of computer technologies. Jacobsen (1998) looked at the adoption of each application and tool and found that word processing, e-mail, the web and library databases used by both early adopters and mainstream faculty. Eight tools were found to have only diffused by the innovator and early adopter categories. Application such as authoring tools, virtual realty and so on were the applications limited diffused. E-mail, word processing, the web, online databases, spreadsheets, charting-graphics, operating systems and statistical packages were found to be used most frequently for classroom use.

Anderson, Varnhagen & Campbell (1999) conducted a study with 557 full time faculty member. Faculty were asked to self-assess their skills on a number of information technologies and assigned to adopter groups based on their self-assessed skills. Over 90% of faculty rated their skills at novice or higher at word processing, electronic mail and library database searching. Below 50% of faculty rated their Internet skills (browsing, email list) excellent or good level. Except presentation software, most faculty reported no experience with www page creation and courseware authoring. Anderson, Varnhagen & Campbell (1999) concluded that faculty used information tools associated with research and professional communication much higher than those associated primarily with teaching.

Proulx & Campell (1997) conducted a study of diffusion of computers into educational practice of university faculty at Mount Allison University, an liberal arts university in Canada. Faculty divided into three categories of low, medium and high user based on faculty's self-assessments of computer expertise and self-reports of the amount of time spent using computers. Overall, word processing (96,9%), personal computer use (90,8%) and e-mail (87%) were found to be the most common applications. The quantitative use of newsgroups, data processing and spreadsheets showed great differences among user levels. The use of tools related to teaching also showed differences among user categories. The use of course materials (handouts, syllabuses, overheads) was high overall (84,9%) but "this level of computer use for teaching is only at the level of a support function"(p.7). Proulx & Campell (1997) concluded that the use of computers for instruction is less common than their use throughout the professional practice of faculty; virtually all faculty use computer technologies for some tasks , but not necessarily as pedagogical tools. Those faculty who extensively apply computers to teaching tend to have a strong set of computer skills

2.2.1 IT Adoption Patterns of Faculty in Higher Education Institutions in Turkey

Although diffusion of technology is a challenge that higher education institutions face today in Turkey, there are very few study that has been carried out on the diffusion and adoption of technology in higher education in Turkey.

One of these studies was conducted by Odabaşı (2000) in a Turkish university to find out the faculty familiarity and use of technology resources, and factors affecting utilization of technology. In this study it is found that the faculty members were mostly familiar with traditional resources such as radio, video but lack familiarity with the current technology resources. Regarding frequency of the use of technology resources, it found that faculty never used computer conferencing to promote class discussion (81,3%), multimedia in class 79,2%), multimedia for individualized learning (76,4%), e-mail for individual contact with students (71,5%), and computer-assisted instruction (68,8%). Technology resources used frequently by the faculty were indicated as word processing to prepare exams and course materials (36,8%), presentation software to prepare handouts, transparencies (26,4%) and e-mail with on and off campus colleagues(21,5%). The findings of this study indicated that faculty uses technology resources but rather in the old fashioned sense.

Another study, a combination of qualitative and quantitative research, to explore the discrepancy pertaining to the current and the expected technology utilization was conducted by Gulbahar, Zayim & Yıldırım (2002). 7 administrators, 42-faculty member, 44-research assistant, 24 administrative personnel and 957 students participated in this study. Gülbahar, Zayim and Yıldırım (2002) reported that that faculty members used computer technologies mostly in course related activities rather than in classroom. In this study it is found that faculty use computers mostly to communicate(95%), to prepare course materials and exams(92%), to search on Internet(9%) and to prepare presentation(90%) (O.D.T.Ü. Eğitim Fakültesi Öğretim Teknolojileri Planı, 2001).

2.2.2 IT Adoption Patterns of Medical School Faculty

There are very few studies about instructional technology use of medical school faculty. One of those studies, conducted in Finland as a part of nationwide project " Culture in Medical Education" in order to determine attitudes of medical teachers and students toward information and, current use of information technologies (Slotte, Wangel & Loka, 2001). Participant were 196 medical teachers (%54 responded) and 392 (66% responded) medical students at two medical school. In this study , it is found that 65% of medical teachers used e mail many times a day, 25% daily and 2% never. With regard to Internet, it found that 33% of the teachers used it many times in a day, 32% used daily, 28% used weekly and 5 % used never. Another finding of this study is that medical teachers use information technologies more in research work than in teaching.

Another study conducted by Lichty (2000), investigated the beliefs and perceptions of medical school faculty regarding implementation of computer-based technologies in medical education as well as faculty use of computer-based technologies. In this study, she found that that 84,8% of the faculty used computers on a daily basis, 13,1% used several times a week and 2,1% not used at all. It is also found that word processing and e-mail and Medline were the applications used most often , HTML and World wide web were least used applications by the faculty.

Goold (1999) surveyed 161 Emergency Medical Services educators from institutions of higher learning in order to explain the associations between computer use, user topologies, perceived barriers, computer attitudes and various demographic and institutional variables computer use behaviors and computer attitudes. The study found that EMS educators are using computer technologies in classroom less often than their colleagues in other disciplines. It is reported that of the respondent, 48,15% are using computer technology " extensively" or quite often" or "more often than not" and, 51,9% are using computer technologies in classroom "infrequently", "rarely" or "not at all" instruction. While word processing and presentation software were commonly used technologies, Internet and e-mail were found to be used by more than half of the respondents.

Jerant, Matian & Lasslo (2003) conducted a follow-up study to compare computer use patterns of family practice residents, students and faculty since 1998. They surveyed 97 first-year medical students, 46 family practice residents and 18 faculty in 2001. They found that significantly more respondents owned a computer in 2002 than in 1998 and, e-mail and internet use increased dramatically for all groups.

Polyakov et al (2000) investigated the use of computers in clinical practice and teaching among medical practitioners working in university –affiliated teaching hospitals. 246 medical staff including interns, residents, fellows and attending physicians at the major teaching hospitals in South Australia answered the questionnaire. The majority of the respondents owned computers and over %80 of the respondents had more than 2 years f experience using computers, and at least half of them used a computer in clinical practice more than 2 hr per weeks. In administration, computers were used for finding results of investigations (41%), word processing (54%), and searching patient records(34%). In research, computers use consisted of Internet access (43%), literature searches (55%), word processing (52%), and presentation preparation (41%). Polyakov et al. (200) reported that most respondents spent less than 5 hr per week on teaching undergraduates. Half of the respondents lectured, and one quarter of them ran tutorials. The tools used in teaching were reported as traditional (blackboard, overhead transparencies, handouts and slides). More than one quarter of the participants used laptop projectors.

In order to define the current use of information technology in radiology tutorials for medical students, Durfee et al. (2003) conducted a web-based survey of directors of medical school courses in radiology. There were 48 respondents to the questionnaire from the 161 e-mail sent to 139 departments. Course directors were questioned regarding the various educational methods they use in the radiology course. The results indicated that the teaching case presentations often included film images on a view box (60%) or or by an overhead projector (43%); in only 38% of the courses was digital projection used. Computers dedicated to student use were uncommon (28%). The web was used infrequently for teaching modules (19%), literature search (17%), course schedules (15%), lecture handouts (6%), and a Web site was not available in most courses. Durfee et al. (2003) concluded that despite the widespread use of digital technology in the field of radiology, information technology is underused in teaching radiology courses.

2.3 Contributing Factors to Diffusion and Adoption of IT Among Higher Education Faculty

Adoption or hesitation to adopt new instructional technologies by faculty involves a complex system involving multiple variables (Spotts, 1999; Albrigt, 1996). Spott (1999) stated that "…, the reality of instructional technology use is in the relationship between the new instructional technologies and the faculty members' individual and organizational context and their personal histories".

Following section presents literature related to individual characteristic of faculty and organizational factors regarding barriers and incentives to technology adoption.

2.3.1 Characteristics of the Faculty

In many studies of diffusion and adoption of instructional technology in higher education regarding faculty characteristics, similar characteristics to those of adopter categories described by Rogers (1995) were found.

Anderson, Varnhagen & Campbell (1998) conducted a study at the University of Alberta in 1996 for the purpose of obtaining data on the use of instructional technologies and measuring attitudes on technology related issues. They compared early adopters of educational technologies and found differences in perception of efficacy in the use of information technologies. The early adopters also perceived that educational technologies have improved the quality of their teaching, their contact with students, and their productivity as teachers. Anderson et al. (1998) also reported that the early adopters of instructional technology were younger than the mainstream faculty and more likely to be lower assistant professor rank.

Rogers' (1995, p.170) states that " certain individuals are more likely to have an attitude/gap than others....later adopters may have low efficacy, defined as the degree to which an individual feels they can control their future". Previous research provided empirical support for that individual's attitude and self-efficacy beliefs are significant predictors of their technology use.

Computer self-efficacy is an individual's belief about their ability to competently use computers (Compeau & Higgins, 1995). Hill et al. (1987) showed that computer self-efficacy is an important determinant of individual's decision to use computer technology. Marcinkiewicz's (1994) findings provided evidence for that self-efficacy beliefs is a significant predictor of behavior related to use of computers in the classroom. Compeau & Higgins (1999) found that both self-efficacy and outcome expectations impact on an individual's affective and behavioral reactions to information technology.

"The indivudual's attitudes or beliefs about the innovation have much to say about his or her passage the innovation-knowledge-process" (Rogers, 1995, p.167). To adopt an innovation, the individual needs to define the innovation as relevant and useful to a specific situation. Stein & Wang (1998, cited in Lichty, 2000) investigated the relationship between success in implementing innovative programs, teacher perception of self-efficacy and the teacher perceived value of the program. The results of this study indicated that successful program implementation by teacher is related to perceptions of self-efficacy and a high teacher-perceived value of innovative program.

In order to analyze the relationship between Computer self-efficacy, perceived usefulness and organizational influences on utilization of Information Sysyems, Lopez and Manson (1997) surveyed 58 managers located at the Alhambra, California Network Engineering Center. The results of this study suggest that perceived usefulness, computer self-efficacy and environmental influences are important determinant of IS utilization in an organizational environment.

Spotts (1999) interviewed faculty members who are selected from 760 full-time teaching faculty members at an U.S. Midwestern university and classified into three groups: high, medium and low-lever users of instructional technology based on the survey responses about their instructional technology use. The interview questions were based on a model suggesting five variables (the learner, faculty, technology environment, and perceived value) influence a faculty member's use of technology in the classroom. Spotts (1999) concluded that the most evident factor differentiating high from low users was the faculty members' attitude and the value they perceived in technology use.

Jayasuriya (1998) surveyed 113 nurses and 40 healthcare administrators in order to identify factors that determine computer acceptance among occupational groups in Community Health and to predict the factors that relate to computer use. In this study it is found that about 55% of the variation in the use of word processing explained by computer skills, perceived usefulness and designation. In the case of database use, perceived usefulness was the only significant predictor explaining 53% of the variation. Findings indicated that health professionals would use computers when they perceived it to be useful for performance in their jobs.

Dixon & Steward (2000) conducted a study to differentiate family physicians' IT-related behaviors according to their views and attitudes towards IT. A total of 101 family physicians were stratified into high use, intermediate use and low use groups according to their self-reported IT use. In this study, the results of ANOVA analysis indicated that usage of IT showed significant differences among groups for intent interest, perceived usefulness, perceived ease of use, finesse and knowledge (all $p < 0.001$). Two of the variables (intent to use IT and perceived ease of use) were found to be able to discriminate among physicians with high use, intermediate use and low use of IT.

In order to investigate characteristics and adoption patterns of faculty who adopt and use technology in classroom, Jacobsen (1998) conducted a study of faculty at the University of Calgary and at the University of Alberta, in Canada. Faculty were placed into adopter categories depending on their answers to a survey on their use of computer technologies. In-dept interviews were then conducted with the individuals who are identified early adopters of technology. Findings indicated that there were differences between early adopters and mainstream faculty. It is found that early adopter faculty have greater expertise, higher innovativeness and higher confidence than mainstream faculty in technology use.

Oates (2001) conducted a study qualitative in nature for the purpose of describing and developing profiles of university faculty who were experienced computer user and who used technology in the classroom, research or service area. It is reported that participants demonstrated high degree of innovativeness and opinion leadership. It is also reported that those participants appeared to be respected by others for their expertise and knowledge.

Participants had a strong technology focus in the classroom, research and service area, spending average 40 hours per week using computer technologies. It is reported that participant risk takers and experimenters. It is also found that participant in this study were horizontally networked, that is, they come in contact with individuals across disciplines.

2.3.2 Barriers to Adoption

Although there are significant increases in faculty use of instructional technologies (Green, 1999; Geoghegan, 1994), there is still a large number of faculty who seem hesitant or reluctant to adopt technology for their teaching task(Jacobsen, 1998, Albright, 1996). In explaining faculty limited adoption of instructional technology, Jacobsen (1999) state that "explanation for limited adoption may be found in the many barrier that still constrain use by enthusiastic beginners"(p.2)

Research in the area of technology adoption among faculty indicates that faculty face a number of barriers (Sumner & Hostetler, 1999; Spotts, 1999; Jacobsen, 1999; Beggs, 2000; Butler & Sellbom, 2002) In a keynote address to Southern regional Faculty and Instructional Development Consortium, Albrigt (1996) pointed out about 5000 references on the barriers that faculty face and reviewed a few of them as fallows:

- Faculty conservatism and commitment to traditional means of teaching
- A reward system that penalizes faculty for concentrating on teaching instead of research.
- Poorly equipped classrooms
- Lack of financial plans
- Disproportionate access
- Lack of knowledge about technology and available resources
- Lack of time

- Lack of commitment to technology at the highest echelons of the administration and so forth.

Recent studies in the area of adoption of instructional technology evidence that higher education faculty still faces most of barriers listed by Albrigt (1996)

In his study, conducted at the State University of West Gorgia with 348 full-time faculty, Beggs (2000) found that lack of time, lack of easily accessible equipment and lack of training were ranked important or critically important barriers to adoption of technology. In addition to barriers listed above, in his study conducted at a Turkish University, Odabaşı (1999) reported that lack of interest in technology was a significant barrier whereas the least important barrier was the lack of contribution to professional advancement.

In order to find out the factor influencing the adoption of technology in teaching, Sumner and Hostetler (1999) conducted a study in which faculty at University of Illinois were interviewed and surveyed. Summer and Hostetler(1999) reported that limited technical support and lack of released time were found to be the most important factors in deterring efforts to integrate technology into teaching. In addition to these factors, lack of institutional support, lack of a viable reward system, and lack of support in the tenure and promotion were also significant barriers to adoption of technology for teaching (Summer & Hostetler, 1999).

Similar to findings of studies related to IT adoption (Spott, 1999; Summer & Hostetler, 1999), Jacobsen (1998) also found that lack of time, lack of resources for students, financial support and lack of reward structure that recognize faculty IT use were barriers to integrating technology on campus.

In addition to barriers those overall faculty agreed on, Jacobsen (1998) reported that there are significant differences on perceived barriers to adoption between early adopters and mainstream faculty. She stated that ”EAs described some of the same impediments that other faculty highlighted, ... However, a subtle difference was that these difficulties seem to be expected, the EAs locate the problem in the technology rather than themselves, and do not appear to be deterred by these impediments”(p.166).

In 1996, Zwirn interviewed thirty-four respondents including administrators, stakeholders and resident physician to identify factors which serves as disincentives to the integration of IT into Graduate Medical education. Three disincentives categories emerged in this study: Faculty related factors, resource related factors and resident related factors. Zwirn (1996) stated that “All three disincentives categories together ultimately lead to the suboptimizing of benefits that might be realized through the application of instructional technology in graduate medical education”.

According to Zwirn (1996) problematic analysis, unfamiliarity of faculty with IT teaching and evaluation, low priority of IT due to clinical emphasis and the complexity of clinical change, institutional administrative structure fails to support IT, generational barriers and absent of curricular integration were identified as faculty-related disincentives to IT adoption.

With regard to resource-related disincentives, uneven or inequitably distributed resources, varying quality and quantity of resources, funding and varying availability of the resources for residents were found to be disincentives.

Cultural biases of residents against IT, lack of connection between classroom learning and practical experiences, residents lack of knowledge and influences were identified as residents-related disincentives.

Related to barriers to adoption of IT among Emergency Medical Services educators, Goold (1999) found that funding, time, equipment and technological support were major barriers to increased diffusion of IT.

Goold (1999) also found that there are differences between selection percentages of two computer user topologies categorized as "explorers" and "change agents" in terms of perceived barriers to IT adoption. Time selected mostly by the "explorers" and funding selected mostly by the "change agent" as their first choice. While lack of adequate software selected by the 23,8% of the "change agent", only 0.8% of the "explorers" selected as their first choice. The selection percentage difference between the explorer and the change agent group was greatest (%23) during the selection of lack of knowledge.

2.3.3 Incentives to Adoption of IT

According to Anderson, Varnhagen & Campbell (1999), "Related to barriers are incentives that help faculty overcome barriers". In their study conducted at University of Alberta in 1996, Anderson, Varnhagen & Campbell (1999) found that five incentives were identified as important incentives by the faculty: Investment in innovation, infrastructure, training and support, tenure and promotion, reduced teaching load, internal grants to develop course material and study leaves.

For all faculty, resources for infrastructure, training and support were identified as the greatest incentive. The next most important issue concerns recognition of innovation in teaching in tenure and promotion evaluations. Reducing teaching load and study leaves were viewed by most faculty as important incentives. Early adopters rated the reduction of teaching load as significantly more important than the mainstream faculty. According to Anderson, Varnhagen & Campbell (1999), it may because of a knowledge of the time commitment required to develop instructional materials or lack of interest and commitment teaching by early adopters. It is also found that early adopters were more likely to view internal grant programs as important.

In their study , Spotts & Bowman (1993) surveyed 306 faculty members at Western Michigan University. Open-ended questions in the survey revealed that faculty member' primary incentive to use technology in classroom was "improved learning". While time and equipment availability were found to be second and third important incentives respectively, money and recognition by the higher education community were found to be least important to the faculty.

In Odabaşı' (1999) study conducted at a university in Turkey , the result that released time incentive was found to be the most important is similar in the rating to

Spotts and Bowman's (1993) study. Odabaşı (1999) found that clerical assistance and scholarships abroad were the next two important incentives to faculty. Similar to Spott and Bowman' (1993) findings, monetary-wise incentives were found to be least important incentives. Monetary reward, contribution to promotion and merit pay were rated as not important incentives by more than half of the faculty.

Jacobsen (1998) discussed incentives personal in nature that motivated faculty to use technology in classroom. Jacobsen (1998) found that many of the incentives that motivated faculty to use technology in teaching were related to improving student learning and satisfaction. They included improved student learning, the ability to "communicate difficult ideas" (p.86), improved presentations, greater student engagement and students' gain of skills needed in future carrier. Jacobsen (1998) also found that "personal grafication from learning computer knowledge and skills" was the number one incentive for faculty (p.85). In addition, saving time and being more efficient were found to be personal incentives in adopting technology.

Related to institutional incentives, Jacobsen (1998) stated that " a number of respondents indicated that there very few or no motivators on campus or in their department to use technology in their teaching" (p.87). Jacobsen (1998) listed seven conditions described by faculty that would provide a motivating environment for integrating technology in their teaching as following:

(1) release time to develop their own technology skills and on-line resources (i.e. web-based courses and support materials),
(2) Better student access to up-to-date hardware and software

(3) Small startup grants or financial support to purchase equipment,

(4) technical support on a timely basis

(5) inexpensive or convenient training opportunities

(6) recognition of time and effort for technology based teaching at annual report time,

(7) evidence that technology improves teaching and learning (p.87).

2.3.4 Resources for Training and Support

In many research studies, resources for training and support were identified as important incentives to faculty adoption of technology for teaching(Anderson, Varnhagen & Campell, 1999; Green, 1999). Jacobsen (1998) suggest that "Individuals tend to have preferred methods for learning more about technology(p.96).

Findings of Jacobsen' (1998) study indicated that the preferred sources of information for faculty were people that faculty know and access immediately. Most preferred sources for gaining information on technology were colleagues, friends and family, graduate students, online newsgroups and websites. Faculty rated their department chairs, university administration and refereed computer journals as neutral or not important sources of information. Early adopters rated refereed computer magazines, computer magazines, innovative graduate students, conferences and workshops, computer newsgroups and websites as more important than mainstream faculty.

In terms of help and assistance, Jacobsen (1998) found that faculty prefer to get help from colleagues and graduate students, wants one-to-one assistance rather than rlying on outside professionals and colleagues at another institutions. Early adopters rated graduate experienced students as more important source for help and assistance than mainstream faculty.

Mu (1999) found similar preferences in his study of College of Education faculty in the University of Tennessee system. The three training formats preferred by faculty were one-on-one instruction, hands-on workshops, and computer-assisted instruction. Respondents learned by both formal and informal means, but for the most part were self-taught using trial and error.

Oates (2001) , in her study with early adopters of technology, found that faculty became aware of new computer technologies through main source: colleagues and support personnel, magazines and journals and the Internet.

In Anderson, Varnhagen & Campell' (1999) study, short blocks of time to learn and practice skills(workshops), working with a mentor and release time for independent study were indicated as the most preferred methods of training and support. Early adopters were less interested in scheduled workshops and working with mentors and were significantly more interested in release time for independent study.

In terms of sources of leadership, Anderson,Varnhagen & Campell (1999) found that "colleagues on campus" were the greatest leadership source for the faculty. Professionals trained in the use of educational technology were identified as the second most important source however; early adopters didn't identify these professionals as important leadership sources as often as mainstream faculty group.

2.4 Summary

There is a considerable amount of literature on diffusion and adoption of instructional technology among higher education faculty. For the purpose of current study, this literature was divided into three areas.

The first area discussed Rogers' (1995) diffusion of innovation theories which provided a theoretical framework for this study. According to Rogers (1995), an individual's decision about an innovation is rather than an instantaneous act, it is a process through which an individual passes from first knowledge of innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. Rogers (1995) also state that individuals in a social system do not adopt an innovation at the same time, a certain percentage of individuals are relatively earlier or later in adopting new idea and, individuals who adopt an innovation at different points in diffusion process differ from one other in terms of social and psychological characteristics.

The second area discussed instructional technology use patterns of higher education faculty including medical school faculty. The literature indicated that while e-mail, word-processing, presentation software, world wide web were most frequently used applications by higher education faculty, use of applications related to teaching such as authoring software, web page creation(html) were limited (Jacobsen, 1999,;Green 1999; Anderson, Varnhagen & Campell, 1999). Studies conducted with medical school faculty also indicated that although there is dramatic increase in technology use (Jerant, Matian & Lasslo, 2003), medical teachers use information technologies more in research work than in teaching (Slotte, Wangel & Loka, 2001).

The third area discussed contributing factors to diffusion and adoption of instructional technology among higher education faculty including individual characteristics and personal and organizational factors. The literature on individual characteristics of faculty indicated that early adopters of instructional technology shared common characteristics such as higher perceptions of efficacy and expertise (Anderson,Varnhagen &Campell, 1999; Jacobsen, 1999; Lichty, 2000; Qates, 2001), risk taker and experimenter(Oates, 2001), positive attitude toward technology (Spott, 1999), have personal interest in technology(Oates, 2001).

Related to organizational barriers, lack of time, lack of equipment, lack of financial support, lack of reward structure were most frequently cited barriers (Jacobsen, 1998; Spott, 1999; Odabaşı, 1999; Goold 1999, Zwirn, 1996). In most of the studies, improved student learning, released time, availability of resources for faculty and students, training and support, tenure and promotion were identified incentives to faculty instructional technology adoption in teaching.(Jacobsen, 1998; Spotts&Bowman, 1993). Literature on barriers and incentives to IT adoption also indicates that there are differences among adopter groups' perceptions about incentives and barriers to adoption (Jacobsen, 1999; Anderson, Varnhagen & Campell, 1999; Goold, 1999).

Finally, literature on faculty preferences for learning and support was sdiscussed. Literature suggest that faculty mostly prefer collegues (Jacobsen, 1999; Anderson, Varnhagen & Campell, 1999), graduate students (Jacobsen, 1999), support personnel, magazines and conferences(Oates, 2001) , and Internet (Oates, 2001; Jacobsen, 1998) as a source of information. One-to one assistance, workshops, released time for independent study were mostly preferred methods of learning (Jacobsen, 1999; Anderson, Varnhagen & Campell, 1999; Mu, 1999).

CHAPTER 3

RESEARCH METHOD

This chapter describes the research methodology used for investigating the characteristics and adoption patterns of medical school faculty who adopt or reluctant or resist to adopt instructional technology for teaching and learning and contributing factors to IT adoption of medical school faculty. Specifically, this chapter describes the research questions, research method, sample information, study variables, instruments for measuring the variables, and research procedures for conducting the study.

3.1 Research Questions

The purpose of the study was to explore IT adoption patterns and characteristics of medical school faculty and contributing factors to IT adoption and diffusion. The focus of the study was to explore differences between faculty who adopt and reluctant or resist to IT adoption and, to determine if faculty characteristics contribute to prediction of faculty adopter category. In order to fulfill the purpose of the study, answers were sought to the following research questions.

Question 1: What are the adoption patterns (computer ownership, amount of daily computer use, number and type of IT used in teaching, self-efficacy beliefs, perceived value of IT, perceived barries to IT, perceived incentives to IT, preferred methods for learning about IT) of medical school faculty?

Sub Questions:

1. Is there any significant differences among adopter categories in terms of computer ownership, amount of daily computer use, number and type of IT used in teaching?
2. Is there any significant differences among adopter categories in terms of self-efficacy beliefs?
3. Is there any significant differences among adopter categories in terms of perceived value of IT?
4. Is there any significant differences among adopter categories in terms of perceived barries to IT?
5. Is there any significant differences among adopter categories in terms of perceived incentives to IT?
6. Is there any significant differences among adopter categories in terms of preferred methods for learning about IT?

Question 2. Which of the variables (sex, age, academic rank, year of teaching experience, academic discipline, computer use self-efficacy beliefs, perceived value of IT) individually or in combination with each other contribute to identify adopter categories of medical school faculty?

Sub Questions:

1. Is there any significant relationship between faculty demographics (sex, age, academic rank, year of teaching experience, academic discipline) and adopter categories of medical school faculty?

2. Is there any significant relationship between perceived value of IT and adopter categories of medical school faculty?

3. Is there any significant relationship between computer use self-efficacy and adopter categories of medical school faculty?

Question 3. What are the perceptions of medical school faculty who adopt or reluctant to adopt IT in teaching and learning about of incentives and barriers to IT adoption, value of IT, methods for learning about IT?

3.2 Research Method

Studies of diffusion and adoption help to explain what, where and why of technology acceptance or rejection in education (Holloway, 1996). Rogers(1995) critiques research designs used in diffusion studies and state that diffusion research designs consist of mainly of co relational analyses of cross-sectional data gathered in one-shot surveys of respondents in which time dimension of diffusion is not reflected accurately. He also stated that cross-sectional survey data are unable to answer many of the "why" questions of diffusion. Rogers (1995) recommend to use multi-method several strategies for overcoming the shortcoming of the research designs. In this study, by considering critiques of diffusion research methodologies and recommendations, a mixed-method research design, a quantitative methodology(survey) in conjunction with qualitative methodology(in-dept interviews) was employed for the purpose of gathering data about characteristics and adoption patterns of medical school faculty who adopt or reluctant or resist to adopt IT for teaching and learning in medical education and, contributing factors to adoption of IT.

Table-2 displays the manner in which the proposed research questions correspond to the survey and interview questions in this study.

Table-2. Research Questions and Methodology

Main Research Questions	**Methodology**
What are the adoption patterns of medical school faculty?	Survey/ In-dept interviews
Which of the variables individually or in combination with each other identify adopter categories of faculty?	Survey
What are the perceptions of medical school faculty who adopt or reluctant to adopt IT in teaching and learning about of incentives and barriers to IT adoption, value of IT, methods for learning about IT?	In-dept interviews

This study was accomplished in two phases. Phase I was accomplished by the administration of a survey to all available Akdeniz University Medical School faculty. Phase I was used to determine faculty adoption patterns , differences between adopter categories, barriers and incentives for adoption and, faculty preferences for support and learning about technology.

Phase II was accomplished with in-depth interviews of selected faculty members of Faculty of Medicine, Akdeniz University. This phase investigated perceptions of faculty from each adopter categories about technology use in teaching, influences to adoption decision, sources of information about technology, the barriers they face, and the incentives for IT adoption.

Each of these phases will be described below using the following format: Sample, instruments, procedures and data analysis.

3.2.1 Phase I: Survey

3.2.1.1 Sample

The population for the study was 308 faculty members at Faculty of Medicine, Akdeniz University, in Turkey, who taught in the basic science and clinical science curriculum during the 2002-2003 academic years.

Results of the comparisons between sample and the population proportions by rank, sex, and discipline suggest that the sample is a good representative of the population (Table-3).

Table-3. Proportions of Sample and Population by Rank, Sex and Discipline.

	Rank				Sex		Discipline	
	Prof. (%)	**Assoc.Prof. (%)**	**Asst.Prof (%).**	**Other (%)**	**Male (%)**	**Female (%)**	**Basic S. (%)**	**Clinical S. (%)**
Population n=308	31,8	18,5	23,1	26,6	67,5	32,5	14,6	85,4
Sample n=155	32,3	19,4	23,2	25,1	72,7	27,3	23,2	76,8

3.2.1.2 Instruments

To gather information about adoption patterns of medical school faculty, the survey consisting of 6 subscales was used. Items adopted or selected from previous investigations of faculty adoption patterns (Anderson, Varnhagen, & Campbell, 1999), teaching and learning with technology (Jacobsen, 1999) and Microcomputer Utilization in Teaching Self-Efficacy Beliefs Scale (Enochs, Riggs, & Ellis, 1993).

Subscale 1: Participant Information: The first section of the survey consist of 5 items that gather nominal and interval data about the respondents academic rank, discipline, age, gender and years of teaching experience. Additionally, in this section faculty asked to be volunteer for interview about present investigation. For volunteers, name, phone-number and e-mail information were asked.

Subscale 2: Perceived Value of IT: The second section of the survey consist of 9 items that collect ordinal data about perceived value of IT in teaching and learning. The items in this subscale were constructed based on literature. Participants used five-point scale(i.e. 1=Strongly Agree, 2=Agree, 3= Neutral, 4=Disagree, 5=Strongly Disagree) to indicate their level of agreement with each statement about instructional technology use in teaching and learning in medical education.

Subscale 3: Computer Usage: This section totally consist of 38 items that gather nominal and ordinal data about computer ownership, hours of daily use, computer use self efficacy, level of expertise and technologies used in teaching and learning.

To gather data about computer use self efficacy, a 10-item from that The Microcomputer Utilization in Teaching Efficacy Beliefs Scale which is developed by Enochs, Riggs and Ellis(1993) and used in prior research(Lichty, M., 2000) was used. Respondents used five-point scale(i.e. 5=Strongly Agree, 4=Agree, 3=Neutral, 2=Disagree, 1=Strongly Disagree) to indicate their level of agreement with each statement about computer use. Enoch, Riggs and Ellis (1993) have found that The Microcomputer Utilization in Teaching Efficacy Beliefs scale displayed an internal consistency of 0.91 and Lichty (2000) found that the Self-Efficacy scale received an internal consistency of (Cronbach's alpha) of 0.80.

To collect data about faculty level of expertise with 11 types of computer software and tools, a five-point scale (i.e. 1=None 2=A Little, 3=Fair, 4=Substantial, 5=Extensive) developed by Anderson (1996) was used. The results from this scale will be used to determine early adopter and mainstream faculty groups.

Subscale 4: Perceived Barriers to IT: The third section of the survey consist of 20 items that gather ordinal data about barriers to technology adoption for teaching and learning. Most of the items in this section were adopted from Jacobsen's (1998) survey to be used with medical school faculty. Participants used five–point scale (i.e. 1=Strongly Agree, 2=Agree, 3= Neutral, 4=Disagree, 5=Strongly Disagree) to rate their level of agreement with each statement about barriers to IT adoption.

Subscale 5: Preferred Method For learning About IT: The fifth section of the survey consist of 13 items that collect ordinal data related to faculty preferences for learning and support about technology. Items in this section were adopted from previous research with higher education faculty (Anderson, Varnhagen, & Campbell, 1997; Jacobsen, 1998). Participants used five point scale (i.e. 1=Strongly Prefer, 2=Prefer, 3= Neutral, 4= Don't prefer, 5= Don't Prefer At All) their level of preferences about learning and support about technology.

Subscale 6: Perceived Incentives to IT Adoption: This section of the survey consist of 5 items that gather ordinal data about incentives to IT adoption for teaching and learning in medical education. The items in this section were also adopted from Anderson, Varnhagen, & Campbell, (1999) survey.

3.2.1.3 Data Collection Procedure

A pilot study was conducted in order to test and hone survey instrument. Eighteen respondents (9 teaching basic science curriculum, 9 teaching clinical science curriculum) participated in the pilot study.

First of all, initial draft of the instrument presented to researcher's colleagues who were asked to comment on it. The instrument was revised based on the suggestions addressing the best way to express the statements of the survey. The revised version of the survey was administered to the participants of the pilot study. Participants were asked to comment and make suggestions on the instrument.. A final revision, grammatical in nature, was made considering participants' comments, resulting in the final form of the survey.

A complete list of academic staff by departments (except research assistant) was obtained from Personnel Affairs of Akdeniz University, School of Medicine. The survey instrument attached a cover letter from the researcher explaining the research(Appendix A) and a letter of support from the Dean of Medicine Faculty(appendix A) was distributed each faculty member in the list.. Participation was voluntary and all responses were kept confidential .

3.2.1.4 Analysis of Data

The survey data has been subjected to a number of statistical analysis in order to explore, describe and interpret result from entire sample as well as to determine the significant differences between faculty adopter groups. The data were coded and prepared for analysis using the statistical analysis software SPSS 10.0.

3.2.2 Phase II: Interviews

3.2.2.1 Sample

Interview sample selection completed in two steps: First, at the participant information section of the survey, faculty were asked to be volunteer for an interview. A total of 110 faculty members accepted to be volunteer for an interview on survey. The second step was preceded fallowing the determination of faculty adopter categories in the analysis of survey data. Of the 110 volunteer faculty members, 100 faculty members were from Mainstream Faculty group, 20 faculty members were from Early Adopters group. A number of faculties from each adopter categories were randomly selected from the pool of volunteers and, invited for an interview. A total of 18 faculties, 12 from Mainstream Faculty group, 6 from Early Adopters group participated in a structured, face-to-face interviews.

3.2.2.2 Instruments

In order to get insight about adopter groups' technology adoption patterns in teaching and learning, a set of pre-defined questions was used to guide the interviewer(Appendix B). However, as additional topics arose which were relevant to the study, further inquiry was made. The following topics addressed in the interviews:

- Technologies used
- Perceived advantages
- Influences on decision to adoption
- Sources of information about new technologies
- Perceived barriers and incentives to adoption

3.2.2.3 Data Collection Procedures

A pilot test of interview questions was conducted with a faculty member from each adopter groups. Question, which were not well phrased or clear , were reworded.

Face-to-face interviews for this study were conducted in the faculty member's office on campus, which provided a natural setting for interview. Interviews were scheduled at the convenience of the faculty member and interviewer and ranged between 40-90 minutes in length. To assure accuracy of transcriptions, the interviews were audio-recorded with the consent of the intervenes. All intervenes agreed to be audio-recorded.

3.2.2.4 Analysis of Data

The qualitative data gathered from interviews were analyzed for common and emergent themes using the grounded theory method which is often referred to in the literature as "the constant comparative method of analysis"(Strauss &Corbin, 1990, p.62). The grounded theory method is a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon (Strauss & Corbin, 1990).

In constant comparative analysis, analysis or coding as it is often called , represents the operations by which data are broken down, conceptualized, and put back together" (Strauss &Corbin, 1990). In this study, the coding of transcribed interviews was carried out by assigning codes to paragraphs, sentences or phrases, grouping the coded pieces of text and assigning categories to them, each time comparing for similarities and differences to categories from previous incidents.

3.3 Assumptions and Limitations

3.3.1 Assumptions

- All the subjects give accurate answers to the questions in the instruments.
- The data is accurately recorded and analyzed.

3.3.2 Limitations

- Sample size is limited to generalize the findings of this study
- Validity is limited to the honesty of the subjects' responses to the instruments used in this study.

- The sample size in this study is limited by the number of medical school faculty in Akdeniz University.

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

- Findings of this study are limited to medical school faculty.

CHAPTER 4

RESULTS

The following chapter summarizes the survey and the interview results from this investigation.

4.1 Survey Results

The quantitative data gathered from the survey has been subjected to a number of statistical analyses in order to explore, describe and interpret results from the entire sample for each research question under investigation. The first section presents descriptive statistics for the faculty characteristics, patterns of technology use, self-efficacy, perceptions about the value of instructional technology, barriers and incentives to adoption, and preferences. The second section presents the descriptive statistics above for adopter groups as well as addresses specific research questions using number tests of significance and measures of relationship.

4.1.1 Results for Whole Faculty

The population for the study was all medical school faculty members (308) in a state university in Turkey, that teaches in the basic science and clinical science curricula. The survey was distributed to all faculty members, and 50,3 % (155) of the faculty members responded.

4.1.1.1 Faculty Characteristics

Of the 155 respondents, 112 (72,7%) are male and 42 (27,3%) are female, and hold various academic ranks (Figure-3).

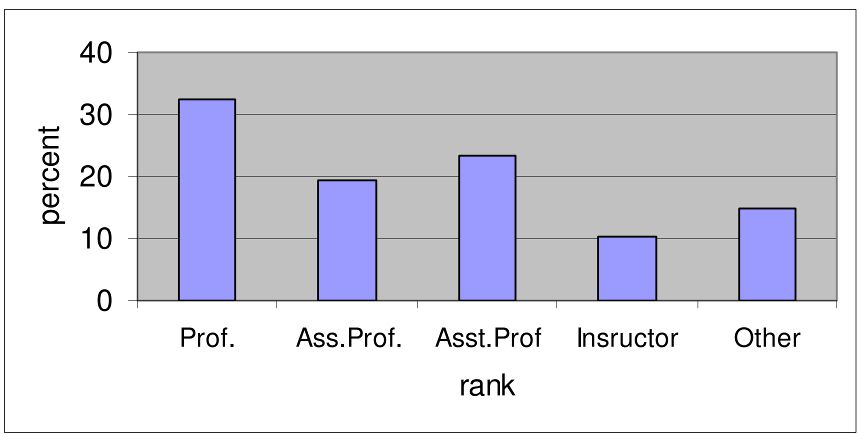

Figure-3. Medical School Faculty by Rank(Akdeniz University, as of January, 2003)

While the average age was 41 years, the largest group(≈55%) was in between 31-40 years range (Table-4). The majority of the respondents (76,8%) have been teaching clinical science.

Table-4. Medical School Faculty Distribution by Age

Age	Frequency	Percent	Cumulative Percent
21-30	6	3,9	3,9
31-40	85	54,8	58,7
41-50	39	25,2	83,9
50-60	22	14,2	98,1
61-	3	1,9	100,0

Although the average years of teaching experience was approximately 10 years, the largest group (39,9%) had 1-5 years of teaching experience, the majority (77,8%) had 1 to 15 years of teaching experience (Table-5.)

Table-5. Years of Teaching Experience(n=153)

Years of Teaching Experience	Frequency	Percent	Cumulative Percent
1-5	61	39,9	39,9
6-10	28	18,3	58,2
11-15	30	19,6	77,8
15-20	9	5,9	83,7
20+	25	16,3	100,0

4.1.1.2 Patterns of Faculty Technology Use

4.1.1.2.1 Computer Ownership

Faculty members were asked to indicate if they have personal computer and internet access at home and at office. Most of the participants (92,5%) indicated that they have computer at home and at office(Table-6). Decreasing prices in computer market and relatively higher economic status of medical school faculty in Turkey may explain the high rate of computer ownership.

Table-6. Computer Ownership and Internet Access

Computer Ownership		Frequency	Percent
Home	Computer	135	92,5
	Internet Access	108	74
Office	Computer	135	92,5
	Internet Access	121	82,9

4.1.1.2.2 Amount of Daily Computer Use

The participants were asked to indicate how much time per day they use a computer. Table-7 illustrates that the participants are not generally heavy computer users; only 21,5% indicated that they spend more than 3 hours per day, 13,7% spend less than one hour per day, and 54,8% spent 1 to 3 hours per day.

Table-7. Amount of Daily Computer Use

Daily Computer Use	Frequency	Percent	Cumulative Percent
less than 1 hour	20	13,7	13,7
1-3 hours	80	54,8	68,5
3-5 hours	21	14,4	82,9
more than 5 hours	25	17,1	100,0

4.1.1.2.3 Computer Use Self-Efficacy

In order to assess self-efficacy beliefs of faculty members in computer use for teaching, ten items adopted from The Microcomputer Utilization in Teaching Efficacy Beliefs instrument developed by Enochs, Riggs & Ellis, (1993) was used. The faculty rated their level of agreement on items by using five point scale (i.e. 5 for Strongly Agree, 4 for Agree, 3 for Neutral, 2 for Disagree and 1 for Strongly Disagree). The internal consistency of this subscale yielded a coefficient alpha of 0,91. The mean score for the faculty is 38,6 with a standard deviation of 5,9. The mean and standard deviation of the responses for each item is presented in Table-8.

Table-8. Means and Standard Deviations of Microcomputer Utilization Self-Efficacy Items.

Items	Mean	SD
I'm continually finding better ways to use the computer in my classroom.	4,06	0,87
Even when I try very hard, I do not use the computer as well as I do other instructional resources.	2,12	1,00
I know the steps necessary to use the computer in an instructional setting.	3,96	0,83
I generally employ the computer in my classroom ineffectively.	2,07	0,95
I understand computer capabilities well enough to be effective in using them in classroom.	3,77	0,91
I find it difficult to explain to students how to use the computer.	2,51	1,04
I am typically able to answer students' questions which relate to the computer.	3,31	1,04
I wonder if I have the necessary skills to use the computer for instruction.	2,23	0,99
Whenever I can, I avoid using computers in my classroom.	4,55	0,70
I do not prefer others to evaluate my computer-based instructions.	2,08	0,90

4.1.1.2.4 The Faculty Expertise in Technology Use

The faculty rated their level of expertise on eleven types of computer software and tools by using five-point scale (i.e., 1 for Extensive, 2 for Good, 3 for Fair, 4 for Novice, 5 for None). An estimate of the internal consistency of this subscale yielded a coefficient alpha of .91, which indicates that faculty responded consistently across items.

The majority of participants (over 90%) rated their skills at fair or higher at word processing, presentation software, electronic mail, library and database searching, search engines and Medline (Table-9). Most of the faculty reported their skills at web page creation (76,1%) and statistics packages (54,2%) at novice or none. These findings indicate that faculty mostly use communication and research related tools. Relatively new tools associated with instruction (e.g. Web page creation) were not adopted by majority of the faculty.

Table-9. Percentage of Self-Assessed Expertise Level of Faculty by Each Software/tools

Tools	Extensive (%)	Good (%)	Fair (%)	Novice (%)	None (%)
Word processing (eg. MS Word)	18,7	61,9	14,8	2,6	1,9
Spreadsheets (eg. MS Excel)	7,1	30,3	37,4	20,6	4,5
Presentation software (eg. MS Powerpoint)	21,9	52,9	17,4	7,1	0,6
Web Page creation (e.g. HTML)	0,6	8,4	14,8	27,7	48,4
Statistics Packages (eg.SPSS)	4,5	14,8	26,5	33,5	20,6
Electronic mail	29,2	51,3	14,3	3,9	1,3
Web browsing	24,5	50,3	14,8	9,0	1,3
Searching library catalogues and databases	23,9	48,4	18,7	5,2	3,9
Listservs and newsgroups	9,7	30,5	26,6	16,2	16,9
Search Engines (eg.google, yahoo)	21,9	49,7	20,0	5,2	3,2
Medline	37,4	49,7	9,7	3,2	0,0

4.1.1.2.5 Technologies Used in Teaching-Learning Process

Medical school faculty were asked to indicate which of the 12 instructional technologies they use in teaching-learning process. The mean number of technologies used in teaching is 4,56 with a standard deviation of 1,94. Based on Rogers' adopter categories, the descriptive results indicate that of the 12 instructional technologies, 9 have been used in teaching by more than 16% of the faculty, which means that these technologies have diffused into the Mainstream Faculty(MF). Of the 9 technologies that have been used by Mainstream Faculty(MF), 4 are used by more than 50% of the faculty(i.e. computer+projection 95%, slide projector 75%, overhead 71%, blackboard 66,5%) which indicate that these technologies have diffused into Late Majority(LM).The other 5 technologies have diffused into Early Majority(EM) which represents the segment between 16 and 50% percent of the Rogers'(1995) diffusion curve (i.e. Web resources 18,3% ,Video 20,9, Special Laboratory 22,2%, word processors 33,3%, presentation software 32,7%) (Figure-4). Frequencies and percent of the faculty for each technology is given in Table-10.

Table-10.Technologies Used in Teaching-Learning

Technologies	**Frequency (N=153)**	**Percent**
Computer+Projection	146	95,4
Slide Projector	117	76,5
Overhead	108	70,6
Blackboard	102	66,7
Word processors	51	33,3
presentation software	50	32,7
Special Laboratory	34	22,7
Video	31	20,3
Web resources as content	28	18,3
Course web site	22	14,4
Sound	6	3,9
Commercial educational software	4	2,6

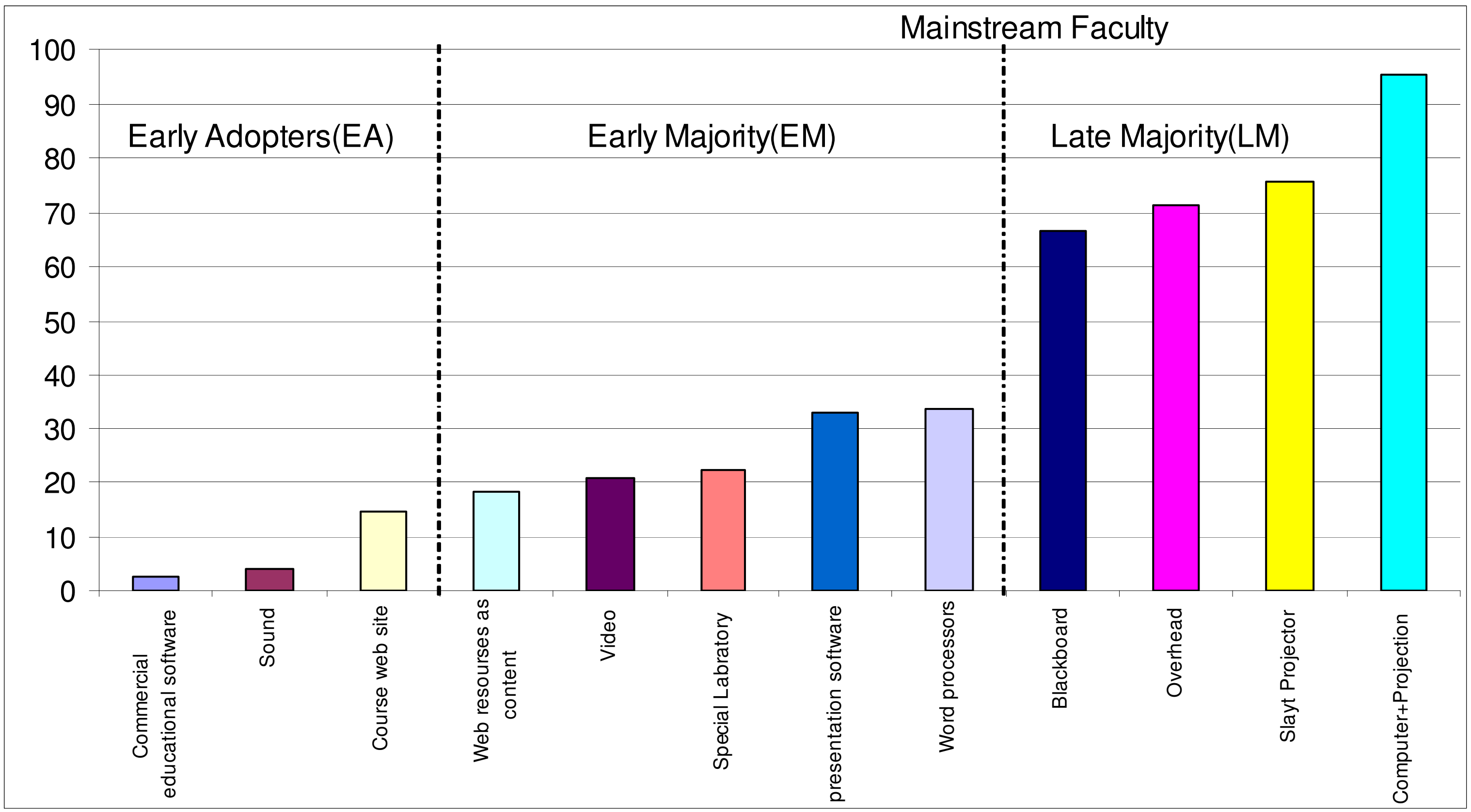

Figure-4. Diffusion of Technologies

4.1.1.3 Perceived Value of IT

The participants used a five-point scale (i.e., 1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree, 5 = Strongly Disagree) to rate their level of agreement on 9 statements about value of IT in medical education. A composite score for each individual faculty was calculated by summing the level of agreement indicated for each of the 9 statement about value of IT. The possible range for perceived value of IT is 10-50, smaller scores indicate a high level of agreement. An estimate of the internal consistency of this subscale yielded a coefficient alpha of .87, which indicates that faculty responded consistently across items.

The mean score for Perceived value of IT scale is 11,75 with a standard deviation of 3,4 which indicates that faculty have high level agreement on value of IT use in medical education (Figure-5). The mean and standard deviation of each item in Perceived value of IT Scale is presented in Table-11.

Table-11. Means and standard deviations of Perceived Value of IT Subscale

Items	Mean	SD
Technology enables me to address different learning styles of students	1,57	0,61
Tools such as e-mail, enhance my contact with students	1,56	0,69
I think that technology enables learning more effective	1,40	0,58
Technology using increase motivation of students	1,59	0,71
Technology enables me update instructional materials easily	1,29	0,47
Using technology enables me to use my lecture time efficiently.	1,55	0,65
Using technology increase quality of my teaching	1,53	0,59
Using technology increase my productivity as an instructor	1,55	0,65
Technology enables me to reach instructional resources.	1,27	0,47

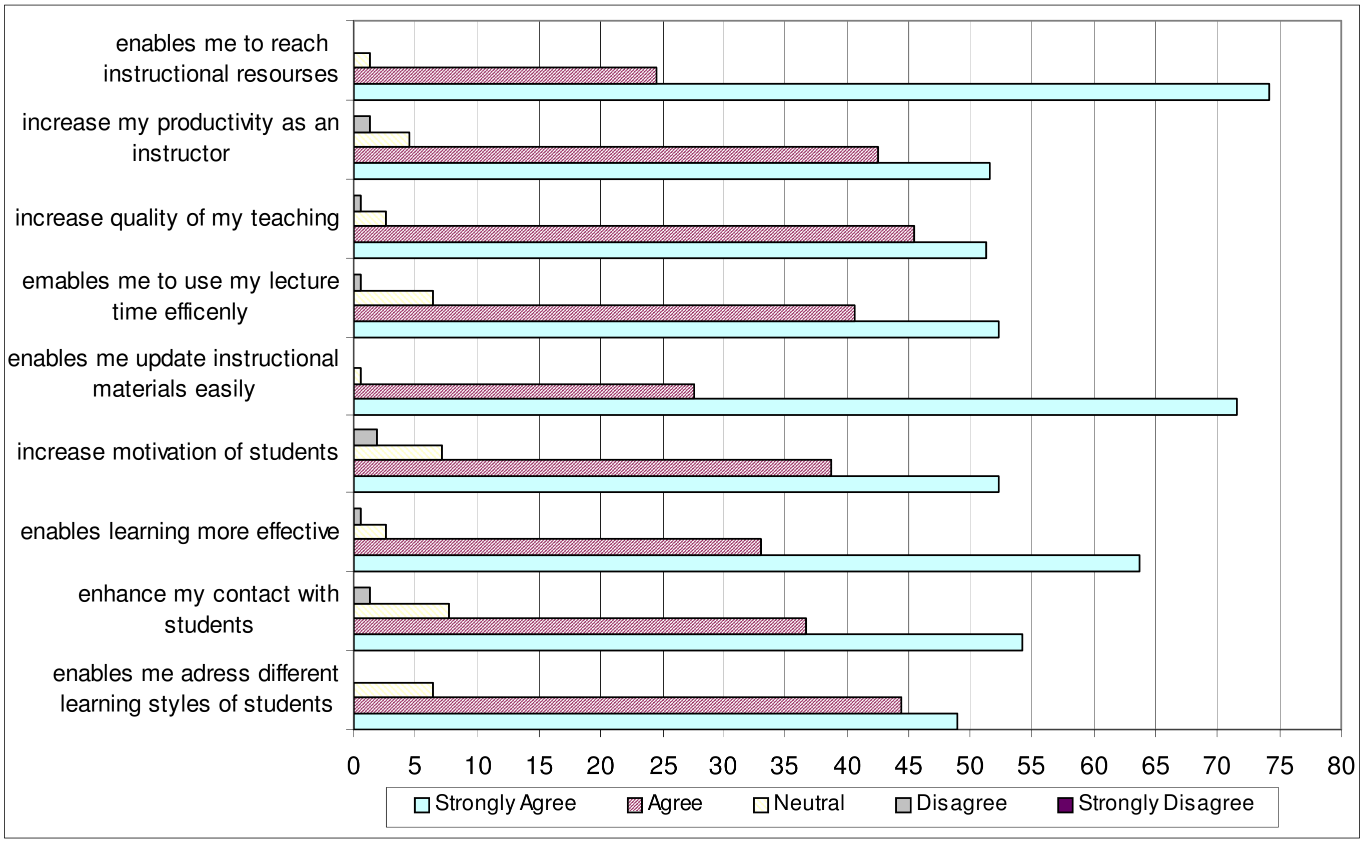

Figure-5. Faculty perception About Value of IT

4.1.1.4 Perceived Barriers

The participants used a five-point scale (i.e., 1 for Strongly Agree, 2 for Agree, 3 for Neutral, 4 for Disagree, 5 for Strongly Disagree) to rate their level of agreement on 20 statements about barriers to adoption. An estimate of the internal consistency of this subscale yielded a coefficient alpha of .86, which indicates that faculty responded consistently across all items.

Six factors which were identified as a major barrier to adoption of instructional technology by over 50% of the faculty are lack of computers and support service for students, reward structure, lack of computers and peripherals for faculty and lack of training opportunities (Table-12).

Table-12. Faculty Agreement on Items of Barriers to Adoption Scale .

(SA=Strongly Agree, A=Agree, N=Neutral, D= Disagree, SD=Strongly Disagree)

Items	**SA+A (%)**	**N (%)**	**SD+D (%)**
Faculty members lack enough time to develop technology-based instructional materials.	31,6	12,9	55,5*
There are problems to access available resources.	38,7	14,2	47,1
Available hardware (i.e. computers, overheads) are unstable and always breaking down.	16,6	7,3	76,2*
There are too few computers for individual faculty.	56,2**	9,8	34,0
There is lack of printers and/or other peripherals in order to effectively use computers for teaching and learning.	61,9**	9,0	29,1
There is too few computers for students.	68,0**	22,0	10,0
There is not enough support for supervising student computer use.	68,5**	22,8	8,8
Physical and technical infrastructure of the classrooms is not suitable for technology use.	31,6	23,9	44,5
There is limited research literature that shows significant improvements in learning as a result of technology-based instruction.	19,2	33,8	47,0
There is no reward structure that recognize faculty for using technology in teaching and learning.	67,1**	19,5	13,4
There is inadequate financial support for the integration of instructional technology.	40,0	24,7	35,4
There is lack of support service for developing technology-based instructional materials.	42,2	20,8	37,0
I lack of necessary knowledge and skills for using technology effectively.	23,4	16,2	60,4*
Available software doesn't fit to my instructional needs.	6,6	17,9	75,5*
Instructional technologies do not fit to he course or curriculum that I teach.	5,2	5,2	89,6*
Available materials that I apply for gaining knowledge about technology don't fit my needs.	9,7	16,9	73,3*
There are lack of / not enough training opportunities for faculty members to acquire new computer knowledge and skills.	50,6**	18,2	31,2
There are lack of/not enough technical support providing immediate help for faculty	45,4	24,3	30,3
Faculty members are not interested in using technology for instruction.	18,3	24,8	56,9*
Technology use has no acceptance in medical education.	8,4	15,6	75,9*

Note:**Agreements over 50%, *Disagreements over 50%

4.1.1.5 Perceived Incentives

The participants used a five-point scale (i.e., 1 for Strongly Important, 2 for Important, 3 for Neutral, 4 for Not Important, 5 for Not Important At All) to rate importance level of 5 statements about incentives for adoption. An estimate of the internal consistency of this subscale yielded a coefficient alpha of .64.

The faculty rated all of the 5 items on the Incentives for Instructional Technology Use Subscale as important (Table-13). Items related to investment in infrastructure, training and support, policy and plans of university, and financial support for material development were rated important incentives by over 96% of the faculty. It is interesting to note that only 31,6% of the faculty agreed on that lack of time is a barrier, 71,6% of the faculty rated the item related to providing development time by reducing teaching load as an important incentive. As consistent with agreement on that reward structure is a barrier, 68,4 % of the faculty rated the reward structure recognizing the technology use as an important incentive.

Table-13. Importance Level of Incentives for Faculty

(SI=Strongly Important, I=Important, N=neutral, NI=Not Important, NIA=Not Important at All)

Incentives	**SI + I (%)**	**N (%)**	**NI +NIA (%)**
A reward structure that recognize faculty for technology use in teaching and learning	68,4	9,7	21,9
Providing development time for teaching innovation by reducing teaching load.	71,6	11,6	16,8
Having the University/Faculty invest in infrastructure, training and support services for instructional technology	96,8*	3,2	0,0
Having the University have policy and plans for diffusion of Instructional Technology.	98,7*	,6	0,0
Having the University/Faculty provide financial support for development of instructional materials	96,8*	2,6	0,6

*Items rated by over 95% of the faculty

4.1.1.6 Preferred Methods of Learning about Technology and, Support

In terms of methods for acquiring knowledge and skills about technology, and support respondents rated their level of preferences on 12 items using a five - point scale (i.e., 1 for Strongly Prefer, 2 for Prefer, 3 for Neutral, 4 for Don’t Prefer, 5 for Don’t prefer at All). Preferred methods for acquiring technological knowledge and skills are listed in descending order(Table-14).

Table-14. Faculty Preferences for Acquiring Technological Knowledge and Skills.

Items	Strongly Prefer + Prefer (%)	Neutral (%)	Don't Prefer + Don't Prefer at All (%)
Online Resources	92,9	5,2	1,9
Printed materials	92,2	4,5	3,2
Structured in service training	86,8	7,9	5,3
Workshops and presentations	82,6	11,4	6,0
Experimenting by myself	60	14	26

Faculty responses on Preferred Methods of Support and Help items are given in Table-15.

Table-15. Faculty Preferences for Support and Help.

Items	Strongly Prefer + Prefer (%)	Neutral (%)	Don't Prefer + Don't Prefer at All (%)
Colleagues on campus	91,5	5,9	2,6
Support service	89,9	8,1	2,0
One to one help	87,8	8,8	3,4
Experienced graduate students	86,4	7,8	5,8
Hotline, or telephone assistance	56,8	22,3	20,9
Colleagues at other institution	54,1	20,9	25,0
Outside professionals	53,3	24,0	22,6

4.1.2 Adopter Groups

In order to classify respondents into adopter categories (early adopters (EA), mainstream faculty (MF)), a scale developed by Anderson, Varnhagen, and Campbell (1999) in a similar study of faculty adoption patterns was used. A composite score was calculated for innovativeness of faculty by summing the self_rated expertise level of each individual faculty (i.e., 1 for Extensive, 2 for Good, 3 for Fair, 4 for Novice, 5 for None) indicated for each of the11 types of computer software and tools. The scale was developed on the basis of the assumption that EAs have come to use these technologies earlier and have gained more expertise relatively to majority faculty (Anderson, Varnhagen, and Campbell, 1999). The total possible range for cumulative score for innovativeness is 11-55 ; the sample scores ranged from 13 to 51.

Rogers' assert that adoption of an innovation will be normally distributed. Consistent with Rogers' assertion, cumulative frequency of the scores on this scale approach an S-shaped curve which lends confidence to assumption of normalcy (Figure-6).

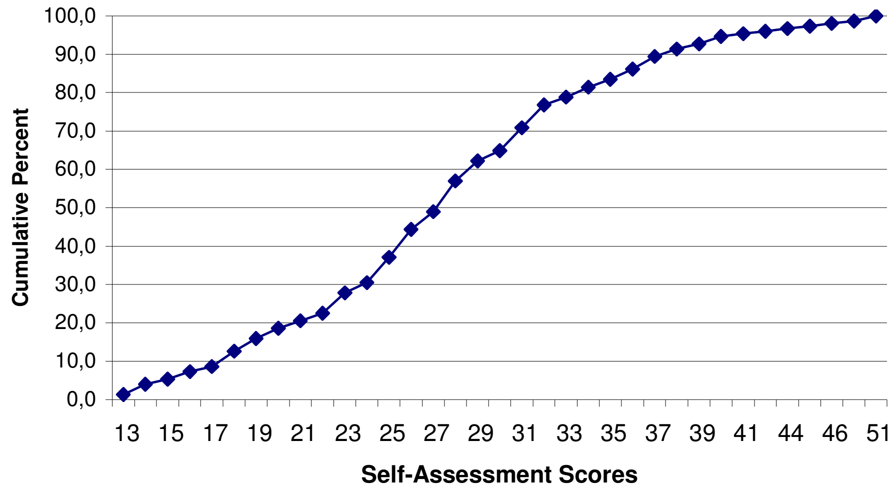

Figure-6. Distribution of Cumulative Percents of Technology Self-Assessment Scores

By using Rogers' (1995) adopter categories and individual innovativeness scores, 16,3% of the respondents (25) were assigned to early adopter group(EA), 83,7 of the respondents (130) were assigned to mainstream faculty (MF) (Figure-7)

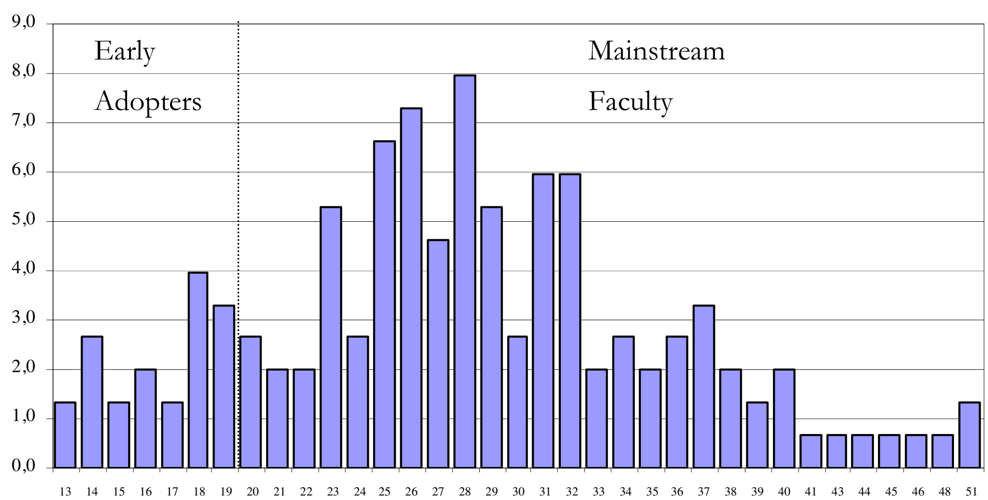

Figure-7. Distribution of Faculty Technology Self-Assessment Technology Scores

4.1.2.1 Characteristics of the Adopter Groups (EA and MF)

The EAs group was less likely to be at the Professor rank and more likely to be lower assistant professor ($\chi 2(1, 155)=5{,}59$, $p=0{,}019$). Proportions of ranks by adopter groups are given in Table-16.

Table-16. Proportions of Adopter Groups by Rank.

	ADOPTER GROUPS	
Rank	Early Adopters (%)	Mainstream Faculty (%)
Professor	25,0	33,6
Associate Prof.	25,0	18,3
Assistant Prof.	16,7	24,4
Other Teaching Faculty	33,3	23,7

Although there was no significant relationship between age and adopter group, early adopters were more likely to be in between 20-40 age interval ($\chi 2(1, 25)=4{,}840$, $p=0{,}028$) while proportions of age groups doesn't differ significantly for Mainstream faculty (($\chi 2(1, 130)=1{,}969$, $p=0{,}161$) (Table-17).

Table-17. Percentage of Adopter Groups by Age

Age	ADOPTER GROUPS Early Adopters (%)	Mainstream Faculty (%)
20-40	72	56,2
41>	28	43,8

Consistent with the finding that there was no significant relationship between age and adopter group, teaching experience and adopter group were not related significantly. However, mainstream faculty group was more likely have more than 5 years teaching experience (($\chi 2(1, 130)=6,031$, $p=0,014$). Proportions of year of teaching experience by adopter groups are given in Table-18.

Table-18. Years of Teaching Experience by Adopter Groups

Years of Teaching Experience	ADOPTER GROUPS Early Adopters (%)	Mainstream Faculty (%)
1-5	41,7	39,5
6-10	20,8	17,8
11-15	25,0	18,6
15-20	0,0	7,0
20+	12,5	17,1

4.1.2.2 Patterns of Adopter Groups' Technology Use

4.1.2.2.1 Computer Ownership

Table-19 presents computer ownership frequencies of adopter groups. There are no significant differences between adopter groups in terms of computer ownership and internet access at home and at office.

Table-19. Computer Ownership and Internet Access By Adopter Groups

		EARLY ADOPTERS		**MAINSTREAM FACULTY**	
		Frequency	**Percent**	**Frequency**	**Percent**
Home	**Computer**	24	96,0	111	91,7
	Internet Access	21	84	87	71,9
Office	**Computer**	23	92	112	92,6
	Internet Access	21	84	100	82,6

4.1.2.2.2 Amount of Daily Computer Use

Proportions of adopter groups by daily computer use are given in Table-20. As expected ,there was a significant relationship between daily computer use and the adopter groups. EAs use computer more often($\chi 2(1, 146)=11,34$, $p=0,001$) than MFs.

Table-20. Daily Computer Use Proportions By Adopter Groups.

	ADOPTER GROUPS	
Daily Computer Use	**Early Adopters (%)**	**Mainstream Faculty (%)**
less than 1 hour	0,0	16,5
1-3 hours	40,0	57,9
3-5 hours	24,0	12,4
more than 5 hours	36,0	13,2

4.1.2.2.3 Computer Use Self-Efficacy

As expected, EAs have significantly higher scores on Computer Use Self_Efficacy Scale than MF group ($t(144)=6,263$, $p<0.01$ Ms 44,68 vs. 37,38) . The mean and standard deviation of each item in this subscale is given in Table-21.

Table-21.Means and Standard Deviations of Items on Computer-Use Self-Efficacy Scale

Items	*Early Adopters*		*Mainstream Faculty*	
	Mean	**SD**	**Mean**	**SD**
I'm continually finding better ways to use the computer in my classroom.	4,36	0,57	4,00	0,91
Even when I try very hard, I do not use the computer as well as I do other instructional resources.	4,28	0,89	3,79	1,01
I know the steps necessary to use the computer in an instructional setting.	4,36	1,04	3,88	0,77
I generally employ the computer in my classroom ineffectively.	4,56	0,77	3,80	0,94
I understand computer capabilities well enough to be effective in using them in classroom.	4,40	0,91	3,65	0,86
I find it difficult to explain to students how to use the computer.	4,56	0,77	3,27	0,96
I am typically able to answer students' questions which relate to the computer.	4,52	0,59	3,07	0,94
I wonder if I have the necessary skills to use the computer for instruction.	4,68	0,69	3,59	0,94
Whenever I can, I avoid using computers in my classroom.	4,84	0,80	4,49	0,66
I do not prefer others to evaluate my computer-based instructions.	4,12	1,13	3,88	0,85

4.1.2.2.4 Technologies Used in Teaching

Significant differences were found between early adopter and mainstream faculty groups in terms of number and type of technologies used in teaching-learning process. Early adopters significantly have used more technologies than Mainstream Faculty group ($t(151)=2{,}841$, $p<0.05$ Ms 5,58 vs. 4,38).

In terms of type of technologies used, Early Adopters more likely have used Course Web Pages (Pearson $\chi 2(1, 153)=8{,}306$, $p=0{,}009$), web resources ($\chi 2(1, 153)=7{,}018$, $p=0{,}018$) and commercial educational software ($\chi 2(1, 153)=22{,}077$, $p=0{,}000$) than Mainstream faculty. Proportion of used technologies by adopter group is presented in Table-22. These findings indicate that relatively new instructional technologies have diffused into early adopter group more than mainstream faculty.

Table-22. Adopter Groups' Technology Use

	Early Adopters		***Mainstream Faculty***	
	Frequency	**Percent**	**Frequency**	**Percent**
Blackboard	15	62,5	87	67,4
Overhead	18	75,0	90	69,8
Slide Projector	18	75,0	99	76,7
Computer+Projection	24	100,0	122	94,6
Video	6	25,0	25	19,4
Sound	2	8,3	4	3,1
Special Laboratory	7	29,2	27	20,9
Course web sites	8	33,3	14	10,9
Web resources as a part of content	9	37,5	19	14,7
Commercial educational software	4	16,7	0	0
Word processors for course materials	11	45,8	40	31,0
Presentation software	12	50,0	38	29,5

4.1.2.3 Perceived Value of IT

Although the findings in section 1 indicated that as a whole medical school faculty valued instructional technology use, EA had overall higher level of agreement than MF on the Perceived Value of IT subscale ($t(151)=-2,681$ $p<0,01$ Ms 10,12 vs.12,07). The means and the standard deviations of items by adopter groups are presented in Table-23.

Table-23. Means and Standard Deviation of Items on Perceived Value of IT Subscale By Adopter Groups

Items	*Early Adopters*		*Mainstream Faculty*	
	Mean	**SD**	**Mean**	**SD**
Technology enables me to address different learning styles of students	1,24	0,44	1,64	0,62
Tools such as e-mail, enhance my contact with students	1,40	0,50	1,59	0,72
I think that technology enables learning more effective	1,24	0,44	1,43	0,60
Technology using increase motivation of students	1,36	0,64	1,63	0,72
Technology enables me update instructional materials easily	1,16	0,37	1,32	0,48
Using technology enables me to use my lecture time efficiently.	1,28	0,46	1,61	0,66
Using technology increase quality of my teaching	1,40	0,58	1,55	0,59
Using technology increase my productivity as an instructor	1,28	0,46	1,61	0,66
Technology enables me to reach instructional resources.	1,12	0,33	1,30	0,49

The EAs had statistically higher levels of agreement on 3 of the 10 items on the Perceived Value of IT subscale than the MF group (Table-24).

Table-24. Significant Differences between Adopter Groups on Perceived Value of IT Items.

Items	**t**	**df**	**p**	**Means**
Technology enables me to address different learning styles of students.	-3,055	153	0,003	1,24 vs. 1,64
Using technology enables me to use lecture time efficiently	-2,357	153	0,020	1,28 vs. 1,61
Increase my productivity as an instructor	-2,357	153	0,020	1,28 vs. 1,61

4.1.2.4 Perceived Barriers

Consistent with the findings that presented for all faculty in section 1, over 50% of both adopter groups agreed or strongly agreed that lack of computers for individual faculty and students, lack of computer peripherals, reward structure, lack of support service for students were barriers to integrating technology in medical education. In addition to these barriers, 54,1 % of the EA agreed or strongly agreed that inadequate financial support was a barrier and, 51,9% of the MF agreed or strongly agreed that lack of training opportunities was an impediment to technology integration(Table-25)

Table-25. Percents of Agreements on Items of Barrier scale by Adopter Groups

Barrier Items	*Early Adopters*		*Mainstream Faculty*	
	f	%	f	%
Faculty members lack enough time to develop technology-based instructional materials	8	32	41	31,5
There are problems to access available resources	10	40	50	38,5
Available hardware (i.e. computers, overheads) are unstable and always breaking down.	5	20,8	20	15,7
There is lack of computers for individual faculty.	16	66,7	70	54,3***
There are lacks of printers and/or other peripherals in order to effectively use computers for teaching and learning.	18	72	78	60***
There are lack of computers for students	17	68	85	68***
There is lack of support for supervising student computer use.	20	80	82	66,1***
Physical and technical infrastructure of the classrooms is not suitable for technology use.	8	32	41	31,5
There is limited research literature that shows significant improvements in learning as a result of technology-based instruction.	4	16,7	25	19,7
There is no reward structure that recognize faculty for using technology in teaching and learning.	16	66,7	84	67,2***
There is inadequate financial support for the integration of instructional technology.	13	54,2*	47	37,3
There is lack of support service for developing technology-based instructional materials.	8	32	57	44,2
I have lack of necessary knowledge and skills for using technology effectively.	0	0	36	27,9
Available software doesn't fit to my instructional needs.	1	4	9	7,1
Instructional technologies do not fit the course or curriculum that I teach.	1	4	7	5,4
Available materials that I apply for gaining knowledge about technology don't fit my needs.	3	12	12	9,3
There are lack of / not enough training opportunities for faculty members to acquire new computer knowledge and skills.	11	44	67	51,9**
There are lack of/not enough technical support providing immediate help for faculty	12	48	57	44,9
Faculty members are not interested in using technology for instruction.	9	36	19	14,8
Technology use has no acceptance in medical education.	10	40	7	5,4

*** rated agree or strongly agree by over 50% of the both adopter groups
*rated agree or strongly agree by over 50% of EA
** rated agree or strongly agree by over 50% of MF

Although there are similar responses of adopter groups, EAs and MFs had significant differences on four of 20 items on Barriers to Adoption subscale. Because of EAs have relatively higher level of technological knowledge and skills, and interest in technology use, as expected, EAs had higher level of disagreement ($t(152) = 6,74$, $p < .001$ (Ms 4,64 vs.3,28)) than MF that they have lack of knowledge and skills to use technology effectively for instruction. EAs had also higher level of disagreements ($t(149)= 2,92$, $p < .05$ (Ms 4,24 vs. 3,75),and $t(152) = 3,55$, $p < .05$ (Ms 4,48 vs.3,95)) respectively) than MF that available software doesn't fit to their instructional needs and technology do not fit to the course they teach. EAs expressed a higher level of agreement ($t (151) = -2,43$, $p < .05$ (Ms 3,00 vs. 3,52)) than MFs on that faculty members are not interesting in using technology for instruction.

4.1.2.5 Perceived Incentives

EA and MFs had no significant differences on the Incentives for Instructional Technology Use Subscale. Over 90% of both adopter groups rated that university policy and plans for diffusion of IT, investment in infrastructure, training and support and, financial support are strongly important incentives for IT adoption. Reward structure and reducing teaching load also were rated as important incentives by the over 60% of both group. Percentage of incentives rated important or strongly important by adopter groups is presented in Table-26.

Table-26. Percentage of Incentives Rated Important by Adopter Groups

Incentives	*Early Adopters*		*Mainstream Faculty*	
	Frequency	**Percent**	**Frequency**	**Percent**
A reward structure that recognize faculty for technology use in teaching and learning	18	72	88	67,7
Providing development time for teaching innovation by reducing teaching load.	15	60	96	73,8
Having the University/Faculty invest in infrastructure, training and support services for instructional technology	24	96	125	96,9
Having the University have policy and plans for diffusion of Instructional Technology.	25	100	128	98,5
Having the University/Faculty provide financial support for development of instructional materials	24	96	126	96,9

4.1.2.6 Preferred Methods of Learning about Technology and, Support

In terms of preferences of learning about technology, over 90% of the both adopter group rated online resources and printed materials as strongly preferred methods. Because of EAs have higher level of expertise in technological resources, not surprisingly, EAs preferred online resources more strongly ($t\ (153)=-2,726$, $p<0,01$ (Ms 1,24 vs. 1,64)) than MFs (Table-27).

While EA group preferred or strongly preferred workshops and presentations (84%), structured in service training (79,2%) and experimenting by myself (68%), MF preferred structured in service training (88,3), workshops and presentation (82,5%) and experimenting by myself (58,4%) in descending order (Table-28).

Table-27. Means and Std. Deviations of Items on Preferred Methods of Learning Scale by Adopter groups

Items	*Early Adopters*		*Mainstream Faculty*	
	Means	**SD**	**Means**	**SD**
Online Resources	1,24	0,44	1,64	0,70*
Printed materials	1,71	0,69	1,85	0,65
Experimenting by myself	2,44	0,92	2,56	1,03
Workshops and presentations	1,84	0,80	2,02	0,84
Structured in service training	2,00	0,88	1,91	0,75

*Significant differences between EA and MF

Table-28. Frequencies and Percentages of Items on Preferred Methods of Learning Scale by Adopter Groups.

	Early Adopters		*Mainstream Faculty*	
	Frequency	**Percent**	**Frequency**	**Percent**
Online Resources	25	100	129	91,5
Printed materials	1,71	95,8	129	91,5
Experimenting by myself	17	68	73	58,4
Workshops and presentations	21	84	102	82,5
Structured in service training	19	79,2	113	88,3

In terms of help and support, while EA group rated colleagues on campus (96%), experienced graduate students (95,8%), support service (87,5%) and outside professionals (80%), MF group rated colleagues on campus (90,6%), support service (90,4%), one-to-one help (89,5%) and experienced graduate students(84,6%) as strongly preferred or preferred methods of support and help in descending order (Table-29). Consistent with the Rogers'(1995) assertion that early adopters' interpersonal networks are more likely to be outside, EAs preferred colleagues at another institution ($t(146)=-2,807, p<0,01$ (Ms 2,04 vs. 2,69)) and outside professionals ($t(148)=-2,851, p<0,01$ (Ms 2,08 vs. 2,71)) significantly stronger than MF (Table-30).

Table-29. Means and Std. Deviations of Preferred Methods of Support by Adopter Groups.

Items	EA		MF	
	Frequency	**Percent**	**Frequency**	**Percent**
Experienced graduate students	23	95,8	110	84,6
Colleagues on campus	24	96	116	90,6
Colleagues at another institution	18	72	62	50,4
Outside professionals	20	80	60	48
Support service	21	87,5	113	90,4
Hot-line, or telephone assistance	12	50	72	58,1
One-one help	19	79,2	111	89,5

Table-30. Frequencies and Percentages Preferred Methods of Support By Adopter Groups

Items	EA		MF	
	Mean	**SD**	**Mean**	**SD**
Experienced graduate students	1,79	0,51	1,94	0,80
Colleagues on campus	1,80	0,50	1,88	0,65
Colleagues at another institution	2,04	0,73	2,69	1,11
Outside professionals	2,08	0,701	2,71	1,06
Support service	1,83	0,646	1,73	0,706
Hot-line, or telephone assistance	2,58	1,02	2,47	1,06
One-one help	1,88	0,956	1,69	0,726

4.1.3 Relationship between Faculty Characteristics and the Adopter Group

Logistic Regression analysis conducted to determine that if a set of variables related to faculty characteristics (rank, sex, age, discipline, teaching experience, self-efficacy, perceived value of IT) in combination with each other contribute significantly to prediction of faculty members' adopter categorie. In analysis, early adopters was encoded as 0, mainstream faculty was encoded as 1.

A test of the full model versus a model with a constant only was statistically significant($\chi 2(7, N = 141) = 51,635, p < .001$) (Table-31). The statistics, Cox&Snell R^2 and Nagelkerke R^2, that attempt to quantify the proportion of explained variation in the logistic regression model, indicate that more than 30% of the variation in the outcome variable is explained by the logistic regression model. The model was able correctly to classify 52,2% of early adopters and 95,8% of mainstream faculty, for an overall success rate of 88,7% (Table-32)

Table 31. Summary of Logistic Regression of the Set of Variables

-2lnLH for the Initial Model	-2lnLH for the Full Model	Model Chi-square	df	Sig
125,436	73,801	51,635	7	,000
Cox&Snell R^2=0,307		Nagelkerke R^2=0,520		

Table-32. Observed vs. Predicted Classification

		Predicted		
		Early Adopters	Mainstream Faculty	Percentage
Observed	Early Adopters	12	11	52,2
	Mainstream Faculty	5	113	95,8
		Overall Percentage		88,7

Stepwise logistic regression analysis conducted in order to test which of the predictor variables(rank, sex, age, discipline, teaching experience, self-efficacy, perceived value of IT) significantly contribute to prediction of criterion variable, Adopter Category. Two variables, rank and computer use self efficacy- were identified as most closely related to faculty members' adopter group. Rank was included as a predictive variable with a Wald chi-square of 6,609, df=1, $p<0.05$. Computer use self efficacy was included as a predictive variable with a Wald chi-square of 21,769, df=1, $p<0.01$(Table-33). No other variables besides rank and computer use self efficacy added to the predictiveness of the model.

Table-33. Results of Stepwise Logistic Regression

Variable	**Beta**	**S.E.**	**z.stat**	**Wald**	**p**	**Exp(B)**
Rank	-2,390*	,930	2,57	6,609	0,010	0,092[a]
Computer-use Self Efficacy	-,375	,080	-4,68	21,769	0,000	0,687[b]
Constant	21,57					
Model Chi-square=78,216, df=2, p<0,001 Cox&Snell R^2=0,285, Nagelkerke R^2=0,483						

Note *Significant at the 0,05 level.

[a] Odds ratio associated with one unit increase in rank

[b]Odds ratio associated with one unit increase in computer use self-efficacy

The predictiveness of the model with two predictor variables was significant. For the effect of rank, the odds of the Adopter Category were estimated to increase by a factor of 0,092 when rank is increased by one point, controlling for other variables. For the effect of computer use Self Efficacy, the odds of the Adopter Category were estimated to increase by a factor of 0,687, when computer use Self Efficacy is increased by one point, controlling for other variable. Cox&Snell R^2 and

Nagelkerke R^2 statistics indicate that more than 28% of the variation in the outcome variable is explained by the logistic regression model. The model was able correctly to classify 47,8% of early adopters and 96,6% of mainstream faculty, for an overall success rate of 88,7% (Table-34).

Table-34. Observed vs. Predicted Classification

		Predicted		
		Adopter Category		
		Early Adopters	Mainstream Faculty	Percentage
Observed	Early Adopters	11	12	47,8
	Mainstream Faculty	4	114	96,6
		Overall Percentage		88,7

4.1.4 Summary of the Survey Results

This section reported the survey data that had been gathered, the technique used to analyze them, and results of the analysis.

The survey sample was 155 faculty members. Of the 155 respondents, 112(72,7%) male and 42(27,3%) female, and hold various academic ranks. While average age was 41 years, the largest group (≈55%) was in between 31-40 years range. The majority of the respondents (76,8%) has been teaching in clinical science.

Although average years of teaching experience was approximately 10 years, the majority (77,8%) had from 1 to 15 years of teaching experience.

Over 90% of the faculty had computer and internet access at home and office, the largest group(54%) spend 1-3 hours per day working with computers.

For the sample, the means and standard deviation for computer-use self efficacy and perceived value of IT, number of technologies used in teaching were 11,75 (3,4), 4,56 (1,94).

Majority faculty (over %90) rated their skills at fair or higher at word processing, presentation software, electronic mail, library and database searching, search engines and Medline. Most faculties reported their skills at web page creation (76,1%) and statistics packages (54,2%) at novice or none.

Six factors were identified as major barriers to adoption by over 50% of the faculty are lack of computers and support service for students, reward structure, lack of computers and peripherals for faculty and lack of training opportunities

Investment in infrastructure, training and support, policy and plans of university, and financial support for material development were rated important incentives by over 96% of the faculty. While Online and printed materials, in-service training, workshops were most preferred method of learning, colleagues on campus, support service, one-to-one help and experienced graduate students were most preferred sources of support.

Results for Adopter Groups

While Earlier adopters were more likely to be lower professor rank than mainstream faculty, more likely to be in between 20-40 age interval , mainstream faculty group more likely have more than 5 year teaching experience.

The Early adopters group have used computers significantly more often, have used more technologies in teaching, had higher computer use self efficacy and had higher agreement on value of IT than the Mainstream Faculty group.

In terms of type of technologies used, Early Adopters more likely have used Course Web Pages, Web resources and Commercial educational software than Mainstream faculty

While both adopter groups rated lack of resources for faculty and students, reward structure, lack of support service for students as barriers to integrating technology, EA group rated lack of financial support and MF rated lack of training opportunities as a barrier. EAs had higher level of disagreement than MF that they have lack of knowledge and skills , available software doesn't fit to their instructional needs and technology do not fit the course they teach. EAs expressed higher level of agreement than MFs that faculty members are not interesting in using technology for instruction. There were no significant differences found between adopter groups in terms of intensives for adoption.

While Online and printed materials were rated most preferred methods of learning about technology, EA group preferred online materials significantly more strongly than MF group. In terms of sources of support, by both adopter groups mostly preferred their colleagues on campus . While EA group rated experienced graduate students, support service and outside professionals, MF group rated support service, one-to-one help and experienced graduate students as preferred methods of support and help in descending order. EAs preferred colleagues at another institution and outside professionals significantly stronger than MF.

Stepwise Logistic Regressions results indicated that computer use self efficacy and rank were significantly contribute to prediction of faculty adopter group and more than 28% of the variation in the adopter group is explained by the logistic regression model.

4.2 Interview Results

In order to get insight about adopter groups' perceptions about technology adoption in teaching and learning, structured interviews were conducted with the faculty from Early Adopters(EA) and Mainstream Faculty(MF) groups. Related to technology adoption, six main areas addressed in interviews:

- Technology use patterns
- Perceived advantages in technology use for teaching
- Influences on technology adoption decision
- Sources of knowledge about new technologies

- Perceived barriers to adoption
- Perceived incentives to adoption

The data gathered from the interviews has been analyzed and interpreted in order to get complementary information to survey results, as well as exploring emerging themes. In this section, the interview results are presented separately for each adopter group under the headings given above.

4.2.1 Results for Early Adopters Faculty

4.2.1.1 Technology Use Patterns

When asked what technologies they use in teaching and teaching related activities, early adopter(EA) respondents stated that they use computer technologies such as presentation software, multimedia applications and world wide web for instructional purposes. One of the respondents stated his reason to use computer technologies as: "Now it is possible to find all technologies in a desktop computer. For this reason, I can say that I only use computer technologies".

Respondents stated that PowerPoint presentations and multimedia applications such as pictures, animations, and films are their primary tools for presenting their instruction. All of the respondents stated that they use the internet for course related activities such as sharing and, searching for course materials.

Almost all of the respondents stated that they use communication tools for communicating with colleagues and others as opposed to instructional purposes.

4.2.1.2 Perceived Advantages

EA participants were asked about their perceptions related to advantages in technology use for instruction. The respondents stated several benefits for instruction, instructor and students. One of the common perceived advantage was increased efficiency and effectiveness for both classroom and course related activities. Almost all of the respondents mentioned that technology provided them to present a variety of visual materials such as pictures and animations in their courses One of the respondents stated the importance of visual materials as:

> In our instruction we give information to students about patient and diseases. For this reason, it is very important to provide an environment in which students can understand symptoms without seeing patients. I take pictures of patients by an electronic camera, and then put them in my PowerPoint slides.

Another common perception stated by the respondents is that technology increases quality of instruction and instructors. The respondents stated that accessing up-to-date information in their field and a variety of instructional materials increased quality of their instruction as well as quality of instructor. Almost all of the respondents mentioned that technology enables them to keep themselves up-to-date. In addition to accessing up-to-date information, respondents stated that technology enable them to access a variety of instructional materials and use them in their instruction. One of the respondents summarized how those features of technology contribute to quality of instruction:

> First of all, using technology increased quality of instruction. Now, as an instructor we can access up-to-date literature and transfer up-to-date information to students……Before, we were limited to printed materials. Now, it is possible to access pictures, animations and films by Internet… .to access more information, to access up-to-date information, the most important thing is renewing yourself as an instructor.

Related to technology use in teaching, the respondents stated several benefits for student learning. Increased student motivation, increased retention, more interactivity were commonly stated advantages for students. One of the respondents explained some of those advantages by giving an example:

> ...Even if you use figures or objects when you are telling students kinetic changes in a cellular structure, students can't visualize that concept in 3-Dimensions. When I start to use animations and 3-Dimensions pictures in my instructions, feedback from students indicated that using that kind of applications made it easer to understand and increased their motivation.

4.2.1.3 Influences on Decisions to Use

Almost all of the participants stated that adopting and learning technologies happened as a result of their personal interest and self-motivation in using technology. One of the participant stated that: "When I saw or heard that there is a new technological tool, it attracts me". Another participant stated his interest in technology as: " I use computers for several years. I had a computer when desktop computers came into use. I think that is because of my personal interest as well as my experience with computers when I was in another institution in working abroad".

When asked if the university environment influenced their decision to use, almost all of the respondents said that they were not influenced but the university environment is important for many others. One of them said:

> …. I think I'm e few steps ahead of the university instructional technology policy. But there is a indirect influence peoples' decision to use technology. That is the fear of to become out of fashion........With the increase in the number of technology using instructors, instructors are now classified in two groups: users and nonusers. There is more social pressure on nonusers, they feel they need to somehow adapt.

Even if they were not influenced from university environment, respondents stated that they influenced from their colleagues expert in technology.

4.2.1.4 Sources of Knowledge about Technology

The EA participants become aware of new technologies through three main sources: colleagues, mass media channels and technology fairs and conferences. The first source consists of colleagues within university and other institutions. These colleagues act as a source of new technologies as well as source of support. One of the faculty explained how his colleagues provided information and support by giving examples as:

> I have a group of friends interested in technology from our university and other institutions.. I keep in contact with them… . For example, in a meeting, a friend from an another medical school who developed a course web site showed me his resources, or sometimes when we are talking together, if one of them tells us about a new version of a software....then I want to try it.

A second source of information used by faculty was publication such as journals and magazines. The participants mentioned that because of time problem, it is not always possible to follow the literature about technology continuously.

Another source of information used by EA faculty was national and international conferences and technology exhibitions. An early adopter faculty stated how these resources provided information about new technologies as: “ For me, national and international conferences are good resources to be aware of new presentation techniques. Technology exhibitions provide opportunities for getting information as well as seeing new tools.”

4.2.1.5 Barriers

The EA faculty were asked about their perceptions for barriers they face when learning and adopting technologies in teaching and learning. The respondents stated their perceptions about barriers to adoption under three headings: Barriers related to educational system, barriers related to administrative support and barriers related to institutional leadership.

Related to educational system, almost all of the EA respondents stated that the conventional education system in which students are passive listeners is an important barrier in their technology adoption efforts. The respondents stated that their technology use in teaching and learning will remain ineffective if the students are not involved in this process. Even if they try to encourage students to use technological resources, ” It is very hard to motivate students to use technological resources in a traditional education system." Another faculty summarized how the education system can serve as an impediment to their efforts as:

> This education system doesn't demand students to be active in class and out of class activities. For example there is no requirement for students to go Internet room and search for something related to course. Had the education system required students to do so, then they would have used technology. The current student evaluation system also encourages memorization.

Related to administrative support in technology adoption, the EA respondents stated several barriers: inequitably distributed resources, varying quality and quantity of hardware, lack of training opportunities, and lack of funding and reward structure. One of the respondents summarized some of these barriers as:

> Most of the hardware in our department is very old. They were given many years ago without asking our needs. Most of the applications we used with those technologies are not compatible with new technologies… . When you need something, you should search for it. Sometimes we buy our needs personally… .When you demand hardware or software , it takes too long , but you also see that some of the departments get them through the system in a very short time.

Another faculty mentioned limited capacity of the hardware in hand: " I see very good applications in which animations, films or sounds were used and I try to develop that kind of applications. But, because the capacity of the computer in my office is very limited, I can do it up to a point."

In addition to difficulties in resources for faculty, the EA respondents mentioned that the same problem exists for students also. One of the faculty stated the problem in resources for students as:

> In order to develop students' problem solving abilities, we often provide practice courses. But sometimes it is hard to find a real patient related to problem instructed in the course. We can use patient simulations for this purpose. Students can use that interactive software individually at their home also. But most of the students don't have computers at home and available resources for students in the university are inadequate. There is a shortage of computer labs which are accessible at all times and are comfortable.

The other problem stated by the EA respondents is just-in-time technical support. The respondents stated that although they mostly solve technical problems by themselves or by getting help from colleagues , they also need technical support for some problem. For example:

> Even though I am a technology-knowledgeable person, sometimes I have problems with technology. For example, if there is a problem with the network, I can't solve this problem by myself. At that point , there is technical support problem. When you inform the support service about the problem, sometimes it takes e few days for the problem to be fixed.

Another faculty mentioned this problem as:

> There is a system in which you do your application to get support electronically but it doesn't work in practice. They assign a number for your application and you receive a message " your problem will be fixed in a short time". You don't know what is "short time". Again you use your conventional methods to fix the problem, that is to find someone you know.

Related to training opportunities, the respondents stated that university provides training opportunities in general about instruction but not in new instructional technologies. The EAs stated that even though such training opportunities are valuable for all faculty in general but they don't meet their needs.

Another issue mentioned by almost all of the EA respondents is institutional leadership. Respondents stated that lack of institutional leadership in technology sometimes limits their efforts in technology adoption. At that point one of the responded stated: "….If the things I want to do are within the boundaries of visions of the persons who are in position of leadership, I get support. Otherwise, it is very hard to get support. Sometimes I pay money personally for the things I want to do."

4.2.1.6 Incentives

The EAs faculty were asked about their perceptions related to incentives that motivate them in technology use. Related to incentives, the respondents mostly stated their expectations or recommendations for barriers they faced in technology use. One of those expectations was related to institutional leadership. Almost all of the EA respondents expected to see administrative commitment in technology use in terms of policy and plans for technology. For example:

> Even though university invests in technology infrastructure, I can not say that it is adequate. Technology is changing rapidly therefore there must be an open-ended technology plan in which objectives are well defined. Then investments should be done in this framework, …by considering updating the infrastructure and providing support. Technology is used by people, therefore without investment in human resources; there will be technology garbage in organizations.

Another early adopter stated how institutional leadership acts as a motivator for his effort in technology use as:

> Technology usage in teaching is not a subject that is independent from the general education policy. Technology is an issue that should be included in your educational policy. We must see 10 years ahead. How do we educate our students?. What technologies do we need to use ? The thing that should be done is planning all those things. It motivates me if I see that we have a plan for the near future or if I see that there will be resources. When I feel that the things in the plan are applicable, then I plan my effort also.

The respondents stated that administrative support in terms of financial support, recognition and training opportunities is another factor that motivates their efforts in technology use. An EA faculty pointed out that " There are not that many people interested in technology" and recommended "For this reason, one should encourage those people by providing support".

Related to learning about technology, the respondents stated several expectations such as "financial support for congress or other activities related to teaching and learning", " 2-3 days formal training programs for different level of expertise ", " a communication network of expert colleagues, in which they share experiences". The other most commonly stated expectation was related to the recognition of instructional activities in terms of reward and promotion. At that point, one of the EA faculty recommended "providing financial support for instructional development projects" and yet another faculty recommended "consideration of instructional activities in academic promotion process".

4.2.2 Results for Mainstream Faculty

4.2.2.1 Technology Use Patterns

The Mainstream faculty(MF) were asked about what technologies they use in teaching and teaching related activities. Analysis of the interviews with the MF respondents indicated that they use computer applications (i.e. PowerPoint slides, web resources) as well as other technologies (i.e. 35mm slides and transparencies) for presenting their instruction.

Related to computer technologies, Mainstream faculty declared that software for preparing presentations and handouts were the most commonly used technologies in teaching. One of the respondents summarized the MF' common patterns of technology use as:

> I have been making use of computers for instructional purposes for last 2-3 years. Nowadays slides are out of date. Sometimes I get materials from the Internet or scan materials from various sources and preapre Powerpoint presentations by making use of these materials.From time to time those materials are turned into handouts for the students. I use presentations If there is a projection system in the classroom. It is not often but sometimes I have to use slide projector.

In using the web resources, the MF respondents showed a varying degree of usage. While a few of them declared that they are heavy users of the web resources for accessing course related materials, the others declared that they do not use the web resources for instructional purposes. One of the MF respondents mentioned his usage of the web resources as: " I use the web resources for graduate courses in order to provide course related up-to-date literature but not for undergraduate courses. I mostly use recent textbooks or other printed materials to prepare course materials for undergraduate courses". Another respondent stated his limited use of the web as: "I use the web resources rarely. I do not have the opportunity to make changes on them. I mostly prefer to use pictures and figures which I scanned from different sources." Related to communication tools, all of the MF respondents pointed out that they use e-mail to communicate with colleagues and others rather than instructional purposes. In this respect, the common idea was that there is no need to communicate by e-mail as the students are in campus.

4.2.2.2 Perceived Advantages

MF faculty were asked about their perceptions related to advantages of technology use for instruction. Analysis of the interviews indicated that the MF respondents see several advantages in terms of instruction, instructor and students at the use of instructional technology.

In relation to the advantages for students, one of the commonly stated one is that using technology increases motivation of the students. One of the respondents stated his observations as: " In a traditional, conference type course students get bored… After a while they are interested with different things. But if you use computer technologies….they see and hear at the same time. It is hard to analyze their motivation statistically but you can understand from their interest.". Yet another faculty : " Students' participation to instruction is increased. They do not get bored anymore". Another commonly stated advantages was that technology enables students to concentrate on instruction. " they can ask questions or they can discuss the subject, …, before they were only taking notes"

Related to advantages for instruction, almost all of the MF respondents stated that using technology increased quality and effectiveness of their instruction. They stated that technology enabled them to access up-to-date information and a variety of instructional materials. The MF respondents mentioned the features of technology that contributed to the quality and effectiveness as "First of all, you learn new things when you are searching on the web. Sometimes you find such a good material related to a subject that you have difficulty to teach.", "now we can use 3-D visuals that is impossible to draw for an instructor", " Now you can access to up-to-date information and present them to students"

Related to advantages for instructor, easiness in sharing and updating course materials and renewing their knowledge by accessing up-to-date information were most commonly stated advantages. Most of the respondents mentioned time saving advantage of technology : "I can do additions to my presentations in a few minutes…it is a great comfort" " I give students a copy of my presentation in a CD". The other common idea is that technology enables them to renew their knowledge as an instructor. An MF faculty responded as " first of all, instructors are now becoming more knowledgeable in their fields. Now we can access information in all over the world easily". Yet another faculty: "Now we are not the only sources of knowledge for students. Students can access to information from different sources and compare them with the one given by the instructor. For this reason, we have to be more up-to date now than we are before"

4.2.2.3 Sources of Knowledge About Technology

Analysis of the interviews with the MF faculty indicated that the MF faculty becomes aware of the new technologies mainly through colleagues interested in technology, graduate students and rarely trough mass media channels.

The respondents stated that colleagues who are expert in technology are their main sources of information about technology than the others. Related to learning about technology, the MF respondents stated several reasons their choice of colleagues rather than mass media channels. Being unfamiliar with technology jargon and lack of time were common reasons stated .One of the respondents put it by saying:

> There is no publication about technology that I read continiously because the information in that kind of publications does not suit me. I mostly do not understand the jargon used in them. I mostly learn or heard about new technologies through people around me. There are friends who follow advances in technology. They are really the best source of information for us.

Other MF respondents stated how he learns about new technologies as:

> I am following the developments in technology through the pages placed in newspapers. But they are mostly about popular technologies such as mobile phones etc. I learn about new technologies, for example computer technologies, from Mr. X, he tells us about new things . Otherwise, as a doctor, I do not have the chance to follow all advances in technology. I have difficulties in following technological advances even in my field as technology advances so rapidly.

Graduate students also are sources of information and support for the MF faculty. One of the MF respondents stated how graduate students provide information about new technologies as: "They have more expertise than us. For example, when they use a new tool in seminars, you first become aware of it and then you try to learn about it. I can say that I learn computer technologies through my assistant. They somehow learn innovations and use it."

4.2.2.4 Influences on Decisions to Use

The MF participants were asked which events or persons if any, influenced their decision to use technology. Related to influences, two categories derived from the responses: University environment and successful applications.

Related to university environment, availability of the resources and social norms/culture in the university were found to be most influential factors on the MF' making decision to use technology. Almost all of the respondents stated that availability of computer and projection system in classrooms affected their decision to use technology in classroom. One of the MF faculty stated that point as:

> My decision to use technology may be because of my personal interest but I think the most influential thing is the resources provided by administration. Most of the classrooms are equipped with systems, we only bring a floppy disk or a CD to classroom. If it was not so, we would have been using computers only in our offices.

At that point, another faculty responded as: "Related to technology infrastructure, our university is in quite a good position. From the beginning, they(administration) have been in an effort to construct an infrastructure. At least, it is easy to access technological resources. After that point, decision to use or not to use is your personal preference."

Another factor related to the university environment was social norms in the university. Most of the MF faculty mentioned their fear of being old fashion .One of the respondents stated that "Now in conferences there are a few people using slide projector. If you bring your 35mm slides to a conference, you are humiliated".

Almost all of the MF respondents stated that they are motivated to use technology when they see successful applications around them. One of the respondents explained how he influenced as: "For example I see an application related to …..in one of my friends' presentation. Then we tried to get it from the internet….Of course I affected when I see something effective or something suits my needs.". Yet another faculty : "the applications that I see are the best motivators for me in technology use. If I see example applications around me, it motivates me…. Because visual factors are very important. When you see a well prepared presentation, you think that you could also do it. "

4.2.2.5 Barriers

The MF respondents stated that they face with various barriers when they are integrating technology in teaching and learning. Most commonly stated barriers were lack of administrative support, lack of time to learn new technologies and the lack of opportunities provided by traditional medical education system.

One of the commonly stated impediments was the lack of time to learn new technologies. Most of the respondents underlined that they are so occupied with daily routines such as research activities, clinical activities etc. that they cannot spare time to learn about technology. One of the respondents pointed the problem as:

> The most important problem is time. It is not easy for us to learn new technologies. You have to spend a great deal of time, but it is not possible always to do that when you are in a busy working environment … It takes time to learn something new. We learn only the things needed, because we do not have a background in computers. When we see new things, it appeals to us but we have to devote time to learn it.

Another respondent also mentioned the time problem as "We are in a very busy working environment. It is hard to find time even for our own research studies… you have to work in the clinic, … and you have to teach assistants and undergraduate students"

The MF respondents stated that they face with several impediments related to administrative support for technology using in teaching. Most commonly stated barriers were lack of training opportunities, lack of recognition, inadequate infrastructure, inadequate technical and professional support . Almost all of the respondents stated that they feel alone in learning and integrating technology. At that point, a mainstream faculty responded as:

> There is nobody who tells us what we can we do for instruction by using technology. I try to do the things by myself. I risk spending lots of time in learning because I'm so happy with the things I do

> with technology. But if there are opportunities for learning, the time spent in learning is reduced by fifty percent."

Most of the MF respondents mentioned the problem of getting professional support for technology integration. For example:

> There is no place for getting help. … I experienced one of the examples last year. I wanted to prepare a presentation including an animation. When I asked for a help from our center, they said they do not know how to do. If they do not know, how do I know?

The other commonly stated barrier was related to inadequacy administrative investments in hardware for faculty and students. A large number of the MF responded stated that they have to invest personal resources to acquire the hardware that they need. For example:

> They (administration) want us to use technology but they do not invest money on technology used by faculty,, for example they don't provide facilities. We are in a position that we solve problems by ourselves. We as medical faculty members relatively have higher economical status than the others, so we may buy computers personally , but this way of solving problem cannot support the diffusion of technology in the other faculties in the campus.

Related to hardware, a number of faculty stated that lack of peripherals and limited capacity of the hardware in hand lead to barriers in their efforts in technology integration. For example: " We have problems in accessing the hardware we need. There is a shortage of hardware such as scanner, CD drive, sound and etc." , "…There should be peripherals such as scanners, printers not for the individual faculty but for the common use, it is a problem to access that kind of things..", "sometimes you could not do the things you want to do because of the limited capacity of the hardware in hand "

In addition to lack of administrative investment in hardware for faculty, a number of MF faculty stated that inadequacy of resources for students limits integration of technology in teaching and learning. At that point one of the respondents mentioned the limitations of the current education system as "In fact, we did not make radical changes in our teaching; instead we are still applying our traditional methods with new tools. Our teaching is still instructor-centered. Real change will happen when the education system will be a student-centered system in which we are facilitators." and continued " In such a system, students are going to be active users of technology. Moreover, in our country, about seventy percent of the students do not have an opportunity to access a computer. For this reason, the university should invest on technology for students"

4.2.2.6 Incentives

The MF faculty asked about the factors that motivate them to use technology and continue on using technology in teaching and learning. In terms of motivators, the respondents mostly stated their expectations related to barriers which they came across with the use of technology.

One of the common perceived motivating factors is just-in-time support for technical and professional aspects of instructional technology. "The most important thing for me is getting just-in time support when I have a problem with technology. When I call the Computer Center for a problem, if they say that they can fix it tomorrow, may be it is a solution for them but not for me, because that interrupts my study". A respond from an MF faculty that " there should be teams providing technical support and instructional support" summarize the common expectation at that point. In terms of professional support, the MF faculty stated that they wish for a center which provides them the accessible support. Afterwards they underlined that this kind of a center should consist of the experts and should provide them with the required support whenever it is needed. A respondent recommended as:

> It will help us if there is a support service for instructional applications. Such a service could be accessible by phone, or could help us in developing applications, for example in developing animations. Because developing that kind of applications needs expertise.

In addition to getting help in application development, several respondents also mentioned that such a unit could help them in being aware of new technologies. One of the MF respondents pointed out the difficulties in following the advances in technology and stated his expectation as: "Everybody experience the same problem. It will be helpful for us if there is a unit doing that., …It would be nice if such a unit organizes introductory meetings about the new technologies or applications". At that point, another MF faculty responded as: " When I wonder something about technology, of course I get help from my colleagues. But first I must be aware of it for asking something about, I have to see and recognize the innovation" and stated her expectation:

> I wish we had a unit or department that could introduce us the instructional innovation at least once in a year or a unit that could provide help when I needed.. Our knowledge about technology does not stem from a systematic training. In order to learn, first I should see the instructional innovations from somewhere or somebody. But this way of learning takes too much time. It is quite obvious that a unit that works systematically in training could provide us with the required knowledge and skills efficiently.

Another common expectation was related to training opportunities provided by administration.

> Faculty members often solve their problems related to technology use through getting help from friend who are more knowledgeable than themselves. There is already a center that helps us to prepare presentations and posters. But I could also use some basic tools effectively. Now it is a problem for me to do something by myself. There should be a training opportunity for basic subjects such as Internet, Word and presentation preparing. Such a training mustn't be theoretical, instead it should provide opportunities for practice.

4.2.3 Summary of Interview Results

Structured interviews conducted with faculty members from early adopters(EA) and mainstream faculty(MF) groups in order to understand their perceptions about integration of technology in teaching and learning. Respondents were asked their perceptions about the technologies they used in teaching and learning, the advantages of technology use, influences on their decision to technology use , sources of knowledge about new technologies, barriers and the incentives to adoption. Summary of the interview results for both adopter group is given in Table-35.

In terms of technologies used in teaching and learning, the EAs stated that they use computer technologies varying from PowerPoint presentation and multimedia application to the Internet in order to present and prepare their courses.

The MF' declared that they use computer technologies as well as other relatively old technologies for presenting their instructions. In terms of computer technologies, while presentation software's and word processors were stated most commonly used technologies, the internet and the web resources showed a varying degree of usage among the mainstream faculty. Both the EAs and the MFs stated that they use communication tools for other purposes rather than instructional purposes.

The EAs and the MFs gave almost the same responses about the advantages of technology usein terms of students, instructor and instruction. Related to advantages for students, increased motivation, participation and retention were most commonly stated ones. In terms of advantages for instructors, time saving, easiness in accessing and updating course material, renewing their knowledge were perceived as an advantage. About advantages of technology use for instruction, increased quality, more interactivity, effectiveness were listed by the both groups.

The EAs and the MFs were asked about the events or the people that influenced their decision to use technology. The EAs stated that their decision to use technology in teaching is induced by their personal interest and self-motivation in technology use. The MFs seems influenced by university environment. The factors that influence MFs' decision to technology were availability of the resources in the university, social pressure caused by the peers and the students and successful applications put forward by the people around them .

The analysis of the interviews indicated that while the EA participants became aware of new technologies through colleagues, mass media channels and technology fairs and conferences, the MF participants became aware of new technologies through colleagues interested in technology, graduate students and rarely trough mass media channels.

When asked about the barriers that they face with technology adoption in teaching, both the EAs and the MFs commonly declared that the lack of administrative investment on resources for faculty and student, the lack of technical support, the lack of training opportunities and the disadvantages of traditional medical education system as handicaps for their adopting technology. Besides those commonly stated handicaps, the lack of funding, the lack of reward structure that promotes teaching related activities and the lack of institutional leadership were barriers listed by the EAs and, lack of professional support in technology integration was the barrier listed by the MFs.

In terms of incentives of technology adoption in teaching and learning, both the EAs and the MFs stated their expectations or recommendations in relation to barriers they face with technology adoption. These expectation or recommendations are mostly related to administrative support in terms of institutional leadership, reward system, investments on training and resources and, technical and professional support.

Table-35. Summary of Interview Results

	Early Adopters	Mainstream Faculty
Technologies Used	Computer technologies varying from presentation software , multimedia applications to internet No use of communication tools	Word processors, presentation software Varying degree of web resources Relatively old technologies No use of communication tools
Percieved Advantages	For students: increased motivation, participation and retention For instructor: time saving, easiness in accessing and updating course materials, renewing their knowledge For instruction: increased quality, more interactivity, effectivenes	
Influences	Self-motivation Personel interest	Availability of the resources Social pressure Succesful aplications
Sources of Knowledge	Mass media channels Technology fairs and conferences	Colleagues interested in technology graduate students Rarely trough mass media channels.
Barriers	Lack of administrative investment on resources for faculty and student Lack of technical support, Lack of training opportunities Disadvantages of traditional medical education system	
	Lack of funding Lack of reward structure Lack of institutional leadership	Lack of professional support
Incentives	Administrative support in terms of institutional leadership, reward system, investments on training and resources Technical and professional support.	

CHAPTER 5

DISCUSSION AND IMPLICATIONS

The purpose of this study was to explore IT adoption patterns and characteristics of medical school faculty and contributing factors to IT adoption. The primary focus was to explore differences between faculty who adopt and reluctant or resist to IT adoption and, to determine if faculty characteristics contribute to prediction of faculty members' adopter category. The mixed-method research design was employed in order to provide a detailed description of the phenomenon. The survey and interview data gathered provided distinct but complementary information about adoption patterns of the faculty. This chapter begins with a discussion of the results of this investigation in relation to the research questions. It continues with the implications of these results, and is finalized with the suggestions for future research and conclusion.

5.1 Discussion

5.1.1 Technology Adoption Pattern of Faculty

Findings from survey data indicated that majority of the faculty use computers for their personal and professional task. Over 90% of the respondents own a computer for personal/home use and professional use and over 50% of respondents spend 1 to 3 hours per day working with computers. Similar to Jacobsen' findings (1998, p.168) , these findings are in contradiction to the general perception that mainstream faculty is hesitant about using computers. But these findings don't reflect the MF 's computer use for teaching.

Based on measures of faculty expertise, findings provides evidence for widespread adoption of communication and research tools into late majority, and adoption of relatively new tools associated with instruction into early majority. The software and tools that show greatest adoption are word processing, presentation software, electronic mail, library and database searching, search engines and Medline. The evidence for adoption of technology tools associated with research and communication is consistent with the findings in the literature (Jacobsen, 1998; Anderson,Varnhagen & Campell, 1999,Lichty, 2000, Goold, 1999; Jayasuriya, 1998).

Consistent with the finding that the faculty had expertise at research and communication tools, survey data gathered about technologies used in teaching-learning also provide evidence for limited adoption of computer-based technologies for teaching. Of the different types of instructional technology, Web resources, Video, Special Laboratory, word processors, presentation software have diffused into early majority(EM) and, course website, sound and educational software have diffused only into early adopters.

An explanation for limited adoption of computer-based technologies in teaching may be found in the perceptions about value of IT, computer use self-efficacy beliefs, perceived incentives, and barriers to integrating technology for teaching and learning, which will be discussed in the subsequent sections.

The results of survey and interviews suggest that the respondents in this study see an advantage to using instructional technologies in medical education. The perceived characteristics of the innovation, such as relative advantage, compatibility, complexity, and observability, impact the innovation-decision process of potential adopters (Rogers, 1995). Even though faculty in this study perceived an advantage in using technology, one of the explanations for limited adoption of relatively new tools may be found in perceptions about other characteristics of innovation which are not investigated in this study.

Six barriers that over fifty percent of the faculty agreed on are lack of computers and support service for students, reward structure, lack of computers and peripherals for faculty and lack of training opportunities. Those findings suggest that medical school faculty hold similar belief about barriers to instructional technology adoption as do other higher education faculty (Jacobsen, 1998; Anderson, Varnhagen & Campell, 1999; Spotts, 1999; Zwirn, 1996; Goold, 1999).

Most of the incentives that faculty perceived as important in their technology adoption are related to the barriers. Almost all of the faculty perceive that investment in infrastructure, training and support, policy and plans of university, financial support for material development, reward structure are important factors for a motivating environment in their technology adoption. Even though faculty doesn't perceive that lack of time is a barrier, they indicated that released time for development materials is a motivating factor. An explanation for this may be found in the perceptions that there is lack of reward structure that recognizes faculty efforts in teaching related activities. Even though faculty has time, given priority to research activities in reward structure, faculty prefers to spend their time for research or service activities.

5.1.2 Differences between Adopter Groups (EAs and MFs)

The EAs group was less likely to be at the Professor rank and more likely to be lower assistant professor .The finding that there is no significant relation with age and adopter group provides an evidence for Rogers'(1995) generalization that earlier adopters aren't different from later adopters in age.

As expected, EAs use computer significantly more often than MFs. However, similar to Jacobsen' (1998) findings, an unexpected result was that EAs have similar computer ownership/internet access patterns to MF for personal/home and professional use.

Early Adopters have higher levels of expertise than MF for all of the 11 types of computer software and tools. Based on the Anderson, Varnhagen & Campell' (1999) assumption that EAs have come to use these technologies earlier and have gained more expertise relative to majority faculty, this result provides evidence for EAs' relatively higher innovativeness; they are earlier in adopting many forms of technology than other members of the social system .

An evidence for the higher computer use self-efficacy of EAs versus MF was found in this study. This finding is consistent with other computer implementation studies (Lichty, 2000; Marcinkiewiez, 1994). This finding also corroborate Rogers' (1995) descriptions that early adopters have high self- efficacy beliefs as well as findings of similar studies (Jacobsen, 1998; Anderson, Varnhagen & Campell, 1999) that early adopters have higher confidence in technology use.

Significant differences were found between the early adopters and the mainstream faculty groups in terms of the number and the type of technologies used in teaching-learning process. Because of higher level of expertise and higher efficacy belief of early adopters, not surprisingly, early adopters used more technologies than Mainstream Faculty group. In terms of type of technologies used, the early adopters more likely have used course web pages, the web resources and commercial educational software than the mainstream faculty. These findings validate the finding in section 1 that relatively new instructional technologies have diffused into the early adopters group more than the mainstream faculty.

It is found that the early adopters have higher agreement than the mainstream faculty on the value of IT in medical education. This finding provides evidence for Rogers' description of early adopters that EA have a more favorable attitude towards innovation and consistent with the findings from previous researches that perceptions about value of IT is a factor differentiating high from low users of technology (Dixon & Steward, 2000, Spotts, 1999).

Consistent with the findings that presented for all faculty in section 1, both adopter groups agreed or strongly agreed that lack of computers for individual faculty and students, lack of computer peripherals, reward structure, lack of support service for students, traditional education system were barriers to integrating technology in medical education. In addition to common barriers, the EAs agreed that inadequate financial support and lack of institutional leadership were barriers and, the MF agreed that lack of training opportunities was an impediment to technology integration. Although there are similar responses of adopter groups, the survey and the interview results demonstrated that EAs and MFs experience different impediments to integrating technology. This finding is consistent with other technology diffusion studies in higher education(Jacobsen,1998; Goold, 1999; Anderson, Varnhagen,& Campell , 1999)

Both adopter groups rated that university policy and plans for diffusion of IT, investment in infrastructure, training and support, financial support, reward structure and reducing teaching load as important incentives. Inconsistent with the result of the Varnhagen, Campell & Anderson (1999), there were no significant differences found between early adopters and mainstream faculty in terms of incentives to adoption..

Consistent with the findings of similar studies (Jacobsen, 1998, Varnhagen, Campell & Anderson, 1999, Oates, 2001), the findings provide evidence for that early adopters and mainstream faculty have different preferences for learning about technology and support. Because the early adopters have higher level of expertise in technological resources; they preferred online resources more strongly. While the early adopter group preferred workshops and presentations, the mainstream faculty preferred structured in service training.

In terms of sources of support, by both adopter groups mostly preferred their colleagues on campus. While EA group rated experienced graduate students, support service and outside professionals, MF group rated support service, one-to-one help and experienced graduate students as preferred methods of support and help. Consistent with the Rogers' (1995) generalization that early adopters' interpersonal networks are more likely to be outside, EAs preferred colleagues at another institution and outside professionals significantly stronger than MF.

5.1.3 Relationship Between Faculty Characteristics and The Adopter Groups

Stepwise Logistic Regressions results indicated that computer use self efficacy and rank were significantly contribute to prediction of faculty adopter group.

This results is consistent with the results of the similar studies that self-efficacy belief is a significant predictor of individuals' technology adoption (Lichty, 2000; Marcinkiewicz, 1994, Compeau & Higgins, 1999 , Stein & Wang, 1998).

5.2 Recommendations for Implications

The results of this study could be used to devise strategies to support faculty members' IT adoption for teaching . As suggested by Jacobsen (1999), understanding the differences between early adopter faculty and mainstream faculty will help us build programs and encourage faculty to pursue the adoption of instructional technology. The results of this study has indicated that the early adopter faculty and the mainstream faculty in this study have different needs in training and support. Therefore, faculty development programs regarding instructional technology should not be designed with a "one size fits all" approach. In providing training and support for technology, institutions might consider the different needs of these adopter groups.

The early adopters are self-motivating and self-taught about technology. Early adopters have to be motivated to continue their focus on innovation and re-invention of technology. Therefore, belonging to an informal network of other EAs who exchange their knowledge and skill is important for motivation and continued growth. At the same time, incentives need to be provided to encourage EAs to share their expertise with the mainstream. Incentives might include release time for training, providing funds for developing instructional materials, supporting symposia and conference participations.

The results of the study indicated that mainstream faculty decision to use technology influenced by the successful applications they see around them. Therefore, increasing observability of technology may help to increase awareness of mainstream faculty. Rogers' (1995) defines observability as "the degree to which the results of an innovation are visible to others"(p.244). Considering Rogers' recommendation that mainstream faculty evaluate innovation through the subjective evaluations of near-peers who have adopted the innovation, demonstration of successful applications by early adopter peers may help to increase mainstream faculty awareness as well as to reduce uncertainty about technology using in teaching and learning. In addition to demonstration of successful practices, campus-wide conferences, quest speakers, newsletters and listservs can be effective strategies to make mainstream faculty aware of different types of technology and the power and potential of those technologies (Surry & Land, 2000).

In order to increase awareness and how-to knowledge of mainstream faculty, Jacobsen (1998) recommends a Post-secondary Teaching Strategies web site that brings together first-hand knowledge and learned lesson about successful technology integration from a particular campus. In such an environment, mainstream faculty would be able to examine current teaching strategies that being used effectively at their institutions by early adopter peers from across disciplines, determine what equipment and resources are needed for a particular idea, would be able to contact their early adopter colleagues for information about developing and applying skills. Considering the finding from this study that faculty prefers online resources as a source of knowledge about technology, the web site approach would be effective for sharing information about effective technology use for teaching and learning. In addition, such an approach would address the time impediment for learning about technology by providing an environment independent from time and place.

Although the early adopters in this study are self-taught about technology, both the early adopters and the mainstream faculty dissatisfied with the support and training in technology use. It seems that formal training programs doesn't appeal early adopter faculty who has a level of expertise in technology use. In designing training programs, institutions might consider gearing early adopters towards advanced topics and focusing on the specific needs of these faculty. Early adopters have to be motivated to continue their focus on innovation. Therefore, making innovative faculty aware of each other and encouraging them to share resources and expertise could be an effective way of increasing motivation and continued growth (Surry&Land, 2000).

The literature and the result of this study suggest that computer use self-efficacy belief of individuals is a significant factor in their technology utilization. From the standpoint of self-efficacy theory, the ideal method for developing teachers' self-efficacy for computer use would be to provide them with training and support to work successfully with technology (Albion, 1999). In designing training and support programs, institutions might consider a number of strategies that address self-efficacy perceptions of mainstream faculty. In order to foster computer use self-efficacy beliefs, Compeau and Higgins (1995) suggest providing hands-on practice in training programs. The mainstream faculty in this study prefer getting help from colleagues, support service and graduate students and want one-to-one assistance. In this case, the most successful professional development program for the mainstream faculty might be providing small group trainings and workshops allowing hands on practice, one-to-one access to colleagues, face-to-face access to support service and experienced graduate students in technology.

Besides providing training opportunities, building comprehensive and systematic technology support system is essential to increasing the faculty member's confidence with the use of technology in teaching and learning. Results of this study indicated that faculty members from both adopter groups were not satisfied with the support system in the faculty. First, it is obvious that there is a need for a systematic technical support system which will ensure that the networks and equipments are properly installed, operated, updated and maintained. Secondly, faculty members needs assistance in developing technology-based instructional materials.

Faculty development seemed to work best when the institution had a culture pervaded by the use of technology and supported by a wide range of strategies (Bates, 2000):

Widespread diffusion of instructional technologies in an institution does constitute a major cultural change. A strong leadership and a shared vision are critical factors in success of such a change (Bates, 2000). However, the traditional leadership function based on formal leader and followers is inconsistent with a change in a culture of education institutions (Mauer & Davidson, 1998). Effective leadership comes in the form of a collective approach by whole senior management of an institution (Bates, 2000). A shared vision will provide a benchmark which to assess different strategies and actions regarding the development of teaching with technology. Faculty will be more inclined to use technology if they are involved in decision making about them(Rice&Miller, 2001); therefore, institutions should include faculty members from both adopter groups in decisions about technology integration.

The other strategy is an extensive investment in infrastructure. Although ownership of computers for professional/home use is almost completely diffused among the faculty in this study, most faculty dissatisfied with the current investment in technology and distribution of available resources among departments. Therefore, to encourage adoption and diffusion of technology, the institutions investment in technology should be based on a long range technology plan rather than uncoordinated departmental or individual initiatives. This technology plan should be driven by the institutions' overall vision and strategy for its teaching.

An institution can construct the most sophisticated technology infrastructure to support teaching, but if students cannot access the technology all the investment is wasted (Bates, 2000). The results of this study also demonstrated that a large number of faculty perceived lack of technology resources for students as an impediment in their technology adoption for teaching and learning. Considering the findings that computer ownership among first-year medical students in the institution is very low (Zayim, Gülkesen, Saka, 2001), it seems that the institution needs to develop strategies to provide resources and support for students technology use.

Similar to most higher institutions, research publications are the predominant or even the only criterion for appointment, tenure and promotion in medical institutions. Medical school faculty, especially young faculty who has carrier worries are unwilling to spend their effort to develop technology-based applications for teaching, although they are more familiar with technology than their senior professors. The results from this study also indicated that lack of a reward system that recognizes faculty efforts in technology use for teaching is an impediment for wide-spread diffusion of instructional technologies. Therefore, to motivate faculty in technology use, intuitions should develop reward and incentive systems that are linked to technology using in teaching and learning such as release time, funding to support development of technology materials and considering instructional activities in promotion process.

5.3 Suggestions for Further Research

Although the findings of this study provides a detailed description of the phenomena under study, additional investigation should be considered to determine how perceptions about other characteristics of innovation such as compatibility, complexity, etc. and other personal and professional characteristics such as general self-efficacy beliefs, intrinsic motivators might influence the adoption of instructional technologies by medical school faculty. Determining these traits, in conjunction with the characteristics presently identified, would provide a more complete picture of faculty adoption patterns.

Studies comparing adoption patterns of medical faculty with faculty from other higher education institutions would provide useful information for understanding influences of institutional culture.

5.4 Conclusion

Medical institutions today confronted with instructional technology innovation, which is transforming the way in which faculty and students interact and the roles they take. If the goal of the medical education institution is the integration of technology for a transformative change, then rather on technology itself, there must be a clear focus on the faculty who use technology. It is essential for administrators, policy makers and anyone interested in an effective teaching and learning in medical education to understand adoption patterns of faculty and how these patterns influence the adoption and diffusion of instructional technology in medical education institution. This study provided information that sheds some lights on the characteristics and adoption patterns of faculty in a faculty of medicine. This knowledge can be used by medical education institutions as well as other higher education institutions interested in integration of technology for teaching and learning.

The results of this study indicated that even though majority faculty perceived instructional technology valuable for teaching and learning, adoption of instructional technology failed to cross mainstream faculty. As stated by Surry (1997), diffusion and adoption can not be based solely on the worth or quality of the innovation, but it should be based on the culture, the needs and the demands of the faculty. The results identify the need for institutional leadership in terms of institution-wide committed technology strategies and plans, supported with investments in human infrastructure by providing training and support, technological infrastructure, rewards and time.

The findings of this study provided additional evidence for that early adopter and mainstream faculty have different characteristics and different needs in technology integration. Identifying the differences between early adopters and mainstream faculty leads to the understanding that different approaches are needed to bridge the gap between EAs and MFs of instructional technology and, to encourage EAs for their efforts. It is obvious that faculty support programs designed with a "one-fit-all" approach fail to success. The outcomes of the study indicated that training and support and leadership of colleagues are critical factors for MFs adoption of instructional technology. EAs also need to be encouraged for their leadership by proving support and training opportunities as well as incentives for them.

The following suggestions are offered to medical education institutions to improve their faculty members' IT adoption for teaching and diffusion of instructional technology in medical education :

- Establish a strong strategic plan in which the use of technology for teaching played a prominent role

- Develop a long-range technology plan driven by the institutions' overall vision and strategy for its teaching.

- Establish a promotion system that places a high value on teaching and the use of innovative teaching methods.

- Design faculty development programs considering needs of different faculty profiles.

- Provide training programs not only about technical aspects of technology, but also about integration of technology for teaching and learning.

- Establish an instructional technology center in which faculty can get help from and work together with IT related professionals.

- Provide a systematic technical and professional support.

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APPENDIX A

SURVEY INSTRUMENTS

A K D E N İ Z
ÜNİVERSİTESİ
TIP FAKÜLTESİ

KAMPÜS , 07070
ANTALYA - TÜRKİYE
TEL : 0.242. 227 44 80
227 44 81
FAX : 0.242. 227 44 82

Değerli Öğretim Üyeleri,

Üniversitemiz Tıp Fakültesi adına O.D.T.Ü., Bilgisayar ve Öğretim Teknolojileri Eğitimi yüksek lisans programında doktora çalışmasını yürüten fakültemiz araştırma görevlilerinden Neşe Zayim, *Tıp Eğitiminde Öğretim Teknolojileri Kullanımı* konusundaki tez çalışmasının veri toplama aşamasını yürütmektedir. Bu çalışma sonucunda elde edilecek bilgi aynı zamanda fakültemizin eğitim-öğretimde teknoloji kullanımının geliştirilmesine katkıda bulunup, bu konuda geleceğe yönelik planlamalara ışık tutacaktır.

Bu nedenle lütfen değerli zamanınızdan 20-25 dakikanızı ayırarak araştırmacı tarafından size ulaştırılan anketi cevaplayınız.

Hem araştırmacımıza hem de fakültemize katkı sağlayacak bu çalışmaya katılımınız için teşekkür ederim.

Prof.Dr.Mehmet BAYKARA
DEKAN

TIP EĞİTİMİNDE

ÖĞRETİM TEKNOLOJİLERİ

ÖĞRETİM ÜYESİ GÖRÜŞLERİ ANKETİ

Değerli Öğretim Üyeleri;

Teknoloji hızlı gelişmelerle birlikte günlük yaşantımızın ayrılmaz bir parçası haline gelirken, bu durum yüksek öğrenim eğitim-öğretim sürecine yeterince yansıtılamamış,öğretim üyeleri ve öğrencilerin bu süreçte teknoloji kullanımı istenilen düzeyde yaygınlaşmamıştır.

Bu anket tıp eğitiminde öğretim üyelerinin teknoloji kullanım düzeyini ve kullanımı etkileyen faktörlerin ortaya konmasını amaçlayan bir doktora araştırmasına bilgi toplamak amacıyla geliştirilmiştir. Sizlerin bu konuda bireysel görüşleriniz araştırmamız için büyük önem taşımaktadır. Ankete vereceğiniz cevaplar sadece bu araştırma kapsamında kullanılacak ve kesinlikle üçüncü şahıslarla paylaşılmayacaktır.

Araştırmamıza sağladığınız katkı için teşekkürler

O.D.T.Ü.
EĞİTİM FAKÜLESİ
BİLGİSAYAR VE ÖĞRETİM TEKNOLOJİLERİ EĞİTİMİ
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KİŞİSEL BİLGİLER

Bu ankete cevap veren Tıp Fakültesi öğretim üyelerinin genel özelliklerini açıklayabilmek için kişisel ve mesleki bilgilerinize ihtiyaç duymaktayız. Lütfen bu bölümdeki soruları kutulara **X** işareti koyarak yanıtlayınız.

1.Akademik Ünvanınız

☐ Profesör ☐Doçent ☐Yrd.Doç. ☐ Öğretim Gör. ☐Okutman

☐Uzman ☐Arş.Gör.

2. Bağlı Bulunduğunuz Akademik Disiplin

☐ Temel Tıp Bilimleri ☐Klinik Tıp Bilimleri

3.Yaşınız ☐ 25-30 ☐ 31-40 ☐ 41-50 ☐ 50-60 ☐ 61-

4.Cinsiyet ☐ Bayan ☐ Erkek

5. Kaç yıldır tıp öğrencilerine eğitim veriyorsunuz?

☐ 1-5 ☐ 6-10 ☐ 11-15 15-20 ☐20+

Bu araştırma konusu ile ilgili daha ayrıntılı görüşlerinizi bizimle paylaşmak isterseniz size ulaşabilmemiz için lütfen aşağıdaki bölümü doldurunuz.

Adı, Soyadı:……………………Tel-No:………………E-mail:...........................

TIP EĞİTİMİNDE ÖĞRETİM TEKNOLOJİLERİ KULLANIMINA İLİŞKİN GÖRÜŞLER

Bu bölümde Tıp eğitiminde öğretim teknolojileri kullanımına ilişkin ifadeler yer almaktadır. Lütfen bu ifadelerle ilgili görüşlerinizi *"Kesinlikle Katılıyorum" "Katılıyorum", "Kararsızım", "Katılmıyorum" veya "Kesinlikle Katılmıyorum", sütunlarına (**X**) işareti koyarak cevaplayınız*

	Görüşler	**Kesinlikle Katılıyorum**	**Katılıyorum**	**Kararsızım**	**Katılmıyorum**	**Kesinlikle Katılmıyorum**
1.	Teknoloji kullanarak farklı öğrenme stillerindeki öğrencilerin ihtiyaçlarına cevap verebilirim.					
2.	Elektronik posta,forum, sohbet vb. araçların öğrencilerle iletişimimi kolaylaştıracağına inanıyorum.					
3.	Teknoloji destekli eğitimin öğrenmeyi daha etkin kıldığını düşünüyorum.					
4.	Teknoloji kullanımının öğrencilerin derse olan ilgisini arttırdığını düşünüyorum.					
5.	Öğretim teknolojilerinin ders materyallerini güncellememde kolaylık sağladığını düşünüyorum.					
6.	Teknoloji kullanımının derse ayrılan zamanı verimli kullanmamı sağladığını düşünüyorum.					
7.	Öğretim teknolojileri kullanımının derslerin kalitesini arttıracağını düşünüyorum.					
8.	Öğretim teknolojileri kullanımının öğretim üyesi olarak üretkenliğimi arttıracağını düşünüyorum.					
9.	Teknolojinin öğretim amaçlı kaynaklara erişimimde kolaylık sağladığını düşünüyorum.					

BİLGİSAYAR KULLANIMI

Evde Bilgisayarınız Var ☐ Yok ☐

Internet erişimi Var ☐ Yok ☐

Ofisinizde Bilgisayarınız Var ☐ Yok ☐

Internet erişimi Var ☐ Yok ☐

Günlük ortama bilgisayar kullanımınız?

1 saatten az ☐ **1-3 saat** ☐ **3-5 saat** ☐ **5 saatten fazla** ☐

Eğitim-Öğretim Sürecinde Bilgisayar Teknolojileri Kullanımına İlişkin Görüşler	**Kesinlikle Katılıyorum**	**Katılıyorum**	**Kararsızım**	**Katılmıyorum**	**Kesinlikle Katılmıyorum**
Her geçen gün teknolojiyi derslerimde daha etkin kullanabileceğim yöntemler keşfediyorum.					
Bilgisayarları diğer öğretim amaçlı kaynaklar kadar <u>kullanmıyorum.</u>					
Bilgisayarları öğretim ortamlarında kullanmak için gerekli adımları biliyorum.					
Bilgisayar kaynaklarını öğretim amaçlı kullanmada <u>etkin değilim</u>.					
Bilgisayarların sağladığı olanakları öğretimde etkin kullanacak düzeyde biliyorum.					
Öğrencilere bilgisayar uygulamalarını nasıl kullanacaklarını açıklamakta <u>zorlanıyorum.</u>					
Öğrencilerin bilgisayarlara ilişkin sorularını yanıtlayabilirim.					
Bilgisayarları öğretim amaçlı kullanmak için gerekli bilgi ve becerilere sahip olduğumdan <u>emin değilim.</u>					
Mümkün olduğunca bilgisayar kullanmaktan kaçınırım.					
Bilgisayara dayalı öğretim uygulamalarımın başkaları tarafından değerlendirilmesini <u>tercih etmem.</u>					

Aşağıdaki Bilgisayar Yazılım Ve Araçları Kullanımı İçin Lütfen Uzmanlık Düzeyinizi Belirtiniz.

Yazılım ve Araçlar	**İleri düzey**	**İyi**	**Orta**	**Acemi**	**Hiç**
Kelime İşlemci (Word vb.)					
Hesap Tablosu (Excel vb.)					
Sunu programları (Powerpoint vb.)					
Web sayfası geliştirme (HTML)					
İstatistik programları(SPSS vb)					
Elektronik mektup					
Web gözgezdiriciler (Internet Explorer, Netscape vb.)					
İnternet'te Kütüphane ve veritabanlarını tarama					
Listeler ve haber grupları(listserv, newsgroups)					
Arama motorları (google, yahoo vb.)					
Medline					

Lütfen Eğitim Öğretim Sürecinde Kullandığınız Öğretim Teknolojilerini İşaretleyiniz.?

- ☐ Tahta
- ☐ Tepegöz
- ☐ Slayt projektör
- ☐ Bilgisayar+projeksiyon sistemi
- ☐ Video+TV ve/veya Video+büyük ekrana yansıtma
- ☐ Ses kayıtları
- ☐ Özel Laboratuvar (anatomi lab, fizyoloji lab vb)
- ☐ Ders yada kişisel web sayfaları
- ☐ Dersi içeriğinin bir parçası olarak web kaynakları
- ☐ Ticari eğitim yazılımları
- ☐ Ders notu yada ders materyali hazırlama amaçlı kelime işlemciler
- ☐ Sunu yazılımları
- ☐ Diğer(Belirtiniz)..

TEKNOLOJİNİN EĞİTİM-ÖĞRETİME UYARLANMA SÜRECİNDE KARŞILAŞILAN GÜÇLÜKLER

Bu bölümde öğretim üyelerinin teknolojiyi eğitim-öğretim sürecine uyarlamada karşılaştıkları güçlüklere ilişkin ifadeler yer almaktadır. Lütfen bu ifadelerle ilgili görüşlerinizi *"Kesinlikle Katılıyorum" "Katılıyorum", "Kararsızım", "Katılmıyorum" veya "Kesinlikle Katılmıyorum", sütunlarına (**X**) işareti koyarak cevaplayınız*

		Kesinlikle katılıyorum	**Katılıyorum**	**Kararsızım**	**Katılmıyorum**	**Kesinlikle katılmıyorum**
1	Öğretim üyelerinin teknolojiye dayanan ders materyali geliştirmek için yeterli zamanı yok.					
2	Mevcut donanımlara erişimde problemler var.					
3	Mevcut donanımlar(bilgisayar, tepegöz vb.) genellikle bozuk ve bakımsız.					
4	Öğretim üyelerinin kullanımına sunulan bilgisayar sayısını yetersiz.					
5	Bilgisayarların etkin kullanımı için gerekli yazıcı, tarayıcı vb. araçların sayısı yetersiz.					
6	Öğrencilerin kullanımına sunulan bilgisayar sayısı yetersiz.					
7	Öğrencilerin bilgisayar kullanımına yardımcı olacak destek servisleri yetersiz.					
8	Dersliklerin teknik ve fiziksel altyapısı teknoloji kullanımına uygun değil.					
9	Teknoloji destekli öğretimin öğrenmeyi olumlu etkilediğini gösteren yeterince bilimsel araştırma yok.					
10	Teknolojinin eğitim-öğretimde kullanımını teşvik eden bir ödül sistemi(puan vb.) yok.					
11	Teknoloji entegrasyonu için idare tarafından sağlanan finansal destek yetersiz.					

		Kesinlikle katılıyorum	Katılıyorum	Kararsızım	Katılmıyorum	Kesinlikle katılmıyorum
12	Bilgisayar destekli ders materyali geliştirmede başvurabileceğim destek servisi yok					
13	Teknolojinin etkin kullanımına ilişkin bilgi ve becerilerim yetersiz.					
14	Mevcut yazılımlar öğretimsel ihtiyaçlarıma uygun değil.					
15	Verdiğim derslerin içeriğini teknoloji kullanımına uygun değil.					
16	Teknolojiye yönelik bilgi edinmede başvurduğum materyaller ihtiyaçlarıma uygun değil.					
17	Öğretim üyelerine yeni teknoloji bilgi ve becerilerini kazandıracak profesyonel gelişim (hizmet içi eğitim vb.) olanakları yetersiz.					
18	Teknoloji kullanımı ile karşılaştığım problemlere anında çözüm üretecek bir destek servisi yok/yetersiz.					
19	Öğretim üyeleri eğitim-sürecinde teknoloji kullanımına ilgi duymamaktadır.					
20	Tıp eğitiminde teknoloji kullanımı yeterince kabul görmemektedir.					

TEKNOLOJİ HAKKINDA BİLGİLENME

Bireylerin teknoloji kullanımına yönelik bilgi edinme ve destek almada tercih ettikleri metotlar farklılıklar gösterebilir. Lütfen bu metotlar için tercihinizi *"Kesinlikle Tercih Ederim"*, *"Tercih ederim"*, *"Kararsızım"*, *"Tercih Etmem"*, *"Kesinlikle Tercih Etmem"*sütunlarına (**X**) işareti koyarak belirtiniz.

Bilgi Edinme	**Kesinlikle tercih ederim**	**Tercih Ederim**	**Kararsızım**	**Tercih etmem**	**Kesinlikle tercih etmem**
Online materyaller(Web kaynakları vb.)					
Basılı Materyaller (doküman,kullanım kılavuzu vb)					
Kendi kendime deneyerek					
Workshop ve sunular					
Düzenli hizmetiçi eğitim seminerleri					
Destek ve Yardım					
Deneyimli asistanlar					
Üniversitedeki çalışma arkadaşlarım					
Diğer üniversitelerdeki meslekdaşlarım.					
Üniversite dışından uzmanlar					
Üniversite/fakülte bünyesinde destek grubu					
Telefonla yardım birimi					
Bire-bir yardım					
Diğer (belirtiniz)…………………………….					

TEKNOLOJİ KULLANIMINA TEŞVİK EDİCİ UNSURLAR

Aşağıda öğretim üyelerini öğretim teknolojileri kullanımına teşvik eden unsurlar yer almaktadır. Bu unsurların sizin için önemini *"Kesinlikle Önemli" "Önemli","Kararsızım"," "Önemli değil","Kesinlikle Önemli Değil* , sütunlarına (**X**) işareti koyarak cevaplayınız

Unsurlar	**Kesinlikle Önemli**	**Önemli**	**Kararsızım**	**Önemli Değil**	**Kesinlikle Önemli Değil**
Öğretim üyelerinin Eğitim-öğretimde teknoloji kullanma çabalarının ödüllendirilmesi					
Ders yükünün azaltılarak öğretim yenilikleri geliştirmeye zaman sağlanması					
Üniversite/fakültenin öğretim teknolojileri altyapısı, hizmet içi eğitim ve destek servislerine yatırım yapması					
Üniversite/fakülte yönetiminin öğretim teknolojilerinin yaygınlaştırılmasına yönelik politikalarının /planlarının olması					
Üniversite yada fakültenin ders materyali geliştirmeye yönelik projeler için destek sağlaması					

Eklemek İstedikleriniz

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....

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APPENDIX B

INTERVIEW GUIDE

GÖRÜŞME REHBERİ

Görüşülen Kişi: _______________________

Görüşmeyi yapan: _______________________

Tarih & Saat: __ / __ / 2003 & __:__

Görüşme Süresi: _________

Merhaba,

Ben O.D.T.Ü Bilgisayar ve Öğretim teknolojileri Eğitimi Yüksek Lisans programında doktora öğrenimimi sürdürmekteyim. Öncelikle Tıp Eğitiminde Öğretim teknolojileri Kullanımı konusundaki tez çalışmamla anketi yanıtladığınız ve ayrıntılı görüşlerinizi benimle paylaşmak istediğiniz için teşekkür ediyorum.

Tıp eğitiminde teknoloji kullanımı konundaki kişisel deneyimleriniz, fikir ve görüşleriniz bu araştırma için büyük önem taşımaktadır. Size eğitim öğretim sürecinde kullandığınız teknolojiler, bu teknolojinin sizin öğretim sürecinize etkileri, kullanımınızı teşvik eden unsurlar ve karşılaştığınız güçlükler konusundaki görüşlerinizi almak üzere bazı sorular yönelteceğim.

Başlamadan önce, bazı noktaları vurgulamak istiyorum. Yaptığımız görüşme sadece araştırma amacıyla kullanılacaktır. Bu çalışma sonucunda oluşturulacak dokümanlarda isminiz doğrudan kullanılmayacaktır.

Eğer izin verirseniz görüşmeyi kaydetmek istiyorum. Sizce sakıncası var mı?

Sizin sormak istediğiniz bir soru var mı?

GİRİŞ

Size yöneltecegim sorular eğitim öğretim sürecinde kullandığınız teknolojiler, kullanma kararınızı etkileyen faktörler, karşılaştığınız güçlükler ve bu konuda beklentilerinize yönelik olacaktır.

TEKNOLOJİ KULLANIMI

1. Derslerinizde yada derslere yönelik aktivitelerinizde öğretim teknolojilerini kullanıyormusunuz?
    - Ne tür uygulamaları kullanıyorsunuz?
    - Bu teknolojileri hangi amaçlar için kullanıyorsunuz?
2. Bu süreçlerde teknoloji kullanımının size sağladığı avantaj yada dezavantajlar nelerdir?

- Öğretim üyesi olarak size katkıları?
- Öğrencilere katkısı?
- Öğretimin etkinliği açısından katkıları?

KARAR VERME SÜRECİNE ETKİ EDEN FAKTÖRLER

1. Eğitim öğretim sürecinde teknoloji kulanmaya karar vemenizde sizi etkileyen kişi yada olaylar var mı?
    - Bu unsurlar kararınızı nasıl etkiledi?
2. Teknoloji kullanma kararınızı bulunduğunuz üniversite ortamı etkiledi mi? Nasıl?(idarenin tutumu, sağlanan olanaklar vb.)

KULLANIMDA KARŞILAŞILAN GÜÇLÜKLER

1. Yeni teknolojileri öğrenme ve derslerinize adaptasyonda karşılaştığınız güçlükler var mı? Örnek verebilirmisiniz? İdari problemler, teknik problemler, kişisel problemler vb.
    - Teknoloji ile ilgili bir probleminizde hangi kaynaklara başvuruyorsunuz? Beklentileriniz karşılanıyor mu?
    - Bu konuda beklentileriniz nelerdir?

YENİ TEKNOLOJİLER HAKKINDA BİLGİLENME VE DESTEK

1. Yeni teknolojilerden nasıl haberdar oluyorsunuz?
2. Yeni teknolojilerden nasıl öğreniyorsunuz?
3. Öğrenme ve uygulama aşamasında arşılaştığınız herhangi bir güçlük var mı?
4. Bu konuda beklentileriniz nelerdir? Nasıl bir öğrenme süreci tercih edersiniz?

KULLANIMA TEŞVİK EDEN UNSURLAR

1. Derslerinizde yeni teknolojileri kullanma konusunda sizi motive eden unsurlar nelerdir?
    - Universite ortamına yönelik unsurlar nelerdir?(politikalar, yatırımlar vb.)

VITA

Neşe Zayim was born in Antalya on May 4, 1964. She received her B. S. degree in Mathematics from the Middle East Technical University in 1986. She received her M. Sc. degree in Medical Informatics from the Akdeniz University in 1996. She worked in the Computer Center at the Akdeniz University from 1992 to 1997 as a system annalist. She also worked as a research assistant at the Department of Biostatistics, Medicine Faculty from 1997 to 1999. Since then, she has been working as a research assistant at the Department of Computer Education and Instructional Technologies at the Middle East Technical University. Her main areas of interest are diffusion of innovation, management of instructional technologies, instructional technology use in medical education.