

# ***Pre-service Teachers' Attitudes Toward the Effect of Mobile Learning***

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## **Özet**

Bu çalışmanın amacı bilişim teknolojileri öğretmenliği (bilgisayar öğretmenliği) adaylarının mobil öğrenmeye yönelik tutumlarını cinsiyet, akıllı telefona sahip olma, mobil telefondan internet kullanma, mobil öğrenme hakkında bilgisi, mobil öğrenme uygulamalarını kullanma ve mobil öğrenme uygulamalarını kullanma istekliliği gibi bazı bağımsız değişkenler açısından incelemektir. Çalışmanın örneklemini 2011 güz döneminde bilgisayar ve öğretim teknolojileri lisans programında öğrenim gören 219 bilişim teknolojileri öğretmen adayı oluşturmaktadır. Katılımcılardan veri toplamak amacı ile “üniversite eğitiminde mobil öğrenmenin etkileri” başlıklı tutum ölçeği kullanılmıştır. Bu çalışmanın sonuçlarına göre, bilişim teknolojileri öğretmen adaylarının tutumları cinsiyet, akıllı telefona sahip olma, mobil telefondan internet kullanma ve mobil öğrenme hakkında bilgiye sahip olma gibi değişkenlere göre anlamlı bir fark göstermektedir. Bununla birlikte, öğretmenlerinin tutumları mobil öğrenme uygulamalarını kullanma ve mobil öğrenme uygulamalarını kullanma istekliliği gibi değişkenlere göre anlamlı bir fark göstermektedir. Mobil öğrenme teknolojilerinin kullanıldığı daha iyi öğretim ve öğrenme ortamlarının geliştirilmesi için eğitim fakültesi bilgisayar ve öğretim teknolojileri bölümünde çalışan öğretim elemanları için tavsiyeler sunulmaktadır.

***Anahtar Kelimeler:*** Mobil öğrenme, tutum, bilişim teknolojileri aday öğretmenleri, yüksek öğretim

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## **Abstract**

The purpose of this study is to determine pre-service computer teachers' (information technologies teachers) attitudes toward the effect of mobile learning in terms of some independent variables such as gender, ownership of a smart phone, using internet with mobile phone, the knowledge about mobile learning, the use of a mobile learning application and the willingness to use a mobile learning application. The sample consisted of 219 pre-service computer teachers enrolled in computer education and instructional technologies undergraduate program during the 2011 fall semester. The attitude scale titled "the effect of mobile learning in university education" (TEMLUE) was used to collect data from participants. Results of this study showed that pre-service computer teachers' attitudes do not differ regarding gender, ownership of a smart phone, using internet with mobile phone and the knowledge about mobile learning. However, their attitudes differ significantly with the other variables such as the use of a mobile learning application and the willingness to use a mobile learning application. Further implications for faculty of education staff working in the computer education and instructional department are presented and discussed in order to create better teaching and learning environments using mobile learning technologies.

**Keywords:** *Mobile learning, attitudes, pre-service computer teachers, higher education*

## **Introduction**

Mobile devices and related technologies such as smartphones, PDAs, netbook, tablet PCs have increased worldwide. It is estimated the total number of mobile phone users worldwide is over 5.6 billion, 79.86% of population. Furthermore, this technologies have been affecting robustly the way people communicate and access information (Borcea & Iamnitchi, 2008; Sharples, Corlett & Westmancott, 2002). As a result of the improvement of mobile technologies rapidly and the demand of mobility in learning environment, a new concept "mobile learning" has appeared recently. Mobile learning is a field which combines two areas that are mobile technologies and e-learning. The most important feature of mobile technologies makes it possible to learn "what they want", "where they want" and "when they want" for learners (Peng, Su, Chou & Tsai,

2009). Moreover, mobile learning has the characteristics that increase the effectiveness of learning, such as dynamic, collaborative, individual and comprehensive. Therefore, mobile learning has been considered as the future of learning or as an integral part of any other form of educational process in the future (Trifonova, 2003). Nowadays, there is a growing amount of research concerned with applying mobile technology to learning. For the importance of mobile learning described above, in this study, we aimed to determine pre-service computer teachers' attitudes toward the effect of mobile learning in higher education. In this context, six research questions were investigated:

- What are the impacts of “gender” on Pre-service computer teachers' attitudes toward the effect of mobile learning?
- What are the impacts of “ownership of a smart phone” on Pre-service computer teachers' attitudes toward the effect of mobile learning?
- What are the impacts of “using internet with mobile phone” on Pre-service computer teachers' attitudes toward the effect of mobile learning?
- What are the impacts of “the knowledge about mobile learning” on Pre-service computer teachers' attitudes toward the effect of mobile learning?
- What are the impacts of “the use of a mobile learning application” on Pre-service computer teachers' attitudes toward the effect of mobile learning?
- What are the impacts of “the willingness to use a mobile learning application” on Pre-service computer teachers' attitudes toward the effect of mobile learning?

## **Review of Literature**

The review of literature section is divided into three categories. First of all, literature related to quantitative and qualitative studies in mobile learning researches are presented. Secondly, the studies and researches on developing mobile learning environment are provided and finally hybrid studies that include developing mobile learning environment and investigating the participants' opinion are explained.

Yılmaz (2011) focused on the awareness levels of postgraduate students and academic staff towards mobile learning at the Department of

Computer Education and Instructional Technology. Data were collected by semi-structured interview form which included 31 questions and 20 participants responded to the interview form. According to the findings, postgraduate students and academic staff in the Department of Computer Education and Instructional Technology have high level awareness toward mobile learning.

Kuşkonmaz (2011) investigated secondary school teachers' perceptions toward mobile learning. The study consists of 610 teachers from 28 different secondary schools in Turkey. The researcher used an attitude scale which consists of 5 factors and 26 items. As a result of this study positive attitudes toward mobile learning were found. In addition, the research show that teachers' opinion related to the mobile learning in teaching and learning environment was positive.

Dearnley, Haigh and Fairhall (2007) investigated the feasibility and identify the issues of using mobile technologies in the health and social care students in practice. 24 students and 5 lecturers participated to the study. They were issued with PocketPCs on which to record assessment documentation including action plans and evidence of achieving performance criteria. For this aim they created a form where students were asked to fill in their diary plans as a portfolio. Qualitative and quantitative data were collected by the researchers. They asked some questions to the participants, they report with students and 3 focus group. And then they analyzed the data. Students liked this application and it was a good experience for them. Lecturing staff found that synchronizing the device with the University electronic diary system was useful.

Seppala and Alamaki (2003) used mobile devices for educational activities for teacher training purposes. The aim of this study was to create a flexible teaching solutions. Trainee students discussed and shared their ideas about teaching and learning methods through the mobile devices and use of a short message service (SMS). There were 11 students and five female teachers. In the study, 10 Communicator and two digital cameras were used in order to collect data from participants. According to the results, the technology used in the teaching and learning environment provided learning possibilities to the students.

Trifonova (2003), tried to make classification of mobile learning studies. According to study there were two categories of mobile learning research. One of them was thematic span of projects and the other category was research goals. According to the results, researchers wonder how a better learning environment can be, and what kind of differences mobile learning from the rest of e-learning has.

Alvarez, Alarcon and Nussbaum (2011) developed one to one mobile learning application in order to support the collaborative learning environments in the classroom. The researchers created an application and a framework architecture which were suitable for the collaborative learning. The results supported that learners' needs provided by the design of application. This study is foreseen as a mobile learning applications and environments.

Özcan (2008) designed and implemented a mobile learning environment for Personal Digital Assistants (PDA). The researcher developed learning modules in order to share them with users. The modules were uploaded to the web servers so that users could easily download the modules to their PDAs. The research also indicated that users can have learning possibilities using the developed application in this study.

Motiwalla (2007) developed an e-learning application. An application was developed to link wireless/handheld devices to three course websites. There were 63 students in this studies sample. The students used the learning environment with w/h devices. Data was collected by a survey and interviews. According to the results, mobile technology provides a better understanding role in higher education.

Leung and Chan (2003) developed a framework for mobile learning. This framework has four functional levels: (1) mobile learning applications, (2) mobile user infrastructure, (3) mobile protocol and (4) mobile network infrastructure. According to results, two big issues are indicated in the mobile learning: knowledge management and learning issues. Mobile learning environment can be attractive for the learners and can improve their 21th century skills. It is clear that mobile learning environments will provide meaningful and correct information wherever they are and whatever they want.

Keskin (2011) designed a mobile learning system to support the requirements about professional development of academic staff. Qualitative and quantitative research methods were used in order to collect data from academic staff. In the study, focus interview, questionnaire, semi-interview, personal information form, check list, evaluation form, system logs were used as a data collection tools. According to findings, one of the important issues for academic staff is to develop themselves in scientific research. For this requirement developed a mobile application and academics used this application. According to the results academics can use the mobile technology for the learning. Mobile application contributed to academics' professional development.

Tanrıverdi (2011) developed a mobile application for the distance learning students to support e-learning. Mobile application was used by 13 students for 6 weeks. During the implementation, students were informed by short message service about their homework and exam date. Students liked this application. The data were collected by student view form and reviewed by the academics.

Çakır (2011) developed a mobile application for Basic Information Technology Usage course. This mobile software was used by 132 students. Questionnaire was developed in order to collect students' opinions about this application. According to the students' opinions, this application was attractive and effective for them. In addition, students have great willingness to use mobile applications.

Korkmaz (2010) investigated how problem based mobile learning affects on students' academic achievements. The researcher worked with 32 students with 16 groups. Half of this group joined the face to face problem based learning application, rest of the groups joined the mobile application for four weeks. The data were collected by performance evaluation survey developed by Gürsul (2008). According to the findings, achievement level of the students at the mobile group was higher than the students in the face-to-face problem-based learning group. The results of the study showed that the mobile application increased the student achievement.

Kışla, Bayburt, Sarsar and Arıkan, (2009) worked on the possible effects of mobile learning environment in Database Management System course. In the study, the researchers developed a mobile teaching and learning application. In order to learn students' opinions about the mobile application, a questionnaire was used. For the academic achievements of students, an achievements test was implemented to obtain data from students. 40 pre-service computer teachers from Computer Education and Instructional Technology Department participated to the study. In this study, researchers used two instrument; achievement test which includes 10 items and students' opinion questionnaire about mobile application developed by Yeniad (2006). According to the results, mobile application increased students' academic achievement. At the end of the study, students indicated positive opinions about the use of mobile learning environment. In addition students reported that they were willing to use mobile learning environments in their education.

Corlett (2005), worked on a mobile learning organizer. An application was developed for the university students. There were 16 students in the sample and they had suitable devices for this study. The application developed for this study was found as a suitable form for the students' device. Three methods were used to collect the data. These were questionnaires, focus groups, and students kept logbooks. During the study, the students were in a wirelessly networked study environment and other locations. According to the results, the use of PDAs as learning organizers has positive effect for learning. Furthermore, researcher stated that these devices can be used to support learning.

## **Methodology**

In this study, the descriptive research methodology was used. This quantitative investigation employed the survey method as a research design. We used an instrument which focused on demographic information. Furthermore, we used "the effect of mobile learning in university education" attitude scale (TEMLUE) consists of 20 items which was developed by Kıcı (2010) for data collection. The instrument has four subscales which are titled; "for increasing the interaction", "for increasing the student participation", "as a support of the learning" and "Integration into curriculum". The study was conducted on 219 Pre-service computer teachers who are enrolling in

Computer Education and Instructional Technologies Department (CEIT) at Faculty of Education at Ege University during the school term year 2011-2012.

The data were analyzed using SPSS 17.0 statistical software program for windows. Descriptive statistics were used to analyze the responses to the descriptive questions. Parametric statistics like t-test were conducted to analyze the differences between pre-service computer teachers' attitudes and other dependent variables. Level of significance is determined as .05 for the analyses.

### Findings

Some demographics information of respondents are given in Table-1.

*Table 1. Demographics Information of the Respondents*

	N	%
<i>Gender</i>		
Male	132	60.3
Female	87	39.7
<i>Grade</i>		
1 <sup>st</sup>	64	29.2
2 <sup>nd</sup>	47	21.5
3 <sup>rd</sup>	63	28.8
4 <sup>th</sup>	45	20.5
<i>Do you have a smart phone?</i>		
Yes	101	46.1
No	118	53.9
<i>Do you access the internet using mobile phone?</i>		
Yes	152	69.4
No	67	30.6
<i>Do you have any information about mobile learning?</i>		
Yes	135	61.6
No	84	38.4
<i>Have you ever use a mobile learning application?</i>		



Yes	34	15.5
No	185	84.5
<i>Do you want to use an educational mobile application?</i>		
Yes	143	65.3
No	76	34.7

As shown in Table 1, it is seen that the number of males are higher than the number of females like almost all CEIT departments in Turkey. Almost half of the participants (46.1%) have a smart phone and 69.1% of the respondents access the internet using their mobile phone. Furthermore, 61.6% of the respondents have information about mobile learning. Although 15.5% of these students have used a mobile learning application, more than half of them (65.3%) want to use mobile learning application. We used an independent t-test in order to determine if pre-service computer teachers' attitudes vary according to different factors. Results of are given in Table 2, 3, 4, 5, 6 and 7 respectively.

**Table 2.** *T-Test Analysis Of Attitude Scores According To Gender*

Scales	Variables	N	X	SD	t	p
SS 1	Male	132	21.4	5.29	-1.663	.20
	Female	87	22.5	3.80	-1.776	
SS 2	Male	132	16.5	3.66	-2.206	.25
	Female	87	17.6	2.88	-2.316	
SS 3	Male	132	10.3	2.61	-1.224	.12
	Female	87	10.8	2.41	-1,244	
SS 4	Male	132	18.3	3.35	-1,211	.98
	Female	87	18.8	3.38	-1,208	
<b>TEMLUE</b>	Male	132	67.6	11.23	-2.024	.45
	Female	87	69.8	9,25	-2.141	

Subscales : SS 1: “for increasing the interaction”

SS 2: “for increasing the student participation”

SS 3: “as a support of the learning “

SS 4: “Integration into curriculum”

As seen in Table 2, there is no significant difference in pre-service computer teachers' attitudes towards the effect of mobile learning in University Education on the basis of SS 1, SS 2, SS3, SS4 subscales and TEMLUE regarding gender ( $p > .05$ ).

**Table 3.** T-Test Analysis Of Attitude Scores According To Ownership Of A Smart Phone

Scales	Variables	N	X	SD	t	p
SS 1	Yes	101	22.0	4.93	-.518	.67
	No	118	21.7	4.65	-.516	
SS 2	Yes	101	17.3	3.40	-1.274	.77
	No	118	16.7	3.41	-1.274	
SS 3	Yes	101	10.4	2.69	.631	.15
	No	118	10.6	2.41	.636	
SS 4	Yes	101	18.9	3.38	-1.616	.75
	No	118	18.1	3.33	-1.615	
TEMLUE	Yes	101	68.7	12.06	-.946	.21
	No	118	67.2	10.46	-.936	

As seen in Table 3, there is no significant difference in pre-service computer teachers' attitudes towards the effect of mobile learning in University Education on the basis of whether or not they have a smart phone. (SS 1, SS 2, SS3, SS4 subscales and TEMLUE,  $p > .05$ ).

**Table 4.** T-Test Analysis Of Attitude Scores According To Access The Internet Using Mobile Phone.

Scales	Variables	N	X	SD	t	p
SS 1	Yes	152	22.0	4.83	-.998	.52
	No	67	21.3	4.65	-1.012	
SS 2	Yes	152	17.1	3.51	-.773	.70
	No	67	16.7	3.17	-.804	
SS 3	Yes	152	10.5	2.43	-.449	.86
	No	67	10.4	2.59	-.460	
SS 4	Yes	152	18.6	3.31	-.512	.61
	No	67	18.3	3.40	-.518	

<b>TEMLUE</b>	Yes	152	68.3	11.42	-.915	.97
	No	67	66.8	10.77	-.936	

The results indicate that there is no significant difference in pre-service computer teachers attitudes according to access the internet using mobile phone in TEMLUE and all sub-scales as seen in Table 4 ( $p > .05$ ).

**Table 5.** *T-Test Analysis Of Attitude Scores According To Knowledge About Mobile Learning.*

Scales	Variables	N	X	SD	t	p
SS 1	Yes	135	22.2	4.76	-1.402	.45
	No	84	21.2	4.77	-1.402	
SS 2	Yes	135	17.3	3.51	-2.010	.35
	No	84	16.4	3.17	-2.059	
SS 3	Yes	135	11.0	2.54	-3,643	.70
	No	84	9.7	2.35	-3.709	
SS 4	Yes	135	18.2	3.53	1.369	.14
	No	84	18.9	3.07	1.413	
<b>TEMLUE</b>	Yes	135	68.8	11.73	-1.601	.38
	No	84	66.3	10.25	-1.652	

It was found that there is not a meaningful difference in the pre-service computer teachers' attitudes towards the effect of mobile learning according to knowledge about mobile learning (SS1, SS2, SS3, SS4 subscales and TEMLUE,  $p < .05$ ).

**Table 6.** T-Test Analysis Of Attitude Scores According To The Use Of A Educational Mobile Application.

Scales	Variables	N	X	SD	t	p
SS 1	Yes	34	23.2	5.00	-.444	.04
	No	185	20.7	4.74	-.460	
SS 2	Yes	34	18.9	3.81	-.399	.03
	No	185	16.1	3.34	-.437	
SS 3	Yes	34	11.8	3.25	-1.06	.00
	No	185	9.6	2.38	-1.31	
SS 4	Yes	34	18.7	3.41	.640	.00
	No	185	16.3	3.37	.640	
TEMLUE	Yes	34	72.6	12.73	-.546	.01
	No	185	62.7	10.95	-.605	

The result clearly reveals that significant difference exists in attitudes of the pre-service computer teachers according to the use of mobile learning applications at confidence interval of 95 % (SS1, SS2, SS3, SS4 subscales and TEMLUE,  $p < .05$ ).

**Table 7.** T-Test Analysis Of Attitude Scores According To The Willingness To Use A Mobile Learning Application.

Scales	Variables	N	X	SD	t	p
SS 1	Yes	143	22.6	5.09	.466	.02
	No	76	21,7	4.15	.438	
SS 2	Yes	143	17.1	3.56	-.781	.03
	No	76	15.9	3.10	-.748	
SS 3	Yes	143	11.7	2.61	-1.659	.04
	No	76	9.7	2.36	-1.711	
SS 4	Yes	143	19.0	3,51	-.551	.01
	No	76	18.1	3.09	-.530	
TEMLUE	Yes	143	70.4	12.33	-.634	.00
	No	76	65.4	8.80	-.574	

The result reveals that there is significant difference in the pre-service computer teachers' attitudes towards the effect of mobile learning in University Education on the basis of willingness to use a mobile learning application (SS1, SS2, SS3, SS4 subscales and TEMLUE ,  $p < .05$ ).

## **Conclusion**

In this paper, we investigated and discussed pre-service computer teachers' attitudes towards the effect of mobile learning in higher education with regard to various variables. The results could be summarized as follows: This study showed that computer teachers candidates' attitudes toward the effect of mobile learning are not related to gender. Similar findings have been found in many studies (Kuşkonmaz, 2011; Kıcı, 2010; Uzunboylu, Çavuş & Erçağ, 2009; Hoskyns-Long, 2009 ).

In three other sub-problems of the study, i.e. internet usage with mobile phone, ownership of a smart phone and the knowledge about mobile learning, there was not found a significant difference between the attitudes of computer teachers' candidate towards mobile learning.

The results of the study showed that there is a positive significant difference between the attitudes of computer teacher candidate and the use of mobile learning applications towards the effect of mobile learning in university education. This follows that teachers candidate who use the mobile learning application have more positive attitudes. This leads us to the evident conclusion that individuals who use a mobile learning application are much more familiar with mobile learning. Several studies have also demonstrated that the use of mobile learning application is the most important factor affecting mobile learning views and attitudes (Seppälä, Sariola & Kynäslahti, 2002; Sharples, Corlett & Westmancott, 2002; Seppela & Alamaki, 2003; Corlett, 2005; Avenoğlu, 2005; Motiwalla, 2007; Dearnley, 2007; Korkmaz, 2010; Alvarez, Alarcon & Nussbaum; 2011; Ateş, 2011; Tanrıverdi, 2011; Sanagusti'n et al, 2012; Echeverría et al, 2012).

Finally, we found positive and significant relationships between the willingness to use mobile learning applications and attitudes towards mobile learning. Similarly, several studies demonstrated that attitudes

towards mobile learning are directly related to the willingness to use mobile learning application in education (Çakır, 2011; Kuşkonmaz, 2011; Ateş, 2011; Avenoğlu, 2005; Corlett, 2005). Thus, there is the need for further studies to develop mobile learning software and to investigate the efficiency and effectiveness of mobile learning environment.

Mobile learning, that is an essential extension of e-learning, will become more popular with the progress of information and communication technologies as the day goes on. Although some disadvantages like small screen, poor input capabilities and inadequate in accessing internet etc., mobile learning holds enormous potential with the promise of instant access to learning anytime and anywhere, if technological and pedagogical features is successfully combined. In addition, suggested future work of the authors will be to analyze the existing mobile learning tools, to develop one and to investigate the efficiency and effectiveness of these application. **Note.** The study reported in here was presented in Global Education Conference which was held in Turkish Republic of Northern Cyprus between 24-26 September 2012.

## **REFERENCES**

Alvarez, C., Alarcon, R. and Nussbaum, M. (2011). Implementing Collaborative Learning Activities in The Classroom Supported by one-to-one Mobile Computing: A Design-based Process. *The Journal of Systems and Software* 84, 1961– 1976.

Ateş, V.(2011). *Mobil Teknolojilerin Eğitim Sürecine Katkılarının İncelenmesi ve Sayısal Tasarım Dersine Yönelik m-Öğrenme Uygulaması*. Unpublished master's thesis, Gazi Üniversitesi/Bilişim Enstitüsü. Ankara.

Avenoğlu, B. (2005). *Using Mobile Communication Tools in Web Based Instruction*. (Yayımlanmamış yüksek lisans tezi). Orta Doğu Teknik Üniversitesi/Fen Bilimleri Enstitüsü. Ankara.

Borcea C., and Iamnitchi. A. (2008). *P2P Systems Meet Mobile Computing: A Community-Oriented Software Infrastructure for Mobile Social Applications*, SelfMan 2008, Proceedings of the Workshop on Decentralized Self Management for Grids, P2P, and User Communities, Isola di San Servolo (Venice), Italy.

Çakır, H. (2011). Mobil Öğrenmeye İlişkin Bir Yazılım Geliştirme ve Değerlendirme. *Çukurova Üniversitesi Eğitim Fakültesi Dergisi*, 2 (40), 01-09.

Corlett, D., Sharples, M., Bull, S., Chan, T. (2005). Evaluation of A Mobile Learning Organizer for University Students. *Journal of Computer Assisted Learning*. 21(3), pp 162-170.

Dearnley, C., Haigh, J. and Fairhall, J. (2007). Using Mobile Technologies For Assessment and Learning in Practice Settings: A Case Study. *Nurse Education in Practice*, 8(3), 197–204.

Echeverría, A., Nussbaum, M., Felipe, Calderón, J. P., Bravo, C., Infante, and C., Vásquez, A. (2012). Face-to-face Collaborative Learning Supported by Mobile Phones. *Interactive Learning Environments* 19 (4), 351-363.

Hoskyns-Long, G. E. (2009). *Trends in Mobile Learning: A Study of The Adoption of Podcasting as A Learning Tool ATA Community College*. Doctorate Thesis. Capella University. UMI Number: 3359056

Keskin, N. (2010). *Mobil Öğrenme Teknolojileri ve Araçları*. Akademik Bilişim 2010. Muğla.

Keskin, N. (2011). *Akademisyenler İçin Bir Mobil Öğrenme Sisteminin Geliştirilmesi ve Sınanması*. (Yayımlanmamış doktora tezi). Anadolu Üniversitesi / Eğitim Bilimleri Enstitüsü. Eskişehir.

Kııcı, D. (2010). Üniversite Öğrencilerinin Mobil Öğrenmenin Üniversite Eğitimindeki Etkisi Konusundaki Beklentileri Üzerine Bir Araştırma. International Conference on New Trends in Education and Their Implications, 11-13 November. Antalya.

Kışla, T., Bayburt, E., Sarsar, F. and Arıkan, D. (2009). Mobil Öğrenme Ortamlarının Öğrenci Başarılarına Etkisi. International Computer and Instructional Technology Symposium. Trabzon.

Korkmaz, M. (2010). *Probleme Dayalı Mobil Öğrenmenin Öğrencilerin Akademik Başarılarına Etkisi*.(Yayımlanmamış Yüksek Lisans Tezi). İstanbul Üniversitesi/Fen Bilimleri Enstitüsü. İstanbul.

Kuşkonmaz, H. (2011). *İlköğretim Okullarındaki Öğretmenlerin Mobil Öğrenmeye Yönelik Algı Düzeylerinin Belirlenmesi*. (Yayımlanmamış Yüksek Lisans Tezi). Bahçeşehir Üniversitesi/Fen Bilimleri Enstitüsü. İstanbul.

Leung, C.,Chan, Y. (2003). Mobile Learning: A New Paradigm in Electronic Learning. The 3rd IEEE International Conference on Advanced Learning Technologies (ICALT'03) 0-7695-1967-9/03 2003 IEEE. 9-11 July, Athens, Greece.

Motiwalla, F. (2007). Mobile learning: A framework and evaluation. *Computers & Education*, 49 (3), 581–596.

Özcan, A. (2008). *Cep Bilgisayarları (PDA) İçin Bir Mobil Öğrenme Ortamı Tasarım ve Uygulaması*. (Yayımlanmamış Yüksek Lisans Tezi). Muğla Üniversitesi/Fen Bilimleri Enstitüsü. Muğla.

Peng, H., Su, Y-J, Chou, C. and Tsai, C-C (2009). Ubiquitous Knowledge Construction: Mobile Learning Re-defined and a Conceptual Framework. *Innovations in Education and Teaching International*. 46(2), 171–183.

Sanagusti'n, M. P., Gonzalez, G.R., Leo, D. H., Organero, M. M., Santos, P., Blat, J. and Kloos, C. D. (2012). Discovering The Campus Together: A Mobile and Computer-based Learning Experience. *Journal of Network and Computer Applications* 35 (2012) 176–188.

Seppälä, P. and Alamäki, H. (2003). Mobile Learning in Teacher Training. *Journal of Computer Assisted Learning*, 19 (3), 330-335.

Seppälä, P.,Sariola, J. And Kynäslahti, H. (2002). Mobile Learning in Personnel Training of University Teachers. The IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE'02) 0-7695-1706-4/02, IEEE. August 29-30. Växjö, Sweden.



Sharples, M., Corlett, D. and Westmancott, O. (2002). The Design and Implementation of a Mobile Learning Resource. *Personal and Ubiquitous Computing*, 6 (3), 220–234.

Tanrıverdi, M. (2011). *E-Öğrenmeye Destek Amaçlı Mobil Öğrenme Uygulaması Geliştirme ve Etkilerinin İncelenmesi*. (Yayımlanmamış Yüksek Lisans Tezi). Gazi Üniversitesi/Bilişim Enstitüsü. Ankara.

Trifonova, A. (2003). *Mobile Learning-Review Of The Literature*. Technical Report # DIT-03-009. Department of Information and Communication Technology, University of Trento. Retrieved February 2012 from <http://eprints.biblio.unitn.it/archive/00000359/01/009.pdf>

Uzunboylu, H., Cavus, N. and Ercag, E. (2009). Using Mobile Learning to Increase Environmental Awareness. *Computers & Education*. 52 (2009) 381–389.

Yeniad, M. (2006). *Uzaktan Eğitimde Kullanmak Üzere WEB Tabanlı Bir Portal Geliştirme*. Unpublished master's thesis, Çukurova Üniversitesi Sosyal Bilimler Enstitüsü. Adana.

Yılmaz, Y. (2011). *Mobil Öğrenmeye Yönelik Lisansüstü Öğrencilerinin ve Öğretim Elemanlarının Farkındalık Düzeylerinin Araştırılması*. Unpublished master's thesis, Dokuz Eylül Üniversitesi/Eğitim Bilimleri Enstitüsü, İzmir.