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Açıköğretim Öğrencilerinin Öz Yönetimli Öğrenme Becerileri ile Mobil Öğrenmeye Yönelik Tutumları Arasındaki İlişkinin İncelenmesi

Exploring the impact of self-regulated learning on mobile learning attitudes

Özet

Bu çalışma, Anadolu Üniversitesi Açıköğretim Fakültesi öğrencilerinin öz yönetimli öğrenme becerileri ile mobil öğrenmeye yönelik tutumları arasındaki ilişkiyi incelemektedir. Nicel bir araştırma çerçevesinde ilişkisel tarama modeli kullanılarak yürütülen araştırma, 2021-2022 Güz Dönemi'nde kayıtlı 644 kadın ve 565 erkek olmak üzere toplam 1209 öğrenciyi kapsamaktadır. Araştırma, öğrencilerin öz yönetimli öğrenme becerileri ile mobil öğrenmeye yönelik tutumları arasında orta düzeyde pozitif bir korelasyon olduğunu ortaya koymuştur. Bulgular, öz yönetimli öğrenmenin mobil öğrenme teknolojilerinin etkili bir şekilde benimsenmesinde temel bir unsur olarak önemini vurgulamaktadır. Mobil öğrenmenin dinamik, kişisel ve bağlamsal olarak çeşitli doğası göz önüne alındığında çalışma, mobil eğitim deneyimlerinin avantajlarını en üst düzeye çıkarmada öz yönetimli öğrenmenin kritik rolünü öne çıkarmaktadır. Elde edilen sonuçlar, öğrencilerin öz yönetimli öğrenme becerilerinin geliştirilmesinin, mobil öğrenme platformlarına yönelik daha olumlu algılar ve katılımlar sağlayabileceğini göstermektedir. Bu durum, mobil öğrenme teknolojilerini eğitimde daha iyi sonuçlar ve deneyimler elde etmek amacıyla entegre etmeyi hedefleyen eğitimciler ve politika yapıcılar için stratejik bir odak noktası sunmaktadır.

Anahtar Kelimeler: Uzaktan eğitim ve çevrimiçi öğrenme, Mobil öğrenme, Öz yönetimli öğrenme, Yetişkin öğrenimi

Abstract

This study explores the relationship between self-regulated learning skills and attitudes toward mobile learning among students at Anadolu University Open Education Faculty. Employing a relational survey model within a quantitative research framework, the research encompasses 1209 students enrolled during the Fall Semester of 2021-2022, including 644 female and 565 male students. The investigation reveals a moderately positive correlation between students' self-regulated learning abilities and their attitudes towards mobile learning. These findings underscore the significance of self-regulated learning as a foundational element in the effective adoption of mobile learning technologies. Given the dynamic, personal, and contextually diverse nature of mobile learning, the study highlights the crucial role of self-regulated learning in navigating and maximizing the benefits of mobile educational experiences. The implications suggest that enhancing self-regulated learning skills among students can lead to more favorable perceptions and engagements with mobile learning platforms, thereby suggesting a strategic focus for educators and policymakers aiming to integrate mobile learning technologies to improve educational outcomes and experiences in open education settings.

Keywords: Distance education and online learning, Mobile learning, Self-regulated learning, Adult learning

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1. Introduction

Today, the prevalence of mobile technologies has changed the way we access information and increased our efficiency. It has provided significant advantages for open and distance education by eliminating time constraints. Mobile technologies used for learning should be easily accessible and simple to use, providing independence in terms of learning space and the opportunity to access information at any time. Furthermore, the use of mobile technologies in open and distance learning is considered to be the most ideal way for learners to access information (Arshad & Saeed, 2014). Therefore, understanding how distance education students use smartphones and their attitudes towards mobile learning is crucial to provide appropriate support and enhance their learning experiences.

Mobile learning occurs in various contexts through content and social interactions using personal electronic devices (Crompton, 2013). It enables continuity of learning experiences in different scenarios or contexts, with the assumption that students can be constantly on the move (mobile) (Clough et al., 2008; Frohberg et al., 2009; Zhang et al., 2010). The main difference between mobile learning and other open and distance learning activities is the assumption that students can be constantly on the move (Sharples et al., 2007). In this context, there is a need to equip students with knowledge and skills that allow them to control their learning appropriately. Another important issue in mobile learning is the assumption that when learners become aware of themselves, they are behaviorally and cognitively dependent on their willingness to participate in learning (Sha et al., 2011). With a student-centered educational approach, it shows that a learning process that depends on one's motivation and abilities in monitoring and controlling one's learning in different environments, therefore, one should manage one's own learning. Therefore, it can be asserted that mobile learning is essentially self-regulated learning. Self-regulated learning is defined as an active participant in one's own learning in terms of cognitive, motivational, and behavioral aspects (Zimmerman, 2008). Palalas and Wark (2020) concluded in their study that mobile learning improves self-regulated learning and self-regulated learning improves mobile learning. They also stated that mobile learning and self-regulated learning improve other learning factors. Moreover, the relationship between mobile learning and self-regulated learning was dynamic and complex. In their view, mobile and self-regulated learning in formal curricula should be overseen by knowledgeable educators skilled in technology. These educators should gradually reduce their support as learners become increasingly self-directed.

Sha et al. (2012) highlighted the learner-centered and individual nature of mobile learning, which allows for learning to occur anywhere. This flexibility enables learners to study at their own pace, whenever and wherever they choose. However, this requires learners to be motivated and capable of managing their own learning processes. During the pandemic, for instance, individuals had to take control of their own learning. In these circumstances, smartphones became the go-to device for accessing learning environments, with a staggering 90.8% of the population owning one, as reported in "We Are Social Digital 2021 Turkey" (We Are Social, Feb 2021). The versatility of mobile devices, allowing for learning anytime and anywhere, underscores their importance in education. Further recognition of the relationship between mobile learning and self-regulated learning is recommended, as it reflects the lively, individual, and dispersed nature of learning (Palalas and Wark, 2020). Since mobile devices are individual communication tools, individual effort and self-learning skills of the learner become important in the learning process organized with mobile technologies. It is seen that some motivational factors of smartphone use among learners are highlighted and it is stated that these factors support the development of knowledge and skills that encourage self-regulated learning (Seifert and Har-Paz, 2020). Understanding attitudes towards mobile learning among open education students and exploring their influence on future applications and research in this field is critical. When properly implemented, mobile learning can help learners build their own personalized learning frameworks and maintain social connectivity from any location (Cochrane and Bateman, 2009). Therefore; this research aims to examine the relationship between Open Education students' self-regulated learning skills and their attitudes towards mobile learning. In this context, answers to the following research questions were sought.

- Is there a significant relationship between Open Education students' self-regulated learning skills and their attitudes towards mobile learning?

- Is there a significant relationship between the sub-dimensions of self-regulated learning skills and the sub-dimensions of attitudes towards mobile learning among Open Education students?
- Do Open Education students differ in self-regulated learning skills based on gender, age, education level, or whether they are studying at a second university?
- Do Open Education students differ in their attitudes towards mobile learning based on gender, age, education level, or whether they are studying at a second university?

The answers to these questions will provide an insight into the relationship between self-regulated learning and mobile learning amongst open education students. This information is of utmost importance in designing and implementing effective mobile learning strategies and tools that foster self-regulated learning, thereby enhancing the overall learning experience and outcomes for students. Moreover, the research aims to uncover whether certain demographics or characteristics—such as gender, age, or the number of mobile devices owned—affect attitudes towards mobile learning. This understanding could help educators and researchers design more effective mobile learning-based applications and self-regulation strategies, and ultimately contribute to improved academic performance and attitudes towards learning. The findings from this research will be instrumental in shaping the future of mobile learning and self-regulated learning in the context of Open Education.

2. Literature

Mobile learning, an evolving educational methodology, is defined in various ways across literature. It's often associated with the use of handheld devices, enabling learning to occur irrespective of a learner's location or time (Crompton, 2013; Geddes, 2004; Georgieva, Smrikarov & Georgiev, 2005; Pachler, Bachmair & Cook, 2009; Traxler, 2005; Wyne, 2015;). Its flexibility, enabled by mobile technologies, removes time and space limitations, supporting student-centered learning among other benefits (Behera, 2013, Hashemi et al., 2011; Yilmaz, 2011)

Mobile learning is a significant method resulting from mobile technologies, offering convenience, accessibility, and versatility. Mobile learning can be undertaken anytime, anywhere, transcending traditional spatial and temporal constraints (Geddes, 2004; Traxler, 2005; Wyne, 2015). Traxler (2005) emphasize mobile learning tools' portability, suggesting that learning can occur anytime, anywhere, using palm-sized devices. Geddes (2004) highlights the role of mobile technologies in acquiring knowledge and skills. Wyne (2015) includes a range of devices from wearable computers to smartphones, highlighting the variety of platforms for teaching and learning activities. Georgieva, Smrikarov, and Georgiev (2005), and Pachler, Bachmair, and Cook (2009) focus on eliminating time and space constraints, promoting mobile learning as a tool for presenting learning materials and exploiting mobile technologies' advantages. Crompton (2013) define it as learning facilitated by personal electronic devices, emphasizing the role of content and social interactions in various contexts. Trifonova and Ronchetti (2003) underline mobile technology's ability to integrate learning into daily life, eliminating physical location barriers. The literature also outlines benefits of mobile learning, such as overcoming temporal and spatial limitations, fostering self-directed learning, supporting distance education, and enhancing learner accessibility and motivation.

Moreover, mobile learning aligns with the essence of self-regulated learning. Learners can utilize a variety of educational apps and online resources, which cater to diverse learning strategies and styles. This diversity encourages learners to choose resources that suit their needs, exercising greater control over their learning journey. The instantaneous access to information supports situational learning, allowing learners to acquire knowledge and skills when needed. This fosters a proactive learning approach where learners actively seek information to fill knowledge gaps, strengthening self-regulated learning behaviors. The ability to share multimedia materials quickly can accelerate learning, allowing for real-time feedback and adjustments. This immediate feedback mechanism helps learners monitor their progress and make necessary adjustments, which are key aspects of self-regulated learning.

The concept of self-regulated learning, a term that emphasizes the necessity for learners to identify their own level of understanding and devise a plan to enhance their knowledge by taking on appropriate responsibilities,

was brought to prominence in the academic community during the 1980s (Zimmerman, 1990; Whipp & Chiarelli, 2004). As we approached the end of the 20th century, there was a noticeable surge in studies focusing on this dynamic model of learning.

In the realm of self-regulated learning, it is crucial that students take the initiative to engage in learning activities that foster a conducive environment for the learning process. They must attribute importance to these activities and motivate themselves to attain their learning objectives (Ryan and Deci, 2000; Sansone and Harackiewicz, 1996; Boekaerts and Cascallar, 2006). Malcolm Knowles described self-directed learning as a process whereby individuals take the lead in recognizing learning needs, establishing learning goals, and identifying both human and material resources for learning. This can occur with or without the support of others. In essence, self-directed learning involves the selection and implementation of suitable learning strategies for the learning process and the evaluation of learning outcomes (Knowles, 1975).

Recently, the concept of self-directed learning has been subjected to retrospective examination and evaluation. Notably, a distinction has been drawn between the self-directed learning process and the concept of self-direction as a personality structure (Brockett et al., 1991). To alleviate the confusion and dilemma created by these two concepts, Brockett and Hiemstra converged the "Personal Responsibility Management" model and "Self-Directed in Learning" concept into a single, unified concept. This concept refers to both the external characteristics of a teaching process and the internal characteristics of the learner, wherein the individual assumes primary responsibility for a learning experience (Brockett et al., 1991).

Similar to the concepts related to self-directed learning, the terminology of self-regulated learning also necessitates clarification. Within the sphere of cognitive psychology, self-regulated learning has been identified as the ability of students to be independent in their learning. Self-regulated learning is described as an active, constructive process wherein learners set goals for their learning and strive to monitor, regulate, and control their own cognition, motivation, and behavior. This is guided and constrained by their goals and the contextual features present in the environment (Pintrich, 2000).

Several perspectives exist on self-regulated learning, and researchers such as Borkaerts, Pintrich, and Zimmerman, who focus on different aspects, strive to model how cognitive, metacognitive, motivational, and contextual factors influence the learning process. Zimmerman postulates that students can be labeled as self-regulated to the extent that they are metacognitive, motivational, and behaviorally active participants in their own learning processes (Jossberger et al., 2010).

Adult learners express a desire to manage their own learning and make decisions about the learning process. Self-regulated learning is grounded in making independent and conscious decisions to facilitate learning about a particular subject (Maboudian & Ward, 2008). In this context, it can be asserted that self-regulated learning constitutes an integral process for adult learners.The characteristics of self-regulated learners can be summarized as follows (Hadwin et al., 2010; Zimmerman & Risemberg, 1997; Whipp & Chiarelli, 2004):

- They possess high motivation.
- They can identify the strategies necessary to achieve the learning goal they have set.
- They are adept at commanding cognitive strategies that can manage their own learning processes.
- They can control and simultaneously evaluate their motivation and behavior necessary to achieve the learning goal.
- They are skilled time managers who have a sense of duty and seek success-oriented ways by analyzing the reasons for their failures.
- They are participants and active individuals in learning processes in collaboration with other learners.

In conclusion, the synergistic relationship between mobile learning and self-regulated learning is foundational. The features of mobile learning not only accommodate but actively promote self-regulated learning, empowering learners to be more proactive, reflective, and adaptive in their educational pursuits.

2.1. Related Studies

In the study conducted by Berberoglu (2020), the aim was to determine the effects of mobile learning-based applications on students' academic success, attitude, motivation, and attitudes towards mobile learning in science lessons. The research found a positive significant difference in the students' science academic achievement, attitudes towards science, motivation towards science, and attitudes towards mobile learning

when the unit determined in the experimental group was implemented through the mobile application. In the study conducted by Gurkan (2017), the attitudes of students studying in open and distance education towards mobile learning were examined. It was found that there was a significant difference between the mobile learning attitude averages of the students participating in the study according to the variables of gender, age, and the number of mobile device types they have. However, there was no significant difference according to the variables of grade level, type of enrollment in the faculty, and type of education.

In the research conducted by Kocdar (2015), strategies and tools for the use of self-management skills by designers and instructors, which can enable learners to organize and manage their own learning processes in online environments, were examined within the framework of cognitive self-management theories. According to the results of the research conducted to examine the self-regulated learning skills of distance education students, it has been concluded that the self-regulated learning skills and sub-factors of the students studying with distance education are above the medium score of the scale (Yılmazsoy & Kahraman, 2019). It was concluded that there was a significant difference in the motivation sub-factor of the scale according to gender, university, desire to do graduate work, in the whole scale according to the age variable, and in all sub-factors except for the self-confidence sub-factor, in the whole scale according to the GPA variable and in all sub-factors except the self-confidence sub-factor. Hasgoren (2021) examined university students' online learning experiences during the pandemic period in the context of self-regulated learning skills and affective dimension. In this study, the Self-Regulated Learning Skills (SLD) Scale was applied to 105 students. According to the results of the research, it was concluded that the level of SLD changes the affective experiences created by the online learning process to a certain extent, and definitely differentiates the dimension of what kind of behavior these experiences turn into.

In the research conducted by Artsın (2018), the self-regulated learning skills of learners participating in Massive Open Online Courses (MOOCs) were examined. According to the results obtained in the study, the self-regulated learning skills of women were higher than the self-regulated learning skills of men, the self-regulated learning skills of the learners who completed MOOC were higher than the self-regulated learning skills of the learners who could not complete MOOC, the self-regulated learning skills of the learners at the associate degree education level were found to be higher. It has been seen that the learners at other educational levels have higher regulated learning skills than self-regulated learning skills. In addition, it was determined that the self-regulated learning skills of the learners aged 25 and below were higher than the self-regulated learning skills of the learners in the other age group. In another study, it is aimed to examine the self-regulated learning skills of university students and to reveal how these skills change in terms of school type, gender, subject area, grade level, academic achievement, university entrance score type, desire to pursue graduate education, and income level (Askın, 2015). In the study, the relationship between university students' self-regulated learning skills and lifelong learning tendencies was also discussed. It has been concluded that the self-regulated learning skills of the students who want to do postgraduate education are significantly higher. It has been determined that there is a positive, moderate relationship between university students' self-regulated learning skills and lifelong learning tendencies.

Palalas (2020) conducted a systematic evaluation study on the relationship between mobile learning and self-regulated learning through 38 articles accessed from 6 databases. In this study, they determined that mobile learning improves self-regulated learning, and self-regulated learning improves mobile learning. However, it was concluded that self-regulated learning improves other learning factors (e.g., health, curriculum development). It has also been observed that the relationship between m-learning and self-regulated learning is dynamic and complex. Another study is the research conducted by Seifert and Har-paz (2020) examining the effect of mobile learning on self-regulated learning and academic success in foreign language classes. According to the results of the research, it was observed that high school students' mobile learning did not affect their self-directed learning abilities. However, with the change in the implementation of learning strategies, it has emerged that there is a surplus in internal and external motivation. As a result, a two-stage model for mobile uninterrupted learning has been proposed, which aims to train young people to be agents of their own learning while practicing mobile learning. Zheng, Li, and Chen (2018) examined the effects

of mobile learning and self-regulated learning in higher education. They developed a mobile self-regulated learning system to improve students' academic achievement and self-regulated learning skills. According to the results of the research, they found that the mobile self-regulated learning approach significantly improved academic achievement and self-regulated learning skills. It has been determined that the system does not increase the cognitive load, but is quite effective and useful.

Studies show that mobile learning-based applications positively impact students' attitudes towards mobile learning itself. The latter study further revealed significant differences in students' attitudes towards mobile learning based on gender, age, and the number of mobile devices owned. However, grade level, type of enrollment, and education type did not significantly affect these attitudes. Mobile learning to enhance self-regulated learning, indicating a dynamic and complex relationship between the two. In the light of this findings, this research investigates the correlation between Open Education students' self-regulated learning abilities and their attitudes towards mobile learning, considering the complex dynamics of these two elements. The outcomes of this research could potentially provide significant insights into the development of more holistic and effective learning approaches that cater to the diverse needs and preferences of today's distance learners.

3. Methodology

In the study, the relational survey model was preferred within the framework of the quantitative research method to determine whether there is a relationship between the self-regulated learning skills of the Open Education Faculty students and their attitudes towards mobile learning, and if there is a relationship, in what direction. The relational screening model is mostly used to reveal whether there is a relationship between two or more variables. A conclusion is reached by examining the variables that are predicted to be related (Buyukozturk et al., 2014).

3.1. Participants

A total of 1,158,045 students (48% female and 52% male) actively studying at Anadolu University Open Education System in the Fall Term of 2021-2022 constitute the population of the research.

Table 1. Demographic information of the sample

Demographic	**Group**	**n**	**%**
Gender	Female	644	53,3
	Male	565	46,7
Age	18-25	492	40,7
	26-35	393	32,5
	36-45	173	14,3
	46+	151	12,5
Education Status	Associate Degree	493	40,8
	Bachelor Degree	616	51
	Master Degree	85	7
	Doctorate	11	0,9
	Post Doctorate	4	0,3
Second University	Yes	849	70,2
Program	No	360	29,8

A total of 161.935 students, 37% female and 63% male, from the Faculty of Economics constituted 14% of the population; female, 47% male, a total of 838,779 students comprise 72% of the population. As a result of the studies on the collected data, 1209 students formed the research group. When the demographic information of the participants in Table 1 is analyzed, 53.3% of them are female, 46.7% are male, 11.6% of the age ranges are between 18 and 20 years old, 29.1% are between 21 and 24, 20 of them were 25 to 30 years old, 12.5% to

31 to 35, 14.3% to 36 to 45, 12.5% to over 46 years old, 40.8% had associate degree, 51% It was determined that 7% of them had undergraduate education, 7% of them had master's degree, 0.9% of them had doctorate and 0.3% of them had post-doctoral education. “The Second University" program offers an unparalleled opportunity for students to earn a second diploma without the need for additional entrance examinations. This program is available to students who have graduated from, are currently enrolled in, or are about to begin any undergraduate or associate degree program, provided that the second program is in a different field of study. %70,2 of the participants were enrolled in the second university program. This suggests that a majority of students recognize the value of earning a second diploma and are taking advantage of this opportunity to enhance their qualifications.

3.2. Data collection and analysis

Data collection involved the use of a personal information form and two scales: the "Self-regulated Learning Skills Scale" to assess learners' self-regulated learning skills, and the "Attitude Scale towards Mobile Learning" to measure learners' attitudes toward mobile learning. The study utilized Kocdar et al (2018)'s "Self-Managed Learning Skills Scale in Lessons Based on Self-Paced Learning," which comprises five factors including goal setting, help seeking, self-study strategies, physical environment regulation, and effort management. The scale demonstrated high reliability with a Cronbach Alpha coefficient of 0.937 (Kocdar et al., 2018). Additionally, Demir and Akpinar (2016)'s "Attitude Scale Towards Mobile Learning," based on four factors including satisfaction, impact on learning, motivation and usefulness was employed in the study, revealing high reliability with a calculated Cronbach Alpha coefficient of 0.950. The results of the study indicated that the scales used to measure self-regulated learning skills and attitudes towards mobile learning were valid and reliable, making them valuable.

3.3. Validity

Reliability analysis was applied to determine the internal consistency coefficient of the scales by using the data of the self-regulated learning skills scale and the mobile learning attitude scale. The results obtained are given in Table 2.

Table .2. *Reliability analysis of scales*

	Cronbach Alpha	**Mean**	**Sd**
Self-Managed Learning Skills Scale	0,920	105,04	17,262
Attitude Scale Towards Mobile Learning	0,973	164,29	33,242

In the study, the online questionnaire was answered by 2145 learners. However, in order to ensure the reliability of the data related to the online survey, select five "I agree" options between the scale questions. Decomposition questions such as when the online survey data is evaluated according to these items, the data obtained from 1209 learners constitute the research group.

3.4. Data Analysis

In the analysis of the research data, Pearson correlation analysis was applied to calculate the relationship between the self-regulated learning skills scale and its sub-dimensions, the mobile learning attitude scale and its sub-dimensions. According to the Pearson product-moment correlation coefficient and interpretation, the data obtained as a result of the correlation analysis in the research were interpreted (Koklu et al., 2006).

Mann Whitney U test and Kruskal Wallis H test were applied to analyze the difference between the self-regulated learning skills scale and its sub-dimensions and mobile learning attitude scale and sub-dimensions according to the variables in the Personal Information form. The Posthoc Tamhane test was applied to determine between which groups the difference emerged as a result of the non-parametric Kruskal Wallis H test applied to analyze the difference in more than two groups.

Reliability analysis was conducted to determine the internal consistency coefficient of the scales using the

data from the self-managed learning skills scale and the attitudes towards mobile learning scale. The results obtained are presented in Table 3.

Table 3. *Reliability Analysis of the Scales*

	Cronbach Alpha	Mean	Sd
Self-Regulated Learning Scale	0,920	105,04	17,262
Attitude Towards Mobile Learning Scale	0,973	164,29	33,242

According to the results presented in Table 3, the Cronbach's Alpha value for the Self-Regulated Learning Skills Scale is between 0.80 and 1.00, indicating that this scale has a high reliability coefficient. The Cronbach's Alpha value for the Attitude Towards Mobile Learning Scale is between 0.60 and 0.80, which suggests that this scale also has a high reliability coefficient.

In this section, a Pearson Correlation Analysis was conducted to determine the relationship between students' self-managed learning skills and their attitudes towards mobile learning, the relationship of the sub-dimensions of self-managed learning skills, and the relationship between the sub-dimensions of attitudes towards mobile learning and the sub-dimensions of self-managed learning skills.

3.5. Findings and Discussions

The analysis of the data should be explaining the findings related to the relationship between self-regulated learning skills and attitudes towards mobile learning.

Table 4 . The correlation analysis results between learners' self-regulated learning skills and their attitudes towards mobile learning

		Self-regulated learning skills	Attitudes towards mobile learning
Self-regulated learning skills	r	1	0,347** **0,000**
	p	1209	1209
	N		
Attitudes towards mobile learning	r	0,347** **0,000**	
	p	1209	1209
	N		

** p<0,01

Table 4 presents the results of the correlation analysis between learners' self-regulated learning skills and their attitudes towards mobile learning. According to the findings, there is a positive moderate relationship between self-regulated learning skills and attitudes towards mobile learning (Koklu et al., 2006) (r=0.347, p<0.01). To determine the relationship between the sub-dimensions of self-regulated learning skills and attitudes towards mobile learning, as well as the relationship between the sub-dimensions of attitudes towards mobile learning and self-regulated learning skills, a Pearson correlation analysis was conducted. The findings obtained from the analysis are presented in Tables 5 and Table 6.

Table 5. The correlation analysis results between learners' attitudes towards mobile learning and the sub-dimensions of their self-regulated learning skills.

	Sub-dimension of self-regulated learning skills	N	r	p
Attitudes towards mobile learning score	Goal setting	1209	0,269**	**0,000**
	Seeking help	1209	0,238**	**0,000**
	Self-study strategies	1209	0,265**	**0,000**
	Managing physical environment	1209	0,254**	**0,000**
	Effort management	1209	0,240**	**0,000**

** p<0,01

Table 5 presents the correlation analysis results between learners' attitudes towards mobile learning and the sub-dimensions of self-regulated learning skills. According to the findings, there is a positive, yet weak relationship between the Attitude Towards Mobile Learning score and the sub-dimensions of goal setting (r=0.269; p<0.01), seeking help (r=0.238; p<0.01), self-study strategies (r=0.265; p<0.01), managing the physical environment (r=0.254; p<0.01), and effort management (r=0.240; p<0.01).

Table 6. The correlation analysis results between learners' self-regulated learning skills and the sub-dimensions of their attitudes towards mobile learning

	Sub-dimension of attitudes towards mobile learning score	N	r	p
Self-regulated learning skills	Satisfaction	1209	0,370**	**0,000**
	Impact on learning	1209	0,278**	**0,000**
	Motivation	1209	0,363**	**0,000**
	Usability	1209	0,044	**0,129***

** p<0,01 * p>0,05

Table 6 presents the correlation analysis results between learners' self-regulated learning skills and the sub-dimensions of attitudes towards mobile learning. According to the findings, there is a positive moderate relationship between the self-regulated learning skills score and the satisfaction sub-dimension (r=0.370; p<0.01) and the motivation sub-dimension (r=0.363; p<0.01). There is a positive, yet weak relationship between the self-regulated learning skills score and the impact on learning sub-dimension (r=0.278; p<0.01). There is no significant relationship between the self-regulated learning skills score and the usability sub-dimension (r=0.044; p>0.05).

Table 7. Comparing results self-directed learning skills and their sub-dimensions in terms of gender variable

Sub-dimension of self-regulated learning skills score	**Gender**	**n**	**X**	**S**	**t**	**Sd**	**p**
Goal setting	F	644	3,55	0,79	0,794	1207	0,427
	M	565	3,51	0,79			
Help-seeking	F	644	2,91	0,84	0,098	1207	0,922
	M	565	2,91	0,88			
Self-study strategies	F	**644**	**3,81**	**0,67**	**6,311**	**1207**	**0,000**
	M	**565**	**3,54**	**0,77**			
Managing the physical environment	F	**644**	**4,14**	**0,70**	**3,559**	**1207**	**0,000**
	M	**565**	**3,99**	**0,73**			
Effort management	F	**644**	**3,70**	**0,86**	**2,386**	**1207**	**0,017**
	M	**565**	**3,59**	**0,87**			
General Mean	F	**644**	**3,62**	**0,56**	**3,430**	**1207**	**0,001**
	M	**565**	**3,51**	**0,59**			

In this section, the findings regarding whether students' self-regulated learning skills and their sub-dimensions vary according to gender, age, educational status, and attendance at a second university have been examined. An independent samples t-test was applied to analyze whether self-regulated learning skills and their sub-dimensions differ by gender. The independent sample t-test conducted to examine whether there is a difference in self-regulated learning skills scores among students participating in the study based on gender found a statistically significant difference between the groups ($t(1207)=3.430$; $p<0.05$). When considering the averages, it is observed that women have higher self-regulated learning skills than men. According to the analysis conducted on the sub-dimensions of self-regulated skills, no statistically significant difference was found between the goal setting and help-seeking score averages and the gender variable ($t(1207)==0.794$; $p>0.05$; $t(1207)==0.098$, $p>0.05$). However, a statistically significant difference was found between self-study strategies averages and the gender variable ($t(1207)==6.311$; $p<0.05$), with women scoring higher in self-study strategies than men. A statistically significant difference was also found between managing the physical environment score averages and the gender variable ($t(1207)=3.559$; $p<0.05$), with women scoring higher in managing the physical environment than men. Furthermore, a statistically significant difference was found between effort management score averages and the gender variable ($t(1207)=2.386$; $p<0.05$), indicating that women scored higher in effort management than men.

We conducted a one-way ANOVA for independent groups to see if students' self-regulated learning skills and their sub-dimensions varied based on their educational status. The Levene Test results, which help determine the type of multiple comparison tests to conduct. In this research, the significance value for interpreting Levene values was set at 0.05. If p values met this criterion, we used the Scheffe Test for multiple comparisons. If it didn't, we used the Tamhane Test. The results have been interpreted accordingly (Field, 2000). When reviewing the overall average values across the full range of participants' age groups, it is observed that the highest average falls within the 18 to 25 age range ($\overline{X}$=3.61, sd=0,574), while the lowest average is seen within the 36 to 45 age range ($\overline{X}$=3.47, sd=0,607). The average self-regulated learning skills for the 26 to 35 age range is noted as ($\overline{X}$=3.53, sd=0,579), and for those aged 46 and above, the average is ($\overline{X}$=3.60, sd=0,517). To determine whether the differences between these averages are statistically significant, a one-way ANOVA Test was conducted. The obtained F(1205) value is 3.421, which is significant (p=0,017, $p<0.05$). In this context, multiple comparisons were made to identify the source of the difference. As previously mentioned, since homogeneity of variances could not be assumed, the comparisons were conducted using the Tamhane Test. As a result of the multiple comparisons, a significant difference is observed between the 18-25 age range and the 36-45 age range, while no significant difference is found among other age ranges. In this context, it can be said that the overall average score of self-regulated learning skills is significantly higher in the 18-25 age range compared to the 36-45 age range ($p<0$, 145*).

A one-way ANOVA for independent groups was conducted to determine whether the self-regulated learning skills and their sub-dimensions of students participating in the study differ according to their educational status. Upon examining the overall average values for all educational statuses of participants, it is observed that the highest average belongs to participants studying in Master's programs ($\overline{X}$=3.61, sd=0,595), while the lowest average is found among participants in Post-Doctoral programs ($\overline{X}$=3.23, sd=0,317). The average for participants in Associate Degree programs is ($\overline{X}$=3.58, sd=0,574), for those in Bachelor's Degree programs ($\overline{X}$=3.56, sd=0,577), and for those in Doctoral programs ($\overline{X}$=3.60, sd=0,592). A one-way ANOVA Test was conducted to determine whether the difference between these averages is statistically significant. The obtained F(1204) value is 0.564, which is not significant (p=0,689, $p>0.05$). In this context, multiple comparisons were made to identify the source of the difference. As previously mentioned, since homogeneity of variances could not be assumed, the comparisons were conducted using the Tamhane Test. As a result of the multiple comparisons, no significant difference has been found among educational statuses. Therefore, it can be said that the overall average score of self-regulated learning skills does not show any difference across educational statuses.

An independent samples t-test was applied to analyze whether self-regulated learning skills and their sub-dimensions differ based on attending a second university. The independent sample t-test conducted to examine whether there is a difference in self-regulated learning skills scores among students participating in the study based on attending a second university found no statistically significant difference between the groups (t(1207)=1.071; p>0.05). According to the analysis conducted on the sub-dimensions of self-regulated skills, no statistically significant difference was found between the goal setting, seeking help, self-study strategies, managing the physical environment, and effort management score averages and the variable of attending a second university (t=1.439; p>0.05; t=0.073, p>0.05; t=1.584, p>0.05; t=0.162, p>0.05; t=0.706, p>0.05).

This section examines the findings regarding whether students' attitudes towards mobile learning and its sub-dimensions vary according to gender, age, educational status, and attendance at a second university. The independent sample t-test conducted to examine whether there is a difference in students' average scores towards attitudes to mobile learning based on gender found no statistically significant difference between the groups (t=-1.959; p>0.05). According to the analysis conducted on the sub-dimensions of attitudes towards mobile learning, no statistically significant difference was found between the impact on learning and motivation score averages and the gender variable (t=0.743; p>0.05; t=-1.514, p>0.05). However, a statistically significant difference was found between the satisfaction averages and the gender variable (t=-2.234; p<0.05), with men having higher satisfaction scores than women. A statistically significant difference was also found between the usability score averages and the gender variable (t=-3.076; p<0.05), indicating that men scored higher in usability than women.

To determine whether the attitudes towards mobile learning and its sub-dimensions of students participating in the study differ according to age, a one-way ANOVA for independent groups was conducted. Upon examining the overall average values across all age ranges of participants, it is observed that the highest average is within the 26 to 35 age range ($\overline{X}$=3.69, sd=0,712), while the lowest average is found in those aged 46 and above ($\overline{X}$=3.51, sd=0,711). In terms of attitudes towards mobile learning, the average for the 18 to 25 age range ($\overline{X}$=3.59, sd=0,734) is observed to be lower than that for the 36 to 45 age range ($\overline{X}$=3.67, sd=0,703). A one-way ANOVA Test was conducted to determine whether the difference between these averages is statistically significant. The results of the one-way ANOVA Test are presented below. The obtained F(1205) value is 2.925, which is significant (p<0.05). In this context, multiple comparisons were conducted to identify the source of the difference. As previously mentioned, since homogeneity of variances could not be assumed, the comparisons were made using the Tamhane Test. As a result of the multiple comparisons, no significant difference has been found in the attitudes towards mobile learning scores across age ranges (p>0.05).

A one-way ANOVA for independent groups was conducted to determine whether the attitudes towards mobile learning and its sub-dimensions of students participating in the study differ according to their educational status. Upon examining the overall average values for all educational statuses of participants, it is observed that the highest average belongs to participants studying in Master's programs ($\overline{X}$=3.77, sd=0,555), while the lowest average is found among participants in Post-Doctoral programs ($\overline{X}$=2.80, sd=0,650). The average for participants in Associate Degree programs is ($\overline{X}$=3.67, sd=0,725), for those in Bachelor's Degree programs ($\overline{X}$=3.60, sd=0,722), and for those in Doctoral programs ($\overline{X}$=3.77, sd=0,555). A one-way ANOVA Test was conducted to determine whether the difference between these averages is statistically significant. The obtained F(1204) value is 2.279, which is not significant (p>0.05). In this context, multiple comparisons were conducted to identify the source of the difference. As previously mentioned, since homogeneity of variances could not be assumed, the comparisons were made using the Tamhane Test. As a result of the multiple comparisons, no significant difference has been found among educational statuses. Therefore, it can be said that the overall average score of attitudes towards mobile learning does not present any difference across educational statuses.

An independent samples t-test was applied to analyze whether attitudes towards mobile learning and its sub-dimensions differ based on attending a second university. The independent sample t-test conducted to examine whether there is a difference in students' average scores towards attitudes to mobile learning based on attending a second university found no statistically significant difference between the groups (t(1207)=-1.635; p>0.05). According to the analysis conducted on the sub-dimensions of attitudes towards mobile learning,

no statistically significant difference was found between satisfaction, impact on learning, motivation, and usability score averages and the variable of attending a second university (t=-1.638; p>0.05; t=-0.727, p>0.05; t=-1.629, p>0.05; t=-1.261, p>0.05).

4. Conclusion and Discussion

The results from this study provide significant insights into the relationship between self-regulated learning skills and attitudes towards mobile learning, echoing previous research findings (Askın,2015; Artsın, 2018; Palalas and Wark, 2020, Seifert & Harpaz, 2020; Zheng, Li & Chen, 2018). A clear positive correlation was observed, indicating that students with high self-regulated learning skills also hold positive attitudes towards mobile learning. This suggests the potential value of enhancing self-regulated learning skills to foster more positive attitudes towards mobile learning among students.

The findings suggest a positive association between students' attitude towards mobile learning and several aspects of self-management skills, including goal setting, help-seeking, self-study strategies, managing the physical environment, and effort management. This indicates that students with a more favorable view of mobile learning tend to exhibit higher competency in these areas (Brown & Lee, 2019). Furthermore, a positive correlation has been observed between self-regulated learning skills and two sub-dimensions of attitude towards mobile learning: satisfaction and motivation. This suggests that as students' self-regulated learning skills improve, their satisfaction with and motivation for mobile learning also increase (Garcia et al., 2021). However, no relationship has been found between self-regulated learning skills and usability, implying that the efficacy of self-regulated learning skills may not necessarily translate into better usability in the context of mobile learning (Wilson & Clarkson, 2017). The lack of correlation between self-regulated learning skills and usability highlights the need for further research to understand this relationship and optimize the design of mobile learning platforms.

Moreover, the study also found differences in self-regulated learning skills based on gender, with women exhibiting higher skills than men (Artsın, 2018; Bidjenero, 2005; Kocdar et al, 2018). This finding is consistent with previous studies that reported gender differences in self-regulated learning skills. The role of gender in self-regulated learning skills and attitudes towards mobile learning is an intriguing aspect of this study. The higher performance of women in managing the physical environment and effort management aspects of self-regulated learning suggests that they might be more adept at creating conducive learning environments and maintaining motivation.

The conducted analysis showed no significant difference in goal setting and help seeking between genders in terms of self-regulated learning skills (Bidjerano, 2005). However, women scored higher in self-study strategies and in managing the physical environment and effort management. When it comes to age differences, the average self-regulated learning skill score was higher in the 18-25 age range compared to the 36-45 age range. Still, there were no significant differences based on age, educational status, or attendance at a second university. This result suggests that while gender may play a role in self-regulated learning skills, other demographic factors may not significantly impact.

In terms of attitudes towards mobile learning, no significant differences were identified based on gender, age, education status, or attendance at a second university. However, men scored higher in satisfaction and usability regarding mobile learning than women. This indicates that while attitudes towards mobile learning are generally positive across different demographics, there may be specific aspects of mobile learning that resonate more with certain groups. The lack of significant differences in self-regulated learning skills and attitudes towards mobile learning based on age, educational status, and attendance at a second university suggests that these factors may not play a major role in these areas. This could be due to the universal nature of mobile learning, which can be accessed and utilized effectively by individuals across different demographic spectrums (Garcia et al 2018).

5. Limitations and recommendations for further research

This study focused on examining the relationship between Open University students' self-regulated learning abilities and their attitudes towards mobile learning. It broadens our understanding of the factors influencing self-regulated learning skills and attitudes towards mobile learning. It highlights the need for further research, particularly in understanding the underlying reasons behind these findings and developing strategies to

enhance mobile learning experiences. Future research could focus on exploring the reasons behind the gender differences in self-regulated learning skills and attitudes towards mobile learning. It would also be interesting to investigate the impact of other demographic factors such as socioeconomic status, ethnicity, and geographical location on these areas. Additionally, studies could be conducted to evaluate the effectiveness of training programs designed to enhance self-regulated learning skills and to promote positive attitudes towards mobile learning. The role of institutional support in encouraging the use of mobile learning applications could also be an area of focus. Another potential area of research is the exploration of the relationship between self-regulated learning skills and other types of distance learning approaches. This could provide valuable insights into the generalizability of the study's findings. Finally, with the rapid advancements in mobile technology, it is crucial to continually assess and update our understanding of mobile learning. Future research should, therefore, also focus on the changing trends and innovations in mobile learning.

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