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RESEARCH ARTICLE

Greek secondary school teachers' degree of readiness in adopting mobile learning in the educational process

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Abstract: Much has been written and researched about mobile learning. The positive impact it has on education has been highlighted in these studies. However, the role of the teacher is also of fundamental importance. Teachers are not sidelined. On the contrary, they take on a different role: reinforcer and guide. Therefore, it is necessary to consider teachers' opinions on mobile learning. It was considered necessary to investigate the degree of readiness of secondary school teachers to adopt Mobile Learning, focusing on the Greek region. Specifically, the study examines how teachers' readiness is affected by their gender, years of teaching experience, whether or not they have attended relevant training, and the type of school they work in. A total of 175 teachers from schools in Heraklion, Rethymno and Rhodes were surveyed, focusing on secondary education. According to the survey, teachers recognize the potential benefits of using mobile devices in education.

Keywords: mobile learning, secondary education, educators' readiness, Greek school

1 Introduction

Over the years that mobile devices have existed in any form, research has been done that highlights the positive effects of mobile devices in education. Thus, when students use mobile devices, they develop critical thinking, cooperation, and communication, the lesson becomes more interesting for them and generally help to develop 21st-century skills (Hwang et al., 2018) and in the transformation of the classroom from teacher-centred to student-centred (Montrieux, Raes & Schellen, 2017).

Although a desired result of using mobile devices is the student's autonomy and that he can master the learning himself, the teacher's role does not lose its value (Tzimopoulos et al., 2021). The effectiveness of mobile devices also depends on the correct guidance of the teacher and the appropriate use and cooperation of both sides (Montrieux et al., 2017). As a result, an essential factor in the adoption of technology in the field of education is the teacher, his attitude, and his readiness to use technology (Petko et al., 2018), which also applies to the adoption of mobile devices (Papadopoulou et al., 2022).

In Greek schools, mobile devices are not among the official means of technology, mainly due to the legislation prohibiting the use of mobile devices by students (Alpochoritis et al., 2022). Nevertheless, is this the only reason mobile devices are being rejected? Investigating the broader issue of the inclusion of mobile devices in Greek education, the problem arises in determining teachers' readiness to adopt mobile learning.

2 Literature review

2.1 Mobile learning

2.1.1 Definition

Winters (2006), considering the studies of that time about mobile learning, concludes that it is challenging to define it. According to him, the interpretations given can be distinguished into four dimensions. According to the first dimension, mobile learning is defined as the process of learning supported exclusively by mobile devices (Schuler et al., 2012; Traxler, 2005; Winters, 2006; Herrington & Herrington, 2007). However, focusing on mobile devices, it is impossible to attribute mobile learning to all its characteristics and the positive effects on learning (Traxler, 2007). Quinn (2002) calls mobile learning e-learning done with the help of mobile devices. It is presented as a subset of distance education and e-learning, focusing on the use of technology. On the other hand, Traxler (2005) and Winters (2006) distinguish these concepts and emphasize their common characteristics. Traxler (2005) observes that interpreting mobile learning as separate from e-learning may make it difficult to understand it as a concept, but this will succeed in maintaining its unique characteristics.

2.1.2 Features of mobile learning

According to Kearney et al. (2012), mobile learning has three main characteristics: authenticity, collaboration and personalization. Personalization refers to the student's ability to choose the place, the time, and the pace at which he will learn. Earlier, So (2008) referred to spatial and time independence. It referred to the opportunity given to the student to seek to learn outside the classroom or during school hours. Their views are identical to that of Traxler (2009). Authenticity refers to whether the various activities are connected to reality or based on everyday problems. Traxler (2009) argues that mobile learning facilitates the student to discover and work on problems daily, while So (2008) also talks about constructive content. Traxler (2009) points out that mobile learning allows students to discover, experiment and collaborate with classmates and thus describes the third characteristic of mobile learning. Kearney et al. (2012) add that with mobile devices, students can communicate with teachers or other experts depending on their type of activity. Thus, mobile learning can create a flexible, personal and collaborative environment (Kalogiannakis & Papadakis, 2017).

2.1.3 Mobile learning in education

In secondary education, research has been done on the use of mobile devices and their applications (Dahal et al., 2022; Hwang et al., 2016; Nikou & Economides, 2018; Xiaoming & Lehong, 2020; Dalby & Swan, 2019), but more often for the use of augmented reality (Jong et al., 2020; Cai et al., 2020; Kyza & Georgiou, 2019; Crawford et al., 2017). Many types of research dealt with teaching inside the classroom (Nikou & Economides, 2018; Dalby & Swan, 2019; Hwang et al., 2016), while others presented the results of actions carried out outside the confines of the classroom (Jong et al., 2020; Cai et al., 2020; Kyza & Georgiou, 2019; Crawford et al., 2017). Hwang et al. (2016) find that students become motivated to learn and feel more satisfied with the process, a fact agreed by Cai et al. (2020) and Crawford et al. (2017). Students work together to achieve their goals and master learning in and out of the classroom (Jong et al., 2020; Crawford et al., 2017). Once again, the change in the role of the teacher is noted.

2.2 Educators' readiness to adopt mobile learning

2.2.1 Definition

Readiness to adopt technology is defined as a person's tendency to accept and use new technologies to achieve personal and work goals (Yirci et al., 2023; Parasuraman, 2000). This definition describes a more general concept of readiness. Lang (1992) had earlier defined the teacher's readiness to adopt technology as the recognition of his intentions at various levels and his positive or negative reactions, which are influenced by factors such as the degree of interest in technology, the will to learn more, but also factors such as support from the environment (Karakose et al., 2022). Christensen and Knezek (2018) define educators' readiness to adopt mobile learning as the degree of acceptance or willingness to adopt mobile devices in the classroom, teaching and educational environment.

2.2.2 Teachers' views

Research examining teachers' attitudes toward mobile learning has addressed their view of these devices as educational tools (Lavidas et al., 2022). Khlaif (2018) reports that their opinions are positive and negative, with those in favour acknowledging the educational effects of the devices. Their ease of use influences teachers' opinions about expected outcomes (Kwon et al., 2019). Al-Furaih & Al-Awidi (2020) add that teachers state that they would like more information on the subject, which seems to be supported by earlier research in which teachers who participated in an experiment with the use of mobile devices expressed their satisfaction with the results (Chiu & Churchill, 2016).

As mentioned above, negative opinions or doubts about mobile learning were recorded in addition to a positive attitude (Papadakis & Kalogiannakis, 2022). In most research, teachers' stress, uncertainty about their self-efficacy and insecurity about the use of mobile devices are mainly mentioned (Al-Furaih & Al-Awidi, 2020; Kwon et al., 2019). In addition, many are wondering if there will be support from the state and those in charge, to strengthen their work with appropriate programs and training (Al-Furaih & Al-Awidi, 2020; Kwon et al., 2019; Christensen & Knezek, 2018). Al-Furaih & Al-Awidi (2020) and other researchers identify in the teachers' responses the fear regarding the distraction that mobile devices can cause to the student during the lesson, causing opposite results than expected, but also cases of delinquency that may exist. Petko et al. (2018) conclude that fears and concerns can be overcome with proper planning and support from the state, a fact that Christensen and Knezek (2018) refer to when they say that the use of mobile devices alone is not enough. The success of mobile learning depends on proper planning, support and teacher training. The fact referred to by Christensen

and Knezek (2018) says that using mobile devices alone is not enough. The success of mobile learning depends on proper planning, support and teacher training (Lavidas et al., 2022).

2.2.3 Factors affecting readiness to adopt mobile learning

Ertmer (1999) distinguished two significant factors influencing teachers' technology adoption. First-order barriers include all elements, such as equipment, time, and training, which teachers need or are not offered to a satisfactory degree by the environment (school, address). He then defines second-order barriers as those stemming from teachers' perceptions, which he characterizes as more inaccessible than the first (Zourmpakis et al., 2022). The term self-efficacy refers to the perceptions one has of one's abilities (Bandura, 1977). These are likely different from one's actual picture of capabilities but to what they consider their capabilities (Bandura, 1977). Many studies report self-efficacy as a capacity factor that determines the acceptance of mobile learning (Kwon et al., 2019; Petko, Prasse & Cantieni, 2018; Jung, 2015; Mac Callum et al., 2014). Kwon et al. (2019) conclude that technical skills influence self-efficacy. A teacher with more technology literacy will be more anxious about using mobile devices (Chiu & Churchill, 2016; Hilton & Canciello, 2018; Mac Callum et al., 2014; Klaif, 2018; Kwon et al., 2019).

Age and years of experience do not significantly affect self-efficacy (Kwon et al., 2019). Technical skills are reported to depend on years of service (Kwon et al., 2019; Christensen & Knezek, 2018). Kwon et al. (2019) emphasize that gender does not affect self-efficacy but technical knowledge. Chiu & Churchill (2016) report that the different speciality of teachers also affects stress level and self-efficacy. The research of Christensen & Knezek (2018) highlights the conclusion that teachers with a positive view on the usefulness of mobile devices have high levels of technology integration, which happens, according to the research results, to teachers who have a few years of experience. Knowledge of and familiarity with technology is a factor that influences opinions (Jung, 2014; Hilton & Canciello, 2018). Klaif (2018), in particular, states that previous experiences with technology have an essential role in forming opinions about mobile learning. Many studies report that speciality influences opinions (Al-Furaih & Al-Awidi, 2020; Xu & Zhu, 2020; Howard, Chan, & Caputi, 2015). Depending on their subject's demands, some teachers express concern about how there will be enough time to include new educational methods and experiments (Lucas, 2020). Kwon et al. (2019) focus on how teachers' opinions and self-confidence influence their intention to adopt mobile devices. In their conclusions, they emphasize that teachers' attitudes are likely influenced by challenges they may face. Technical problems often arise, and teachers, if they do not have the necessary knowledge or the help of an expert, consider that this obstacle will make their teaching work challenging (Liu et al., 2017; Lucas, 2020). Situations that will put the teacher in a difficult position are also a reason to form a negative opinion about mobile devices and prevent someone, especially when he is not familiar with the technology (Drolia et al., 2020; Kwon et al., 2019; Petko et al., 2018; Al-Furaih & Al-Awidi, 2018). As reported by McCarthy et al. (2019), Cavanaugh, Kelley, & McCarthy conclude that the professional development of teachers is necessary for the change required to integrate mobile devices. Gunter and Reeves (2017) concluded that the teacher with the appropriate training and the activities he will carry out would be able to appreciate the value of mobile devices in education.

2.3 Mobile learning in the Greek school

Nowadays, regarding the use of mobile devices in Greek schools, circular F.25/103373/D1/22-6-2018 issued by the Ministry of Education is valid. According to the instructions, students are prohibited from carrying a portable device or any other electronic device with which they can record sound or image. They are only allowed to use school-provided electronic equipment only under the supervision of teachers. On the other hand, teachers are entitled to use their equipment alongside the school equipment exclusively and only in the context of the educational process and for teaching purposes.

Despite the exclusion of mobile devices from the Greek school (Papadakis et al., 2021), many researchers influenced by international research have conducted research on the use of mobile devices. In their research, Papadakis et al. (2018) compare the results of teaching mathematics using computers and tablets. The research was carried out on preschool children and proved that their ease of use requires minimal training, makes children more enthusiastic and facilitates their active participation and cooperation with classmates and teachers. Similar results are reached by Koutromanos and Boutekas (2020) and Papadakis et al. (2016). Studies on using mobile devices in Greek schools have also been done in secondary education. Kousloglou (2019) uses the BYOD method in 106 high school students, increasing student interest and developing cooperation. To reach Vocational High School students, Vasilogiannis and Zogopoulos (2020) presented some interactive applications for Mechanical Engineering and reached similar conclusions. The

student's enthusiasm for participating in the course and creating a positive climate of cooperation and more efficiency compared to the traditional way of teaching was recorded (Kalogiannakis & Papadakis, 2017; Nikolopoulou & Kousloglou, 2019).

What is the opinion of Greek secondary school teachers about mobile devices? Nikolopoulou and Kousloglou (2020) asked 32 teachers of the prefecture of Kavala to fill in a questionnaire about their opinion on mobile devices. The results converge with those of foreign surveys. There is a positive attitude and recognition of the results of the integration of mobile devices, but also concern about the inadequacy of teachers or delinquency issues that may arise. Quite a few agree with the law in force (Kousloglou & Syrpi, 2018; Sakalis, 2021). Nikolopoulou et al. (2021) examine and compare the opinions of 920 Greek teachers of both grades. They find that both primary and secondary teachers recognize the potential benefits of mobile learning. They also observe the difference in opinions between teachers who have attended relevant training and those who have yet to. Finally, they come to the following conclusion: primary school teachers or those with fewer years of teaching experience are more likely to use mobile devices.

3 Research methodology and analysis

In order to make the inclusion of mobile devices a reality, it is necessary to determine teachers' opinions and readiness to adopt mobile learning. In the Greek area, research on Greek teachers' readiness is limited, primarily due to the relevant legislation prohibiting students' mobile device use. The research aims to determine the degree of readiness of Greek Secondary Education Teachers in schools of Crete and the Dodecanese regarding the adoption of mobile learning in the educational process.

3.1 Research questions

Question 1: Is readiness to adopt mobile learning related to gender and stage of technology adoption?

Question 2: Is readiness to adopt mobile learning related to years of teaching experience and the stage of technology adoption?

Question 3: Is participating or not in any ICT training related to teachers' readiness to adopt mobile learning?

Question 4: Does the type of school affect teachers' readiness to adopt mobile learning?

In order to collect data, the Mobile learning readiness survey tool by Christensen and Knezek (2017) was used, as well as the Stages of Adoption of Technology tool (Christensen, 2002). The questionnaire consists of two sections. Section 1 contains nine questions to collect demographic information. While question 10 asks participants to select the stage of technology adoption, they feel they are in by completing the Stages of Adoption of a Technology tool. The second section is the Mobile learning readiness survey tool. In it, they are asked to answer 28 closed-ended questions. Responses are on a five-point Likert scale: strongly disagree, disagree, neither agree nor disagree, agree and strongly agree. According to its creators, the questionnaire is divided into four factors: F1: Possibilities, F2: Benefits, F3 Preferences, and F4: External influences. After the necessary checks, the final form of the questionnaire was given. It was chosen to be given in the form of an electronic questionnaire (Google form). The research sample was teachers from Secondary Education schools in Heraklion, Rethymno and Rhodes. Of the collected questionnaires, 175 were, and all of them were accepted. Cronbach's alpha coefficient was used to test the reliability of the questionnaire. The results showed that the scale had a high level of internal consistency, as determined by Cronbach's Alpha coefficient of 0.902 (Petousi & Sifaki, 2020).

3.2 Descriptive characteristics

This section reports the results from the demographic characteristics we will need to analyze the research questions.

Regarding the gender distribution of the sample, of the 175 respondents, 48 (27.43%) are male, and 127 (72.57%) are female (Figure 1).

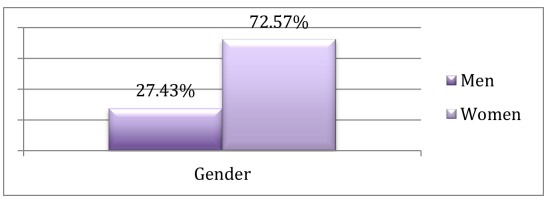

Figure 1 Gender distribution of the sample

Regarding the years of teaching experience, 30 people (17.14%) are from 1 to five years, 22 (12.57%) from 6 to 10 years, 28 (16%) from 11 to 15 years, 37 (21.14 %) from 16 to 20 years and 58 (33.14%) over 21 years of teaching experience (Figure 2).

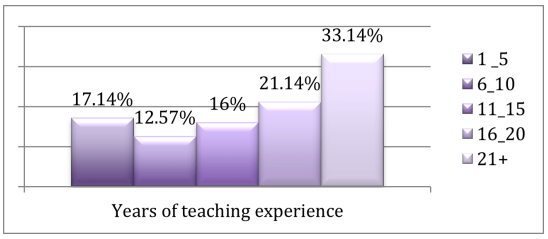

Figure 2 Years of teaching experience

From the total sample, 49 people stated that they had not received any ICT training, and the remaining 126 (72%) (Figure 3).

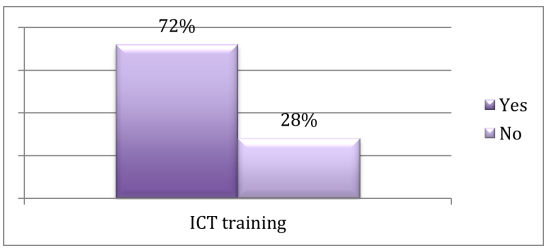

Figure 3 Received any ICT training

In terms of the type of school they work in, the teachers are divided as follows: 67 people (38.29%) work in a General High School, 58 (33.14%) in a Vocational High School (EPAL), 46 (26.29%) in High school, while four people stated otherwise (Figure 4).

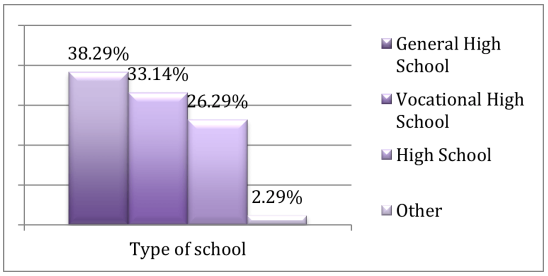

Figure 4 Type of school working in

Finally, regarding the stage of technology adoption to which the teachers consider themselves to belong, they are distributed as follows: 3 people (1.71%) belong to the first stage, 5 (2.86%) to the second, 15 (9.14%) in the third, 31 (17.71%) in the fourth, 51 (29.14%) in the fifth and 69 (39.43%) in the sixth stage (Figure 5).

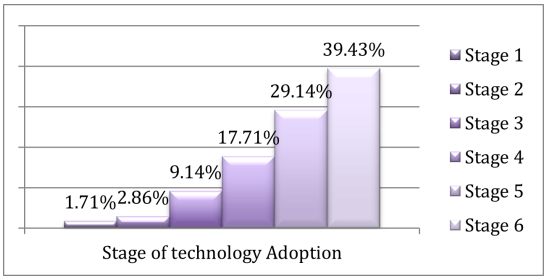

Figure 5 Stage of technology adoption

3.3 First research question

"Is Readiness to Adopt Mobile Learning Related to Gender and Stage of Technology Adoption?"

For the first factor, the 2-way Anova test showed that there is a statistically significant interaction between gender and the stage of technology adoption regarding the first factor $F(5,163) = 2.754$, $p = 0.02 < 0.05$, $\eta^2 = 0.078$ (Table 1).

Table 1 Factor 1 of research question 1: Test of between-subjects effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	11.558[a]	11	1.051	4.036	0.000	0.214
Intercept	614.238	1	614.238	2359.571	0.000	0.935
Gender	0.046	1	0.046	0.176	0.675	0.001
Stages	8.830	5	1.766	6.784	0.000	0.172
Gender * Stages	3.584	5	0.717	2.754	0.020	0.078
Error	42.432	163	0.260			
Total	2758.813	175				
Corrected Total	53.990	174				

Note: [a] $R^2 = 0.214$, Adjusted $R^2 = 0.161$.

There appears to be a substantial statistically significant difference ($p = 0.001 < 0.05$) between males and females who state that they are in the third stage of technology adoption. Specifically, in the third stage, women have a difference of 0.979 higher than men, $F = 11.049$, $p = 0.001$, $\eta^2 = 0.063$. Female teachers surveyed who consider themselves to begin to understand the usefulness of technology score higher on questions about the potential capabilities of mobile devices.

Gender does not statistically significantly affect the mean score of the questions regarding the possible possibilities that one considers mobile devices to have concerning education, $F = 0.176$, $p = 0.675 > 0.05$, $\eta^2 = 0.001$. Table 1 shows that the average score of the answers is firmly statistically significantly affected by the stage to which someone declares that he belongs, $F = 6.784$, $p < 0.001$, $\eta^2 = 0.172$.

For the second factor, the two-way ANOVA test showed a statistically significant interaction between gender and technology adoption stage for the score of the second factor, $F(5, 163) = 3.735$, $p = 0.003$, $\eta^2 = 0.103$.

Table 2 Factor 2 of research question 1: Test of between-subjects effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10.333[a]	11	0.939	2.957	0.001	0.166
Intercept	450.899	1	450.899	1419.601	0.000	0.897
Gender	0.167	1	0.167	0.526	0.469	0.003
Stages	6.556	5	1.311	4.128	0.001	0.112
Gender * Stages	5.932	5	1.186	3.735	0.003	0.103
Error	51.773	163	0.318			
Total	1973.800	175				
Corrected Total	62.105	174				

Note: [a] $R^2 = 0.166$, Adjusted $R^2 = 0.110$.

As can be seen in Figure 6, there is a difference in the average score between the two sexes at each stage.

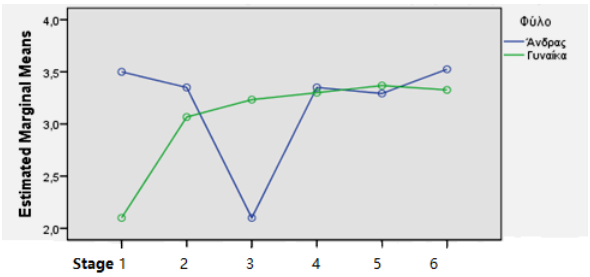

Figure 6 Estimated marginal means

Specifically, among teachers who state that they do not use ICT because it stresses them out (stage 1), men have a higher average score than women. While in stage 3, women show a higher average. There is a statistically significant difference in the score for the second factor between the two sexes at the first stage $F(1, 163) = 4.114$, $p = 0.044 < 0.05$, $\eta^2 = 0.25$ and a strongly statistically significant difference at the third stage, $F(1,163) = 12.132$, $p = 0.001 < 0.05$, $\eta^2 = 0.069$. It appears that the better the female teachers' relationship with technology, the more aligned they are with the positive effects of mobile devices in the classroom.

The analysis showed that this factor is not affected by gender, $p = 0.469 > 0.05$. In contrast, the stage to which the teacher declares that he belongs statistically significantly affects the

average score, p = 0.001 < 0.05. It is observed that the mean score increases for teachers who declare themselves to be in a more significant stage of technology adoption.

For the third factor, the analysis showed that there is also a statistically significant interaction between gender and technology adoption stage, F(5,163) = 3.009, p = 0.013, η^2 = 0.084. Unlike the previous factors, the analysis showed that this one depends on gender. So men have a higher average score, meaning they are more receptive to choosing mobile devices over traditional technology or a book. Regarding the fourth factor, i.e. questions about external factors, there is no interaction between gender and stage. The stage does not appear to affect responses either. Conversely, gender affects the mean score. The mean score of men is 0.400 points higher than that of women, and this difference is statistically significant. (see in Table 3)

Table 3 Factor 4 of research question 1: Pairwise comparisons

(I) Gender	(J) Gender	Mean Difference (I-J)	Std. Error	Sig.[b]	95% CI[b]	
					Lower	Upper
Man	Woman	0.401*	0.163	0.015	0.078	0.724
Woman	Man	-0.401*	0.163	0.015	-0.724	-0.078

Note: Based on estimated marginal means. * The mean difference is significant at the .05 level; [b] Adjustment for multiple comparisons: Bonferroni.

3.4 Second Research Question

"Is readiness to adopt mobile learning related to years of teaching experience and stage of technology adoption?"

Two-way-Anova analysis was performed for each factor separately. For the first factor, there is no statistically significant interaction between the years of experience and the stage of technology adoption, F (16, 149) =0.984, p = 0.477 > 0.05, η^2 = 0.096. (see in Table 4)

Table 4 Factor 1 of research question 2: Tests of between-subjects effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	12.384[a]	25	0.495	1.774	0.019	0.229
Intercept	729.329	1	729.329	2611.898	0.000	0.946
Teaching experience	0.509	4	0.127	0.456	0.768	0.012
Stages	3.744	5	0.749	2.682	0.024	0.083
Teaching Experience * Stages	4.396	16	0.275	0.984	0.477	0.096
Error	41.606	149	0.279			
Total	2758.813	175				
Corrected Total	53.990	174				

Note: [a] R^2 = 0.229, Adjusted R^2 = 0.100.

In the same table, it can be seen that teaching experience does not statistically significantly affect the mean score of factor 1, F(4,149) = 0.456, p = 0.768 > 0.05, η^2 = 0.012.

In contrast, it appears that the mean score of the responses is firmly statistically significantly affected by the stage one declares to belong to, F(5,194) =2.682, p = 0.024 < 0.05, η^2 = 0.083. The average score is higher for teachers in stages 5 and 6.

For the questions of the second factor, there is also no statistically significant interaction between years of teaching experience and stage. Nor does each variable influence the responses. (see in Table 5)

Table 5 Factor 2 of research question 2: Tests of between-subjects effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	12.680[a]	25	0.507	1.529	0.063	0.204
Intercept	550.765	1	550.765	1660.367	0.000	0.918
Teaching experience	2.104	4	0.526	1.586	0.181	0.041
Stages	0.810	5	0.162	0.489	0.784	0.016
Teaching Experience * Stages	7.654	16	0.478	1.442	0.130	0.134
Error	49.425	149	0.332			
Total	1973.800	175				
Corrected Total	62.105	174				

Note: [a] R^2 = 0.204, Adjusted R^2 = 0.071.

From the analysis, it appears that there is a statistically significant interaction between years of teaching experience and the technology adoption stage for the average score of the third factor, F(16,149) = 1.999, p = 0.017 < 0.05, η^2 = 0.177. (see in Table 6)

Table 6 Factor 3 of research question 2: Tests of between-subjects effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	12.534[a]	25	0.501	1.739	0.023	0.226
Intercept	434.102	1	434.102	1505.775	0.000	0.910
Teaching experience	4.228	4	1.057	3.667	0.007	0.090
Stages	1.462	5	0.292	1.014	0.411	0.033
Teaching Experience * Stages	9.221	16	0.576	1.999	0.017	0.177
Error	42.955	149	0.288			
Total	1452.240	175				
Corrected Total	55.489	174				

Note: [a] $R^2 = 0.226$, Adjusted $R^2 = 0.096$.

In Stage 2, teachers have a higher mean score for those with fewer years of teaching experience. This may be because they are also younger, so they are more likely to choose a mobile device over a more traditional form of technology.

Continuing the analysis, we observe that there is no statistically significant difference in the average score of the third factor between teachers of different stages, $F(5,149) = 1.014$, $p = 0.411$, $\eta^2 = 0.033$. However, there is a statistically significant difference in the average score of teachers with different years of experience, $F(4,149) = 3.667$, $p = 0.007$, $\eta^2 = 0.090$. Educators with fewer years of experience are more receptive to choosing a mobile device for personal use than older ones.

From the analysis, it appears that there is a statistically significant interaction between years of teaching experience and the technology adoption stage for the mean score of the fourth factor, $F(16,149) = 2.517$, $p = 0.002 < 0.05$, $\eta^2 = 0.213$. (see in Table 7)

Table 7 Factor 4 of research question 2: Tests of between-subjects effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	15.920[a]	25	0.637	2.400	0.001	0.287
Intercept	431.659	1	431.659	1626.763	0.000	0.916
Teaching experience	1.930	4	0.482	1.818	0.128	0.047
Stages	1.159	5	0.232	0.874	0.500	0.028
Teaching Experience* Stages	10.688	16	0.668	2.517	0.002	0.213
Error	39.537	149	0.265			
Total	1492.040	175				
Corrected Total	55.457	174				

Note: [a] $R^2 = 0.287$, Adjusted $R^2 = 0.167$.

The results show that teachers with more experience have a higher average score in lower stages. However, teachers with 16-20 years of experience have a higher average score when they belong to stage 5 or 6 than those with the same years of experience but at stage 4. Finally, the years of teaching experience or the stage do not have a statistically significant effect on the average score of the fourth factor.

3.5 Third research question

"Is participating or not in some ICT training related to teachers' readiness to adopt mobile learning?"

Normality testing showed that the resulting subgroups do not follow a normal distribution. Therefore, the Mann-Whitney U test was chosen. The test results showed a statistically significant difference in the mean score of the first factor for the teachers of the two groups, $U = 2279$, $z = -2.709$, $p = 0.007$ (Table 8). For the other factors, the mean score does not differ statistically significantly (factor 2: $U = 2765.5$, $z = -1.072$, $p = 0.284$, factor 3: $U = 2800$, $z = -0.960$, $p = 0.337$, factor 4: $U = 2758$, $z = -1.100$, $p = 0.271$). (see in Table 8)

Table 8 Research question 3: Mann-Whitney U

	First factor	Second factor	Third factor	Fourth factor
Mann-Whitney U	2279.000	2765.500	2800.000	2758.000
Wilcoxon W	3504.000	3990.500	4025.000	3983.000
Z	-2.709	-1.072	-0.960	-1.100
Asymp. Sig. (2-tailed)	0.007	0.284	0.337	0.271

Note: a. Grouping Variable: Have you received any ICT training?

Those who have not received training have a mean score of 3.88 as opposed to those who received 4. Therefore, those who have received some training agree with the positive effects

of mobile learning in education. In the remaining categories of questions, the difference in the average score could be more considerable. (see in Table 9)

Table 9 Research question 3 means

Have you received any ICT training?	First factor	Second factor	Third factor	Fourth factor
No	3.88	3.30	2.80	2.80
Yes	4.00	3.35	2.80	3.00
Total	4.00	3.30	2.80	2.80

3.6 Fourth research question

"Does school type affect teachers' readiness to adopt mobile learning?"

The test showed no statistically significant difference in the mean score of each factor between teachers serving in different types of schools. Respectively for each factor: F(3,174) = 0.696, p = 0.556, F(3,174) = 0.553, p = 0.647, F(3,174) = 0.825, p = 0.482, F(3,174) = 1.321, p = 0.269. (see in Table 10)

Table 10 Research question 4: Anov

		Sum of Squares	Df	Mean Square	F	Sig.
First factor	Between Groups	0.651	3	0.217	0.696	0.556
	Within Groups	53.338	171	0.312		
	Total	53.990	174			
Second factor	Between Groups	0.597	3	0.199	0.553	0.647
	Within Groups	61.508	171	0.360		
	Total	62.105	174			
Third factor	Between Groups	0.791	3	0.264	0.825	0.482
	Within Groups	54.698	171	0.320		
	Total	55.489	174			
Fourth factor	Between Groups	1.256	3	0.419	1.321	0.269
	Within Groups	54.201	171	0.317		
	Total	55.457	174			

Educators agree on the positive effects of mobile learning in education. They express their uncertainty about solving problems such as classroom management or approaching students. Regardless of the school they serve, teachers have differing views on using mobile devices over printed books or computers for personal use. Finally, all teachers seem hesitant about whether they will have adequate support for the inclusion of mobile devices.

4 Conclusions

In the first research question, the existence of a correlation between gender and the stage of readiness to adopt technology that the teachers had declared was tested. For the first three factors, there was a statistically significant interaction between gender and the stage that had been declared. However, in the questions about the external difficulties that might prevent the use of mobile devices, there is no statistically significant interaction between the two variables. Stage one belongs to affects the first three factors. The more confident and knowledgeable one is about technology, the more likely they are to adopt mobile learning (Kwon et al., 2019; Petko et al., 2018; Jung, 2015; Mac Callum et al., 2014). For the second research question, years of experience do not influence teachers' views of mobile learning or readiness (Kwon et al., 2019). The better knowledge and confidence someone has about technology, the more receptive they become to new technologies, which are not affected by years of experience (Kwon et al., 2019; Christensen & Knezek, 2018). For the third research question, The results demonstrate no statistically significant difference in the mean score of the last three factors for both groups. Their average score could be higher regardless of whether they are educated. Nevertheless, there is a statistically significant difference in the mean score of the questions regarding the results of mobile learning in education. Attending some training affects teachers' view of the effectiveness of mobile learning in education (Gunter & Reeves, 2017; Christensen & Knezek, 2018; Sakalis, 2021; Nikolopoulou et al., 2021).

In Greece, secondary school teachers work in different types of schools, and it was considered appropriate to check if there is a difference in their views. Nevertheless, and as expected due to the lack of corresponding research, the type of school does not influence teachers' opinions. The positive attitude of teachers towards mobile devices and their results in the field of education and teaching is evident from the entire survey. However, on a personal level, teachers appear

less in agreement regarding using mobile devices than other forms of technology or printed book. In addition, when asked about the conditions offered for integrating mobile devices, or the support they will have from the school, the teachers state that they do not exist. Logistical support is a concern for them, as the majority state it needs to be improved.

5 Discussion

This specific research aims to investigate the readiness of secondary school teachers to adopt mobile learning. As mentioned, there is a positive attitude of teachers regarding mobile learning and recognition of its value. The teachers who participated in the research recognize the positive results of mobile learning, proving that it can be accepted in Greek education as well. Doubts arise about the effectiveness of mobile learning in classroom management or the effects its use can have on student engagement and improvement. Even these could cease to exist with the appropriate training of teachers and participation in programs in which they could experience the use of mobile devices in the educational process. Changing the syllabuses would also be necessary. The demanding material and the way students are examined is a factor that leaves no room for teachers to use alternative forms of teaching. Also, mention the need for more logistical infrastructure in most schools, especially in smaller areas. Difficulties that could be addressed with appropriate support. Thus, everything mentioned in the international literature should be examined before discarding mobile devices. With appropriate modifications for the Greek area, the adoption of mobile learning should be re-examined.

Conflicts of interest

The author declares that they have no conflict of interest.

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