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Postgraduate Students' Perspectives on Mobile Technology Benefits and Learning Possibilities: Insights from Greek Students

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Abstract: University students increasingly use mobile devices in their studies, while during the COVID-19 pandemic, mobile technology supported learning was applied by many students. Exploring students' mobile technology perceptions is an ongoing research issue. This pilot study aimed to explore postgraduate students' perspectives on the benefits and learning possibilities of mobile devices' usage in their studies. In total, 34 Greek postgraduate students participated, and they answered an online questionnaire. The students expressed positive, strong perceptions, indicating their awareness of mobile technology learning possibilities and educational benefits for their studies. Almost all students (94.1%) agreed that mobile technology should be used to connect postgraduate students with people, content, and resources, and that mobile devices bring new learning opportunities in a postgraduate programme. Isolated significant differences were observed with regard to age and postgraduate mode of study (more positive views were expressed for blended mode in comparison to face-to-face mode). Implications for tutors, educational practices, and university policies are discussed.

Keywords: higher education; postgraduate students; mobile technology; mobile learning; Greece

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1. Introduction

Mobile technology (e.g., mobile/smart phones, laptops, tablets) has attracted research interest for over a decade and can be considered a learning tool with educational potential [1–4]. Mobile devices are light enough, are equipped with communication capabilities, and may influence how learners learn. Indicatively, university students use their smartphones for various educational tasks, such as to search for educational resources and content or for information via the web, to communicate with fellow students and tutors, to access e-class, to download books, and to manage assignments [5,6]. Recently, during the COVID-19 pandemic, mobile technology-mediated learning was upscaled by many university students and it supported online learning [7–9]. Mobile learning refers to the educational use of mobile technology with the aim to support, facilitate, and extend the teaching and learning process anytime and anywhere [1]; e.g., to support information collection and exchange, collaborative learning, knowledge construction, as well as independent and lifelong learning. The educational affordances of mobile technology (communication possibilities, access to information, etc.) have the potential to support educational practices. Mobile learning usage and effectiveness may be influenced by different factors, and students' perceptions can play a role in mobile technology utilization [10].

The utilization of mobile technology in universities and higher education institutions is associated with benefits such as flexibility in learning, broadening learning beyond the physical classroom anytime and anywhere (e.g., by employing online platforms as applied during the pandemic), and supporting personalization [11]. Potential educational benefits include improvement of students' motivation and achievement [12], possibility to expand

collaborative learning and communication [2,3], stimulation of interest/motivation, and facilitation of students' engagement [13]. The sense of ownership and the freedom to define the activities/tasks might increase students' motivation to study [14] via, for example, applications' utilization to assist engagement, collaboration, interaction, or handling resources and material. Mobile technology use by university students is also linked with drawbacks/barriers such as technological (internet connectivity, barriers associated with the usability of the hardware/software) and instructional barriers (difficulties in locating learning material, unsuitable material for use on mobile devices) [5,6,8]; however, these do not constitute the focus of this study. University students are also mature and more autonomous in making learning decisions utilizing mobile technology. The use of mobile devices among university students is increasingly more common, while research on student mobile technology/learning perceptions is still relevant and can contribute evidence to this ongoing research issue.

This pilot study aimed to explore Greek postgraduate students' perspectives on the benefits and learning possibilities of mobile devices' usage in their postgraduate studies; this is an under-researched area within the Greek context. Studying university students' perceptions of whether using mobiles raises standards [15] increases their awareness of the educational use of mobile technology. When students perceive that mobile technology/learning has benefits and learning possibilities, they are more likely to integrate it into their academic studies. Positive perceptions may influence students' interest, motivation, or performance in mobile-based environments, and such perceptions may also contribute to the adoption of mobile-mediated learning in universities in the post-pandemic era.

The rest of the paper is organized as follows: Section 2 regards the background of the study, Section 3 presents materials and methods, Section 4 indicates the results, and Section 5 presents the discussion and implications.

2. Background

2.1. Students' Perceived Mobile Technology Benefits and Learning Possibilities

Research on students' mobile technology/learning perceptions is increasingly growing, but most studies regard undergraduate students. Very few studies have explored postgraduate students' views on using mobile applications [16] or the factors affecting the adoption of mobile learning by postgraduate students [17]. Thus, most of the studies in this section regard undergraduate students' perceptions, with the focus being on recent studies during and after the COVID-19 pandemic.

Early on, Kim et al. [18], in the USA, explored university students' views towards mobile device usage to create personalized learning experiences outside the classroom. In general, the students expressed positive attitudes towards the use of mobile technology, while they were competent to use their devices in projects. Some barriers were also revealed; however, as stated earlier, the exploration of barriers is not the focus of this paper.

Van den Berg and Mudau [16] explored postgraduate students' perceptions of the use of WhatsApp as a communication tool to support teaching and learning during the pandemic at a South African institution; during this period, mobile devices were a unique tool for communication between students and tutors. A benefit was that WhatsApp groups facilitated student-student and student-tutor communication and connection (the platform was easy to use and fast); the communication aspect was highlighted. Affordability and the ease of sharing learning materials were reported as benefits, while disadvantages included distractions. Another study which included both undergraduate and postgraduate students in Saudi Arabia [17] investigated the factors affecting the adoption of mobile learning; among others, awareness, university culture, and university management support were found to play a basic role in mobile learning acceptance.

Zogheib and Daniela [15] explored perceptions of mobile phone usage among students from the University of Latvia and a Middle Eastern American University. They indicated that perceived enjoyment and perceived usefulness influence students' attitudes towards mobile phone usage.

In the USA, Elliott [19] revealed that university students consider their mobile phones to be important educational tools; around 50% of the students agree that accessing their course material on their smart phone would help them perform better in their studies. In the same country, Milheim et al. [20] reported that college students voluntarily use mobile devices for online course work or course-related activities, e.g., using phones and tablets to download/read course content, take notes, and communicate. Most students mentioned that they use their mobile devices for convenience, ease of use, and portability, while perceived challenges were associated with technological barriers (compatibility issues, device design).

A study in Ghana [21] revealed students' overall positive perceptions of many mobile device features and characteristics: instant information accessibility, communication and interactivity, collaboration, portability, and enhancement of blended learning (i.e., maximizing the benefits of both face-to-face and online approaches). The majority of the respondents were introduced to the educational use of mobile devices in the university; the laptop was the most preferred mobile device for learning, while their academic activities via mobile devices included searching the internet for information, learning their course content, and contacting tutors.

Positive attitudes towards mobile devices/phones were also expressed by university students in other countries, such as Russia and Kazakhstan [22], Malaysia and Arab countries [23], and the Pacific area [24]. Student perceptions regarding the use of mobile technologies for e-evaluation differed in terms of gender (male students expressed more positive perceptions), but not in terms of age, educational level, or faculty [23].

Within the Greek context, there are a small number of studies about university students' perspectives on the benefits and learning possibilities of mobile devices and, to the best of our knowledge, there is no research with postgraduate students. A recent study [6] indicated that students report both benefits and obstacles in association with mobile phone usage for educational purposes (information searches for assignments/videos/photos, easy and quick access to e-classes, communication with peers and tutors). The main benefits include flexibility, easy and quick searches for information, and familiarization with digital technology, while barriers include connectivity issues, unreliable sources for obtaining information, and distractions (barriers are relevant in the Greek context today). Other studies indicated that the constructs performance expectancy, hedonic motivation, facilitating conditions, and habit predict students' intention to use mobile devices/phones for learning, while behavioural intention strongly predicts actual mobile technology use [25,26]. Since research evidence on mobile learning possibilities and benefits (as these are perceived by students) is limited, this study was considered necessary.

2.2. Higher Education Pedagogies, Student Motivation and Engagement, in the Context of Mobile Technology Utilization

Since this study was carried out in higher education, we briefly discuss some points about higher education pedagogies as well as student motivation and engagement, as these are relevant to the context of mobile technology utilization. For example, university students' motivation and engagement with mobile devices may influence their preference for mobile technology use in their studies.

Pedagogy has different approaches to learning (e.g., constructivist, collaborative, inquiry-based), differs in studying different academic disciplines, and is influenced by culture, global challenges, and technological developments [27]. Globally, higher education is not static, since new methods are applied in combination with digital technologies; for example, a trend after the recent pandemic regards the spread of blended education and university digitalization [6]. According to a recent report [28], pedagogies based on collaboration among students, the formation of learning communities, or making connections across settings are still relevant today. The researchers [28] proposed innovative pedagogies that might affect educational policies today, such as pedagogies and strategies for flexible hybrid learning, dual learning scenarios (connecting learning in university classrooms and

industry workspaces), and pedagogy of autonomy (building student capacity for freedom and independent learning). Challenges faced in higher education include demographic changes, limited funding of public education, challenges of educational technologies [29], and adoption of hybrid learning models [28]. An example of a challenge for higher education institutions is to implement pedagogies which support internationalization via mobility of students and tutors for the development of language and communication skills [30]. Lately, there has been a discussion for developing a better understanding and pedagogical methods of wisdom pedagogy in higher education [27]; the methods applied in wisdom education include challenging students' beliefs (e.g., via dialogue), self-development (in terms of wisdom it regards improvement of different abilities), self-reflection, reading texts, and fostering a community of inquiry for students and tutors [27].

Mobile technology utilization and (innovative) mobile pedagogies are associated with the context of higher education pedagogies. For example, since all higher education students are adults, mobile learning approaches could be linked to student self-development, self-directed learning, and learner autonomy. Mobile technology applications provide opportunities to access/share resources, learn vocabulary, write texts, and communicate, thus facilitating the exercise of different student abilities and competencies. Mobile technology can also be utilized in the context of the innovative pedagogies of flexible hybrid modes of education. Mobile technology utilization in higher education is relevant to both benefits (student autonomy, mobility, as well as student-student/-tutor communication, etc.) and challenges (e.g., lack of devices, digital inequality for socially disadvantaged students) [1,7,8,28].

In parallel, the concepts of student motivation and engagement are relevant to mobile technology utilization for academic purposes. Motivation to learn is a principle for effective education, a drive supported by expectations, goals, and emotions [31]. Students' motivation to learn reflects their desire to attend university courses/sessions, while higher levels of student motivation are likely to lead to more efficient learning. Intrinsically motivated students get involved in the learning process for the pleasure or satisfaction derived from it [32], and they wish to increase their knowledge and achieve personal objectives [33]. Extrinsic motivation is pursuing an activity out of a sense of obligation [32], where students might look at rewards/gains out of the educational process, such as better marks or certificates [31]. Student engagement is the time and energy students devote to educational activities, such as attending lessons and completing assignments [34]. Student engagement is a central aspect of higher education and within the context of digital technology utilization [35]; e.g., student engagement with educational activities may be linked to student preference for the use of mobile technology in their academic disciplines.

Motivation may influence learners' attitudes, perspectives, and engagement. Attitudes impact student engagement and behaviour [32]. When students are more motivated to learn, they are more likely to be engaged and, in turn, they are more likely to accomplish the learning objectives [31]. Mobile technology use could be considered as a process that affects (positively or negatively) student motivation. A recent study [34] indicated that university students' motivation and engagement changed during the pandemic when online learning was exclusively implemented; the motivation went from intrinsic to extrinsic (since online courses were the only way to obtain attendance) and engagement increased (as a result of massive use of learning platforms). (Post)graduate students' engagement with academic activities could be supported when they carry out research for assignments and academic work; for example, digital academic reading (obtaining information from academic papers/documents) applied with the assistance of mobile devices such as mobile phones and tablets [36]. Supporting student autonomy in mobile learning environments may affect their motivation to study. Motivation and engagement are likely to influence student acceptance of or preferences for mobile technology.

3. Materials and Methods

3.1. Research Questions of the Study

The research questions of this study were as follows:

1. What are postgraduate students' perspectives on the learning possibilities and benefits of using mobile devices in their studies?
2. What factors influence students' perspectives in relation to the learning possibilities and benefits of mobile devices' utilization?

3.2. Sample and Procedure

In total, 34 postgraduate students constituted the sample of this pilot study (Table 1 indicates the characteristics of the sample); they were attending postgraduate/master's programmes at the International Hellenic University (Kavala campus in N. Greece). The research population was 180 postgraduate students. The selection of the sample was done systematically according to a specific numerical interval. A certain distance was defined between the subjects of the population based on the formula $k = \frac{\text{population size}}{\text{sample size}} = \frac{180}{34} \cong 5$. Ten subjects were randomly removed from the population and the remaining subjects were selected in fives. Thus, the research sample was N = 34 postgraduate students (18.9%). In total, 24 students were female, 10 were male, the age range was 22–52+ years old, and their employment was in education or private sector. The mode of postgraduate studies they attend, during the academic year 2022-23, is either face-to-face (16 students) or blended (18 students).

Table 1. Demographic characteristics of the sample (N = 34).

Category	Category	Frequency	Percentage (%)
Gender	Female	24	70.6
	Male	10	29.4
Age	22–31	7	20.6
	32–41	13	38.2
	42–51	11	32.4
	52+	3	8.8
Employment	Education	21	61.8
	Private sector	13	38.2
Mode of postgraduate studies	Face-to-face	16	47.1
	Blended	18	52.9
Ownership of mobile device	Laptop	32	94.1
	Smartphone	31	91.2
	Tablet	21	61.8

An online questionnaire was administered in January 2023. The questionnaire link was distributed via email to all postgraduate students' official email addresses. Ethical issues were considered in accordance with the General Data Protection Regulation, and participation was based on a voluntary basis. Official permission was obtained from the university's research ethics committee (N.4957/21-7-2022). We informed all students that the questionnaire was anonymous and that the data would be utilized only for research purposes. Informed consent was obtained from all subjects involved in the study.

3.3. Research Instrument and Data Analysis

An online questionnaire (with two sections) was used for data collection. Section A was created to collect data regarding students' characteristics (gender, age, employment, mode of postgraduate studies). Section B involved 10 statements/items regarding mobile technology learning possibilities and benefits. Indicatively, these items regard the potential of mobile devices to have a role and offer opportunities for learning in a postgraduate

programme of studies, as well as to contribute to student motivation, engagement, collaboration, and organization. These 10 items were taken and adapted from the "Possibilities" and "Benefits" scales/constructs of the Mobile Learning Readiness Survey, which was constructed and administered to measure teachers' willingness to use mobile devices in their classrooms [37]. All items were translated into the Greek language by the researchers with the assistance of a language expert. The 10 items were presented in random order and the students were asked to provide their responses on a 5-point Likert-type scale (from 1 = strongly disagree to 5 = strongly agree). Google Forms was used to design the questionnaire.

Regarding data analysis, the statistical software SPSS version 21.0 was used for managing the data and conducting the statistical analyses (descriptive statistics, Pearson r, Mann-Whitney U test, Kruskal Wallis test).

4. Results

4.1. Postgraduate Students' Perspectives on the Learning Possibilities and Benefits of Using Mobile Devices in Their Studies

To investigate students' perceptions of mobile technology benefits and learning possibilities, we initially performed a descriptive analysis. Table 2 indicates the students' response percentage frequencies on the 10 items of the questionnaire (N = 34 students). The last column of the table presents the percentages of those who "agree" and "strongly agree", in descending order. The reliability of the questionnaire is excellent, Cronbach-a = 0.919 (>0.7). The sample size is small (this is discussed in the Limitations section), and this affects Cronbach-a.

Table 2. Students' response percentage frequencies for the 10 items (N = 34 students). SD = Strongly Disagree, D = Disagree, N = Neutral, A= Agree, SA = Strongly Agree.

	SD	D	N	A	SA	A and SA
S3. Mobile technology should be used to connect postgraduate students with people, content and resources	0.0	0.0	5.9	44.1	50.0	94.1
S4. Mobile devices (learning) bring new opportunities for learning in a postgraduate programme	2.9	2.9	0	47.1	47.1	94.1
S5. Mobile devices can be used to improve the skills of postgraduate students	2.9	2.9	2.9	44.1	47.1	91.2
S2. Mobile devices can increase the flexibility of learning in a master's degree programme	0.0	5.9	2.9	38.2	52.9	91.1
S9. Mobile learning devices improve communication between postgraduate students and their teachers	2.9	2.9	5.9	32.9	35.3	88.2
S8. The use of mobile devices increases collaboration—cooperation between postgraduate students	2.9	2.9	17.6	50.0	26.5	76.5
S10. Using a mobile device would improve student organization	5.9	0.0	17.6	32.4	44.1	76.5
S1. Mobile devices can play an important role in postgraduate education	0.0	2.9	5.9	32.4	41.2	73.6
S6. The use of mobile technology in the classroom makes postgraduate students more motivated to learn	8.8	8.8	17.6	26.5	38.2	64.7
S7. The use of mobile technology in the classroom increases postgraduate student engagement	11.8	11.8	14.7	38.2	23.5	61.7

It was revealed that over 70% of the sample agreed and strongly agreed with items S3, S4, S5, S2, S9, S8, S10, and S1. The items with the highest percentage of agreement correspond to the possibilities of mobile learning. For example, students reported that "Mobile technology should be used to connect postgraduate students with people, content and resources" and "Mobile devices (learning) bring new opportunities for learning in a postgraduate programme" (agreement for S3 and also for S4: 94.1%). The items with lower percentages of agreement are S6 (agreement 64.7%) and S7 (agreement 61.7%); these are associated with the benefits of mobile technology usage to increase postgraduate students' motivation and engagement with their studies.

The questionnaire was divided into two groups/factors of five items each, namely "Possibilities" (items: S1–S5) and "Benefits" (items: S6–S10). To confirm this grouping, the

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) reliability index was applied; KMO is an indication of the suitability of the data for factor analysis and must be >0.5. More specifically, for the factor "Possibilities" KMO = 0.828 and for the factor "Benefits" KMO = 0.698. Therefore, the grouping of the questions was done correctly.

Then, a Total Variance Explained investigation for the factors "Possibilities" and "Benefits" was carried out. This check indicates that the total percentage of the variance of the variables was explained by the selected factors; it is an indicator of the data suitability for factor analysis (the closer to 100%, the better the respective factors interpret most of the data, with a minimum acceptable value of 50%). The check showed that for the factor "Possibilities", the top percentage of variance explained is 78.607% (eigenvalue = 3.93), while for the factor "Benefits", it is 63.274% (eigenvalue = 3.164). Therefore, the data in both cases are suitable for factor analysis. The check showed that for the factor "Possibilities" (S1–S5), the mean is greater than that of "Benefits" (S6-S10); 4.38 (SD = 0.707) and 3.89 (SD = 0.878), respectively (Table 3). This means that student responses for "Possibilities" are closer to "strongly agree", in comparison to responses for "Benefits" which are closer to "agree"; i.e., stronger perceptions appear for the factor "Possibilities".

Table 3. Descriptive statistics for the factors "Possibilities" and "Benefits".

	N	Mean	Std. Deviation
Possibilities	34	4.38	0.707
Benefits	34	3.89	0.878
Valid N (listwise)	34		

Finally, the Pearson r linear correlation test, between the factors "Possibilities" and "Benefits", showed that there is a strong positive linear correlation; r = 0.734 and Sig. = $p < 0.01$. Therefore, as the values of the "Possibilities" factor increase, so do the values of the "Benefits".

4.2. Confirmatory Factor Analysis

In order to confirm the allocation of the ten items to the two factors "Possibilities" and "Benefits", the following checks were carried out. There are no missing values, so we will not have different sample sizes. The test showed that there were no ambiguous variables. No factors emerged, with fewer than three items/variables. Moreover, all factor loadings are well above 0.30. Therefore, it is confirmed that the factor analysis was correctly done; the first factor (F1: "Possibilities") is associated with items S1, S2, S3, S4, and S5 and the second factor (F2: "Benefits") is associated with items S6, S7, S8, S9, and S10. Table 4 displays the loadings for each factor (F1, F2), as well as the mean and standard deviation per item.

Table 4. Factor loadings, mean and standard deviation per item (10 items).

	F1	F2	Mean	S.D
S3. Mobile technology should be used to connect postgraduate students with people, content, and resources	1.019		4.44	0.613
S5. Mobile devices can be used to improve the skills of postgraduate students	0.896		4.29	0.906
S4. Mobile devices (learning) bring new opportunities for learning in a postgraduate programme	0.817		4.32	0.878
S2. Mobile devices can increase the flexibility of learning in a master's degree programme	0.774		4.38	0.817
S1. Mobile devices can play an important role in postgraduate education	0.737		4.47	0.748
S7. The use of mobile technology in the classroom increases postgraduate student engagement		1.011	3.50	1.308
S6. The use of mobile technology in the classroom makes postgraduate students more motivated to learn		0.790	3.76	1.304
S9. Mobile learning devices improve communication between postgraduate students and their teachers		0.766	4.15	0.892
S8. The use of mobile devices increases collaboration—cooperation between postgraduate students		0.625	3.94	0.919
S10. Using a mobile device would improve student organization		0.554	4.09	1.083

All responses ranged from 1 to 5. 1st factor (F1): "Possibilities". 2nd factor (F2): "Benefits". Extraction method: Principal component analysis. Rotation method: Promax with Kaiser normalization. Rotation converged in 3 iterations.

The relationship was tested for each pair of variables (correlation). No variable is very strongly correlated (r > 0.8). In addition, the determinant is $6.192 \times 10^{-5} > 10^{-5}$ and the level of statistical significance is $p < 0.05$. Therefore, the analysis can clearly distinguish them.

A KMO test of sphericity was performed to test whether the analysis yielded distinct and reliable factors. The test showed that KMO = 0.796, an indicator characterized as good.

In order to establish whether the number of factors ("Possibilities" and "Benefits") are actually two, a Total Variance Explained (TVE) test (>50%) and the eigenvalue criterion were performed. The check showed that the number of factors is two, while two eigenvalues are greater than 1 (6.191 and 1.081), as indicated in Table 5.

Table 5. Total Variance Explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadingsa
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.191	61.907	61.907	6.191	61.907	61.907	5.615
2	1.081	10.815	72.721	1.081	10.815	72.721	4.953
3	0.974	9.745	82.466				
4	0.532	5.317	87.783				
5	0.473	4.730	92.513				
6	0.274	2.743	95.256				
7	0.183	1.829	97.084				
8	0.149	1.486	98.571				
9	0.078	0.783	99.353				
10	0.065	0.647	100				

Extraction method: principal component analysis.

4.3. Factors That Influence Student Perspectives

Then, we explored the possible influence of the factors/variables "Gender", "Age", "Employment", and "Mode of Study" on students' perspectives. A normality check was carried out for the variables "Gender", "Age", "Employment", and "Mode of Study". The test was based on Shapiro-Wilk (sample < 50) to check the probability that the variables in question follow a normal distribution. Based on the results, the probability that the aforementioned variables follow a normal distribution is, in all cases, less than 5%. Therefore, we discuss a non-normal distribution (for "Age", Sig. = 0.001, for each of the "Gender", "Employment", and "Mode of Study", Sig. = 0.000). For this reason, a non-parametric test was applied, the Mann-Whitney U test for the factors "Gender" and "Mode of Study", and the Kruskal Wallis test for the factors "Age" and "Employment".

The non-parametric testing for the influence of the variables "Gender" and "Employment" indicated that these do not influence student responses. The variable "Age" significantly influences two items: item S3 (Sig. = 0.011), which regards the possibility of mobile technology usage to connect students with people, content and resources, and item S4 (Sig. = 0.015), which is associated with new learning opportunities in postgraduate studies when mobile technology is used. For item S3, the maximum mean is observed in the age group 52+ (Mean = 4.67, SD = 0.577) and the minimum in the age group 22–31 (Mean = 3.71, SD = 0.488) (Table 6). For item S4, the maximum mean is observed in the age group 32–41 (Mean = 4.62, SD = 0.506) and the minimum in the age group 22–31 (Mean = 3.29, SD = 1.254). The variable "Mode of studies" appears to influence student responses for the item "Mobile devices can play an important role in postgraduate education" (S1, Sig. = 0.027) (Table 6); the Hybrid mode of studies (Mean = 4.78, SD = 0.428) has a higher mean than the face-to-face mode (Mean = 4.13, SD = 0.885). Finally, there is no impact of any of the variables "Gender", "Age", "Employment", and "Mode of Study" on the factors "Possibilities" and "Benefits".

Table 6. Impact of "Age" and "Mode of Study" on perceptions.

"Age"				"Mode of Study"	
S3		S4		S1	
Maximum mean: 4.67 52+	Minimum mean: 3.71 22–31	Maximum mean: 4.62 32–41	Minimum mean: 3.29 22–31	Maximum mean: 4.78 Hybrid mode	Minimum mean: 4.13 Face-to-Face mode

5. Discussion and Implications

This pilot study investigated Greek postgraduate students' perspectives on the benefits and learning possibilities of mobile devices' usage in their postgraduate studies. The study contributes to the research evidence on postgraduate students' perspectives. Students' perceived mobile technology learning possibilities and benefits are likely to relate to student interest and motivation when they use mobile devices, and this, in turn, may influence their academic performance in mobile-mediated educational environments.

With regard to the first research objective, postgraduate students' perspectives on the learning possibilities and benefits of mobile devices' utilization in their studies were positive. Most of the students expressed strong perceptions indicating their awareness of mobile technology possibilities and benefits for their studies; awareness of the mobile learning/technology benefits is also likely to increase student acceptance of mobile learning [17]. Awareness may also facilitate students in becoming lifelong learners who adapt to new (mobile) technologies. There is agreement with studies in other countries [16,18,19,21]. Indicatively, in this study (see Table 2), the item "Mobile devices (learning) bring new opportunities for learning in a postgraduate programme" (S4: agreement 94.1%) is in line with university students' perceptions regarding the importance of mobile phones as educational tools for their academic activities [19]; the view "Mobile devices can be used to improve the skills of postgraduate students" (S5: agreement 91.2%) is documented in students' views regarding familiarization with digital technology [6]. Participants noted that "Mobile learning devices improve communication between postgraduate students and their teachers" (S9: agreement 88.2%), which aligns with studies revealing (post)graduate student views on the role of mobile devices in communication with peers/tutors [16,21]. As mentioned in the results, the items which had the highest percentage of agreement are linked to the possibilities of mobile learning, while those with a relatively lower percentage of agreement (S6 and S7: over 61%) regard the role of mobile devices in enhancing student motivation and engagement in their studies. It is suggested that actual practices (learning activities in mobile technology-mediated environments) can provide opportunities to increase student engagement and motivation; this has implications for higher education pedagogies.

With regard to the second research objective, isolated significant differences were observed. "Age" influences the items "Mobile technology should be used to connect postgraduate students with people, content and resources" (for S3: students aged 52+ had higher values in comparison to the age group 22–31), and "Mobile devices (learning) bring new opportunities for learning in a postgraduate programme" (for S4: students aged 32–41 had higher values in comparison to the age group 22–31). Higher values are associated with more positive perceptions. The variable "Mode of postgraduate studies" affects item S1, which regards the role of mobile devices in postgraduate education (the hybrid mode of studies has a higher mean value in comparison to the face-to-face mode); this has implications for the adoption of the blended learning mode in the post-pandemic era. "Gender" and "Employment" had no significant effect on postgraduate students' perspectives.

We recommend utilization of mobile devices in postgraduate education in different education modes (in-person, blended and online education). Post-pandemic, forms of teaching and learning (such as blended/hybrid education) that were previously on the margins are becoming mainstream [38]. During the pandemic mobile technology-mediated learning was applied by many university students and it supported online learning [7–9], while post-pandemic its usage is on the rise in higher education institutions [6]. Post-pandemic, mobile learning is likely to play a gradually more important role in university teaching and in hybrid-blended courses [39].

Postgraduate students' perspectives on the learning possibilities and educational benefits of mobile devices' usage in their studies have implications for students, tutors, educational practices and university policies. Student training could highlight the effective use of mobile devices and provide opportunities for the enhancement of different skills that will prove useful in mobile technology-mediated learning environments; skills such as communication, collaboration, resilience, autonomy, and adaptability. Digital mobile

technologies are changing the context of teaching-learning with increasing access to the internet and online learning environments, thus resulting in different levels of mobile technology integration within the university systems. Student perspectives need to be taken into account in the decisions made by universities and/or education policy makers. Educational policies could be (re)adjusted to improve the availability of e-resources and offer opportunities to tutors to utilize mobile technology, use different internet-based tools, and implement mobile-supported pedagogy. Innovative pedagogies, such as flexible hybrid learning and pedagogy of autonomy [28], are suitable when mobile technology is utilized in higher education contexts. Indicatively, tutors could be better prepared to incorporate mobile pedagogy issues in face-to-face, blended, and online modes/approaches of education, thus addressing students' needs and implementing effective communication strategies that strengthen student communication, collaboration and interactions. Enhancement of student motivation and engagement are also important. Mobile-mediated learning is suggested to be implemented in different modes of postgraduate studies' provision (face-to-face, blended, and online modes). Potentially effective mobile learning environments are associated with the universities' organizational and technological management, resilience, and infrastructure. For example, universities should be supported by flexible, convenient, and digital platforms [40] that can be accessed via mobile technology and facilitate student-student/-tutor communication and collaboration. Adoption of hybrid-blended modes of education is useful to be planned by universities for future crises or situations when face-to-face engagements are difficult (e.g., for postgraduate students who work full-time). Educational policies could develop clear guidelines on how to evaluate the pedagogical benefits of implementing mobile technologies in (post)graduate studies. Latest research [41] has highlighted the importance of hybrid events as beneficiaries of the educational process. The design of mobile applications to supplement/enhance traditional higher education teaching is also a relevant issue; mobile tools and chat applications are a potentially valuable resource for online/blended learning affecting educational interactions [42]. For example, in the online environment, a mobile learning system enables tutors to upload educational content/activities, tests, and assignments, while students can download learning materials, access online classes, and interact with peers/tutors, using the mobile learning system [17]. Via their own mobile devices, students engage in their own learning from their location, and this has implications for the design of content, activities, and communication [43].

A major limitation of this study is the small sample size; therefore, the findings cannot be generalizable/transferable. However, it is a pilot study and the percentage of participation was 18.9%. Another limitation is that the survey did not include any reverse questions, and reverse coding was not used. The questionnaire items did not include possible barriers perceived or experienced by students when mobile technology is used, and this diminishes the items' representativeness. We used a quantitative inquiry only; students' perspectives could be further investigated via interviews that may indicate students' views on the role of mobile technology in the blended mode of postgraduate studies. We plan to administer the questionnaire to a larger sample of postgraduate students across different universities and to also investigate student-perceived barriers when mobile technology is used. Other variables/characteristics, such as the profile/specialization of the postgraduate programme, that may influence students' perspectives were not explored due to personal data protection; however, this constitutes an issue for future research.

Future research could investigate postgraduate students' mobile-mediated educational practices in both face-to-face and blended modes of study, e.g., how students utilize their mobile phones for research and assignment purposes. Perceived benefits and practices in association with specific mobile applications or academic disciplines could also be explored; e.g., research reported on the use of mobile virtual labs in chemistry [44]. It is worth investigating postgraduate students' perspectives in relation to their university profile or support. Finally, since mobile learning research in higher education includes various issues, different factors (e.g., educational technology, social) that influence mobile technology usage [45] or factors that may affect student perspectives (e.g., facilitating conditions) constitute issues for

future research. Investigating (post)graduate students' perspectives on mobile technology learning possibilities and benefits is an ongoing research issue.

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