



Motivation and MOBILE Devices' Usage at School: Pupils' Opinions

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Abstract: This study investigated junior high school pupils' opinions on motivation and mobile devices' usage at school. The sample consisted of 179 pupils aged 13-15 years old, in a state experimental school in Greece. The majority of pupils believe that mobile devices (e.g., mobile phones, tablets) are an incentive for learning, mainly because these help in searching for information, they are interesting, they help pupils in understanding the concepts and in completing the school assignments. The school subjects for which many pupils would be more interested, in case mobile devices were used in the classroom, were physics, mathematics and history. The examples of learning activities (or functions) with mobile devices in the classroom, as stated by pupils, were mainly those pupils are familiar with (searching the internet, using the calculator, the stopwatch and the dictionary). Implications for school practices are discussed.

Keywords: Mobile Devices, Motivation, Mobile Learning, Pupils' Perceptions, Adolescents

1. Introduction

Mobile technologies, such as mobile phones, smart-phones, tablets (tablet PCs), laptops and personal digital assistants (PDAs) have attracted the attention of the educators and researchers [1-6] to consider their pedagogical implications. Mobile/portable devices connect their users to a mobile web with multiple applications, are light enough, and might influence how learners learn. Examples of their uses include communication, casual entertainment, navigation, capturing objects and events and accessing web-based information. Evidence reports on the high penetration rate of mobile devices and their high popularity among the school-age population, particularly in the teenage years [7-8]. The educational use of mobile devices (MD) is often referred to as mobile learning, with the focus on facilitating and extending the reach of the teaching and learning [9-10, 8, 3-4] such as knowledge construction, information collection and exchange, collaborative learning [11], independent learning [12] and lifelong learning [13]. For example, in the study [10], pupils used mobile phones for inquiry-based learning to allow learners to gather information during school visits to museums, while in study [4] 14-15 years old pupils used web-based software to support science inquiry learning in a semiformal context. Various factors may influence the usage and the

effectiveness of mobile learning [14-17]. Pupils' computer attitudes and self-efficacy were basic factors which determined the success of pupils' participation in mobile learning.

Among the motivating aspects when learners use MD are the sense of ownership, the control over their own goals and the freedom to define the activities - tasks they wish to engage in [3]. Ownership and mobile devices' usage in schools might increase motivation to study [18] via, for example, the use of applications that encourage involvement/engagement, interaction, collaboration and manipulation of materials. It is noted that technology rich contexts is one factor among others (pedagogic practices etc.) in the complex issue of technology use/integration. Previous studies revealed that the attitude towards a new technology plays an important role in its acceptance and usage [19]. Pupils' attitudes and opinions towards MD are essential issues to be investigated, because the attitudes are expected to affect pupils' motivation, interests and performance in mobile based environments. Pupils' attitudes towards using mobile devices may influence the motivation and the interest that pupils apply to using mobile devices, and this, in turn, may affect their performance in mobile-based learning environments [7]. The purpose of this study was to investigate junior high school pupils' opinions regarding

motivation and mobile devices' usage at school.

2. Literature Review

Although prior studies highlighted students' attitudes towards MD or learning, only a few studies have investigated this topic from the pupils' motivation perspective. These, are briefly discussed below and summarized in Table 1.

Study [20] examined elementary and high school pupils' attitudes towards mobile devices. Across all grade levels, about one third of the sample reported they were "early adopters", while over 50% of the sample would like to use mobile devices more often in the classroom. Pupils at all grade levels felt that tablets make learning more fun, help them to do better in class, and to learn in a way that is best for them. Study [21] investigated University students' perceptions towards the use of mobile devices to create personalized learning experiences outside the classroom. The participants had generally positive attitudes towards the use of MD for learning, they demonstrated ability and willingness to use their MD in projects, but they also identified some barriers. A recent study [22] investigated Greek junior high school pupils' attitudes and self-efficacy of using mobile devices. Pupils' attitudes were positive; also, higher self-efficacy was linked to positive perspectives and feelings, to greater willingness to use mobile devices, and to favorable perceptions towards their independent control.

A recent research synthesis regarding the effects of integrating mobile devices into education on students' learning performance [23] indicated that researchers mostly studied students in higher education, while with regard to their pedagogical roles, most research has used MD primarily as a reinforcement tool to stimulate motivation and strengthen engagement. Study [18] investigated the academic achievement and motivation of sixth grade social studies students when incorporating mobile devices into the classroom. Although no effect of mobile learning on higher academic achievement was found, the findings encourage

the use of mobile devices due to their effect on motivation, which may offer an interactive classroom environment where students feel enthusiastic and eager to learn. Study [24] analyzed the role of mobile devices for the development of pupils' motivation and concentration. The pupils indicated that the mobile devices improved and fostered their motivation to study, but they were also aware of the possibility of distraction caused by mobile devices. Pupils' views characterized mobile devices as "helping and using" (e.g., looking for and finding useful information), as "taking pleasure in learning", and as "distraction/concentration" (potential factor of distracting concentration). A large scale survey [25] in secondary schools using iPads in Canada, found students divided over key benefits with a quarter to a half of them mentioning access to information, quality of student presentations, creativity and motivation. In study [26] 90% of high school pupils stated that the mobile devices had proven useful particularly in learning English. Study [7] observed the impact of using individual communication technologies (SMS, email and online forum) on student learning motivation and performance and indicated that when SMS was combined with internet communication media it could significantly increase students' motivation.

Study [27] reported that, in teachers' viewpoint, mobile learning had a positive effect on motivating secondary school students towards mathematics. They found a direct and significant relationship between utilization of mobile devices and secondary school students' motivation towards mathematics. Educational applications for mobile devices motivate the students and engage their attention while focusing on solving problems, improving their memory, their reading and writing skills. Study [28] investigated students' engagement in technology-mediated learning. Among others, engagement is linked to the degree of pupils' interest, motivation, concentration in learning, and reinforces the incentives for learning.

Table 1. Findings from studies regarding attitudes towards MD and motivation.

studies	sample	findings
[20]	elementary & high school pupils	attitudes: 50% would like to use MD more often, views for tablets: help in class, they are fun
[21]	University students	positive attitudes, willingness to use MD, identification of some barriers
[22]	high school pupils	positive attitudes to MD & high self-efficacy (affected willingness to use MD)
[23]	elementary to University level (research synthesis)	MD usage as a tool that stimulated motivation and strengthened engagement
[18]	6th grade students	MD enhanced motivation (no effect on academic achievement)
[24]	secondary school pupils	views: MD fostered motivation to study, awareness of MD causing some distraction
[25]	secondary school pupils	views: identified benefits & distractions of MD
[26]	high school pupils	views: MD useful for learning
[7]	high school pupils	SMS & internet communication affected motivation
[27]	teachers' views	MD effect on pupils' motivation in maths

3. Research Questions

The aim of this study was to investigate junior high school pupils' opinions about motivation and mobile devices' usage

at an experimental school. This study constitutes part of a larger project in this school; earlier, during 2016-17 study [22] revealed pupils' positive attitudes and high self-efficacy in using MD. The results of this study are expected to be useful for this school's practices/policy regarding mobile learning.

The research questions of this study were: (1) What are pupils' opinions about using mobile devices as an incentive/motivation for learning? (2) What are pupils' opinions about the school subject(s) they would be more interested in, if they were using a mobile device in the classroom? (3) What are pupils' opinions about the learning activities that can be done with a mobile device in the classroom?

4. Methodology

4.1. Context of the Experimental School and Sample

The context of the experiment school in Greece is briefly presented here, with more details in study [29]. The policy of this school encourages the trial of new programmes of studies and new teaching tools/methods, while any empirical evidence produced is expected to provide feedback for the improvement of the educational policy in Greek schools. Regarding ICT, the curriculum provides guidelines for computer use in various subjects, but there are no references to mobile devices. School policy regarding mobile phones, is the same for all public (state) schools in Greece, including experimental schools. Secondary school pupils (aged 12-18) are prohibited from using mobile phones during school day (both during class time and intervals), but they are allowed to carry their phones with them in a "switch off" mode. Major causes of restricting mobile phone use in schools are the protection of privacy (e.g., pupils taking photos of their peers/teachers in the classroom) and the possibility of sending messages that can lead to cheating. In this school, many teachers incorporate in weekly basis ICT/computer use in their lessons (either in computer lab or by carrying their laptop in the classroom). Additionally, pupils' mobile phones are occasionally used, under teachers' supervision, during the extra-curricular activities (e.g. participation in after-school clubs and projects), while tablets are not used at all in the school environment.

The sample consisted of 179 junior high school pupils of a state experimental school in Greece. The age of pupils ranged from 13 to 15 years old (45.3% were aged 13-14 and 54.7% were aged 14-15). Regarding sample selection, the aim was to include all pupils attending the 2nd and the 3rd year of the high school (i.e. pupils who had experienced this school's environment), while the 1st year (ages 12-13) was excluded. Demographic and individual characteristics of the sample (age group and grade, gender, years of accessing the internet via a mobile device) are shown in Table 2. All pupils have access to a computer at home and possess a mobile phone. The frequency of mobile phone use was reported to be "daily" for all pupils, while most of them have more than three years experience of accessing the internet via their mobile device. The questionnaire was administered at the beginning of the academic year 2018-2019, during class time, with the teacher present. The response rate was 100%, the responses were anonymous and the pupils were assured that there was not right or wrong answer.

Table 2. Demographic and individual characteristics of the sample.

Age group	
13 – 14 years old (2nd year in school)	(45.3%)
14 – 15 years old (3rd year in school)	(54.7%)
Gender	
Male	(51.8%)
Female	(48.2%)
Years of accessing the internet via a mobile device	
2 years	(11.73%)
3 years	(20.67%)
4 years	(19%)
5 years	(13.97%)
6 years	(11.73%)
7 years	(8.38%)
> 8 years	(11.17%)
Frequency of computer use at home	
Less than once per month	(8.7%)
Monthly (2-4 times per month)	(15.1%)
Weekly (2-4 times per week)	(32.9%)
Every day (daily)	(43.1%)

4.2. The Research Instrument

A form consisting of three open ended questions was developed by the researcher and it was used as data collection tool in this study. The following three questions were given to pupils. (1) Do you think mobile devices (e.g., mobile phone, tablet) are an incentive / motivation for learning? Yes/No. Explain the reasons. (2) For what school subject(s) would you be more interested if you were using a mobile device in the classroom? (3) Write examples of learning activities that you think (you know) can be done with a mobile device in the classroom.

5. Results and Discussion

With regard to the first question, most pupils (80.4%) expressed the opinion that the mobile devices (e.g., mobile phone, tablet) are an incentive/motivation for learning. Pupils' reasons (for answering 'yes' or 'no') are shown in Table 3. Examples of pupils' excerpts were as follows: "*Via the mobile we can search in sites to learn various things that are not shown/presented in books*", "*Pupils are using the mobile devices in their daily lives. They would be interested in using them in the classroom as well*", "*By using the internet we get help for school work. For example, if we have a group assignment, we could search Google from our mobile phones, to find interesting information*", "*It would be interesting and less boring, if we kept notes on our mobile phones*", "*It is an incentive, I continually search (the internet) for the translation into Greek, and also for synonyms*", "*It is an incentive: it is a new way to learn. It is a device we all know to use and we feel closer*", "*All pupils like using mobile devices; as a result they will become more interested in learning with them (paying more attention in the lesson)*". The reasons given by some pupils who believe that mobile devices are not an incentive for learning were: "*It*

is not an incentive. There is a lot of addiction, and the books are more preferable”, and “Mobile devices are not an incentive for learning; it is a way to relax at the end of the day. Internet is addictive and, as a result, pupils will not put their minds to think”. According to the above, there is an agreement with earlier research [18, 24] in that mobile devices are an incentive/motivation for pupils’ learning, and that “searching for information” was the most frequently reported reason by pupils (similar to the studies [24-25]). A popular and attractive for adolescents’ mobile devices feature/function is the wireless and instant access to the internet: pupils engage in a range of online activities such as internet surfing, managing e-mail, playing games and

communicating via social network sites [30]. The advantages of using mobile phones for school work as pointed out by Tanzanian secondary school students included finding further information via the internet, access to pictures that ‘explain better’ and greater flexibility than textbooks [31]. Thus, there is an agreement with earlier research regarding the usefulness of accessing the internet via mobile devices [31], as well as the stimulation of pupils’ interest [28]. In parallel, some pupils are aware of the possible distraction that can be caused by the mobile devices in the classroom (agreement with the study [25]), an issue that raises the important role of the teacher (discussed later).

Table 3. Pupils’ responses to the first question.

Yes – they are an incentive for learning (80.4%)	Number of references
searching for information (e.g., Wikipedia, Google)	39
it is interesting (e.g., e-class)	35
they help understanding the concepts (enriches learning)	15
they help in (completing) school assignments	15
it is pleasant (less monotonous) to learn via entertainment	11
it is a new way of learning (innovative)/ technological advancement	10
adolescents are familiar with mobile devices	10
No - they are not an incentive for learning (19.6%)	
they do not help – they distract pupils’ concentration	15
they are only for entertainment (e.g., for games, chatting with friends)	10
they are not necessary	4
the value of books will be lost	2

With regard to the second question, pupils’ responses are shown in Table 4. Examples of pupils’ excerpts were as follows: “In mathematics, because we can do the mathematical calculations more quickly, to save time. In physics for an experiment where we need to measure time with accuracy - the subdivisions of the second”, “In history, for example, we can use the internet to see pictures relevant to the lesson we study”, “Mobile devices are useful in subjects, where there is a need to carry out complex and large actions/exercises”, “In mathematics and in physics, we can be certain that our actions/calculations were correctly done. In history we can search for a historic event, to see details not included in our books”, “In history we could watch a video-documentary”, “In Greek language/literature lessons it would be useful, because we could discuss topics from the news, or we could study articles from what is happening around the world”, “In information technology we could use mobile devices to facilitate the lesson, to understand it better”. It is the case that in physics and mathematics there are several free applications for Android devices (e.g., drill and practice, content presentation such as encyclopedias and dictionary). Additionally, in this school pupils have experiences with new technologies in different subjects (physics, mathematics, history etc.) and this might have influenced their responses. Study [27] found a direct and significant relationship between utilization of MD and secondary school students’ motivation towards mathematics.

Table 4. Pupils’ responses to the second question.

Subjects	references
physics	94
mathematics	92
history	80
information technology	42
chemistry	26
Greek language /literature	23
geography	13
biology	10
foreign languages	8
all school subjects	8

With regard to the third question, pupils’ responses are shown in Table 5. Examples of pupils’ excerpts were as follows: “Interactive exercises - problems, tables in excel, presentations”, “Mobile phones are useful when carrying out experiments”, “To watch an e-lesson, an experiment”. The examples of learning activities (or functions) stated by many pupils, were mainly those pupils are familiar with (searching the internet, using the calculator, the stopwatch and the dictionary). For example, in physics lessons during their 1st year in school (ages 12-13 years old), all pupils used the calculator and the timer/stopwatch tools of their mobile phones during specific experiments –when measuring the length and the time (with the permission of their physics teacher). Besides, in this school, the mathematics teacher uses,

quite often, the computer with the pupils both at school and at home (e.g., e-class, online exercises). There is also a similarity between specific activities reported in this study and the activities reported by secondary school pupils in the study [32], in Sweden: browsing the internet for information, using the mobile phone as calculator and for translation.

Pupils' opinions in all research questions reveal that these have been influenced by pupils' school experiences: i.e., their computer use for internet searches in different subjects and their (occasional) use of their mobile phones. As a result, teachers' practices affect pupils' views about what can be done with mobile devices in the school environment. Mobile devices enable learners to access resources and information in the context where they are needed and used [33]. It is not surprising that (a) "searching for information" was the most frequently reported reason when considering a mobile device as an incentive for learning (see Table 3) and (b) "searching the internet" was reported by many pupils as a learning activity to be carried out with mobile devices in the classroom (see Table 5). The majority of the pupils are familiar with this action, since they have above two years experience in accessing the internet via their mobile phone (Table 2) and they also carry out internet searches at school, in different school subjects.

Table 5. Pupils' responses to the third question.

Activities/ functions	Number of references
searching the internet	62
using the calculator (e.g., in maths, physics)	49
using the timer/ stopwatch (e.g., in physics)	31
using the dictionary (e.g., in language)	22
for experiments in physics	8
online exercises/ problems	7
other (keep notes, read e-books)	7

6. Conclusions

This study aimed to investigate junior high school pupils' opinions about motivation and mobile devices' usage at school. Investigating pupils' opinions/ perceptions is important since motivation is linked to pupils' learning performance in mobile-based learning environments. In summary, the majority of the pupils believe that the mobile devices are an incentive/motivation for learning, mainly because these help in searching for information, they are interesting, they help pupils in understanding the concepts and in completing the school assignments. Pupils' positive opinions seem to be linked to their positive attitudes towards mobile devices. The school subjects for which pupils would be more interested in case mobile devices were used in the classroom were physics, mathematics and history, followed by IT and chemistry. The examples of learning activities that can be carried out via mobile phones in the classroom, were mainly those pupils are familiar with (searching the internet, using the calculator, the stopwatch and the dictionary). The findings of this study are expected to have implications for this school's context/environment.

The school's policy encourages teachers to implement new teaching methods, to disseminate the findings and to participate in the (self)-evaluation of the school unit. Teachers of various subjects need to be aware of pupils' opinions, so as to motivate them to carry out innovative work within a safe environment. Despite high ownership of MD, their use in classrooms is rare and the mobile learning's potential has yet to be realized. Teachers could initiate appropriate uses of mobile devices in different subjects, under the umbrella of ICT. Mobile learning activities need to be carefully designed and then evaluated, in order to provide feedback regarding mobile learning practices. Teachers' and pupils' practices influence the school's context. Recent work [34] raises the issue of ethics, suggesting a more participatory approach with all parties concerned engaging with an underpinning ethic of responsibility for safe and sensible practice. Classroom environment is critical for fostering motivation. Thus, future research is suggested to investigate further what motivates pupils to use mobile devices in the classrooms. As the mobile phone was the predominant device which was used daily by almost all pupils [35], future research aims to examine pupils' preferences on learning activities with mobile phones in the classroom, as well as their opinions on possible problems (derived from mobile phone usage) and rules that should apply. In parallel, teachers need to be educated on the benefits and drawbacks of incorporating mobile technology into their classrooms. For example, teachers by using mobile learning in class might be able to make any inflexible content of textbooks more motivating and attractive for some pupils.

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