OPEN-SOURCE TOOLS IN EDUCATION: HOW ANDROID CAN FIND ITS PLACE IN A LEARNING ENVIRONMENT

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Abstract

In the last decades, mobile devices have successfully managed to become an integral part of our everyday lives. This particular technology is progressively occupying more and more of the time we previously used to spend on desktop computers. This is especially apparent since the arrival of the Android Operating System. Among the wide variety of life-improving applications Android has in store and even those associated with entertainment, such as video games, there is a notable amount primarily focused on educational content. This particular category is addressed to both adults and children and can be easily accessed through the system's application store (Playstore). The educational applications' scope varies from teaching simple, basic subjects (e.g. the colors or the letters of the alphabet) to much more advanced topics in the form of mathematics, geography, history, foreign and even programming languages, via structured courses and hands-on practice (Scratch Junior and App Inventor are notable examples). This study aims to provide research on the use of Android and to evaluate whether mobile devices should have a place within the margins of the educational system. Concerning the Greek reality, the results indicate that although teachers are willing to include Android devices in the educational process, they often struggle to come up with innovative ideas that make use of its capabilities. Moreover, technology's absence from classrooms is usually attributed to the way education is approached by the government on a national level which, as they claim, does not contribute towards that certain goal.

Key words: *Education, Android, Operating System, Mobile Devices, Applications, Classroom*

1. INTRODUCTION

The needs of the educational process have significantly changed over the course of time. ICT (Information and Communication Technologies) are now considered a key ally for teachers, not only in the subject of computer science but in other areas as well. Students nowadays are completely familiar with new technologies, as computers, smartphones and tablets have become an integral part of their lives. Additionally, seeing how mobile devices are slowly finding their way in the educational process, the goal is to stimulate students' interest and to exploit the potential offered by such new technologies. We are given a chance to allow students to comprehend more difficult concepts and have them participate with joy in the learning process.

According to Unesco (2013), a large number of studies have shown that mobile technologies and their applications are proven to be an effective mean of expanding educational opportunities for students. Research findings (Bradley, et al., 2010)

indicate that students using mobile technologies exhibit increased motivation and that carefully designed educational activities using mobile devices prompt students to get involved.

From the perspective of teachers, their positive attitude towards the use of ICT in education, as well as their willingness to get involved with them is showcased by international and Greek studies alike (Gulbahar, et al., 2008; Kyridis, et al., 2003; Tzimogianis, et al., 2004). Teachers claim that ICT activities increase students' motivation to participate in the educational process (Kafai, et al., 2002), help develop critical thinking (Jonassen, et al., 1998; Rumpagaporn, et al., 2007) and contribute to the introduction of student-centered educational models (Diamantaki, et al., 2001).

Critical issues on the way to introduce ICT in education are, according to teachers, their overall effectiveness in learning, the obstacles they usually come face to face with and the level of control they (teachers) can have on them (Demetriadis, et al., 2003, Preston, et al., 2000; Vosniadou, 2006). Other obstacles are also highlighted, the most important of which are, the high workload and time management of education (Guha, 2000), poor administrative and technological support (Butler, et al., 2002; Slaouti, et al., 2007) and the low confidence teachers tend to showcase regarding the use of ICT (Pelgrum, 2001; Giavrimis, et al., 2010).

1.1 THE ANDROID OPERATION SYSTEM

Android is an operating system (OS) for portable devices based on the core (Kernel) of the Linux operating system. This core in specific is a typical example of open-source software. It enables the creation of innovative applications for mobile devices in a Java-like programming environment by controlling the device through software libraries developed by Google.

Android source code is distributed by Google under the open-source Apache license. The flexibility this certain form of licensing provides, allows free modification and distribution of software by device manufacturers, wireless data transfer companies, and developers who are systematically working with this particular operating system.

It was originally developed by the titular company Android, Inc. which was funded and ultimately bought by Google, back in 2005. The first commercial version of Android 1.0 was released in September 2008. The Android operating system is under continuous development by Google and a series of upgrades to the core operating system has been developed since its initial release.

1.2 HOW WIDESPREAD THE ANDROID OS IS

According to statistics published by dotMobi in 2014, it appears that Android dominates the market for Operating System Software. Among 101 countries, Android is superior in 67 (mostly emerging markets) and iOS (Apple) in 34 (western markets), while only two markets have another favorite (BlackBerry and Nokia). In the following

figure, the green color indicates where Android prevails on an international level. (Elpidis, 2014).

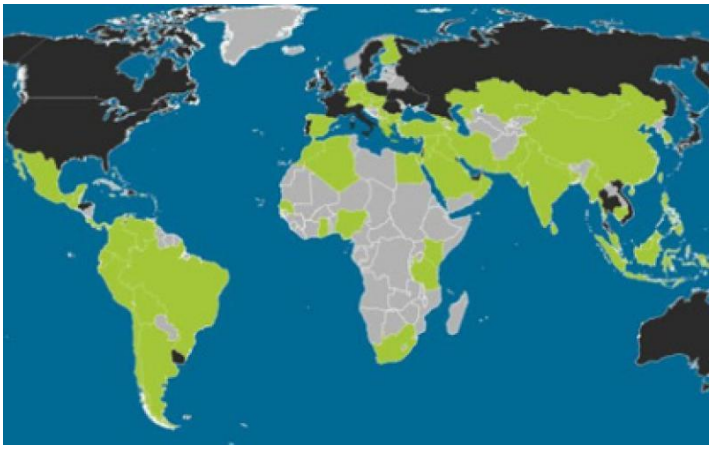

Figure 1: iOS versus Android

Furthermore, according to another dotMobi survey presented by the Device Atlas website in regards to country-specific usage of the Internet per operating system, Android is prevalent in Greece, whereas iOS is its biggest competitor.

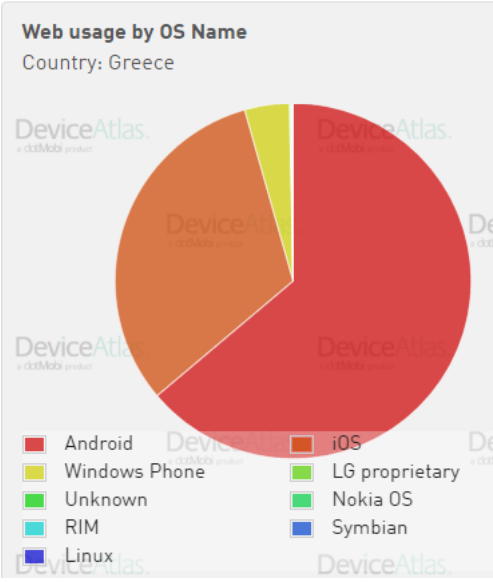

Figure 2: (Data, Device, 2016)

This is one of the main reasons why we focus on its potential and possible integration in the educational process.

2. RESEARCH METHODOLOGY

The purpose of this study is to investigate teachers' intentions regarding the use of mobile devices in education and more specifically their attitude towards the use of Android software and educational applications as a means of facilitating the learning process.

In order to conduct research, an improvised questionnaire (based on the Google Forms online platform) which included demographics-related, as well as limited choice questions was used, in order to better research the following issues:

- In what way do teachers think that open-source software can help in the learning process?
- How willing are they to use portable devices within the classroom?
- Is it acceptable to incorporate the Android software, as well as the applications it offers, in the educational process?

Through this questionnaire which was based on earlier works (Armakolas, et al., 2016 and Sakellariou, P, 2016), we tried to keep track of how teachers address open-source software, mobile devices and Android within the margins of the educational system. By using specific demographics-related questions, we wanted to assess how parameters like gender, educational level, years of teaching experience and scientific fields affect teachers' opinions.

The online questionnaire was answered by 22 teachers in total, active in both public and private education, of whom 72.7% were women and 27.3% were men. 54.5% of respondents were employed in secondary education, 31.8% in primary education and the rest (3 respondents) in other forms of education (public and private vocational education and training, adult education). The majority of respondents (45.5%) teach theoretical subjects, while the remaining 54.5% were equally distributed among scientific and technical fields. As far as their work experience is concerned, 54.5% had 10-15 years of service, 22.7% had 5-10 years, 18.2% had 1-5 years and, finally, there was one respondent who had over 15 years of service. This means that the majority of respondents were younger teachers, usually expected to be positively predisposed towards the use of mobile devices and Android as educational tools.

3. RESULTS

According to the results, the majority of teachers believe that open source software can prove useful in the learning process. Teachers in secondary education especially are more supportive of open-source software than their colleagues in other levels of education.

54.5% of respondents answered that they would systematically use mobile devices while teaching, if that was feasible. As far as operating systems are concerned, Windows is the most familiar operating system (95.5%), since it has been established for many years in school laboratories and desktop computers.

As for the Android operating system, despite the fact that the majority (77.3%) believes that there were several interesting applications for Android mobile devices that could be used in classrooms, there's a large percentage (45.5%) which has never used any Android educational application in the past.

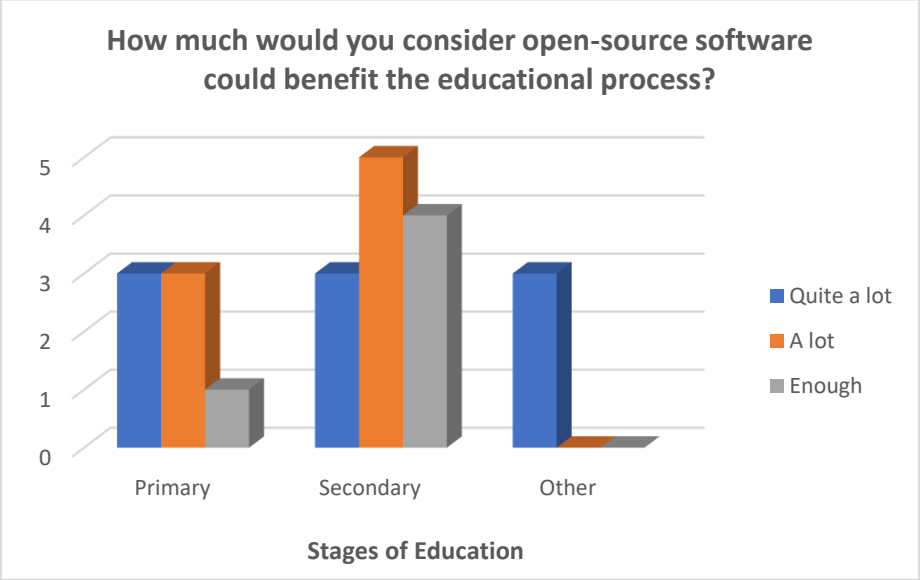

Figure 3: Teachers' view on the use of open-source software in the educational process.

Finally, in an attempt to track Android mobile devices' use in each level of education, we found that the majority of respondents in primary education had never used any application or Android software. As for secondary education, the results were very different. Most teachers claimed that they take advantage of Android and the several educational apps it provides in order to facilitate the learning process for students.

4. CONCLUSION

Reflecting on our research, it can be said that although Android is an integral part of people's everyday lives in Greece, its use in education has been rather limited. Despite the fact that there are a lot of teachers who are experimenting with the use of Android software and educational applications within the classroom, there are still many who have never done so or plan to.

However, most of them are positive regarding the use of portable devices and open-source software, even though Windows, an operating system that is considered to be closed-type, is more familiar to them. We deduce that, despite the fact that most

respondents belong to a younger generation of teachers (with less than 15 years of service), they elude from being more receptive to trying new teaching methods, such as the use of Android.

Of course, this is not entirely the responsibility of teachers, since most schools in Greece lack compatible technological infrastructure and also the current educational model does not encourage the adoption of innovative ideas in the teaching process.

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