Educational Aspects of Current Mobile Applications

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Abstract:

Relevance of the issue under study is due to the necessity of educational mobile applications in learning process.

The purpose of the article is to analyze current mobile applications on Google Android App Market in compliance with four educational aspects. The article outlines the opportunities how to use them in the learning process.

The leading approach to the study is statistical analysis, along with selection, systematization and generalization of original facts and sources, that allowed us to study Android mobile applications. The results showed deficiency of ideal educational applications.

The article may be useful for school teachers, lecturers and for self-education of the general public.

Keywords: Student, Education, Learning, Language, Knowledge, Introduction, Teaching, Analysis, Mobile learning, Educational application, Android.

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1. Introduction

New technologies changed our concepts about gadgets and education. Concept where we believe mobile or portable devices/gadgets are only for fun is changed and became one of important part of our life. Mobile device users around the world increases rapidly (ICT Statistics, 2016). Woong Ki Park in his research (Park, 2005) describes rapid increase of mobile phone usage as "a mobile phone addiction". According to survey of college students from Seoul-Korea, 73% of students feel uncomfortable if they do not have access to mobile phones (Lee, 2002). American people also show signs of addiction of the use of mobile phones and parallel it with obsession to carry mobile devices everywhere they go (Wikle, 2001). Academic communities also actively use mobile devices. Russian Public Opinion Research Center (RPORC) and "IBS" organized a survey in nine Russian federal universities which shows that 95% of academic stuff and 99% of students use mobile devices and all of the respondents are willing to use mobile applications for education (Samochadin et al., 2015). Some studies showed that integration of mobile devices in the learning process has led to increased motivation and improved learning outcomes (El-Sofany *et al*., 2014).

Mobile devices can connect us "anytime", "anywhere" with "anyone" and can give access to "any information" that we need. And thus, we aim to define possibilities of using this modern technology of mobile devices in the field of education (Baranova et al., 2016).

A lot of foreign (Fisch, 2014; Park, 2005; Roseberry *et al*., 2014; Wikle, 2001 and others) and domestic researchers (Yahin, *et al*., 2016; Pogulyayev, 2006; Eremeeva & Baranova 2016; Kuharenko, 2011; Vorotnitski *et al*., 2012 and others) are engaged in studying of mobile applications and their influence on modern society. Educational aspect of mobile applications is also studied by many researchers (El-Sofany *et al*., 2014; El-Hussein & Cronje, 2010; Hirsh-Pasek *et al*., 2015; Kim & Kwon, 2012; Kukulska-Hulme, 2007; Lee, 2002; Sharples *et al.,* 2005; Samochadin *et al.*, 2015; Titova, 2012; Golitsina & Polovnokova, 2011; Kruglov & Eremeeva, 2017 and others).

The relevance of our research is that we consider educational aspects of the selected Android mobile applications for high school pupils and students. These applications were evaluated in accordance with the four aspects of education, namely active learning, involvement in the learning process, meaningful learning and social interaction.

2. Materials and Methods

Methods of update, selection, analysis, systematization and generalization of original facts and sources, applied in the research, promoted studying of modern mobile applications. Methods of statistical analysis and data processing allowed us to study

Android mobile applications for compliance with educational aspects. Procedure of collecting data was performed by means of search applications in the category of education on Google Play Android Market. The search was carried out in November 24-25, 2016.47 applications were chosen, and their details were shown.

Google Play does not give exact number of application downloads, only provides distinct intervals of upper and lower limit. And according to this, midpoint of each interval was chosen as approximate number of downloads for each application. As Google Play provides users to rate applications and to leave comments about the experience of using the application, we, in turn, on the basis of data of 47 applications used this information to assess their popularity and usefulness.

The selected apps were categorized by age categories. And according to it, considering specifics of work of the authors, applications for senior pupils and students, and programs for students were chosen. The popularity of each category was determined by average number of downloads, rating and review by application users.

Many years of research of educational television programs showed their effect on learning many academic subjects, such as reading, math, science and others (Fisch, 2004; Fisch & Truglio, 2001). These studies revealed limitations, challenges of development and opportunities of using a multimedia screen as a tool for learning process. Hirsch-Pasek (2015) and his colleagues in their research define that an application can be educational, if it contains four aspects of education, namely active learning, involvement in the learning process, meaningful learning and social interaction.

Active learning is when a learner plays an active role both physically and mentally in the learning process. Every application demands at least some physical activity, but it also has to be reasonable or with activity that requires thinking and intellectual manipulation. Studies by Arora S. (Arora *et al*., 2011), Leopold & Mayer (2015) showed that, active learners study more efficiently than passive ones. Involving active learning into educational application can be in different forms. For instance, a learner can touch a screen, which is not a reasonable activity, he also can leaf, zoom, move a device (e.g., shake, tilt, point), talk or sing into a microphone, listen to music through speakers or headphones, and wave at a camera connected to gesture-recognition software (Hirsh-Pasek *et al*., 2015).

Participation in all forms can support learner's ability to remain interested and make the learning process more effective. Distraction is the main problem for training and to avoid this, a learner requires constant multitasking. Research in the field of multi-tasking in the context of driving and sending text messages at the same time showed that only 2% of drivers are able to perform efficiently many tasks without cognitive overload (Watson & Strayer, 2010). Any activities that aren't related to training process can distract a learner. Educational applications should support learner's involvement in the learning process. Irrelevant animations, sound effects and touching

games can attract learner's attention when activated, but they do not help the understanding of the main content, because they disturb the consistency of the learning process and learner's involvement.

Meaningful learning can be achieved if new learning experience is connected with already existing knowledge. Brown P. (Brown et al., 2014) states that "people who learn to get key ideas from new material and to organize them into mental models and to connect these models to the level of knowledge, show preferential progress in learning complex material". According to Bransford and his colleagues (1999) a learner will need the factual knowledge to develop his competence in a certain area, but for sufficiency, a conceptual framework is necessary for him to place these facts and to systematize new knowledge in a way that allows him to apply what he has learned. David Ausubel (1968) claims that true learning can be achieved if new material is connected with the content which is already familiar to a learner. Meaningful learning will motivate a learner to remain interested. In applications meaningful interactions with content that directly related to learner's life can provide effective learning process.

Studies showed that social interaction, in particular, is a key factor in the learning process. When two participants establish interaction in which the reaction of one participant is the answer for another, there is an effective learning (Hirsh-Pasek *et al.*, 2015). If this social interaction is established in an electronic format (for example, via online chat program), it gives the same good result, as well as in training a real person (Roseberry *et al.*, 2014).

Social interaction can be applied to educational applications in three ways. Firstly, several users can be engaged at the same time face to face, interacting via screen, at the same time they participate in similar activity. Secondly, users can learn using such technologies as voice or video teleconferences, together with the use of screen applications, which provide collaborative visual interaction, by means of typing texts, drawings or interactions with virtual objects. Despite the absence of direct physical contact between people, this interaction can also give the same result. Thirdly, users can interact with more realistic animated characters of applications. The use of this active, involved, meaningful learning and social interaction during learning will lead to significant result in the process of education (Hirsh-Pasek *et al.*, 2015).

3. Results

The results of our research showed that 36.36% are applications for senior pupils and students. 24.18% of educational applications are designed for schoolchildren. The main object of interest for developers were math (17,58%), programming (13,19%) and productivity (12,09%). There was surprisingly large amount of math applications pre-school children (8,79%). The most popular educational application was Skype, which can be used for online classes. But if we consider programs which were developed for educational purposes only, the leaders were "RealCalc Scientific

Calculator" and "Photomath – Camera Calculator". Both of them were downloaded about 30 million times.

Using rating as a proxy for quality, the average ratings of the applications were 4.28/5 (average) and 4.40/5 (median). The lowest average rating of 3.5 was recorded for Dnevnik.ru; it might be because that application was only for commercial use. The highest rated applications were for senior pupils and students (4.49/5). Other high rated applications were for university students (4.32/5). The lowest rated educational applications were for pre-school children (3.97/5). The highest rated application, that teaches programming, was titled "Learn Python" (4.8/5); in the second place was "Learn C#"; in third place was "Division Calculator".

So, we will focus on the applications which were divided into two categories in terms of age-related approach, namely "senior pupils and students" and "students". As for percentage statistics of applications from all the analyzed applications, in the category "senior pupils and students" the following turned out (in descending order):

1.   Programming – 10.99%;
2.   Language learning – 6.59%;
3.   Productivity – 5.49%;
4.   Biology – 3.30%;
5.   References and Online courses – 2.20% each;
6.   Chemistry, Exam preparation, Math, Physics and Useful tools – 1.10% each.

In the category "students" there was the following:

1.   Online courses – 5.49%;
2.   Productivity and References – 3.30% each;
3.   Citation – 2.20%;
4.   Online conferences and Useful tools – 1.10% each.

Approximate number of downloads of each application allowed us to determine popularity of the applications. Let's have a look at the results of statistical analysis of approximate applications loadings in the category of "senior pupils and students" (in ascending order):

1.   Physics – 75,000.00 (mean loads);
2.   Chemistry and Exam preparation – 300,000.00;
3.   Biology – 1,125,000.00;
4.   Programming – 1,582,500.00;
5.   Useful Tools and Math – 3,000,000.00;
6.   References – 15,375,000.00;
7.   Language Learning – 23,625,000.00;
8.   Productivity – 67,800,000.00;
9.   Online courses – 376,500,000.00.

The results of statistical analysis of approximate applications loadings in the category of "students" (in ascending order):

1.   Citation – 300,000.00;
2.   References – 1,200,000.00;
3.   Productivity – 2,025,000.00;
4.   Online courses – 2,550,000.00;
5.   Online Conferences and Usefull Tools – 30,000,000.00.

Google Play allows users to rate applications and to write a review about experience of using applications. Users can estimate each application, giving them rating from one to five. According to the results of statistical analysis of users' estimation in the category "senior pupils and students" we found out that Exam preparation and on Physics got the highest point (average rate 4.70), then was Programming (4.67), Useful tools (4.60), Chemistry (4.50), Language learning and References (4.45), Biology (4.40), Online courses (4.35), Productivity (4.28), Math (4.00). In the category "students" the highest rated applications were Online conferences (4.60), Productivity and Useful tools (4.50), Online courses (4.34), References (4.20), and the last was Citation (3.95).

The most "educational" applications were "Skype – free IM & video calls", "Brainly: Study & Homework Help", "Coursera: Online courses", "Ready4 SAT (Prep4 SAT)", "EdX - Online Courses" and "RefME - Referencing Made Easy".

According to the results of the analysis only six of forty-seven applications correspond to the criteria of four aspects of education. Only one aspect is reflected in the majority of the applications, while the other three are ignored. This analysis showed deficiency of applications that would be ideal for the educational process, and prove the need of educational applications that would actually teach learners. Besides, it became obvious that difficult subjects can also be interesting for learners, if applications are created properly for them.

4. Discussions

The educational applications selected for the analysis were in three types: free of charge, free and trial, and paid. The statistical analysis of applications loadings by three types of acquisition showed, that in the first place was free of charge, in the second place was free and trial version and paid, respectively, was in the third place. And it was not surprisingly for the selected age categories.

During the analysis of the applications in compliance with the four educational aspects, the apps were divided into two categories: "satisfactory" and "unsatisfactory". Due to the absence of applications that are ideally suited to the criteria of the four aspects of education, there are only two categories. The applications, which got more than fifteen points out of twenty, were classified as

"satisfactory", and the applications with less than fifteen points were categorized as "unsatisfactory" educational applications. Some applications were disadvantageous from the aspect of social interaction, where learners could only enter data and receive results. Some applications were bad from the aspect of involvement in the learning process, as they have a lot of advertising that interfere with the learning process. The statistical analysis of the applications in compliance with the four educational aspects by Hirsh-Pasek showed, that in the category "senior pupils and students" Exam preparation and Online courses were the best. In the category "students" Online courses were in the first place, in the second was Citation.

5. Conclusions

Mobile devices exist in life of almost everyone. In case of the correct use, this technology can provide a set of benefits.47 educational applications from Google Play were analyzed in this article. On an average, the educational applications were downloaded 1,5 million times, the average ratings of the applications were 4.28 out of 5, most of them are free of charge and most of them do not correspond to the four aspects of the educational process by Hirsh-Pasek. Despite many benefits of the educational applications for society, there are also concerns about whether they really teach us.

For future research it is possible to analyze applications in greater quantities. Other platforms, such as iOS and Windows can be also analyzed. As education has moral aspect, future research can be conducted to analyze how moral values are applied in educational applications. Further research can be focused on the analysis of mobile applications not only for senior pupils and students, but also for preschool children, for elementary and secondary school pupils, and also for adults. In our opinion, they will give complete idea of educational applications for users of various ages, as life-long learning is especially significant nowadays, and mobile applications promote its modern effective implementation.

Summing up the result of the aforesaid, it is possible to state the absence of scientific works where the analysis of Android mobile applications for senior pupils and students is made in point of educational aspect, and that could become an independent subject of research. Meanwhile, such a research would reveal even greater productive opportunities of mobile applications in educational field. The results of the research can find application in any educational institutes, in preparation of electronic educational resources on any subjects, and also in improving pedagogical culture and self-education of the general public.

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