THE EVOLUTION OF USAGE OF SMARTPHONE IN EDUCATION

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Abstract

The popularity of smartphones around the world during the last fifteen years has increased significantly, and users of these devices now explore new avenues to access, store and disseminate information. Although smartphone sales have reached a saturated stage, the sheer amount of smartphone models still introduced to the market remains impressive. Furthermore, new smartphones have become more and more powerful with more functionality. As a result, users of such devices utilize them to process more information. Furthermore, the availability of more mobile apps makes these devices very attractive for learning and exchanging ideas. For sometimes, the educators around the world have examined advantages and disadvantages of using smartphones in education. On one hand, the massive popularity of smartphones allows smartphones to potentially be an accessible medium to exchange educational content. On the other hand, the negative effects of smartphones cannot be overlooked. In this study, first, we attempt to take a balanced approach for the use of smartphones in education by pointing out major barriers and benefits of using smartphones in education. Then, based on our discussion it is reasonable to conclude that the smartphone has become increasingly popular in an educational setting since it promotes a stronger and more efficient learning environment. Finally, we provide several reasons which make the usage of smartphone in education not only justifiable but, to some extent, inevitable.

Keywords: Smartphones, New Apps, Ultra Wide-band Wireless (5G), and Cloud Computing.

1 INTRODUCTION

During the last couple of years, it has become increasingly popular to use mobile devices in an educational setting in order to promote stronger and quicker learning for students. This phenomenon which is often referred to as “mobile learning” has become prevalent at different levels of education. Mobile learning is defined as “using portable computing devices (such as iPads, laptops, tablet PCs, PDAs and smartphones) with wireless networks, enabling mobility and mobile variation related to instructional approaches, disciplines, learning goals, and technological tools.” Among the mobile devices, the smartphone has become more and more popular due to its functionality and convenience.

Having said that, it is important to use a realistic approach and discuss major disadvantages and advantages of using smartphones in education. To do so, first we briefly discuss background information about smartphones. Then, we point out existences of barriers using smartphones in education. Finally, we point out major opportunities which make the usage of smartphones not only justifiable but to some extent inevitable.

A “smartphone” is defined as a mobile phone that performs many of the same functions as a computer [4]. It typically is controlled through a touchscreen interface and runs with the use of an operating system that allows internet access as well as the download and use of applications, commonly referred to as “apps.” Mobile phones were first invented in 1973 by a Motorola employee, and consisted of a much larger unit than we see today [3]. The phone weighed close to 2 ½ pounds, a drastic difference from the mere ounces that most phones now weigh. The construction of the first-generation cellular network began in 1979, and the first consumer mobile phone was released in 1983. These phones and networks continued to develop and adapt over the next twenty to thirty years as they grew to be a common factor of most households in addition to existing landlines. Construction on the second-generation cellular network began in 1991, and increased speed and reliability of cellular coverage. Phones continued to develop and become far more advanced, and in 1992 the first “smartphone” was released by IBM. The term “smartphone” was coined due to the fact that the device was “smarter” than a regular phone and could complete additional computing tasks rather than just placing and receiving calls. Just as with the original mobile phone, the sale of smartphones began to rapidly rise each year as their processing power has continued to increase exponentially. Back in 1969, the Apollo 11 moon landing occurred, and was assisted by one of the earliest computers in existence: the Apollo Guidance Computer (AGC). By comparison, today’s smartphones are more powerful than the AGC. Technology has advanced more than most people ever thought possible, and
computing performance has increased by close to 1 trillion-fold over the last sixty years. Information today is available at the blink of an eye, and ease of access has never been greater. Rather than having to take a trip to the library, or conduct a lengthy search of an encyclopedia, a smartphone can be used to quickly browse the web and locate the answer to almost any question in seconds. The abundance of information on any topic is overwhelming and humans have become more and more dependent on these devices to access information instantly almost at any time and from anywhere. In the next two sections we discuss benefits and barriers which educators face when they are dealing with using the use of the smartphones in education.

2 BARRIERS OF USING SMARTPHONE IN EDUCATION

In this section we discuss several barriers and obstacles that the educators face regarding using the smartphone in education.

2.1 Sources of Distraction

Some educators believe that smartphones can be a source of distraction in an educational setting. Constant notifications of messages, e-mails plus ring tones noises have been cited as a major source of distraction. While cell phones are in use, notifications will constantly go off. Students become distracted during the day without even noticing they are. A research study published by the London School of Economics [1] examined the impact of banning mobile phones at schools on test performances. Researchers found that students in schools with phone bans earned higher grades. Furthermore, the low-performing students benefited the most of banning cellphones.

2.2 Misusage of smartphones

These days, smartphones are very resourceful. Generally speaking, constant connection to the internet from anywhere makes the smartphones a valuable source to retrieve the latest information about any subject. Therefore, in a matter of a couple of seconds, huge amount of data can be accessed from anywhere by smartphone owners. Obviously, students can access the latest information in a couple of seconds and answer any questions that they do not know the answers to. Some research studies supported this notion. The Beneson Strategy Group [5] showed that 35% of teens have admitted using their cell phones to cheat.

2.3 Technical Issues

For years, two main operating systems have been used on the majority of all smartphones in existence; Android, which was created by Google, and iOS which is distributed by Apple. In 2019, according to IDC [7], Android market share is 86.8% while the iOS market share is 13.2%. Having two totally different operating systems may pose a challenge for using different apps. Indeed, it can be argued that these two operating systems are functioning quite differently. Android follows an open-source model whereas iOS follows a closed-source model. In an open source system, such as Android’s, the source code is made available publicly for non-commercial use online since their priority is not to sell the software to consumers but to sell the permissions to use their software to hardware companies. It is in Android’s best interest to keep all their source code available for developers to improve upon as it will provide more exposure to skilled developers who are willing to contribute to the community. As a result of this policy, during the last several years, the number of Android users increased drastically. Further discussion of this policy reveals how Android has become such a dominate force in smartphone operating system. First, since Android is freely available to hardware companies, hundreds of companies have adopted the platform and they were able to develop some amazing smartphones. Second, many users embrace the idea of software versatility and flexibility of Android. Third, since Android is open source, then many software developers work on developing different application programs, so a huge number of application programs are developed for Android based smartphones without effort on the part of parent company.

Apple’s scenario, however, is quite different than that of Android’s. Since Apple produces a highly integrated product, it is not in their best interest to allow their software to the open-source because through integrating their software and hardware, they have a better control on all aspects of their products so they can bundle them as packages. Obviously, this approach makes Apple in control of all stages of production of its products. Any modification or change must be approved by Apple after rigorous testing.
3 BENEFITS OF USING SMARTPHONES IN EDUCATION

In this section we summarized several important benefits regarding using smartphones in general and in education in particular.

3.1 General Availability of the Smartphone

The phones have come a long way from when they were first invented and until recently, the market for smartphones expanded each year. People who did not own phones were purchasing smartphones, and people who owned regular cell phones were often upgrading to smartphones. Figure I below provides number of cellphones worldwide [11].

![Figure 1. Worldwide Smartphone usage over time (2009 through 2022)](image)

As seen on the figure above, the upside trend continued for several years, but recently the number of smartphones sold has started to level out. Over the past three to four years, the majority of the market for smartphones has switched to customers who purchase them to replace their existing unit, rather than upgrade to a smartphone for the first time.

3.2 Potential Availability of Smartphone to the College Aged Group

To get a better understanding of the potential usefulness of smartphones in education, a breakdown of the usage of smartphones based on age can be helpful. The following table summarizes the market penetration of cellphones and smartphones in the USA in 2018 [10].

<table>
<thead>
<tr>
<th>Ages</th>
<th>All cellphone</th>
<th>Smartphone</th>
<th>Cellphone, but not smartphone</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-29</td>
<td>100%</td>
<td>94%</td>
<td>6%</td>
</tr>
<tr>
<td>3-49</td>
<td>98%</td>
<td>89%</td>
<td>9%</td>
</tr>
<tr>
<td>50-64</td>
<td>94%</td>
<td>73%</td>
<td>21%</td>
</tr>
<tr>
<td>56+</td>
<td>85%</td>
<td>45%</td>
<td>40%</td>
</tr>
</tbody>
</table>
As Table 2 shows the 18-29 age group has the highest exposure to the smartphone (94%) in the United States. This group is university aged group and obviously their high exposure can provide an excellent opportunity for educators to take advantages of resources that are available on smartphones. Users of smartphones are connected to Internet and each other at all times of the day or night. In 2018, a survey was taken that showed nearly 80% of students use a mobile device in some fashion in order to complete their studies [8]. This is a staggering percentage and nearly 50% of students said they use their smartphones in order to access readings and communicate with their teachers. A mere 10 years ago, these numbers would have been a fraction of what they are today, and it seems as if this trend is going to continue to grow in the near future. Smartphones today contain immense amounts of assorted data as well as different apps that can facilitate the access of information in a few seconds.

3.3 The Availability of Educational Apps and Digital Learning Platforms on Smartphones

During the last several years, software developers introduced enormous amount of applications available for the mobile devices in general and for smartphones in particular. In June 2015, there were over 80,000 educational apps available in the app store [9]. In just four years we have seen an impressive increase in the number of educational apps, and it reached over 500,000 in 2019 [6]. Although one may argue designating an app as an educational app is a self-reported process, however one cannot dispute that thousands of high-quality educational apps are available usually free of charge and in some occasions for nominal fees. In 2019, there are hundreds and hundreds of options of educational apps and services such as Quizlet, Dropbox, Wikipedia, Evernote, and Chegg to name a few. There are also standalone learning platforms that have many different aspects of mobile education built into them such as MindTap by Cengage, Blackboard, and MyLab by Pearson. These platforms are far more comprehensive and include many smaller services such as flashcards or message boards between the class. Some educators are actually using these apps and platforms in the physical classroom and are incorporating it right into their lessons. Items that can be accessed by students and educators alike are explored together and if the educator needs to emphasize any specific portion of the apps, they can instruct their students how to use it. Consequently, accessing learning resources at anytime and anywhere can help educators to disseminate information to larger audiences.

3.4 Availability of Mobile Friendly Web Sites

Mobile friendly web sites are designed to be accessed by the mobile devices. Usually, they use the same web address, uniform resource locator (URL), as the original web site. However, these web sites are capable of recognizing the device that it is accesses them and can make appropriate adjustments and scale to any sized device from the desktop down to smartphones (via responsive web design). In October 2016, mobile traffic officially surpassed desktop traffic on the internet. Recent survey revealed that in 2017, 70% of Internet access was through smartphones [2]. It is expected that the smartphones will be used for 80% of internet access by 2019. Improvements in technology have helped accelerate mobile access to the internet around the world. Indeed, what used to be named “mobile internet” is now just called the internet.

3.5 Availability of Cloud Computing

Smartphones can access cloud computing and as a result they can have unlimited storage capacities. An enormous amount of information can be stored on the cloud and instantly become accessible by mobile devices. This phenomenon overcomes the obvious disadvantage of smartphones compared to more traditional computing devices such as desktops. Consequently, the smartphone users can store data and accessing an enormous amount of information on the cloud.

3.6 Innovation of Ultra Wide-band Wireless Network

In 2019, the next generation of networks are slated to begin rolling out. This new network, called Ultra Wide-band Wireless or 5G will offer the fastest speeds ever offered and more reliable connections for devices utilizing it. The average speed of 5G is estimated to be close to 1 gigabyte per second for download compared to speed of current smartphones networks which is anywhere from 5 to 12 megabytes per second. This will allow a much higher rate of data transfer and productivity using smartphones as they will have a data speed equivalent to that of an Ethernet cable just a few short
years ago. 5G networks differ from 4G in numerous ways but, at a basic level, while the speed of 5G network far surpasses that of the 4G network, the coverage area provided for 5G is significantly more limited than that of 4G [12]. The higher the Internet speed of smartphones, the more desirable these devices become in education.

4 CONCLUSIONS

In a fairly short lifetime, smartphones have gone from a rare, novelty item to a common necessity for a large amount of the world. They are now incredibly powerful devices and almost anything can be accomplished by using them. Using smartphones in education has been focus of many studies for several years. Opponents of using the smartphone argue that distraction, misusage of smartphone in educational setting, and lack of uniformity of smartphones as major obstacles for using smartphone in education. However, it can be arque that these barriers are becoming less and less important. Since new technological advances plus adapting a robust policy regarding using smartphone in educational settings can overcome many if not of all these obstacles. For example, on the surface, existence of different operating systems on smartphones may pose technical problems in regard to availability of different apps. However, lately this is not a problem in practice since overwhelming majority of educational apps have become available on both systems. Also, regarding distraction and misusage of smartphones in educational settings, a robust and clear policy can create an environment that minimizes if not totally eliminates these issues. In actuality, they may provide even less distraction as there are steps that can be taken in order to minimize what can be performed on the network and device. Certain websites or applications can be restricted in order to limit the scope of what the devices can do and keep the students focused. These days, also the digital learning has become more prevalent. Indeed, it can be argued that the digital and interactive learning are proved to be far more beneficial to the students rather than the traditional style of either lecturing or teaching by using PowerPoints which can become extremely monotonous and students can lose interest quickly. Students also have access to a much broader spectrum of content and information when they use smartphones. While there are some educators who still do not believe in using smartphones in educational setting, this number is continuing to shrink. In 2019, it has become increasingly more popular to use smartphones in an educational setting in order to promote a stronger and quicker learning environment. Indeed, it could be argued that advantages of using smartphones are out weighing its disadvantages significantly.

REFERENCES

[10] https://www.pewinternet.org/fact-sheet/mobile/