Smartphone usage for learning among postgraduate students

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Abstract

This study explores the numerous effects smartphones have on learning among postgraduate students. Research objectives were formulated from the gaps in literature which comprise of exploring influential factors, pros and cons along with academic performance, which surround smartphone usage in an educational setting. Moreover, this study followed a cross-sectional research design consisting of a purposive sampling technique. Template analysis was conducted on data collected via telephonic interviews. Altogether, the results revealed that 40% of respondents believe that the internet is a key influential factor when it comes to using smartphones for educational purposes. In addition, many of the benefits and drawbacks of smartphone usage in learning were highlighted by the students. Seventy per cent vouched for being able to learn while away from laptops whereas 60% said it was distracting. Plus, 80% of respondents perceive that smartphone usage does not have an impact on their academic standing. They associated more importance to the primary ways of learning through computers and laptops. Assessments were also drawn using popular theoretical concepts like Goodhue and Thompson's Technology-to-Performance Chain (TPC) model. Henceforth, this study has enriched the existing literature in terms of novel contributions. It is recommended that future researchers conduct experiments on a larger sample size to further enrich smartphone literature.

Keywords: *e-learning, handheld learning device, learning, smartphone, students*

Introduction

One of the biggest technological revolutions of the 21st century is the Smartphone which has changed the way we communicate and interact with the world. Many functions of a computer are now packed into our palms owing to the rapid advancements mobile phones have made over the decades. Bangladesh is no different when it comes to experiencing the mobile revolution. At present, Bangladesh has around 85 million mobile subscribers with a penetration rate of 51%. It is expected that the number of subscribers will cross 107 million by 2025 (USAID Bangladesh, 2019). The goal in this study is to observe how academic learning is impacted by smartphones. Crompton et al. (2017) narrated that 62% out of 113 papers analyzed showed constructive learning was facilitated by using mobile phones. In terms of research in this field in Bangladesh, many papers have examined various aspects like smartphone addiction, motivations, etc. among undergraduate students (Ahmed et al., 2020; Al-Zaman, 2019; Hossain and Ahmed, 2016). However, postgraduate students have been largely ignored. There are still many questions to answer; hence, this particular study aimed to shed some light in this sector of learning through smartphones.

The main reasons for undertaking this research require discussion. Primarily, most of

the reviewed literature focuses on the quantitative aspects of this sector. Therefore, this study will look at the qualitative side of things in terms of collecting data and analysis. It must be noted that, all the objectives of this paper were assigned with respect to the recommendations made by previous researchers in this field. For instance, Ng et al. (2017) stresses that there is a crucial need to understand the underlying mechanism of using smartphones as a learning tool. Yi et al. (2016) also states that environmental and cultural factors which impact academic smartphone usage must also be investigated. The foundation of the first objective was derived from these sources and will try to unearth why students are inclined to use smartphones as a learning companion. Moving on, a study on using mobile phones to improve educational outcomes in Asia highly advised to further explore the various impacts of mobile learning in developing countries such as Bangladesh (Valk et al., 2010). Alfawareh and Jusoh (2014) also recommended that more research are needed to evaluate how the numerous features of smartphones promote learning among students. To get a clearer picture, we looked at both the pros and cons of smartphone usage on the target audience as part of our second objective. Finally, it was suggested to keep on exploring the connection of students' academic performance with e-learning facilities (Yunita et al., 2018). Ahmed et al. (2020) also stated that this relationship needs further exploration. Hence, the third and final objective sheds some light by exploring the relationship in a qualitative manner.

Literature review

The government has a vision of building a 'Digital Bangladesh' by the end of 2021 which happens to be the golden jubilee of the country's independence. Expanding the reach of education with power of technology happens to be one of the main proponents of this vision. The introduction of 4G internet has changed the dynamics of the online world in Bangladesh. Online schooling and accessing information in remote areas are now possible owing to the rapid advancements in technology the country has made. Moreover, the government is also working hard to increase internet penetration to 100% by 2021 (USAID Bangladesh, 2019).

The range of technological use and the potential in education is quite impressive. Bring your own device (BYOD), personal learning network (PLN) and flipped classrooms are some of the examples of technological adoption inside and outside the classroom. In Bangladesh, tertiary educational institutes employ many of the instructional strategies mentioned above. Flipped classrooms are popular in universities where teachers encourage students to learn a topic before it is taught in class. In addition, the utilization of online networking groups is very prevalent since it helps students to co-ordinate work and foster collective learning. However, BYOD does face economic barriers to an extent in a developing country like Bangladesh. The journey of making fully digitized education accessible to all is far from over (Al-Zaman, 2019). But such education has the power to contribute to the economy immensely. For example, SMEs in Bangladesh contribute to 30% of the country's GDP (Rahman, 2016). A digitally educated workforce can increase said economic contribution even further.

The most popular theory surrounding factors that influence smartphone usage in learning is the Technology Acceptance Model (TAM). Created by Fred Davis in 1989, this model represents two aspects which determine the adoption of a new technology amongst potential users which is perceived usefulness and perceived ease of use (Alrajawy et al., 2018). In our case, if students find that smartphones are easily usable and helpful for them, they will develop an intention to use the device for academic learning. Many studies have shed light on this model. Factors motivating South Korean college students to utilize smartphones in learning were examined and it was found that social norms and facilitating conditions were the main motivators (Yi et al., 2016). Furthermore, a South African study investigated the association between mobile phone features and behavioural intention to use. The internet and SMS service were found to be the main motivating factors (Shava et al., 2016). Though these studies have assumed that smartphones

are easy to use, the opposite scenario has not been regarded.

Just like many other technologies, smartphones play an integral role in promotion of learning among students. The Information Systems Success (ISS) model is mainly used to evaluate the positive effects of smartphones in learning. Created in 1992 by William DeLone and Ephraim McLean, this model aims to represent the success of information systems by analysing the relationship between five different characteristics: system usage, user satisfaction, information quality, system quality, and individual impact (Elmorshidy, 2012). A study at New Orleans University concentrating on the application of this model highlighted that rich information quality supplied by smartphones play an integral role in motivating students to use it for academic purposes (Kwun et al. 2015). In this study, we may find other factors contributing as well. Furthermore, this aforesaid research was conducted on undergraduate students so positive effects may differ for postgraduate students.

On the other side, students can experience a number of harmful effects while using smartphones in learning. They might even suffer from smartphone addiction which is the excessive or over usage of these devices. Various studies have highlighted how frequent usage of smartphones leads to a negative impact in academics. For example, Winskel et al. (2019) reported that high rates of smartphone usage, particularly among adolescents and young adults, can lead to a host of problems. Likewise, when excessive smartphone usage occurs, it will possibly result in a host of undesirable consequences including poor academic standing (Rosen et al., 2013). Kushlev et al. (2016) also stated that inattentiveness in class and decline of grades is associated with smartphone overuse. Most of these researches were done on college and undergraduate students so whether these issues are prevalent in postgraduate students remains to be seen.

Investigations on the apparent connection between smartphone usage and academic performance are fairly limited. A study concerning this subject on Taiwanese female university students concluded that higher texting led to lower GPAs (Lin et al.,

2016). Moreover, heavy gaming and Facebook usage has resulted in lower GPAs among student populations across Europe (Lepp et al., 2015). Mostly, a negative relationship has been portrayed in past studies with little evidence of a positive one. Whether the target group, postgraduate students, produces the same results remains to be seen. From a theoretical point of view, it is important to examine the Task-Performance Chain (TPC) to gain a better understanding. Established by Goodhue and Thomspon (1995), it looks to explore how an individual's performance is impacted by technological usage. When the technological features matches the task requirements, a Task-Technology Fit (TTF) is established which directly affects the performance and utilization of the user. D'Ambra et al. (2013) explored the practicality of this model and ascertained that reading e-books were a good fit for learning among UNSW engineering students. This might not be the case for our target group.

Objectives of the study

The primary objectives of this research are as follows:

1. To uncover the key factors that influence smartphone usage in learning.
2. To understand the benefits and drawbacks of using smartphones for learning
3. To explore the existing connection between smartphone use and academic performance

Methodology
Research philosophy

The philosophy of interpretivism has been followed in this paper. Interpretivists are focused on the capturing the latent meanings behind human behaviour and tries to make sense of what is perceived as reality (Black, 2006). Unlike positivism and its rigid structure, this philosophy follows a more personalized and flexible approach (Carson et al., 2001). The use of such a collaborative and emergent approach is constant with the interpretivist belief (Hudson and Ozanne, 1988). Moreover, the researcher remains open to new knowledge throughout the study and allows it to expand with the help of the respondents. Previous studies have also used the philosophy of

Interpretivism effectively. Shin et al. (2011) used this philosophy in an attempt to identify the key factors that motivate college students and faculty members to use smartphones as a learning tool. Yi et al. (2016) followed Interpretivism to analyse influence of smartphones on academic performance of college students based in Hong Kong.

Data collection

This paper applied the use of telephonic interviews with semi structured questions as the primary data collection method. Interviews are extremely scare among the reviewed literature; hence, this study aimed to be unique in terms of collecting data. Al-Emran et al. (2019) undertook a study on the usage of mobile learning among students. Questionnaires were used for data collection but, it was stressed to employ interviews for future researches to gain a deeper insight.

Sampling technique

The main technique used to gather respondents was purposive sampling (n=10). A purposive sample, also denoted as a judgmental or expert sample, is a category of non-random sample (Lavrakas, 2008). In this case, it is assumed that the 10 respondents selected will best represent postgraduate students who use smartphones for learning. This sampling technique has been employed in other studies as well. Issacs et al. (2019) conducted a research on mobile learning pilots in Africa which consisted of purposive sampling to recruit respondents. In another study of Bangladeshi undergraduate students' conceptions on mobile learning, the participants were selected purposively to obtain accurate data (Khan et al., 2019).

Data analysis

In this study, template analysis was applied in decoding the collected qualitative data. A key element of this system is the use of a coding template, which summarises themes found in the research as important in a data set and arranges them in a meaningful way. Template Analysis is a way of thematically ordering and interpreting qualitative data which is extensively used in social science research (King, 2012). Coding is the system of recognizing themes in

accounts and assigning labels to catalogue them. Themes are recurrent traits of participants' accounts portraying specific experiences that are related to the research question and objectives. Once the researcher has successfully identified the themes or codes in their textual data, these are then arranged into the template, which in turn is organised so that it represents the relationship between different themes (Brooks and King, 2014). A paper concerning smartphone effects on academic performance used partial least squares path modelling to assess the measurement model and the bootstrapping technique to test the significance of the hypotheses (Yi et al., 2016). Another Bangladeshi study on educational smartphone usage applied the use of SPSS software to scrutinise quantitative data (Hossain and Ahmed, 2016). As qualitative data will be examined in this research, template analysis would be the ideal choice to interpret the collected information.

Ethical considerations

Anchored on the international research standards, the following ethical considerations were made for this study:

1. Consent was taken from all participants prior to interviews.
2. All data stored was managed confidentially to ensure privacy of participants.
3. The whole study was conducted in an unbiased and fair manner.
4. Plagiarism checks were conducted to ensure uniqueness of the study.

Findings and discussion

All data for this paper was obtained from 10 postgraduate students who belong to various masters programs in Bangladesh. Telephonic interviews were held with respect to the convenience of the respondents. Some vital responses have been provided below while observing full anonymity. We shall now go through the data and see how it contributes to this study.

Key factors that influence smartphone usage in learning

Seventy per cent of the participants indicated that they utilise smartphones for learning purposes quite frequently throughout day. The ease and portability of such a device makes it a great learning companion. The most common activity undertaken by the target group is searching for assignment related information on the internet and watching educational videos. This is because university assignments require a lot of deep diving into topics. A few replies from the participants have been quoted below:

"Yes, I use my smartphone to search for relevant educational materials and videos. I use it about 2-3 times a day but not for more than 30 minutes to an hour"
"I use smartphone for my educational purposes at least twice a day. I search assignment related articles and reports online. Even if I don't know a topic, I Google it for better understanding"
"Well, I do search for online educational channels on YouTube, read e-books and browse for different articles. More or less, I perform these activities everyday"

The findings contrast with a research conducted on UAE undergraduate business students about the academic use of smartphones in learning. It was seen that they primarily used smartphones to login to student portals and access library services (Johnson and Radhakrishnan, 2017). The target group of this study was more focused on using smartphones as a gateway to university information rather than self-learning development. On the other hand, a research done on the academic use for smartphones among Dhaka University students showed similar results to this study. Searching for assignment related articles and information were some of the activities which overlapped with this study (Hossain and Ahmed, 2016).

Now coming to the main research question; what motivates students to utilise their smartphones in an academic context? Forty per cent of the students interviewed felt that internet was the biggest factor along with accessibility (20%). The capabilities of the internet and the mobility of smartphones is a game-changing combination; be it for professional or educational purposes. In addition to that, peer influence also plays a small part in influencing students (20%). It does not directly impact learning but, tasks such as co-ordination and division of group assignments is easier with communication apps such as WhatsApp. Although, whether universities should introduce more smartphone-based content, is debatable. Half of the respondents believe that they should, while the other half believes that laptops suffice and smartphones should always be used as a side tool. Some responses are given below:

"Educating myself about dynamic business topics on the internet really motivates me to learn"
"Google Docs and Google Sheets are influential since they allow many of us to work simultaneously online"
"Accessibility, adaptability and the implementation of smart ways to learn like AR or VR is motivating"

Congruency has been found among the reviewed literature. It was observed that 78% of the respondents had access to internet connectivity from a wide range of networks like WiFi and cellular data. About 52% accessed the internet on a daily basis for educational activities (Hossain and Ahmed, 2016). As we had discussed earlier, the dynamic development of internet services has ensured that students and everyone alike have ready access to information. Subsequently, accessibility was highlighted as one of the key influential factors behind smartphone usage for academic purposes in a South Korean institution (Yi et al., 2016).

The data collected in this research supports the theory known as Technology Acceptance Model (TAM). Majority of the participants believe that smartphones are beneficial for learning and everybody has ready access to these gadgets. Therefore, the amalgamation of such aspects motivates them to use it for educational purposes and they eventually end up using smartphones for learning. This concept of TAM has been applied in previous literature as well. A Yemeni study examined the effects of anxiety on the intention to use mobile

learning. The results affirmed that anxiety negatively impacts both perceived ease of use and perceived usefulness which in turn decreases the intention to use (Alrajawy et al., 2018). Moreover, another research was conducted on Spanish students which confirmed that intrinsic motivations promoted ease of use (Racero et al., 2020).

Benefits and drawbacks of using smartphones for learning

Seventy per cent of the participants made it clear that using smartphones for learning were indeed advantageous. The main reasons behind this choice is that smartphones can be used anytime, anywhere and it is especially useful when one's laptop or tablet is not present nearby. Some of the answers have been stated as follows:

"It makes life easier and I can use it while I am away from my desktop or laptop. Plus, I can use it whenever I want and wherever I am"
"It is interesting as it is quite handy, and you don't have to rush to the laptop when you are away from it"
"Yes, smartphones make learning interesting and I can study when my laptop and tablet are not near me"

The results are similar to several other previous studies. A research conducted on medical students revealed that 90% of them, irrespective of their year of studying, believed that instant access and communication were the most useful features of smartphones (Gavali et al., 2017). Subsequently, in their research undertaken in India, Halder et al. (2015) stated that undergraduate students studying science and arts courses found smartphones to be helpful in the learning process irrespective of differences in their study area.

The ISS model will allow us to understand which factors promote smartphone use in academic learning. User satisfaction and information quality are the most contributing factors in this study. System quality, which refers to the performance of a smartphone, has not been considered in this research. However, we can predict that smartphone performance is satisfactory or else students would not have

used them for learning. Another study produced results which is consistent to this one. The fact that information quality impacts student's smartphone usage in an academic context was verified by a study done in New Orleans (Kwun et al., 2015).

Sixty per cent of respondents stated that the most negative effect of using smartphones in learning is distraction. The constant barrage of notifications from social media accounts can be very distracting while trying to study. Hence, overcoming these distractions is not easy. Most of the respondents try to ignore it and focus on deadlines. Among other drawbacks of smartphone usage in learning, eyestrain from overuse was also reported. Few anecdotes are as follows:

"Most often I feel distracted. I force myself to concentrate while keeping in mind the upcoming academic deadlines. The constant bombardment of notifications from social media accounts is distracting. It is very easy to lose concentration while trying to study"
"Distractions occur but I try to ignore it. Other negative effects include eye strain from using smartphones too much"

The primary research is congruent with numerous other secondary sources. It was seen during an experiment that students who had access to smartphones during a lecture did not do well in quizzes as opposed to those who did not have access. High distraction from smartphone usage was the culprit (Mendoza et al., 2018). Consequently, it was found that high social media engagement led to smartphone distractions among Asian students (Swar and Hameed, 2017). Additionally, Rahman (2021) also narrated that Instagram is a rising giant among young social media users. This may be one of the social media sites respondents were talking about.

The study of how people react to their surrounding environment is known as Behaviourism. In this case, it will assist us to understand why students tend to ignore their phones as a means of combating distraction (Skinner, 2014). The stimulus here, distraction, is creating a response of ignorance from the students. A secondary source also investigated

this phenomenon. A Saudi Arabian study confirmed that smartphone addiction was prevalent among 48% students and that it was a response to the stimulus of frustration (Aljomaa et al., 2016). Even though smartphone addiction is more severe than distraction, we get an impression of the nature of a stimulus-response relationship.

The apparent connection between smartphone use and academic performance

The connection between these two variables is difficult to ascertain. According to 80% of the participants, they believe smartphone usage does not enhance their grades. They are referring to the final grades they have obtained in courses. In fact, 80% of the respondents believe that the absence of these gadgets would not have a big effect on their academic performance. They have associated high importance to the primary modes of learning such as laptops and computers. We can conclude that there is no relationship between smartphone use and academic performance for this study. The following were narrated by the students:

> *"Actually, not at all. Not having smartphones around will not impact my studies. It is true that the convenience would be missing but the primary ways to learn are more efficient"*
>
> *"Absence of smartphones would not really effect my academic grades, but the handy nature of smartphones would be missed when I am not around my laptop"*

The findings are contrary to several other studies which mostly depict a negative relationship between these variables. In a Malaysian tertiary institution, it was found that high usage of smartphones was linked to lower CGPAs among students (Ng et al., 2017). Furthermore, a research undertaken on first year university students in Belgium also confirmed that heavy smartphone use was the primary cause of scoring low in exams (Baert et al., 2019). Evidence from higher educational institutes in Pakistan also verified that smartphone overuse led to declining GPAs (Khan et al., 2019).

Goodhue and Thompson (1995) developed the task-performance chain (TPC) model which determine the link between individual performance and information technology. However, the primary data is not consistent with this model. From the interviews, we have come to know that students believe there is no relationship between smartphone use and academic performance. Previous literature sources have also contrasted this study with regard to the TPC model. TTF in another study was verified (D'Ambra et al., 2013). Another research determined the positive effect of the smartphone TTF on the academic standing of college students (McGill and Klobas, 2009).

We can conclude from the results in this study that postgraduate students in Bangladesh use smartphones to a considerable extent for educational purposes. The internet and accessibility strongly motivate them to use smartphones in an academic context. Subsequently, most of them have narrated how these gadgets have both benefits and drawbacks such as the ability to use it anywhere and distraction respectively. Finally, it was observed that they believe that smartphones do not have an impact on their grades.

Conclusions and future research directions

To sum up, this study has attempted to enlighten the field of smartphone usage in learning. The main insight was that students believed the absence of smartphones would not affect their grades. Subsequently, internet accessibility and distractions were mentioned as the main benefits and drawbacks, respectively. This is one of the few researches in this field to apply a qualitative analysis and data collection through telephonic interviews.

Although this paper has provided a meaningful contribution, it has faced its fair share of a great deal of limitations. Firstly, it fixated only on a small group of postgraduate students which is not large enough to represent the country as a whole. Additionally, the intricate connection between smartphone usage and academic performance is solely based on the opinion of the respondents without any proper experimentation or testing.

Hence, more research is essential to determine the relationship between the two variables. An experimental approach is encouraged to unearth the existence, if any, of such a relationship. A bigger sample size consisting of students from other disciplines is also advised to get a better understanding across the entire institution.

Smartphones are a common staple of this modern generation. It has great untapped potential to revolutionise education as we know it. Harnessing the positives of this pocket miracle to promote learning is of vital importance and we must ensure that its benefits are fully maximized.

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