Use of Smartphone for Communication and Acquisition of Knowledge among Students of Selected Universities of Bangladesh

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Abstract

Background: Among university students, smartphones have been profoundly influential day-to-day activities and academic pursuits. However, not enough research has been done on how Bangladeshi university students utilize smartphones for communication and education. The purpose of the study is to explore use of smartphones for communication and knowledge acquisition.

Methods: This study was a cross-sectional study. Total 615 students were interviewed from seven randomly selected universities in Dhaka. Survey work was conducted by following face-to-face approach. During data analysis, factor analysis and logistic regression were used.

Results: For more than median communication scores, participants aged ≤23 years, housewife mother, engaged in extracurricular activities, and perceiving adverse impacts from smartphone overuse on education were significantly ($p<0.05$) higher percentage. Odds of more than median communication scores associated with regular smartphone checking (AOR=1.73; p=0.012) and using smartphones primarily for recreational purposes (AOR=2.00; p=0.001). Conversely, having a housewife mother (AOR=0.51; p=0.006) and starting smartphone use after age 18 (AOR=0.64; p=0.047) were associated with reduced odds. Regarding knowledge acquisition, students aged ≤23 years, those from higher SES categories, dedicating more time to educational activities, engaging in extracurriculars, and recognizing adverse effect of smartphone overuse achieved significantly ($p<0.05$) higher scores. Odds of achieving above-median knowledge scores for students who independently seek information on smartphones (AOR=1.699; p=0.006), spend extensive time on educational tasks (AOR=1.58; p=0.013), rely heavily on smartphones for notes (AOR=1.46; p=0.04), are ignored their surroundings (AOR=1.46; p=0.04), perceive smartphones as indispensable (AOR=1.68; p=0.018), avoid paid apps (AOR=1.44; p=0.057), and use smartphones during class (AOR=1.70; p=0.049).

Conclusion: Findings underscore the complex interplay between smartphone usage behaviors and academic outcomes, suggesting positive and negative influences depending on usage patterns.

Keywords: Smartphone; Communication; Acquisition of Knowledge; University Students

Introduction

Communication technologies have revolutionized the living pattern of human beings and lead to significant changes in communication for convenience and accessibility. In this technology-driven era, smartphones have become globally common instruments that greatly influence various aspects of our daily life, particularly among university students. They have transformed how people interact worldwide by providing diverse opportunities to store, collect, and share information conveniently and quickly[1]. Smartphones are widely using by the university students for communication as well as acquiring knowledge.

Smartphones, a hallmark of the twenty-first century are predominantly used by young people, offering a plethora of resources and functionalities. The widespread adoption of smartphones has revolutionized communication dynamics and educational practices, prompting important inquiries into their influence on students' academic pursuits. While these devices provide unparalleled connectivity, they also present new challenges, potentially affecting concentration, mental health, and academic achievement[2].

Collaboration and co-construction of knowledge and ideas are essential in driving change in educational practices[3]. This approach is crucial for enabling students to effectively utilize smartphones for learning. Smartphone applications can enhance learning content and provide opportunities for collaborative interaction anytime, anywhere[4]. For instance, smartphones enable students to access lectures from leading scholars in their fields and stay updated on the latest research and innovations.

Most of the research thus far has found that cell phone use in schools is detrimental[5]. That have numerous benefits to support learning in and out of class[6] relevant social relationships with learners through collaborations, exchange, and sharing of information at any time and in any case as to meet the needs and interests of learners while increasing their critical thinking abilities[7]. In Bangladesh, among the mobile technologies vastly owned and used by young population is the smartphone. Bangladesh is one of the fastest growing countries of spreading mobile technology in the world, has around 8 million smartphone users which ranked out of the 50 countries in the world[8]. Nowadays, smartphones are cheaper than other devices like desktop computers or laptops, and hence, it is claimed

that smartphones are suitable as teaching and learning devices for the students at a low cost[9]. It assists the students to improve technological skills, help of sharing knowledge, and also develop their learning capabilities[10].

Recognizing the significance of this interplay between technology and education, this study delves into the patterns of smartphone use among university students in Bangladesh. We aim to analyze the broader context of the influence of smartphones on communication and academic achievements and explore how smartphone usage in communication dynamics, and assess the association of smart phone usage with academic performance. The findings of this study may assist in creating awareness and developing possible guidelines for smart phones usages.

Methods

Study design and settings:

This was a cross-sectional study. Out of 79 universities in Dhaka division, data were collected from seven randomly selected universities using a multistate sampling design. Among the seven universities, two universities were public universities, and five universities were private universities. The inclusion criteria included current students who had smartphones and completed at least one year of study in the university. There were also some exclusion criteria including those students who were not willing to participate in this study, students who did not have smart phone and students who did not complete at least one year of study in the particular university.

Sampling technique and sample size:

100 students were randomly selected from each of the seven selected universities visiting every university campus and their residential halls. The sample size was calculated using the standard formula proposed by Kabir et al., 2022,

$n= N/ [1+ (N\times d2)]$

where n and N denote the estimated sample and population sizes of the study area, respectively. Note that d signifies a 5%-tolerated standard error or level of precision. The sample size was calculated to be 700. Given that 700 students were approached, 615 students provided complete data, and the response rate was 88%.

Questionnaire and data collection:

Survey was conducted by following face-to-face approach. The field survey for the data collection was completed from February, 2023 to March, 2023 using a structured questionnaire. The questionnaire was developed based on literature review and pertaining research questions. The questionnaire was

first prepared in English and then translated into the native language Bangla before use in the field. The translated questionnaire was pre-tested on similar background 30 respondents to get feedback about the understandability, timing, and consistency of the questions. The questionnaire was updated and finalized after necessary modifications based on the findings from the pretest. To monitor the field data collection and quality control, two experienced field supervisors were deployed.

Measurements

The survey collected information on socio-demographic characteristics of the participants including, age, gender, place of birth, family size, residence status, parental education, and some key information on family wealth index Rutstein and Johnson[11]. The later includes major family assets, like television, refrigerator, car etc. Students' academic standing and performance are recorded. Information of smartphone usage for communication, including messenger, SMS, phone calls' duration; for academic assistance, web browsing for data collection and research.

Smartphones use data included daily usage in hours of smartphone, purpose of smartphone use, and age at first use of a smartphone. To identify the purpose of smartphone use (such as phone calls, entertainment, web surfing, etc.), respondents were asked to report their level of use from 1 (never) to 5 (always) on a Likert scale and assess the magnitude of the usage. Level of using smartphone for Messenger (chatting), Message (SMS), Phone calls, Information collection, Web browsing, Education and Research, as well as survey data collection were considered to understand the utilization of smartphone and it is found from reliability test that these items are reliable to measure utilization of smartphone as Cronbach's Alpha 0.685 (>0.6) considered reliable. From the factor analysis, we calculated the following composite score to develop two domains of smartphone utilization-(i) communication and (ii) knowledge acquisition (**Table 1**).

Table 1. Weight of the items for the domains of smartphone utilization from factor analysis

Items	**Communication Scale**	**Knowledge Scale**
Level of using smartphone apps: Messenger (chatting)	0.749	0.079
Level of using smartphone apps: Message (SMS)	0.696	0.142
Level of using smartphone apps: Phone calls	0.406	0.250
Level of using smartphone apps: Information collection	0.131	0.806
Level of using smartphone apps: Web browsing	-0.021	0.758
Level of using smartphone apps: Education and research	0.088	0.648
Level of using smartphone apps: Survey data collection	0.467	0.495

Data analysis

Both descriptive statistics and inferential analysis were used for data analysis. Frequency distribution, percentage, and mean ± standard deviation (SD) was used to provide a descriptive analysis of the study variables. To examine associations between outcome and explanatory variables, bivariate analysis was performed. Logistic regression was performed to explore the associations of explanatory variables on communication and knowledge for using smartphone. Multiple logistic regression analysis was used to identify the associated factors after controlling the effects of potential confounders. All statistical tests were performed using two-sided tests at the 0.05 level of significance. All analyses were performed using SPSS version 25.

Results

A total of 615 students were in the final sample for this study with mean (±SD) age was 22.7±1.8 years, where almost half (48.9%) of them were female (**Table 2**). Nearly 56% students born in the rural areas and 46% family of the respondents living in the rural area. Around 34% of the student's family reported to be of the low wealth category. More than 77% students started using smartphone at age less than or equal to 18 years of age. Over 57% students believed that frequent overuse of smartphones had adverse effect on education.

Table 2. Association between demographic characteristics and Communication Score as well as Acquisition of Knowledge Score

Variables[$]	**Categories**	**Total (n 615) n (%)**	**Communication Score of use of smartphone n (%)**			**Acquisition of Knowledge Score of use of smartphone n (%)**		
			Below or median	**Above median**	**P Value**	**Below or median**	**Above median**	**P Value**
Age (in year)	≤ 23 years	438 (71.2)	201(45.9)	237(54.1)	**0.024**	142(44.5)	177(55.5)	**0.005**
	>23 years	177 (28.8)	99(55.9)	78(44.1)		165(55.7)	131(44.3)	
Occupation of mother	Housewife	509 (82.8)	236(46.4)	273(53.6)	**0.009**	257(50.5)	252(49.5)	0.534
	Others	106 (17.2)	64(60.4)	42(39.6)		50(47.2)	56(52.8)	
Wealth Index	Low	210(34.1)	124(59.0)	86(41.0)	0.121	127(60.5)	83(39.5)	**0.001**
	Medium	75(12.2)	37(49.3)	38(50.7)		29(38.7)	46(61.3)	
	High	330(53.7)	167(50.6)	163(49.4)		152(46.1)	178(53.9)	
Age at start of using smartphone	≤18 years	476 (77.4)	219(46.0)	257(54.0)	**0.011**	239(50.2)	237(49.8)	0.789
	>18 Years	139 (22.6)	81(58.3)	58(41.7)		68(48.9)	71(51.1)	
Average hours spend in study/homework	<5 Hours	258 (41.9)	124(48.1)	134(51.9)	0.509	144(55.8)	114(44.2)	**0.011**
	5-9 Hours	185 (30.1)	89(48.1)	96(51.9)		95(51.4)	90(48.6)	

	10-14 Hours	118 (19.1)	64(54.2)	54(45.8)		47(39.8)	71(60.2)	
	>14 Hours	54 (8.8)	23(42.6)	31(57.4)		21(38.9)	33(61.1)	
Engaged in extra-curricular activities	Yes	335 (54.5)	150(44.8)	185(55.2)	**0.033**	151(45.1)	184(54.9)	**0.007**
	No	279 (45.4)	149(53.4)	130(46.6)		156(55.9)	123(44.1)	
Adverse effect on education due to overuse of smartphone	Occasionally or less	229 (37.2)	135(59)	94(41)	**0.001**	134(58.5)	95(41.5)	**0.001**
	Frequently or more	386 (62.8)	165(42.7)	221(57.3)		173(44.8)	213(55.2)	

Note. [$]All the variables which are mentioned in the methodology are considered during analysis, however only significant variables are shown in the Table 2.

A bivariate analysis was conducted to explore the significant difference in communication score by socioeconomic status (SES) and other variables. The study revealed that participants who were 23 years old or younger (p=0.024), participants who were 18 years old or younger (p=0.011), participants with mothers who were homemakers or housewives (p=0.009), participants who engaged in extracurricular activities (p=0.033), and participants who perceived that smartphone overuse negatively impacted their education (p=0.001) had a significantly higher percentage of above-median communication scores (Table 2). Our analysis also presents the results of the bivariate analysis, which was performed to examine the difference in the percentage of respondents who achieved a knowledge score above the median, based on SES and other characteristics. It was found that students aged 23 years or younger had a higher percentage (p=0.005) of reaching above the median score for acquiring knowledge. Additionally, students belonging to higher wealth categories (p=0.001), spending more time on educational/homework activities (p=0.011), participating in extracurricular activities (p=0.007), and expressing the opinion that smartphone overuse has adverse effects on education (p=0.001) also had a significantly higher percentage of reaching above the median score for acquiring knowledge.

Table 3: Logistic regression of explanatory variables on communication score

Variables[$]	**AOR***	**95% C.I. for AOR**		**P Value**
		Lower	**Upper**	
Age				
≤23 years (Reference)				
>23 years	0.676	0.453	1.011	0.057
Checking smartphone notification				
Occasionally (Reference)				
Regularly	1.734	1.126	2.671	**0.012**
Prioritizing online buddies than real-life friends				
Occasionally (Reference)				
Regularly	2.349	1.401	3.940	**0.001**
Using smartphone for feeling good	2.000	1.312	3.048	**0.001**

Occasionally (Reference)				
Regularly				
Occupation				
Service (Reference)				
Mother (housewife)	0.510	0.315	0.828	**0.006**
Age at start of using smartphone				
≤18 Years (Reference)				
>18 Years	0.635	0.406	0.994	**0.047**
Using smartphone during class				
Occasionally (Reference)				
Regularly	1.700	0.994	2.906	0.053
Prefer web browsing on smartphone than computer				
Occasionally (Reference)				
Regularly	0.669	0.427	1.048	0.079
Thinking of reducing using smartphone				
Occasionally (Reference)				
Regularly	0.697	0.463	1.049	0.083
Losing smartphone feel as losing friend				
Occasionally (Reference)				
Regularly	1.537	1.023	2.309	**0.038**

Note: *AOR is Adjusted Odds Ratio

Table 3 presents the logistic regression analysis showing the odds of having above median communication score (dependent variable). Students who regularly check their smartphones have 73% higher odds (AOR=1.73; p=0.012) compared to those who check occasionally. Regularly using a smartphone solely for feel good regularly also doubles the odds (AOR=2.00; p=0.001). Having a mother who is a housewife, as opposed to a working mother, reduces the odds by half (AOR=0.51; p=0.006). Starting to use a smartphone at an age older than 18 decreases the odds by 36% (AOR=0.64; p=0.047). Lastly, regularly feeling a sense of loss when losing a smartphone increases the odds by 54% (AOR=1.54; p=0.038). These factors were significantly associated with a communication score above the median. However, students aged ≤23 years had 32% lower odds (AOR=0.68; p=.057) compared to those older than 23 years, whereas regular smartphone use during class was associated with 70% higher odds (AOR=1.70; p=.053) of having a communication score above the median, although this link was only marginally significant.

Table 4: Logistic regression of explanatory variables on knowledge acquisition score

Variables	**AOR**	**95% C.I. for AOR**		**P Value**
		Lower	Upper	
Age				
≤23 (Reference)				
>23	0.911	0.615	1.350	0.643
Prefer to search in smartphone rather asking people				
Occasionally (Reference)				
Regularly	1.699	1.168	2.472	**0.006**
Average hours spend in education/homework (weekly)	1.230	0.806	1.878	0.032
5 hrs. (Reference)	1.851	1.123	3.052	

5-9 hrs	2.164	1.107	4.232	0.337
10 – 14 hrs				**0.016**
>14 hrs.				**0.024**
High dependency for taking notes and personal information				
Occasionally (Reference)				
Regularly	1.575	1.099	2.257	**0.013**
Ignore what occurring at surroundings				
Occasionally (Reference)				
Regularly	1.460	1.017	2.098	**0.040**
Type of internet connection in smartphone				0.045
Mobile internet data (Reference)	0.916	1.783	1.057	0.797
Both Wi-fi and mobile internet	0.471	1.551	2.276	**0.025**
Involvement in extra-curricular activities				
No (Reference)				
Yes	0.674	0.469	0.967	**0.032**
Feel that life would be empty without smartphone				
Occasionally (Reference)				
Regularly	1.676	1.093	2.568	**0.018**
Avoid using paid applications				
Occasionally (Reference)				
Regularly	1.435	1.001	2.058	0.049

Table 4 presents the logistic regression analysis, which indicates the odds of having a knowledge score above the median (dependent variable). The results indicate that students who regularly prefer to independently search for information on their smartphones rather than asking someone else have 70% higher odds of scoring above the median in knowledge acquisition (AOR=1.699; p=.006). Additionally, students who spend more than 9 hours on education and homework have around double the odds (AOR=1.575; p=.013). Those who regularly rely on their smartphones for taking notes and personal information, as opposed to occasionally, also have higher odds (AOR=1.46; p=.04). Similarly, students who regularly ignore their surroundings have a 46% higher the odds (AOR=1.46; p=.04). Furthermore, those who feel that their life would be empty without their smartphone on a regular basis have higher odds (AOR=1.68; p=0.018). Students who regularly avoid using paid apps have a 44% higher the odds (AOR=1.44; p=.057), and those who regularly use their smartphones during class have 70% higher odds (AOR=1.70; p=.049) of achieving above the median score in knowledge acquisition.

Discussion

This study identified the determinants of smartphone usage on communication and knowledge acquisition among university students in Bangladesh. The data for the study were obtained through a cross-sectional survey with a relatively large sample of 615 students (51% male) having smartphones.

A significant portion of students came from families categorized as low wealth. The majority began using smartphones at or before 18 years old. More than half of the respondents perceived excessive smartphone uses to negatively effect on education.

Comparing the findings with existing research reveals consistent patterns across different contexts, indicating that younger participants, especially those under 23 years, tend to have higher communication scores, a trend we also observed, likely influenced by the pervasive use of smartphones[12, 13]. In line with our findings, a review consistently shows a negative relationship between students' smartphone use frequency and academic success, with variations in strength based on data collection methods, academic performance measures, and smartphone use metrics[14]. Maternal occupation, particularly mothers working as housewives, has been found to influence communication patterns in various cultural settings, a trend reflected in our study and likely impacted by the influence of smartphone use[15]. Similarly, the link between time spent on educational activities and communication scores is supported by findings from diverse educational systems, as seen in our study, a result consistent with our findings. Additionally, the perception of adverse effects of smartphone overuse on education, impacting communication scores, is a significant concern globally, including in our study, highlighting a universal worry about technology's effect on academic performance and communication dynamics among university students[5].

When examining the findings in the context of existing literature, several notable patterns emerge. Consistent with prior research, the study underscores the significance of certain variables in influencing knowledge acquisition among participants. Specifically, the age of young participants consistently predicts knowledge acquisition scores[16]. This aligns with the broader understanding that younger individuals may possess different learning styles or preferences that affect their ability to acquire knowledge effectively. Similarly, the findings regarding relationship between socioeconomic status, indicated by belonging to a higher wealth category, and higher knowledge acquisition scores, align with existing literature[17]. This suggests that economic factors play a role in shaping access to educational resources or opportunities for knowledge acquisition.

Additionally, the positive associations between time spent on educational activities, engagement in extracurricular activities, and the perception of adverse effects of smartphone overuse on education with knowledge acquisition scores are consistent with findings from a previous study[18]. This underscores the importance of active engagement in educational pursuits and the potential drawbacks associated with excessive smartphone usage in impacting academic performance and knowledge acquisition.

The analysis has identified predictive factors for communication patterns also align with broader literature trends. For instance, frequent smartphone checking, prioritizing virtual connections over face-to-face interactions, and using smartphones for emotional gratification have been reported in various studies examining communication behaviors among university students[19, 20]. Moreover, the influence of parental occupation, age of smartphone usage initiation, and physical symptoms like dizziness on communication patterns further highlight the complex interplay between individual, familial, and environmental factors in shaping communication dynamics among young adults[2].

Furthermore, the findings from the logistic regression analysis provide valuable insights into the factors influencing knowledge acquisition among university students. These findings prompt a nuanced exploration of the dynamics shaping learning outcomes within the context of smartphone usage and associated behaviors. One significant predictor identified is the inclination to search for information on smartphones rather than relying on interpersonal communication. This consistent with broader trends indicating a shift towards digital platforms for accessing information[21]. Such reliance on smartphones for knowledge acquisition underscores the evolving role of technology in education and highlights the need for educators to adapt teaching strategies to accommodate digital learning preferences.

Moreover, the duration of study hours emerges as a crucial factor influencing knowledge acquisition. These findings underscore the importance of time management and study habits in promoting effective learning outcomes among students[22]. It also emphasizes the need for universities to provide resources and support systems that facilitate students' academic engagement outside of traditional classroom settings. The high dependency on smartphones for tasks such as note-taking and storing personal information emphasizes the integration of technology into academic practices. The findings are supported by the notion that while smartphones offer convenience and efficiency in tasks, their overreliance may raise concerns regarding information retention and cognitive processing, which aligns with our observations[23]. Therefore, educators should encourage a balanced approach to technology usage that promotes active learning and critical thinking skills.

Additionally, behaviors such as ignoring surroundings while using smartphones and the type of internet connection available highlight the environmental and technological factors influencing students' learning experiences[21]. These findings underscore the importance of creating conducive learning environments that minimize distractions and optimize access to reliable internet connectivity. Furthermore, the significant associations found between extracurricular activities, emotional attachment to smartphones, and knowledge acquisition suggest a complex interplay between students'

personal lives and academic performance[18]. This underscores the need for holistic support systems that address students' social, emotional, and academic needs.

Finally, preferences regarding the use of paid applications and the average time spent on educational activities underscore the influence of digital consumption habits on learning outcomes[21]. As universities increasingly integrate technology into curricular and co-curricular activities, it is essential to consider how students' digital behaviors impact their engagement and success in academic pursuits.

Overall, this study contributes to the ongoing discourse on the effects of technology, socioeconomic status, and various personal factors on knowledge acquisition and communication patterns among university students. By contextualizing our findings within existing research, we gain deeper insights into the multifaceted nature of these phenomena and their implications for academic success and interpersonal interactions. However, it is important to acknowledge some limitations of this study. Firstly, the study's cross-sectional design limits our ability to establish causal relationships between variables. Longitudinal studies would provide a more robust understanding of how these factors evolve over time. Secondly, the study relied on self-reported data, which may be subject to biases such as social desirability bias. Future research could employ more objective measures of smartphone usage and academic performance. Finally, the study was conducted in a specific cultural and educational context, which may limit the generalizability of the findings to other populations. Further research in diverse settings would help to validate the findings and provide a more comprehensive understanding of the issues at hand.

Conclusion

This study emphasizes the impact of technology use, socioeconomic status, and personal factors on university students' knowledge acquisition in learning and communication interactions in daily life. It underscores the need for tailored educational interventions and policies to support academic success. Future research should delve deeper into these dynamics across various contexts to ensure interventions meet students' diverse needs in a digital era.

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Conflict of interest

There is no conflict of interest among the authors.

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