

Learning through smartphone during pandemic in Assam, India : Evidence from panel data

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Abstract

This paper explores the usefulness of smartphones in studies among the students of higher educational institutions. The study is based on a comparative assessment of students' perception before and during COVID-19 situation. We use a panel dataset based on two rounds of survey conducted in Assam, India. Even though students used their smartphones extensively for studies during the lockdown period, we discovered that perception of smartphone's has not changed much. Furthermore, offline learning is still the preferred

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choice. Therefore, we advise student's counseling and guidance to ensure the proliferation and best possible use of smartphone for academic purposes.

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I. Introduction

Smartphones have become incredibly important in this age of technological growth. These days, life appears to be impossible without such mobile devices. It is no longer a luxury to own a smartphone. A smartphone may be considered as a valuable learning tool. M-learning, or mobile learning is a novel approach to access educational information through internet enabled smartphones. As long as one has an internet-connected smartphone or mobile device, one may access educational content everywhere and every time. Thus, M-learning gives the flexibility of studying at any time and from any location, bringing a slew of advantages to those who use it. With the help of an internet enabled smartphone, the user can quickly find a good solution to any issue, appropriate answers to any inquiry, and an explanation of any confusion.

E-learning is a learning approach that is based on formalized instruction by using electronic resources and is primarily based on the use of computers and the internet. Mobile learning, like E-learning, may support a range of educational methods and techniques. Due to familiarity and comfort with the handheld devices, student engagement in mobile learning may be significantly greater than in conventional learning.

There are certain expenses and drawbacks of using mobile learning solutions. The size of small screen, slow internet connection, limited battery life and limited storage capacity are few of them. Another problem is increasing addiction to smartphone [1] which can lead to behavioral addiction which is termed as Nomophobia [2]. Physiologically, over use of smartphone causes eye strains [3]. Other than that, students may remain unmindful during online classes. Taking into consideration the merits and demerits of mobile learning, we propose to consider the relative usefulness of smartphones in studies among the students studying in higher educational institutions of Assam, India. To carry out the study we prepared a panel dataset by conducting two rounds of survey: one prior to COVID-19 and the other during COVID-19.

Our study is an improvement over others for several reasons. First, a study relating to usefulness of mobile in higher education with empirical data is limited. Second, our study uses panel data set where we have captured the actual changes. There is rarely any study which collects data in the Pre COVID-19 period and during COVID-19 period observing the perceived changes.

This paper is organised into five sections. The first section gives the introduction to the problem. This is followed by the literature review and conceptual framework in section two. Methodology is described comprehensively in the third section followed by results and discussion in the fourth section. Finally, we present our conclusion and recommendation in the fifth section.

II. Literature Review

Role of smartphones in the learning process is discussed by many. Students prefer using mobile devices rather than computers due to ease of use and easy interface [4]. There is evidence to show that the main benefit of mobile technology for students is improved access to information and resources, as well as the ability to record and reflect on practical experience in real time [5]. Students use mobile because of ease of access to information [6] but proper use of smartphone needs to motivate students to embrace mobile learning [7]. It has also been found that technology had only a limited impact on students' active participation in certain classes or as a connection with other students [8]. There are studies which emphasize the role of YouTube in learning process. It brings the fun element into the classroom by catering to students' interests [9]. YouTube helps students broaden their perspectives on cross-cultural understanding as well as multilingual and multicultural skills [10].

COVID 19 being a global pandemic [11] disrupted the traditional teaching learning process in India making it compulsory for the students and teachers to opt for m-learning and online learning. In this regard based on a study which interviews 1100 lecturers [12] has found that the viral outbreak leads to significant negative effects on higher educational institutions in India.

A few studies focus on psychological aspects of mobile use among students [13-14]. Excessive use of mobile phones cause detrimental physiological effects but not limited to bodily pain and sleeping disorders such as shorter sleep duration, lower sleep quality and daytime sleepiness [15]. Studies find that self-reported subjective smartphone addiction and

problematic smartphone use is inversely connected with psychological well-being thus leading to depressive symptoms [15]. Low self-esteem [16], as well as social anxiety and psychological distress [18], has been linked to excessive device usage in adolescents and young adults.

Concern has also emerged over the possible harmful effects of smartphone usage on users' behavioral and cognitive capacities [18, 19, 37]. It has also been found that problematic mobile phone use has a detrimental effect on university students' academic development and performance [20]. In addition, insufficient or poor internet speed, lack of computer laboratory and other technical problems were found to be major problem in online learning [21-22]. According to [23], financial support from the government, student motivation, and well-trained tutors are the most important variables for successful e-learning deployment in developing nations.

Thus, it is clear that mobile learning is beneficial for its portability but software-hardware issues, connection speed issues, distraction and misuse of mobile are the prominent drawbacks of mobile learning. [24] It has observed that many students prefer to keep their camera off during the online classes and hence teachers face the problem of not being able to watch the body language of the students. It is a constraint for the teachers to deliver quality lectures based on the needs of the students with their full potential.

The conceptual framework has been described in Figure 1. Considering the TAM as the theoretical basis we have developed our own conceptual framework. To evaluate the perceived; usefulness of smartphone we use the 'Technology Acceptance Model' (TAM). This

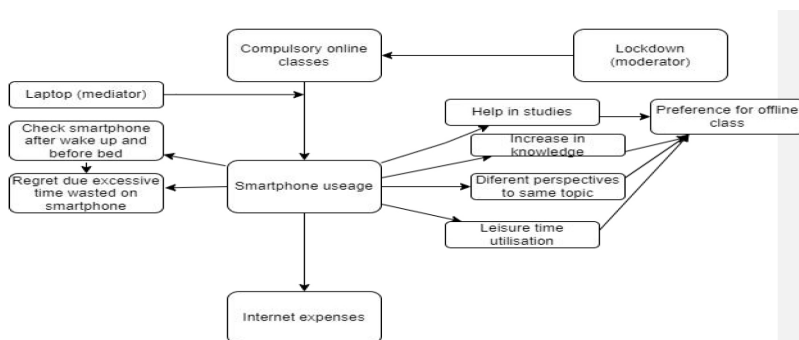


Figure 1
Conceptual framework

Source: Authors' construction based on literature review.

model states that two factors viz perceived usefulness and perceived ease of use determine the acceptance of any new technology by the masses. The former has been defined as the degree of belief of the potential user that the particular technology will help in his/her work and perceived ease of use is explained as the degree of effort required to use the new technology [25]. TAM and its modified versions are used extensively to understand technology adoption behaviour of the people in diverse fields like the computer adoption behaviour of corporate employees [25], technology adoption behaviour of police [26], use of email among the genders [27], acceptance of information technology by people of different culture [28], and e-learning [29] etc. Students were compelled to buy or upgrade their smartphones to attend the compulsory online classes during COVID-19 period.

Laptop is an alternative to smartphone. However, it is costlier and exhibits less mobility than a smartphone. In our case it is the mediator variable. We took the lockdown imposed due to the pandemic as the moderator variable that led to compulsory online classes for the first time in the country. Students faced the issue of slow and irregular network, increased expenses on mobile data pack and most importantly the whole affair was a strange thing for both teachers and students. Smart phones and their ability to provide instant help in studies may adversely affect students' preferences for physical classes. Thus, our conceptual framework aims to investigate changes in the perceived benefits and drawbacks of mobile under two separate scenarios: one being usual and the other unusual.

III. Methodology

The study is based on a panel dataset collected from the field survey. The first round of data was collected by face to face interview from the college and university students spread across the state of Assam. The educational institutions were randomly selected and from each of the institutes students were chosen randomly based on their enrolment number. The survey was conducted by trained graduates with the help of a well-structured questionnaire in the months of February-March 2020, before imposition of the lockdown due to the surge of COVID-19. Prior to the field survey we tested the questionnaire for reliability and validity by checking and rechecking the instrument among different groups of students. The second round of data was collected immediately after lockdown during October to December, 2020. We created a balanced panel

of 110 respondents in each round because many of the respondents who gave consent in the first round refused to be interviewed in the second round.

The questionnaire contained questions relating to socio-economic details, usage of smartphones and perception about the utility of smartphone in studies. Information collected were mostly categorical. In addition, we included two additional questions in the second round. These questions were expected to provide additional information about student's experience with mobile use in studies in an unusual situation when mobile was extensively used for studies. Using SPSS Version 26 we derived the descriptive statistics.

IV. Results and discussions

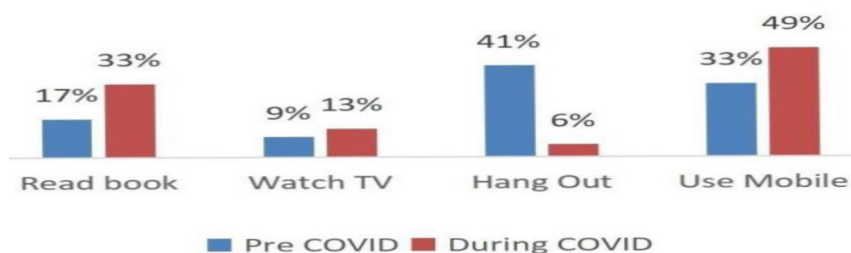
Table 1
Basic characteristics of the participant respondents

Variables	Sub groups	Responses
Place of Residence	Urban	45%
	Rural	55%
Sex	Male	49.5%
	Female	50.5%
Age	Mean Age of the respondents (Years)	19.7
Expenditure on mobile recharge	Pre COVID-19	INR 221
	During COVID-19	INR 265

Source: Authors' calculation from field survey.

From the descriptive statistics above (Table 1) it is clear that the sample is representative, since there are both rural and urban students, male and female students are almost equal. It is evident from our survey that students have increased the usage of mobile phones during the lockdown as the average monthly mobile recharge has gone up from Rs. 221 to Rs. 265.

The rise in expenditure in recharge is natural because students had to use mobile extensively for different purposes during lockdown.

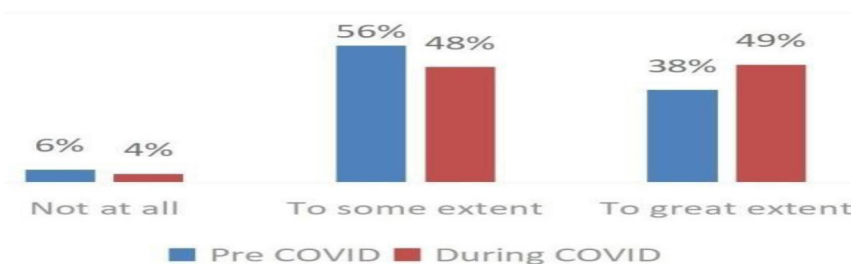
**Figure 2****Leisure time utilisation.**

Source: Authors' calculation from field survey.

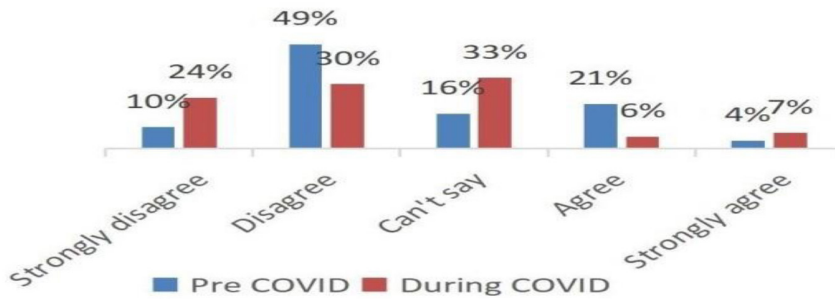
There is a change in the pattern of leisure time utilization by students (Figure 2). We see a drastic reduction in outing with friends due to the fear of further spread of COVID-19 and movement restrictions imposed by the government, as a result students have more inclination towards smartphone based activities. They read more books and spend more time with smartphone but there is barely any change in the number of audience of television (TV).

Gradually, smartphone has grabbed the place of friends in a students' life and the issue needs urgent attention.

We enquired as to whether or not using a mobile phone has aided them in their studies; we found that the students regard mobile phones to be beneficial in their studies (Figure 3). It indicates that, as predicted, students' reliance on mobile devices for study increased during the COVID-19 period, when they were unable to attend physical classes. The percentage of respondents who feels that mobile phones help students to

**Figure 3****Use of mobile helps in studies.**

Source: Authors' calculation from field data.

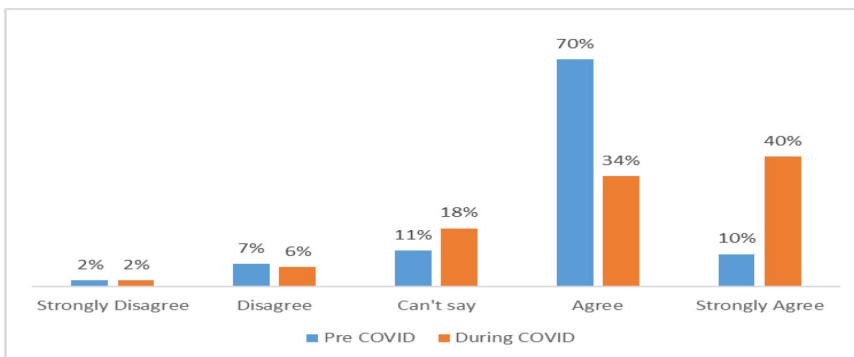
**Figure 4****Help from YouTube in studies.**

Source: Authors' calculation from field data.

a great extent has increased during COVID-19 time. Our result is similar to the findings of [29- 31].

Learning from mobile can be through various applications. We choose YouTube as it is preloaded in most of the smartphones. We find responses tending towards disagreement in both the rounds (Figure 4). Students have failed to use the educational content in YouTube and still maintain the same opinion that YouTube does not help to a great extent in study. It is a conundrum and it could be due to student's preference for ready-made study materials or due to the conventional habit of learning and language problem.

There are provisions of live classes in YouTube as well but it's not as appealing as a face to face offline class for the students. There can be

**Figure 5****Smartphones help me to get different perspective to the same topic.**

Source: Authors' calculation from field data.

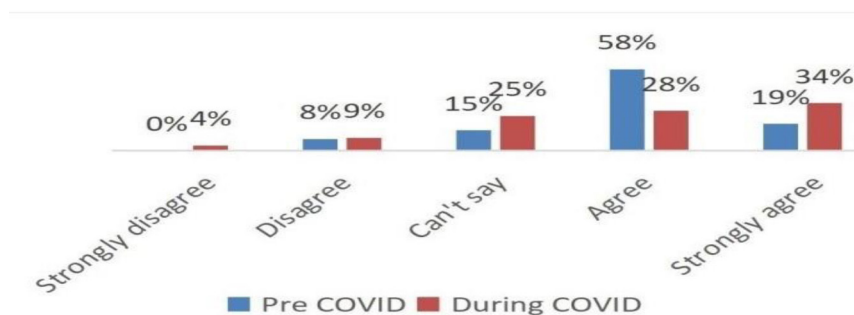


Figure 6

Use of smartphone has increased my general knowledge

Source: Authors' calculation from field data.

multiple reasons like slow internet connectivity and difficulty in clearing doubt which is possible in offline classes. Our result is similar to the findings of [32].

Internet is a great source of study materials. These materials highlight different aspects of a particular issue. Such diverse study materials are available in internet in a fraction of second. During the pandemic, the number of students who strongly believe that they get different perspectives to the same topic using smartphones have increased (Figure 5). Majority of them agree to the idea in the first round that students get exposures to plenty of reading materials and in the second the feeling is even stronger as mobile was only means of learning during lockdown.

Besides asking about the usefulness of different aspects of a particular issue, students were also asked if smartphone could enhance their general knowledge. It is evident from Figure 6 that there is less disagreement on the issue in the both rounds. The feeling is stronger during COVID-19. It shows that they perceive mobile phone as an instrument of learning in addition to its other utilities [33]. The 21st century is widely acknowledged as 'knowledge century' and the smartphones are handy tools to access the knowledge. In both the rounds of survey the combined response of the students to agree and strongly agree options exceed the 50 percent. It implies that majority of the students acknowledge mobile phone as great device to acquire general knowledge. However, the percentage of students who responded neither agree nor disagree has also gone up from 15 per cent to 25 percent. This behaviour is unexplainable precisely. The possible reasons include the network and internet speed issues and overburdening

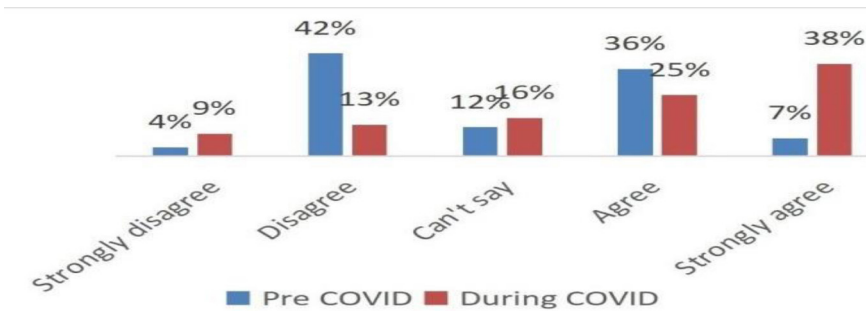


Figure 7

Smartphone is a substitute of laptop for me.

Source: Authors' calculation from field data.

with the online compulsory class, making very less room for general knowledge acquisition from mobile phone.

Students' preference for smartphone as an instrument of learning is clear from Figure 7. There is less disagreement in the second round of survey on the substitution of a laptop by a mobile. It shows that they have agreed mobile phone as an instrument of learning in addition to its other utilities [33]. Internet is a source of knowledge which is primarily accessed by the mobile devices such as smartphones, tablets, laptops and personal desktop computers. Out of all these devices the mobile phones are mostly used by the students because of the highest affordability and portability. Our data revealed that students give greater preference to mobile phone (Figure 7) during the lockdown notwithstanding the small size of screen

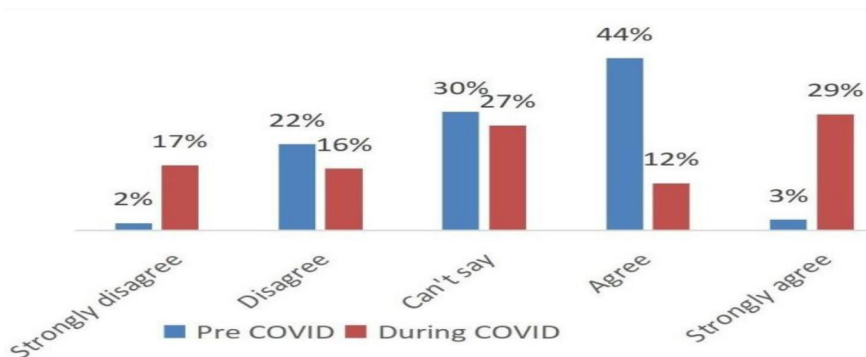


Figure 8

Regret due to wastage of time on smartphone.

Source: Authors' calculation from field data.

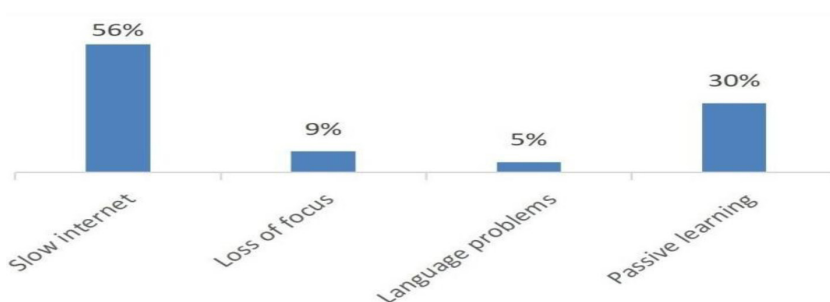


Figure 9
Problems of online learning.

Source: Authors' calculation from field data.

of smart phone. In the second round of survey there is less disagreement and more agreement about the substitutability of laptop for mobile.

The notion of time wastage on a mobile device is diverse and perplexing (Figure 8). In both rounds, an almost equal percentage of students expressed indifferent opinions when asked whether using their phones was a waste of time for them. There were more students who agreed with the statement in the first round and surprisingly, the number of students who firmly thought that mobile usage wasted their time climbed considerably in the second round. Overall, their response indicate that using a mobile device may result in time waste, since students now have more free time owing to the suspension of normal courses and lockdown.

(Figure 9) Slow internet access was a serious issue for students. This is followed by "Passive" online learning, in which students are unable to actively engage in online classroom discussions and activities. This explains why many students are unsure if YouTube can benefit them with their studies. Teachers need to adapt their teaching methodology in order to satisfy these students. We found that nearly 9 per cent of the students experience "loss of focus" during online learning (either live or recorded) owing to unwanted notifications from various installed programs and games. Language barrier is also an issue, although only for a few of them, since students can converse with professors in their native language.

After taking into considerations various aspects of learning through mobile, students were assessed to gauge their preference for physical classes. We found that the percentage of students who would like to come for physical class has increased from 67 percent to 84 percent (Figure 10). Such surge might be due to problems with online classes like

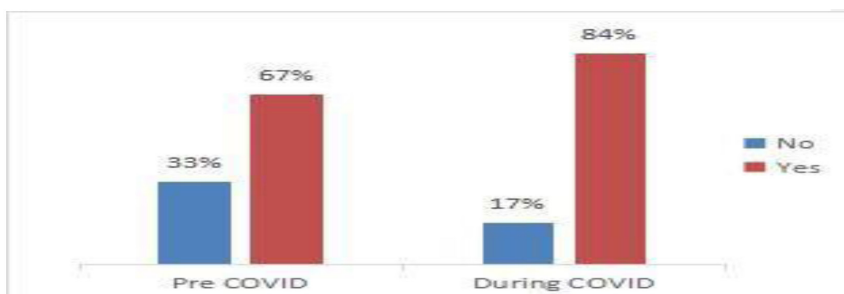


Figure 10
Preference for online classes.

Source: Authors' calculation from field survey.

the poor connectivity, one way interaction and students unfamiliarity with such learning environment which suddenly came to their life. The formal education sector in across the world as well as in India have never offered compulsory online courses at such a massive scale so lecture delivery needs fresh pedagogy.

[34] has found that students show a favorable perception towards e-classroom. In this context based on a comparative experiment of two groups of students (i.e. online and offline learners) [35] has claimed that in case of website design learning, online learning can substitute the traditional classroom based learning. While this may be true for computer based learning during normal period our study shows that for traditional subjects included in Arts, Science and Commerce stream students prefer the offline classes over online classes both in the pre and during the COVID-19 lockdown period in Assam.

V.Conclusion

The study explores the perceived utility of smartphones with the help of two rounds of surveys before COVID-19 and during COVID-19 period. We find that smartphone has always remained an essential component of life and occupies the leisure time in which students often remain busy with it. It is during COVID-19 situation especially students realise that smartphone can help in studies.

However, there are some differences in opinion among students regarding the use of YouTube in studies. They are unable to harness the potential of this platform for various reasons. In spite of availability of plenty of study materials and current affairs based information, students

could not upgrade their general knowledge. The main reason behind this is the difficulty in understanding English language. Although smartphones remain the most preferred gadget for online learning among desktop, laptop, tablet etc. Students often end up wasting time in exploring social media and different sources of entertainment.

Taking into consideration all the pros and cons of mobile learning in both the two rounds, it can be concluded that students fail to use smartphones to the fullest extent in studies. As a result, offline learning remains students' universally preferred mode of learning. In developing countries, the use of mobile learning is only getting to grips, and not experiencing any issues is an exception. Therefore, we recommend proper training and orientation of students in use of mobile phones in studies and for career development. They may be educated to learn English as well with the help of mobile phones for their capability enhancement. Proper training will eliminate confusion and minimize wastage of time while studying with smartphones.

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