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UNLOCKING THE FUTURE: INVESTIGATING THE IMPACT OF SMARTPHONE USE ON ACADEMIC PERFORMANCE AND LEARNING THE LANGUAGE

Madiha*[1], Ajab Ali Lashari[2], Umm e Ammara[3]

[1,3] MS Scholar Department of Education Sindh Maddarsatul Islam University, [2] Department of Education Sindh Maddarsatul Islam University.
***Corresponding Author**: madihak361@gmail.com

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ABSTRACT

Smartphone use in our daily lives is increasing day by day. The covid 19 has changed the world to be more dependent on the use of technology and use of smartphones. Young people have widely used it for academic purposes and day to day life affairs. With extensive smartphone use in the classrooms, it can be a better source of learning and addition to easily access the information required for academic progress and learning target language. The study aims to identify the impact of smartphone use on the academic performance of undergraduate students at the universities of Sindh. The study is quantitative. A cross-sectional survey was conducted among 320 undergraduate students at the universities of Sindh, belonging to different departments at the universities of Sindh. SPSS Software version 22 was used to analyze the data. The findings show that using smartphones helps in academic performance, mastery of subject knowledge and target language. It is recommended that smartphones should be used in the classroom for learning activities. The use of smartphones fosters new ideas and critical thinking among students. Besides this, it has a positive impact on subject understanding and a negative impact on exam scores. The study is limited to the public sector universities of Karachi. The study will help teachers, students and researchers use smartphones for academic purposes.

Keywords: Smartphone use, Academic performance, Subject understanding, Critical thinking, Exam scores

INTRODUCTION

The smartphone is one of the widely used devices in the contemporary technological world. It is one of the learning resources that could develop academic performance and outcomes among university students. According to Kalogiannakis and Papadakis (2019) smartphone technology is considered the recognized face of educational applications for recent technologies. During the pandemic, our educational organization selected digital methods in their organizations to keep providing education to students at home, and that decision also makes students learn using digital devices in education aspects. Amez and Baert (2020) and Elhai et al. (2017) claimed that smartphone performs many computer functions efficiently. It can be used as the best source of information searching and retrieving. After covid 19, smartphones have been widely used by students for academic activities performance. Smartphone usage is highest among people aged 18–29 (Anderson & Jiang, 2018) so the age bracket of this section are mostly enrolled in university educations around the world.

New technological innovations have also penetrated the field of education. The smartphone has become the most widely used cultural tool for student access to

technology (West, 2019). The national focus on smartphones has driven the growth in the use of digital devices in education. Information and Communication Technology (ICT) has been introduced into school systems through smartphone devices using personalized, connected interactive laptops in the classroom to support traditional and digital learning (Ghavifekr & Rosdy, 2015). Leu et al. (2013) explore how the smartphone in a learning environment offers students the opportunities to teach various skills that will facilitate information retrieval and analysis, problem-solving, understanding innovative advances, and transforming traditional or traditional media into effective 21st-century classrooms. To rethink the role of smartphones in the development of students, scholars have developed learning theories that move away from traditional pencil-and-paper literacy (Ghavifekr & Rosdy, 2015). Traditional reading and writing tools like pens, paper, and textbooks have evolved into digital tools, excellent blogs, and Google apps. Leu et al. (2013) observed that technological progress is rapidly influencing changes in pedagogy. Instead of focusing on individual literacy skills that have historically been unique in schools, scholars suggest that more sophisticated research with the advent of smartphones in a more globalized society will focus on the specific ways young people interact with smartphones, both inside and outside school.

Smartphones offer benefits such as staying connected with friends, engaging in leisure activities, internet access to endless information, and a positive knowledge-sharing impact (Lepp et al., 2015; Omar et al., 2016). On the other hand, smartphone use can worsen well-being, which is of great concern to both the public and researchers. For example, smartphone use affects education, wellness, academic performance, and social interaction (Amez & Baert, 2020). Over time, smartphone apps have begun to replace traditional learning environments, giving students unprecedented access to information and experiences (Ghavifekr & Rosdy, 2015). Despite this recognition, there is limited research to support claims that smartphone use is effective in improving student academic achievement.

RESEARCH QUESTIONS

1. What is the impact of smartphone use on learners' subject understanding?
2. What is the impact of smartphone use on a learner's exam score?
3. What is the impact of smartphone use on learners' critical thinking?

LITERATURE REVIEW

Using smartphones is gradually increasing in our daily lives, personally or professionally, and educational institutions worldwide are enhancing technology to improve learners' capacity and overcome their problems (Shields, 2019). Students use smartphones for various purposes, with internet access being the most common use for students, followed by gaming, email, and word processing (Fairlie, 2005). Smartphones are one of the gadgets in the educational fields for improving the students' experience by creating a more convenient and intuitive way to access and use services through smartphones that help them maintain enrollment and conduct university-related information (Galanek et al., 2018). Using smartphone technology, students can use, suggest, or make decisions with online self-service tools for student portals, early warning systems to identify learning problems or issues (Wali & Omaid, n.d.), and tools to track digital services. Smartphones are essential almost everywhere, and in everything people do in their daily work, and smartphones are recognized as essential tools for work, entertainment, study, education, and more (Bennett, 2020). methodologies to enable teachers to use technology as a learning tool in the classroom (Buck et al., 2013).

Modern smartphone applications allow students and teachers to improve subject-related issues, solve problems of complex topics, make teaching easy, learning language (Lashari, Umani, & Buriro, 2021) and add current information regarding their teaching methods (Kolb, 2006). Sa et al. (2021) and Yosiana et al. (2018) explored how using smartphones in learning with unique learning materials can improve students' critical thinking skills. The average score of students studying on a smartphone while studying is higher than when studying in the library. Using your smartphone for educational purposes makes it easier to motivate, engage, and participate in class discussions and generally helps you pay more attention and interest to the entire learning process and improve results (Marlow, 2018; Ahmed, Lashari & Golo, 2023). Samaha and Hawi (2016) expressed

the seriousness of students' grades and improved test scores depending on how they study using their smartphones. Many educational systems encourage using smartphones as an active learning method, but there is evidence that teachers still prefer traditional learning over active classroom learning (Gkonou & Miller, 2021). The successful implementation of active learning comes with unique challenges. The faculty of many educational systems also found that using smartphones for educational purposes was the least used method (Saikat et al., 2021). This is the opposite of students who think active learning methods such as smartphone use and problem-solving are more effective than lectures.

This study is related to "Bloom's digital theory ". This theory is the evolution of Bloom's taxonomy of evaluation (Ahmed, Lashri & Golo, 2023; Practice & Bloom, 2008). According to Sneed (2016), using smartphones in an educational setting is used as a facilitator, bringing change toward active learning and providing a learning opportunity. Digital Bloom's taxonomy focuses on the cognitive domain associated with the smartphone used to enhance critical thinking and develop subject understanding (Amin & Mirza, 2020; Ahmed, Lashari & Golo, 2023). Using smartphones positively impacts the betterment of exam scores and the development of the educational sector (Cardoso, 2019; Lightle, 2011). According to Crocket (2011), Bloom's Digital Taxonomy theory supports learners' academic performance by using smartphones with a great understanding or an easy way of acquiring knowledge.

A smartphone is a flexible tool that everyone can use for different purposes. It connects indirectly through the world web and the internet (Bennett, 2020). Everyone uses smartphones everywhere, especially in education, which is gradually increasing with the transformation of our education system from a traditional to a modern format (Faimau et al., 2022). After reviewing many pieces of research, it is observed that smartphones are widely used in the education system, and smartphones positively or negatively impact academic performance (Jumoke et al., 2015). However, this study examines smartphone use and academic performance in terms of subject understanding, exam scores and critical thinking of undergraduate students at universities of Sindh. Several researches show that the use of smartphones in education increases with the world's developing technology, and using smartphones can increase multitasking and distraction during academic activities and decrease academic performance (Faimau et al., 2022). This research study general aims to identify the impact of smartphone use on the academic performance of undergraduate students at the universities of Sindh. The specific aim of the study is to find the impact of smartphone use on subject understanding, critical thinking, learning the language and exam scores of undergraduate students at the universities of Sindh.

METHOD & PROCEDURE

The quantitative research method was adopted in this research study. A cross-sectional survey design is used to analyze the study's results. The study population is the undergraduate students at the universities of Sindh, and the study sample is the two public universities in Karachi. The sample size was selected with the help of the Gower application (Lakens, 2022). The study sample is N = 320 undergraduate students at the universities of Sindh and n = 160 from each university. The sample was collected through a simple random sampling technique. The data was collected through physical and personal visits and filled out the questionnaires through Google doc foam.

The impact of smartphone use on the academic performance and learning the language of undergraduate students at the universities of Sindh was examined with a five-point Likert scale, which is adaptive from another related research study (Han & Yi, 2019). The questionnaire was adapted based on a Likert scale with 35 question items. Ten questions were regarded as subject understanding,10 for critical thinking, 10 for exam score and the last five for smartphone use. Data was analyzed through statistical tools using SPSS version 22. The data was quantified by percentage of the results, and regression was carried out to check the impact of smartphone use on the learners' academic performance.

RESULTS

Table 1

Reliability statistics

Variables	Cronbach Alpha	Question items
Subject Understanding	.771	10
Critical thinking	.745	10
Exam score	.700	10
Smartphone use	.715	05

The purpose of the study is to find the impact of smartphone use on the academic performance of undergraduate students at the universities of Sindh. Initially, reliability was tested to ensure that the tool (Likert scale) measured the accurate result of the study(Kennedy et al., 2019). The reliability of all factors is more significant than $\alpha = 0.7$ in Table 1, which indicates that the tool used in this study was satisfactory in measuring the reliable result of the study.

Table 2

Smartphone use and Subject understanding

S.No	Items	S.D	D	N	A	S.A
01	Using a smartphone assists in understanding subject knowledge more efficiently.	28.8	17.5	33.4	13.4	7.2
02	Using a smartphone promotes current knowledge related to the subject topic.	22.5	20.9	22.5	24.7	9.4
03	Using a smartphone increases my subject's productivity or output.	21.6	21.3	30.9	14.4	11.9
04	Using a smartphone enhances my subject understanding.	5.0	6.6	24.4	48.8	15.3
05	Using a smartphone solves my subject-related problem.	25.9	21.3	23.1	23.4	6.3
06	Using smartphones makes it easy to access online libraries for learning the language.	19.7	12.5	30.6	24.1	13.1
07	Using a smartphone enhances academic searching skills.	17.5	14.1	28.4	24.4	15.6
08	Using smartphones to help resolve academic-related problems.	31.6	25.0	24.7	13.4	5.3
09	Using a smartphone, watch subject-related videos, docs and PowerPoint presentations.	26.9	19.1	25.9	14.7	13.4
10	Overall, the smartphone is helpful for learning.	24.1	24.4	18.1	21.9	11.6

The results of Table 2 are exciting. The items statistics show that the statement with the highest results is a statement no. Four, which reveals that smartphone use develops understanding of the subject with 48.8 % Agreement and 15.3% strongly agreement results. Another statement with the second highest results is statement 07, which reveals that mobile use helps search for relevant content on the web portable. The third statement with the highest score is that the use of mobile

phones helps in the search of libraries. The fourth highest percentage supports smartphone use to resolve subject-related problems, the Fifth highest percentage shows that overall smartphone use in learning is beneficial, and the last highest percentage supports smartphones that promote the students' current knowledge. With the exciting result, Table 2 also reveals some disagreement. Most respondents indicate that smartphone does not help resolve academic problems and reveal that smartphone use does not assist in understanding subject knowledge more efficiently.

Moreover, most students do not use smartphones to watch subject-related videos, Docs and PowerPoint presentations and believe that using smartphones does not increase students' subject productivity and outcomes. The majority of respondent believe that smartphone use is beneficial in academic and provide the subject understanding. So, this finding reveals that smartphone is essential to subject understanding.

Table 3

Smartphone use and Critical thinking

S.no	Items	S.D	D	N	A	S.A
01	Using smartphones contributes to learners' intellectual development.	91.1	12.8	23.4	34.4	10.3
02	Using a smartphone develops my skills to connect with other people.	17.8	15.6	30.6	24.4	11.6
03	I am using a smartphone to help create precise observations.	28.4	23.8	22.2	17.5	8.1
04	Using smartphone increase dependency on performing tasks.	30.3	24.1	22.5	14.7	8.4
05	I am using a smartphone to increase reason-based thinking.	28.1	17.8	26.5	15.0	12.5
06	Using a smartphone supports my problem-solving skills.	23.1	20.6	24.4	15.6	16.3
07	Using smartphone develop critical thinking.	24.4	15.3	25.3	25.0	10.0
08	Using a smartphone provides a better understanding of concepts.	26.3	30.0	21.6	14.7	7.5
09	I am using smartphone support to develop new ideas or independent thinking.	18.1	17.2	19.1	30.9	14.7
10	Using smartphone enable learners to express thoughts, ideas, and beliefs clearly.	15.93%	19.37%	17.5%	31.56%	15.62%

Table 3 analyses the use of smartphones in critical thinking; this study found that among the participants, 34.4% agreed, and 10.3% strongly agreed that using smartphones helps develop the subject's intellectual ability. The second highest is 31.56% of respondents agreeing, and 15.62% strongly agree that smartphones enable learners to express their thoughts, ideas, and beliefs clearly. The third highest respondents, 30.9%, agreed, and 14.7% strongly agreed that using smartphones helps develop new ideas and make students think independently. The fourth highest score of respondents supports that smartphone provides a better understanding, and the fifth highest score with 25.0% agree, and 10.0% strongly agree that using smartphones help develop student critical thinking. However, 24.4% agree, and 11.6% strongly agree that using smartphones help to develop student skills that are used to connect to other peoples. Following the above result, most respondents, around 30.3%, strongly disagree, 24.1% disagree that using smartphones increases student dependency to perform any task, 28.4% strongly disagree, and 23.8% disagree that using smartphones does not help students create precise observations about any

subject. However, 28.1% of respondents strongly disagree, 17.8% disagree that using smartphones does not support student reason-based thinking, 23.1% strongly disagree, and 20.6% disagree that smartphones do not enhance students' problem-solving skills. Most respondents support smartphone use as beneficial for learning and improves undergraduate students' critical thinking at the universities of Sindh.

Table 4

Smartphone use and Exam score

S.no	Items	S.D	D	N	A	S.A
01	Using a smartphone helps me to record the class lecture for examination preparation.	91.1	12.8	23.4	34.4	10.3
02	Using smartphones has a positive impact on academic performance.	24.4	11.9	30.6	17.8	15.6
03	Using a smartphone helps to overcome exam anxiety	28.4	23.8	22.2	17.5	8.1
04	Using a smartphone distracts my attention while focusing on my studies.	30.3	24.1	22.5	14.7	8.4
05	Using a smartphone helps to communicate during the exam.	28.1	17.8	26.5	15.0	12.5
06	Using a smartphone helps me to discuss my studies.	23.1	20.6	24.4	15.6	16.3
07	Using a smartphone makes it easier to pass a difficult subject.	24.4	15.3	25.3	25.0	10.0
08	Using a smartphone enhances my expertise in my subject.	26.3	30.0	21.6	14.7	7.5
09	Using smartphones helps me to connect with the subject teacher for any help before exams	18.1	17.2	19.1	30.9	14.7
10	Using a smartphone helps to achieve a score in tasks and exams.	18.1	17.2	19.1	30.9	14.7

Table 4 analyses the impact of smartphone use on exam scores. The results reveal that the maximum number of respondents, 34.4%, agree, and 10.3% strongly agree that using smartphones positively impacts smartphones. The second majority of the respondents, 30.9%, agree, and 14.7% strongly agree that using smartphone help student achieve a good score in exams or tasks; the third highest is 25.0% agree, and 10.0% strongly agree that using smartphones enhances student subject expertise. The fourth highest score of 24.4% agree, and 11.6% strongly agree about using smartphones to help overcome student exam stress. With the above finding, most of the respondents 24.2% strongly disagree, 11.9% disagree about using smartphones to help students record the class lecture for examination preparation, around 30.3% strongly disagree, and 24.1% disagree about using a smartphone to help students communicate during exams, and 28.4%

respondent strongly disagree, and 23.8% disagree about using smartphone distract student attention while they are focusing on studies. However, 28.1% of respondents strongly disagree, 17.9% disagree about using smartphones to help students with discussion, 26.3% respondents strongly disagree, 30.0% disagree about using a smartphone to help the student connect with the teachers for any help before the examination, and 23.1% respondent strongly disagree, and 20.6% disagree about using smartphone make the subject easy. Most findings reveal that smartphone does not help students in the exam.

Table 5

Smartphone use and academic performance

S.no	Items	S. D	D	N	A	S. A
01	Using smartphones, learners are comfortable with their screens.	28.8	17.5	33.1	13.4	7.2
02	Smartphones help me to complete my tasks on time.	17.5	14.1	28.4	24.4	15.6
03	Using a smartphone helps to overcome exam anxiety	23.4	6.3	23.1	25.9	21.3
04	Smartphones help me to access online content easily.	14.7	13.4	25.9	26.9	19.1
05	The smartphone is the best to use for my studies.	24.1	24.4	18.1	21.9	11.6

Table 5 analyses smartphone use, and the result reveals that the majority of respondents, 26.9%, agree, and 19.1% strongly agree that smartphones help students easily access online content, 25.9% agree, and 21.3% strongly agree that using smartphones helps overcome the student exam anxiety. However, 24.4% agree, and 15.6% strongly agree that smartphone learners are very comfortable with the screen of smartphones. Most of the respondents, 28.8%, strongly disagree, 17.5% disagree that smartphone learners are comfortable with the screen of smartphones, almost 24.1% strongly disagree, and 24.4 % disagree that smartphones are the best tool to use for students in their studies after analysis results reveal that smartphone use is beneficial for learning and improving academic performance.

Analyzing the impact of Smartphone use on Academic performance

In this study, smartphone use is the independent variable and subject understanding, critical thinking and exam scores are the dependent variables. Multicollinearity test was used to find the impact level (Ryan, n.d.) of smartphone use on subject understanding, critical thinking and exam scores of undergraduate students at universities of Sindh.

Table 6

Multicollinearity test

Model Summary

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate
1	.926[a]	.858	.857	1.689

Table 6 shows that the value of $R^2 = 0.858$, which indicates that the independent variable (smartphone use) variance in the dependent variable (academic performance). The value of adjusted R square is 0.857 is the preferred one for reporting regression results, and adjusted R square value multiplied by a hundred, the value of adjusted R square is 85.7%, and this per cent shows that 85.7% variation in academic performance is due to students using a smartphone. The remaining 14.3% of variance indicates other predicted variables that are not included in the model or uncontrolled factors.

FINDINGS AND DISCUSSION

This research aims to identify the impact of smartphone use on academic performance, and academic performance is split into three sub-variables: subject understanding, critical thinking, and exam scores. This research has three dependent variables and one independent variable, and each variable is analyzed with a separate tool based on a five-point Likert scale. The finding of the first dependent variable, subject understanding, reveals that most respondents agreed about using smartphones for subject understanding of undergraduate students at the universities of Sindh. Critical thinking findings reveal that the maximum agreed about using smartphones for improving critical thinking, and last exam score findings find that most students have agreed about using smartphones for improving exam scores of undergraduate students at the universities of Sindh. After descriptive analysis, a multicollinearity test was run to find the impact level of smartphone use on academic performance, and the finding indicates that smartphone use has an 85% impact on the academic performance of undergraduate students at the universities of Sindh.

SMARTPHONE USE AND SUBJECT UNDERSTANDING

Smartphones have several uses and, more importantly, in education. Mainly, the education system after the pandemic provided blended education and *Birch* (n.d.) reviewed that, technological learning, which integrates smartphone technology into the classroom, will revolutionize learning by increasing student achievement and engagement. Another benefit of smartphone technology is that classroom activities allow students to develop notes, subject-related material, and current information about the subject topics to improve their knowledge and digital skills (Kolb, 2011). Rizzo (2015) Smartphones support digital literacy, which explores multiple layers of visual content and generates new knowledge developed in multiple ways. Digital literacy allows learners to interact more with different media and with each other, and as learners skim through information faster to find solutions to a topic or problem related to a topic, diversity is needed to understand how resources can be used. This result finding is similar to (Kolb, 2006) and statement 4, which indicates that students use smartphones to improve their subject understanding, knowledge and productive outcomes. The smartphone makes learning easy, and students can access subject notes and material everywhere with a single click.

SMARTPHONE USE AND CRITICAL THINKING

Critical thinking is a psychological activity that encourages original ideas using well-researched smartphones (Mardiana & Kuswanto, 2017). (Yosiana et al., 2018) indicates that the ability to think in various ways is one of the elements of creativity, different from creativity. It is the ability to think from one point and then develop in another direction. People need the ability to think creatively, that is, divergent thinking, and to generate creative ideas. Four aspects of thinking, specifically fluency, flexibility, creativity, and processing factors (Language et al., n.d.). Yosiana et al. (2018) explore how using smartphones in learning media with unique learning materials can improve students' critical thinking skills, and the average score of students studying on a smartphone while studying is higher than when studying in the library (Yosiana et al., 2018). Following the above result, this study's finding is similar to those (Mardiana & Kuswanto, 2017), and statement 17 reveal that using smartphone in learning help to develop the critical thinking of the student.

SMARTPHONE USE AND EXAMS SCORE

Smartphones are flexible tools students use to help self-study (Samaha & Hawi, 2016). Smartphone habits have a positive association with life satisfaction but a negative association with academic achievement. Using smartphones in a learning environment allows students to teach various skills in information retrieval and analysis, problem-solving, insight into innovative results, and the practical introduction of traditional or traditional media into the 21st-century classroom (Leu et al., 2013). Excessive smartphone use becomes an addiction, and the consequences of this addiction are lower grades, low CGPA, exam anxiety and low scores on exams (Case & Catholic, 2015). The study results are similar to those (Case & Catholic, 2015), revealing that statement number 04, using

smartphones during exam days diverts students' attention while focusing on their studies.

SMARTPHONE USE AND ACADEMIC PERFORMANCE

The implications for the role of smartphone technology in learning in the context of higher education can be easily accessed by students, reducing subject anxiety and influencing levels of higher education (Hoffmann, 2015). Amez Baert's (2020) research on Australian students found a negative association between smartphone use and average success. The study found that smartphone users are likelier to use a problem phone. Using a smartphone with this problem can reduce academic performance, but teachers use technology or smartphones most of times for easy access to the content, material or tests (Ahmed, Lashari, 2023) in the classroom, which positively impacts academic performance . It is equally important to use a smartphone, evenly distributing each element to create the best possible learning environment (Koehler & Mishra, 2008). The study's finding is similar to the (Baert et al., 2020) with following statement 35, which reveals that using smartphones is very helpful for learning and improves students' academic performance.

CONCLUSION

Smartphones are integral to our daily and academic lives (Carbonell et al., n.d.).Even an evident observation in today's era of university students will disclose that smartphones are used publicly and privately everywhere in and out of university, including the classroom (Faimau et al., 2022), as smartphone technology continues its rapid development. The devices appear capable of contributing to student learning and improving academic performance. For example, recently, smartphones have given students instant portable access to many of the same educational features as computers connected to the internet. The smartphone is an essential learning tool as the majority of respondents use it to improve academic performance, and a smartphone makes it easy to understand the subject main ideas (Kruger-Ross, 2013). However, this study result indicates that using a smartphone for subject understanding depends on student usage; if students use their smartphone to improve their subject understanding, that is a good tool for improving subject understanding.

Furthermore, using smartphones directly improves students' critical thinking, but this study's results reveal that using smartphones improves undergraduate students' critical thinking at the University of Sindh. Moreover, exam scores also improve using smartphones (Hossain, 2019) because smartphone students can clarify their problems (Faimau et al., 2022), and this study shows that smartphone use is a helpful tool during exam days. However, it also depends on the students using their smartphones on their exam days; if students use smartphones to resolve academic problems, exam scores can be improved by using smartphones. The overall result indicates that smartphone use impacts the academic performance of undergraduate students at universities of Sindh. Smartphones are becoming one of the most popular devices for accessing information (Yao & Wang, 2022). What stands out from this study is the widespread use of multi-use interactive features that can be disturbing and helpful during the study. This study identifies that smartphones are good and bad for academic performance because it depends on how students use them more for learning or entertainment, but learners have been more likely to misuse them (Radtke et al., 2022). The student's internal motivation to communicate with each other allows universities to use potential and use a smartphone for educational purposes (Turner et al., 2014). The availability of smartphones presents many opportunities and challenges for today's students. Smartphones are convenient and valuable learning tools that can be dangerous and distracting depending on student attitudes and usage patterns (Carbonell et al., n.d.). Smartphones have various impacts on academic performance and life, but This study proved that smartphones impact academic performance (Bennett, 2020). Smartphones have various impacts on student life (Hossain, 2019). The recommendation for future study is to identify the psychological impact of smartphone use on students' academic life or personal lives, and another is the impact of dependency on smartphones on academics (Shields, 2019) in different areas of education at the university level.

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