Impact of Smartphone Usage on Academic Performance: A Study on Higher Education Students

D A Akuratiya

Lecturer, Department of Accountancy, ATI-Dehiwala, SLIATE, Sri Lanka

DOI: https://dx.doi.org/10.47772/IJRISS.2024.803004S

Received: 10 March 2024; Revised: 17 March 2024; Accepted: 21 March 2024; Published: 25 April 2024

ABSTRACT

As smartphones become increasingly integrated into academic settings, understanding their impact on student performance is crucial. This study investigates how interaction competency which means communication skills, smartphone self-efficacy, and behavioral intention to use a smartphone affect academic performance. A mixed-methods approach was employed, combining surveys and interviews. Results indicate a significant positive relationship between interaction competency, smartphone self-efficacy, behavioral intention, and academic performance. Students with higher interaction competency and smartphone self-efficacy tend to perform better academically. Additionally, a strong behavioral intention to use smartphones positively influences academic outcomes. Interviews highlighted nuanced perspectives on smartphone usage and confirmed the quantitative findings. Participants described how interaction competence facilitated effective communication and collaboration, positively impacting their academic endeavors. Moreover, smartphone self-efficacy influenced confidence in utilizing educational resources and managing study routines. Thus, promoting interaction competency and smartphone self-efficacy among students should be combined with strategies to develop responsible smartphone usage for academic purposes. However, limitations in the study include potential biases in self-reported data and the generalizability of findings to broader populations.

Keywords: Interaction competency, self-efficacy, behavioral intention, academic performance, smartphone, students, higher education

INTRODUCTION

The current pinnacle of mobile phone development is presented by smartphones. Where it has become an indispensable gadget in day-to-day life. Smartphone provides a wide variety of functions that can be applied to diverse domains, such as communication and learning (Han & Yi, 2018). In 2017 there were 4.77 billion mobile users worldwide (Yadav, Kodi & Deol, 2021). According to Digital 2023, there were 14.58 million internet users and 36.18 million active mobile connections at the start of 2023 in Sri Lanka. Further, a survey conducted in 2015 revealed that 46 percent of Americans said they could not live without their smartphone (Amez & Baert, 2020).

Globally, there is a tremendous increase in smartphone use among students especially those who are in higher education (Ng et al., 2017). And the number of users is noticeably increasing day by day. According to the Pew Research Center (2024), smartphone ownership is highest among the age group of 18-29 where students are highly represented. So, smartphone use may have an important influence on enhancing students' performance as it might boost teaching and learning experiences (Singh & Samah, 2018).

The smartphone has impacted students' lives in various areas. With one click they can obtain a wide range

of information regarding any subject. Even though learning is the priority in students' lives they have difficulty balancing their academic life with their social life. Students seem to be motivated to update their status on Facebook rather than downloading their class assignments (Singh & Samah, 2018). Also, smartphone use is reported to have bad influences like addiction, wasting time on social media, information overload, and isolation from physical society.

Anyhow according to past research, portable devices such as smartphones were considered as a leisure cum communicative tool but not as a learning one (Amez & Baert, 2020). Numerous studies have investigated the relationship between smartphone usage and academic performance. Some suggested potential benefits, such as access to educational resources and improved communication (Chen et al., 2018), increased use of smartphone application technology, and increased engagement in educational activities (Shaw and Tan, 2015). In comparison, others highlight the negative impact of distraction, multitasking, or task-switching on academic performance (Junco & Cotton, 2012; Levine et al., 2018; Ng et al. 2017).

Although technology has been more prevalent in higher education worldwide over the past years, its effect on academic consequences, particularly on students' learning, is still not fully researched. Understanding the interplay between interaction competency, smartphone self-efficacy, behavioral intention and their influence on academic performance is crucial in the modern educational landscape. So, by combining the above variables this study object to examine the impact of smartphone use on the academic performance of students.

LITERATURE REVIEW

The integration of smartphones into academic settings has become increasingly prevalent, warranting a deeper understanding of their impact on students' academic performance. This review explores past literature to enrich the present study on interaction competency, smartphone self-efficacy, behavioral intention, and their influence on overall academic performance.

Interaction Competency

Mobile phones are mainly used for communication. Through communication, we can interact with each other. Students effectively communicate, collaborate, and engage with others in various social and technological contexts. Today students communicate mainly via mobile phones, especially smartphones (Han & Yi, 2018). For that students need technological knowledge and skills relevant to smartphones. The combination of knowledge and skills can be stated as interaction competency. In the realm of academia, interaction competency plays a crucial role in facilitating meaningful interactions between students, educators, and learning resources. Research suggests that students with higher levels of interaction competency are more likely to exhibit positive attitudes toward using smartphones for learning (Chen & Lin, 2019). As previously reported, college students were the early adopters of smartphones (Joo & Sang, 2013; Lee, 2014 as cited in Han & Yi, 2018). They are not only the major users of smartphones but they also engage in a lot of communication (Han & Yi, 2018).

Behavioral Intention to Use Smartphones

According to previous research, behavioral intention refers to an individual's subjective likelihood or willingness to perform a specific behavior. As per Venkatesh and Bala (2018), about 40% impute a behavioral intention to use innovative information technology (IT) out of actual use of IT (as cited in Han & Yi, 2018). Behavioral intention to use smartphones for academic purposes is a key determinant of students' engagement with mobile learning. Students who perceive smartphones as valuable tools for learning and receive support from peers and instructors are more likely to intend to use them for academic activities (Al-Emran et al., 2016). One of the key preconditions for the behavioral intention to use novel IT, like

smartphones, is self-efficacy (Park & Chen, 2007 as cited in Han & Yi, 2018).

Smartphone Self-Efficacy

Smartphone self-efficacy refers to an individual's belief in their ability to effectively utilize smartphones to accomplish various tasks and goals. With the increasing integration of smartphones into educational settings, researchers have begun to investigate the role of smartphone self-efficacy in shaping students' attitudes and behaviors toward mobile learning (Teo et al., 2018).

Studies have shown that students with higher levels of smartphone self-efficacy are more likely to engage in productive learning activities using their smartphones, such as accessing educational apps, conducting research, and collaborating with peers (Chen et al., 2015). Furthermore, smartphone self-efficacy has been positively associated with academic performance, as students who feel confident in their smartphone skills are better able to leverage mobile technologies to support their learning goals (Crompton & Burke, 2018). As per above mentioned studies there are strong positive correlation between interaction competency and behavioral intention to use a smartphone as well as smartphone self-efficacy. So, the study suggests the following hypotheses.

H_1: There is a strong positive correlation between interaction competency and behavioral intention to use smartphones

H_2: There is a strong positive correlation between interaction competency and smartphone self-efficacy.

Technology Self-Efficacy and Behavioral Intention to Use Smartphones

Several studies have investigated the relationship between technical self-efficacy and behavioral intention to use smartphones for academic purposes. For example, a study by Liaw et al. (2007) found that students with higher levels of technical self-efficacy were more likely to express positive intentions to use smartphones as learning tools. Also, Kim and Malhotra (2005) found a positive relationship between technology self-efficacy and behavioral intention to use mobile internet services. Similarly, Lee et al. (2003) demonstrated that individuals with higher levels of technology self-efficacy exhibit greater behavioral intention to adopt and use smartphones.

Moreover, technology self-efficacy mediates the relationship between other factors, such as perceived ease of use and perceived usefulness, and behavioral intention to use smartphones (Venkatesh & Davis, 2000). Individuals with high levels of technology self-efficacy are more likely to perceive smartphones as easy to use and useful, leading to stronger intentions to adopt them. Therefore, the following hypothesis can be presented regarding smartphone self-efficacy and behavioral intention.

H_3: there is a strong positive correlation between smartphone self-efficacy and behavioral intention to use smartphones for academic purposes.

Technologies Efficacy, Behavioral Intention, and Academic Performances

Academic performance serves as a key outcome variable in studying the impact of interaction competency, smartphone self-efficacy, and behavioral intentions to use smartphones. According to past research, academic performance refers to the extent to which students achieve their educational goals, as measured by grades, test scores, and other indicators of learning outcomes. Fitting learning technologies with the academic environment has a positive impact on students' grades (Han & Yi, 2018). Accessing the influence of smartphones on academic performance can be challenging (Han & Yi, 2016).

According to Shin et al. (2011), there is a high tendency to use smartphones as a learning tool if there is a

strong correlation between smartphone technologies, students' abilities to use smartphones, and their academic activities (as cited in Han & Yi, 2018). As per Park et al. (2012) due to the advancement in mobile technologies, college students now anticipate that mobile learning will be efficient and productive. This will drive their behavior intention to utilize mobile devices for academic purposes. Smartphone self-efficacy is high among university students. Because as early adopters they tend to be good at handling smartphones (Han & Yi, 2018). Higher learning outcomes are more likely to occur when mobile phones are used for academic purposes. This is due to the impact of smartphone self-efficacy or expectations for smartphone use in learning activities. Thus, the following hypothesis can be constructed.

H_4: There is a strong positive correlation between smartphone self-efficacy and academic performance.

According to the Technology Acceptance Model (TAM), proposed by Davis (1989), behavioral intention is a crucial determinant of actual technology usage. Numerous research studies propose that the utilization of technology positively impacts academic achievement. The intention to engage in certain behaviors is a direct predictor of the action since such intention indicates readiness to perform said action from a cognitive standpoint (Shin, 2009 as cited in Han & Yi, 2018). According to the Technology Acceptance Model (TAM), proposed by Davis (1989), behavioral intention is a crucial determinant of actual technology usage. In essence, behavioral intention aligns with the actual behavior conducted. Consequently, the intent to use smartphones is viewed as having a favorable influence on academic success, given that the actual use of smartphones leads to enhanced performance. Thus, this study posits the fifth hypothesis in the following manner:

H_5: There is a strong positive correlation between behavioral intention to use smartphones and academic performance.

The relationship between interaction competency, smartphone self-efficacy, behavioral intention to use smartphones, and academic performance is multifaceted. While past literature has established individual relationships, few studies have explored their combined effects comprehensively. However, recent research by authors such as Han and Yi (2018) has begun to address this gap, highlighting the interconnected nature of these variables and their collective influence on academic success. By building upon this foundation and integrating insights from previous literature, the researcher investigates the smartphone use by diploma students to enhance their learning in the Sri Lankan context.

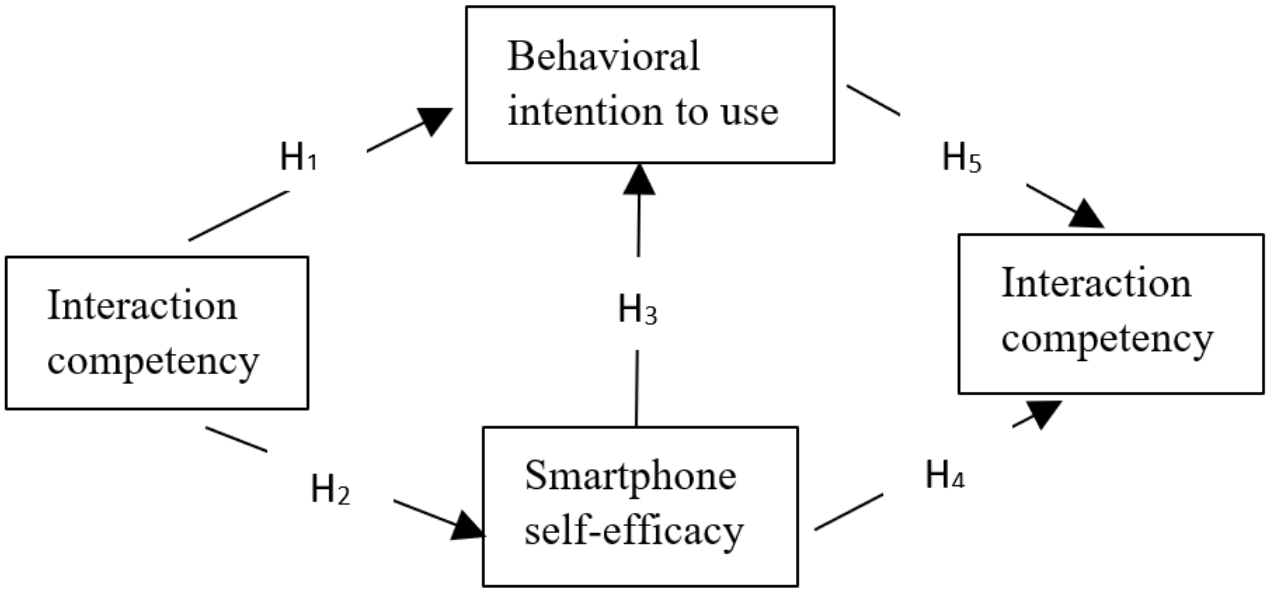

Fig. 1 Conceptual Model Proposed by Han & Yi (2018)

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue III March 2024

RESEARCH METHODOLOGY

This study investigates the impact of smartphone usage on the academic performance of higher education students adopting the model developed by Han and Yi (2018). Most of the previous empirical studies employed a quantitative approach whereas the current study employs a mixed approach. Through the mixed approach, the study can have a more holistic view of the research topic. Further, this methodology enhances the validity, strength, and flexibility of the study. The current study was conducted at the Sri Lanka Institute of Advanced Technological Education (SLIATE) most demanded and popular state institute located in Sri Lanka. SLIATE has several Advanced Technological Institutes (ATIs) located in different regions of the country. Compared to other institutes located in remote regions ATI Dehiwala is located in the commercial region where the availability and use of technology, diversity is comparatively high. The strategic position of ATI Dehiwala made it the perfect study site. Because it is assumed that smartphone usage is more popular and advanced and data collection easier for this study.

The target population consists of students in ATI Dehiwala who study business-related and non-business-related diploma courses. Due to the time and financial constraints, non-business-related courses were left out. Through the student registration list for Year 2023 randomly selected 135 students from different departments (such as Accountancy, Management, Business Studies, and Business Finance) were given questionnaires to confirm representation. Also, 2 students from each department were interviewed. Before data collection respondents were explained about the purpose of the study. And obtained their consent to participation, informed them about potential risks and their right to withdraw. The study adopted the questionnaire developed and used by Han and Yi (2018) to collect data from respondents. The questionnaire was modified to suit to Sri Lankan context. Data was collected from five constructs demographic information, interaction competency (6 questions), smartphone self-efficacy (16 questions), behavioral intention to use smartphone (10 questions), and academic performance (8 questions). Variables were measured using a Likert scale from 1 to 5 (1 = strongly disagree, 5 = strongly agree). The Pearson correlation coefficient was calculated to assess the strength and direction of the linear relationship between variables using the SPSS 21 version.

RESULTS AND DISCUSSION

Out of the 135 questionnaires distributed 123 questionnaires were completed and returned where the response rate is 91 percent. The majority of the respondents were female with a percentage of 61.4 (83) while males were 38.6 (40). Age ranged from 20 to 24 years. When considering mobile ownership all respondents owned a smartphone with 23 students having feature phones and 7 students having tablets other than smartphones. During the COVID-19 pandemic, all these respondents used smartphones for online learning. These results seem to be confirmed by the literature on the age and ownership of smartphones. As per the Pew Research Center (2024), the highest ownership of the smartphone is among the age group of 18 to 29 and this decreases with age increase.

The rising integration of smartphones in educational settings has generated interest in studying the connection between users' interaction competence and their desire to utilize smartphones for academic purposes. This examination utilizes Pearson correlation to investigate the potential association among these factors. The Pearson correlation coefficient (r) between interaction competence and the intention to use smartphones for academic reasons (Hypothesis 1) was discovered to be 0.72 ($p < 0.01$). This finding suggests that individuals with higher interaction competency are more likely to exhibit a stronger intention to use smartphones for learning purposes. Also, interviewees said, "Communicating with others is very easy due to social apps, and mostly we use WhatsApp for group chatting and course updates". A participant emphasized, "Group projects are much easier to coordinate with messaging apps on smartphones. We can

discuss ideas, share documents, and coordinate meetings effortlessly, leading to better outcomes". Participants consistently expressed how their confidence in using smartphones for academic purposes positively influenced their academic performance. For instance, one student remarked, "I used to struggle with organizing my study materials, but with my smartphone, I feel more in control. I can access resources anytime, anywhere".

This study is in line with past studies emphasizing the significance of digital competencies in adopting educational technology. Tertiary students who either directly or indirectly improve their communication skills are inclined to have behavioral intentions to use smartphones in learning activities (Han & Yi, 2018). High smartphone self-efficacy of students might be the key factor in increasing the synergy effect between interaction competency and behavioral intention to use smartphones (Park & Chen, 2007).

Understanding the correlation between interaction competency and self-efficacy to use smartphones may provide insights into how students utilize smartphones for learning purposes. According to the analysis, hypothesis 2 was confirmed. There is a significant positive correlation between interaction competency and self-efficacy in using a smartphone for academic purposes (H_2, $r = 0.67$, $p < 0.01$). One student stated, "I use the smartphone to record lectures as well as to download and read lecture materials". Participants frequently expressed a sense of confidence in navigating educational apps and online resources using their smartphones. Another student remarked, 'I feel like I can find anything I need for my studies on my phone, whether it's lecture notes, research articles, or study materials'. This suggests that students with higher communication skills are more likely to have more self-efficacy in utilizing smartphones for academic tasks. This is in line with the findings of Han and Yi (2018). They are also able to reveal a relationship between learners' interaction skills and self-efficacy when doing learning activities. Further in this study students' smartphone self-efficacy was linked to applying academic tasks like reading course materials, recording lectures, or preparing presentations.

The current study validated the previous findings about the correlation between students' smartphone self-efficacy and behavioral intention to use smartphones for academic purposes (Hypothesis 3). The finding revealed a strong positive relationship between these two variables (H_3, $r = 0.75$, $p < 0.001$). According to prior research, one's self-efficacy in using technology has a direct or indirect impact on their behavioral intention (Gu et al., 2009; Park et al., 2012). The result indicates that students who see themselves as experts in using smartphones for learning activities are more likely to use them frequently for such purposes. Several participants articulated a strong intention to incorporate their smartphones more extensively into their academic routines. One student stated, "I plan to start using flashcard apps to aid in memorization and quiz myself on key concepts. It seems like a convenient way to study on the go".

The analysis of hypothesis 4 indicated a strong positive association between the two variables (H_4, $r = 0.78$, $p < 0.001$). This advocates that students with higher confidence in their skills to use smartphones for learning tend to have better academic performance. The most prevalent factor for perceiving smartphones to be used in learning seems to be their simplicity of use. One interviewee mentions that "using a smartphone does not require much training like a computer and it is very easy to operate". According to Rung et al. (2014), smartphones are highly valuable to students due to their simplicity. Another revealed, "I feel pretty confident in my ability to find relevant information using my smartphone. It's become second nature to me, and I believe it enhances my academic performance".

Finally, the study shows a moderate relation (H_5, $r = 0.56$, $p < 0.001$) between behavioral intention to use a smartphone and academic purposes (Hypothesis 5). This positive correlation indicates that an increase in intention to use phones also tends to increase academic performance. The respondents did not see smartphones as a distraction for their learning. Where one respondent said, "Smartphone is very useful in my learning because it helped to enhance learning efficiency, effectiveness, and overall productivity". Participants highlighted the convenience of having instant access to a plethora of learning resources through

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue III March 2024

smartphones. One student elaborated, “I can quickly look up relevant articles, watch educational videos, or participate in online forums using my smartphone. It broadens my learning beyond the classroom and enriches my understanding of subjects”.

Despite recognizing the benefits, participants were mindful of potential distractions posed by smartphones. A student acknowledged, “While smartphones are helpful for academics, they can also be distracting. Social media notifications and endless scrolling can divert my focus from studying if I’m not disciplined”. The qualitative analysis provides rich insights into the subjective experiences and perceptions underlying the observed positive correlation between the variables considered.

The primary finding of the study is that the self-efficacy and behavioral intention of students regarding smartphones positively impacted their perceived learning achievements and get ahead in their academic activities. Even though past literature illustrates the impact of online learning on students’ academic performances, engagement, and satisfaction there is very limited empirical evidence on the relationship between smartphone use and students’ academic performances. So, it is important to research how smartphones impact students’ academic performance because smartphones have become an integral part of online or virtual learning.

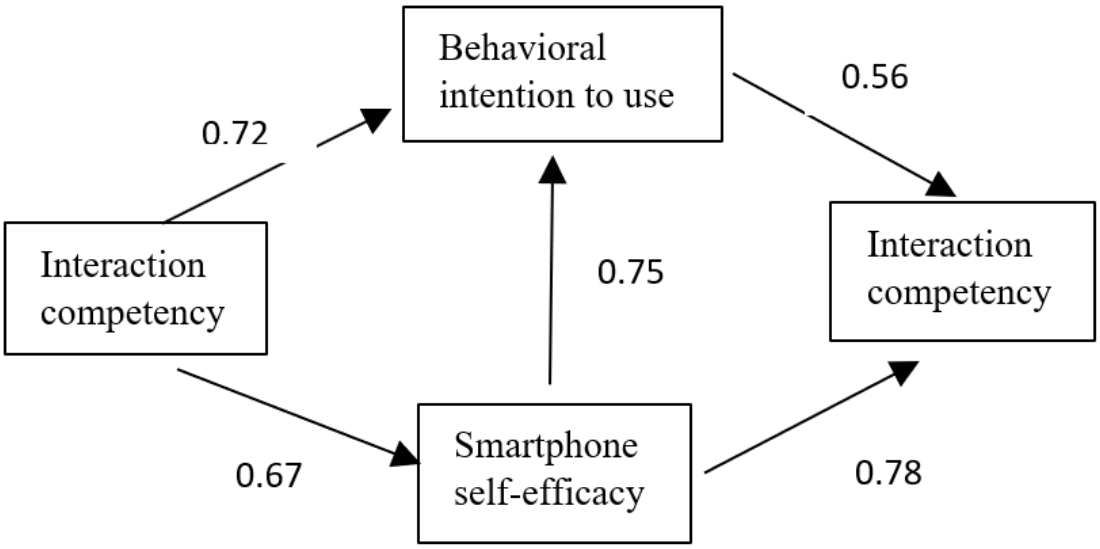

Fig. 2 Final Model

CONCLUSION AND IMPLICATIONS

In conclusion, the elaborate interplay between interaction competency, smartphone self-efficacy, and behavioral intention to use smartphones has significant implications for academic performance. As technology continues to evolve, students are increasingly relying on smartphones as indispensable tools in their educational journey. The competence to effectively interact with these devices, coupled with a sense of self-efficacy in utilizing their features, plays a pivotal role in shaping the behavioral intentions of students to incorporate smartphones into their academic activities.

Studies suggest that students who possess higher levels of interaction competency tend to leverage smartphones more efficiently for educational purposes. Moreover, heightened smartphone self-efficacy contributes to increased confidence in utilizing these devices as academic tools. This, in turn, influences the behavioral intention to integrate smartphones into academic routines, shaping a positive attitude toward their educational utility.

Despite valuable insights, several limitations were noted. The study's cross-sectional design limits causal inference, and self-reported measures may introduce bias. Additionally, the sample size and demographics might not fully represent the broader population, warranting caution in generalizing findings. Furthermore, the dynamic nature of smartphone technology suggests that results may evolve over time, necessitating ongoing research.

However, the implications on academic performance are nuanced, suggesting both positive and negative effects. While smartphones offer access to vast educational resources and facilitate communication and collaboration, excessive usage can lead to distractions and decreased focus, ultimately impacting academic achievement negatively. Thus, fostering interaction competency and smartphone self-efficacy among students should be coupled with practical strategies such as educational institutions can incorporate courses or workshops focused on enhancing interaction competency, which includes effective communication skills, collaboration, and digital etiquette. These programs can teach students how to engage meaningfully with smartphone technology for academic purposes, such as online discussions, group projects, and virtual collaboration tools. To promote behavioral intention institutes can launch awareness campaigns highlighting the benefits of using smartphones for educational purposes and providing training on how to leverage smartphone apps and resources effectively. Encouraging students to develop positive attitudes and intentions toward using smartphones for learning can be done through workshops, seminars, and peer mentoring programs. Academic institutions can offer support services, such as tech literacy workshops and personalized coaching sessions, to build students' confidence in using smartphones for academic tasks.

While implementing these programs academic institutes may face challenges such as the digital divide such as students from disadvantaged backgrounds may lack access to smartphones or reliable internet connection, limited technology literacy of the students, excessive use of smartphones for non-academic purposes, and privacy and security risks. Through comprehensive understanding and addressing the complexities of smartphone usage in academia, educators and policymakers can better support students in navigating the digital landscape while optimizing their academic success.

Further research could be conducted longitudinal studies to examine the causal relationships between interaction competency, behavioral intention to use a smartphone, smartphone self-efficacy, and academic performance over an extended period. This would help establish temporal precedence and assess the long-term effects of these factors on academic outcomes. Or a comparative study could be carried out to compare the influence of interaction competency, behavioral intention, and smartphone self-efficacy across different demographic groups (e.g., age, gender, socio-economic status) and academic disciplines. This would provide insights into potential variations in the relationships between these factors and academic performance based on individual characteristics and contextual factors.

REFERENCES

1. Al-Emran, M., Mezhuyev, V., & Kamaludin, A. (2016). Technology acceptance model in m-learning context: A systematic review. Computers in Human Behavior, 63, 160-177.
2. Amez, S., & Baert, S. (2020). Smartphone use and academic performance: A literature review. International Journal of Educational Research. doi:https://doi.org/10.1016/j.ijer.2020. 101618.
3. Chen, B., Bastedo, K., & Howard, W. (2015). Mobile technology acceptance model: An investigation using mobile users to explore smartphone credit card. International Journal of Technology and Human Interaction, 11(2), 43-59.
4. Chen, B., Cheng, Y., & Run, E. (2018). Examining the effect of multitasking on mobile learning effectiveness: A structural equation model. Computers & Education, 121, 33-45.
5. Chen, C. M., & Lin, Y. C. (2019). The development and validation of an interaction competency scale for online learning. Computers & Education, 128, 13-25.

6. Crompton, H., & Burke, D. (2018). The use of mobile learning in higher education: A systematic review. Computer & Education, 123, 53-64. https://doi.org/10.1016/j.compedu.2018.04.007
7. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340.
8. Felisoni, D.D. & Godoi, A.S. (2017). Cell phone usage and academic performance: An experiment. Computers & Education. doi: 10.1016/j.compedu.2017.10.006.
9. Gu, J. C., Lee, S. C., & Suh, Y. H. (2009). Determinants of behavioral intention to mobile banking. Expert Systems with Applications, 36(9), 11605–11616.
10. Han, S., & Yi, Y. J. (2018). How does the smartphone usage of college students affect academic performance? Journal of Computer Assisted Learning. doi: 10.1111/jcal.123.6
11. Junco, R., & Cotton, S. R. (2012). Not A 4 U: The relationship between multitasking and academic performance. Computers and Education, 59, 505-514.
12. Kemp, S. (2023). Digital 2023: Sri Lanka. Retrieved from: https://datareportal.com/reports/digital-2023-sri-lanka
13. Kim, Y. J., & Malhotra, N. K. (2005). A longitudinal model of continued IS use: An integrative view of four mechanisms underlying post-adoption phenomena. Management Science, 51(5), 741-755
14. Lee, Y. K., Park, J., & Kim, Y. S. (2003). Understanding mobile internet continuance usage from the perspectives of network externalities and flow experience. Information Systems Research, 14(4), 452-469.
15. Lepp, A., Barkley, J. E., & Karpinski, A. C. (2015). The relationship between cell phone use and academic performance in a sample of U.S. college students. SAGE Open, 5(1), 2158244015573169.
16. Levine, L. E., Waite, B. M., & Bowman, L. L. (2018). Mobile media use, multitasking, and distractibility. International Journal of Mobile Human Computer Interaction, 10(4), 1-20.
17. Liaw, S. S., Huang, H. M., & Chen, G. D. (2007). Surveying instructor and learner attitudes toward e-learning. Computers & Education, 49(4), 1066-1080.
18. Ng, S. F., Hassan, N. S. I. C., Nor, N. H. M., & Malek, N. A. A. (2017). The Relationship Between Smartphone Use and Academic Performance: A Case of Students in a Malaysian Tertiary Institution. Malaysian Online Journal of Educational Technology, 5(4), 58-70.
19. Park, S. Y., Nam, M. W., & Cha, S. B. (2012). University students' behavioral intention to use mobile learning: Evaluating the technology acceptance model. British Journal of Educational Technology, 43(4), 592–605.
20. Park, Y., & Chen, J. V. (2007). Acceptance and adoption of the innovative use of smartphone. Industrial Management & Data Systems, 107(9), 1349–1365.
21. Pew Research Center Report (2024). Mobile Fact Sheet. Retrieved from: https://www.pewresearch.org/internet/fact-sheet/mobile/
22. Rung, A., Warnke, F., & Mattheos, N. (2014). Investigating the use of smartphones for learning purposes by Australian dental students. Retrieved from: http://mhealth.jmir.org/2014/2/e20/
23. Shaw, C. M., & Tan, S. A. (2015). Integration of mobile technology in educational materials improves participation: Creation of a novel smartphone application for resident education. Journal of Surgical Education, 72(4), 670–673.
24. Singh, M. K. K., & Samah, N. A. (2018). Impact of Smartphone: A Review on Positive and Negative Effects on Students. Asian Social Science, 14(11), 83-89.
25. Teo, T., Sang, G., Mei, B., & Hoi, C. K. W. (2018). Investigating pre-service teachers' acceptance of Web 2.0 technologies in their future teaching: a Chinese perspective. Interactive Learning Environment, 27(4), 1-17.
26. Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science, 46(2), 186-204.
27. Yadav, M. S., Kodi, S. M., & Deol R. (2021). Impact of mobile phone dependence on behavior and academic performance of adolescents in selected schools of Uttarakhand, India. Journal of Education and Health Promotion. doi: 10.4103/jehp.jehp_915_20