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University students' engagement with mobile device and its academic impacts in developing countries: Lesson from Sokoine University of Agriculture - Tanzania

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Abstract

The increasing use of mobile devices for various purposes is marked globally, though there are concerns about the differences in usage between students in developed and developing countries, potentially leading to academic performance disparities. This cross-sectional study investigated patterns of engagement with mobile devises among university students at Sokoine University of Agriculture (SUA) in Tanzania, and its impact on their academic performance. The study involved 1,012 second and third year undergraduate students from two of SUA's largest campuses. Respondents voluntarily responded to the online shared 5-point Likert scale researcher-prepared questionnaire, previously piloted with 70 first-year students. Descriptive statistics summarized the data, while a Chi-square test assessed the relationship between mobile device usage for learning and academic performance. Results indicated that students predominantly used mobile devices for learning compared with non-learning purposes, with accessing educational materials being the most common activity for which the students used mobile devices. Furthermore, the study revealed positive albeit insignificant relationship between mobile device usage for learning and academic performance. The study suggests that policymakers consider implementing blended courses to influence students' mobile device usage habits. Additionally, educators are encouraged to integrate more online activities into their teaching to optimize students' use of mobile devices for academic purposes.

Keywords: mobile devices, mobile device usage, academic performance, university students, developing countries

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1. Introduction

The integration of mobile devices (MDs) such as smartphones, tablets, and laptops into education has fundamentally reshaped the way students learn and engage with educational content. Over the five past decades, MDs have become essential tools for fostering accessibility, flexibility, and personalized learning experiences. They enable students to access a vast array of resources, connect with peers and educators globally, and engage in interactive, multimedia-rich learning environments (Dhawan, 2020). As educational institutions increasingly incorporate digital tools into their curricula, MDs facilitate a shift towards more student-centered learning, enhancing collaboration and problem-solving skills. Moreover, the integration of mobile learning technologies aligns with the growing demand for preparing students for an increasingly digital world, equipping them with the technological skills needed in their academic and professional pursuits.

Given the usefulness of MDs, ownership among students has risen dramatically worldwide, becoming a significant factor in the education sector. Dhawan (2020) and Elliott (2023) inform that that over 90% of students globally now own a mobile device, with the highest penetration rates observed in developed countries. In regions such as North America, Europe, and parts of Asia, smartphones and tablets have become ubiquitous, enabling students to access educational content and engage in digital learning. For example, Elliott (2023) revealed that 98.3% of college students in the United States own a smartphone, 92.5% own a laptop, and 35.2% own a tablet. The trend is also evident in developing nations. Reports inform an increas in the use of MDs amongst students (Masika et al., 2015). Despite this high rate of penetration of MDs in developing countries, still there is inadequate access for some advanced devices such as laptop and tablets. Mobile phones appear to be affordable alternatives to traditional computers (Kavuta, 2018). That is to say, there is notable disparity in ownership rates and types of MDs based on socio-economic status, urban-rural location, and local infrastructure.

While substantial research exists on the use of mobile devices in education in developed countries (Foen et al., 2017), there remains a significant gap in studies focusing on their usage among students in developing countries (Lamptey & Boateng, 2017). This discrepancy is critical, as mobile device ownership rates are increasing in these regions, and the impact of MDs on education performance remains largely underexplored. In developed countries, MDs have been integrated into classrooms as part of structured learning environments. The situation is somewhat different in developing countries, where mobile devices are often used more informally, with students leveraging them largely for social and ordinary communication purposes (Kibona & Mgaya, 2015). The differing contexts of MD usage between these regions suggest that their educational impacts may vary, with factors such as limited internet connectivity and infrastructure (Tayo et al., 2015), and socio-economic status (Al-Barashdi et al., 2015) influencing the effectiveness of mobile learning. Therefore, investigating the patterns of mobile device usage among students in developing countries is crucial to understanding its potential benefits and challenges. By examining these patterns, this study aims to explore how mobile devices influence educational outcomes and how these insights can inform policies to maximize their positive impact in resource-limited settings. This study aimed at filling this knowledge gap.

Study context and purpose - As for the rest of the world, the government of the United Republic of Tanzania acknowledged the importance of digital technologies in education. This recognition is reflected in the formulation of the National ICT Policy and the Education and Training Policy. These policies stress the importance of digital literacy, e-learning platforms, and equal access to technology as vital components for enhancing educational quality. Such initiatives signal a strong commitment to leveraging technology to bridge gaps in educational delivery and promote lifelong learning opportunities.

Recent data reveal that mobile device (MD) ownership among university students in Tanzania is widespread. Smartphones, in particular, have emerged as the most commonly used digital devices among students, surpassing tablets and laptops (Mfaume et al., 2018). According to Cowling (2024), Tanzania registered approximately 67.72 million mobile connections (excluding IoT) as of 2024, adding that overall, mobile connections corresponded to over 86 percent of the country's population. One of groups which use mobile phone internet extensively is students in Higher Learning Institutions (HLIs). This claim is supported by the study by Kibona and Rugina (2015), which reported that 75% of university students owned smartphones, with an additional 15% accessing them through borrowing. This means a combined 90% of students rely on smartphones for various activities.

Despite high levels of MDs ownership, anecdotal evidence sugest that students' use of MDs remains unstructured and lacks academic focus. Pattermann et al. (2022) suggest that while many students mainly use laptops for course-related activities, they also take out their smartphones to engage in non-course-related activities, such as checking social media, texting and reading or writing emails. This situation brings worries, indicating that many students are unsure about the appropriate contexts, timing, and purposes for using their MDs. In fact, the researchers' converstaion with university lecturers suggest that students use MDs during lectures, even when the lecture does not require their use. While these issues highlight the gap between the aspirations outlined in policies and the proper use of MDs in Tanzanian education, there is a lack of empirical research in Tanzania regarding the broad usage patterns of MDs among university students and how such patterns impact academic performance. This study aims to cover this information gap, intending to provide evidence-based insights that will inform policy adjustments, promote best practices, and support a more balanced integration of MDs in the educational process.

Significance of the Study - This study contributes to the existing literature on mobile device usage among university students by focusing specifically on the context of a developing country, namely, Sokoine University of Agriculture in Tanzania. While previous research, such as Dhawan (2020) and Elliott (2023), has largely focused on developed countries, this study addresses a critical gap in understanding the unique dynamics of mobile device integration in higher education within developing nations. By investigating the patterns of MDs usage and its impact on academic performance among students at Sokoine University of Agriculture, this study provides valuable insights into the challenges and opportunities presented by the increasing reliance on mobile technology in higher education settings within developing countries. This research can inform pedagogical practices, institutional policies, and resource allocation decisions to effectively leverage the potential of mobile devices for enhancing student learning outcomes while mitigating potential challenges.

Specifically, this stud examined: Patterns of mobile devices usage among university students, and the relationships between academic performance and MDs usage for learning purposes among 2nd and 3rd year SUA students.

2. Literature

Mobile devices (MDs) have revolutionized education globally, providing unprecedented opportunities for access, flexibility, and interactivity in learning. These tools have reshaped the educational landscape, fostering student-centered learning and equipping learners with critical technological skills. The literature on MDs predominantly focuses on their integration into formal education systems, highlighting their benefits in enhancing collaboration, problem-solving, and personalized learning experiences. However, disparities in ownership, accessibility, and usage patterns between developed and developing countries necessitate a nuanced understanding of their educational impacts. This review explores existing literature on MD ownership and accessibility, usage patterns, barriers to effective usage, and the positive and negative impacts of MDs on academic performance, emphasizing contextual differences.

2.1 Ownership and Accessibility

Studies consistently highlight the widespread ownership of MDs among university students, making them ubiquitous tools in higher education (Dhawan, 2020; Elliott, 2023). In developed countries, over 90% of students own at least one mobile device, with laptops and smartphones being the most common (Elliott, 2023). This high ownership rate facilitates continuous access to educational content, enabling students to engage with materials anytime and anywhere. In contrast, ownership patterns in developing countries reveal a different narrative. While mobile phones are widely accessible due to their affordability (Kaliisa et al., 2019), advanced devices such as laptops and tablets remain beyond the reach of many students (Kavuta, 2018). Lamptey and Boateng (2017) observe that socio-economic factors significantly influence device ownership, with students from urban areas and higher-income families having greater access to advanced MDs compared to their rural and lower-income counterparts. This disparity, according to Kaliisa et al. (2019), affects the ability of students to participate fully in mobile learning activities, often limiting their engagement to less resource-intensive applications.

2.2 MDs usage scope

MDs have become indispensable tools for university students worldwide, serving a wide range of academic and non-academic purposes. Their versatility and portability make them essential for accessing resources, enhancing productivity, and fostering connectivity. While university students use MDs for academic activities, this tendence is more prevalent in more structured environments (Essel et al, 2018). In such environments, MDs are integrated into classroom activities to support interactive learning, facilitate communication with educators, and access digital libraries (Foen et al., 2017). Elliott (2023) further notes that university students use MDs for participating in virtual lectures, managing assignments, and for collaborating on group projects. Students often use mobile devices for informal learning, such as watching educational videos, searching for academic resources, or engaging in online discussions (Essel et al., 2018). Students utilize MDs for personalized learning experiences, leveraging e-books, online tutorials, and multimedia resources to deepen their understanding of complex concepts. (Foen et al., 2017). Furthermore, they use MDs to facilitate seamless communication with peers and instructors through email (Alfawareh & Jusoh, 2014 , 2014; Ramadhani, 2018) and accessing the learning management systems and collaborative tools such as Google Workspace and Microsoft Teams (Ally & Wark, 2018).

Beyond academic purposes, university students frequently rely on mobile devices (MDs) for a variety of non-academic activities that support their social and personal lives (Ahmad, 2017; Sserunkuma et al., 2023). Social media platforms like Facebook, Instagram, and Twitter allow students to stay connected with friends, share experiences, and engage in online communities (Gikas & Grant, 2013; Mahenge & Sanga, 2016). Instant messaging apps such as WhatsApp and Snapchat facilitate real-time communication, enabling students to maintain personal relationships with family and peers, even over long distances. Additionally, mobile gaming provides an entertainment outlet, offering students a break from their studies (Lepp et al., 2015). These non-academic uses of MDs not only offer students relaxation but also serve as coping mechanisms for stress, making MDs integral to their overall well-being and social integration (Dhawan, 2020).

2.3 Academic Impacts of using MDs

The integration of MDs into education has been associated with several positive academic outcomes. One significant advantage is the enhancement of personalized learning experiences. Dhawan (2020) emphasizes that mobile learning technologies allow students to learn at their own pace, catering to individual needs and preferences. This flexibility is particularly beneficial for students with varying learning styles or those requiring additional support. Collaboration and communication are other key areas where MDs have made a positive impact. By enabling seamless interaction among students and between students and educators, MDs foster collaborative learning environments (Foen et al., 2017). For instance, platforms like Google Workspace and Microsoft Teams allow students to work on shared documents, participate in virtual meetings, and manage group

projects efficiently. This collaborative aspect not only enhances learning outcomes but also prepares students for teamwork in professional settings. Mobile devices also support the development of critical thinking and problem-solving skills through access to diverse resources and interactive tools (Maharjan et al., 2022). According to Elmqaddem (2019), applications such as simulation software and augmented reality platforms provide immersive learning experiences, enabling students to explore complex concepts in innovative ways.

While MDs offer numerous benefits, their misuse can have detrimental effects on academic performance. One significant concern is the potential for distraction. Studies indicate that students students often spend significant time on social media, instant messaging, and gaming, which, though providing relaxation and connection, can become distractions when not properly managed (Lamptey & Boateng, 2017). Without clear boundaries on when, where, and for what purposes MDs are used, students risk falling into the trap of excessive, non-academic usage. This multitasking behavior negatively impacts concentration and reduces the quality of learning (Aivaz & Teodorescu, 2022) and tends to lead to procrastination, decreased focus during study sessions, and reduced overall academic engagement (Abbas et al., 2020). Furthermore, Bhandarkar et al (2021) emphasizes that frequent interruptions from notifications or social media can hinder cognitive processes, negatively affecting the quality of learning and performance in exams or assignments. Another challenge is that the overreliance on digital tools can undermine traditional learning skills such as note-taking, critical reading, and problem-solving (Kibona & Mgaya, 2015; Mfaume et al., 2018). According to Mfaume et al. (2018), overeliance to MDs led to distraction of concentration, impairment of handwriting skills and speed, poor attendance to the lecture sessions, and distortion of students' ability to compose and organize their own work.

2.4 Barriers to effective usage of MDs

Several barriers hinder the effective use of MDs in education. Socio-economic factors play a significant role, with students from low-income families or contexts often unable to afford advanced devices or internet connectivity. Infrastructure deficits, including limited broadband access and unreliable electricity, further exacerbate the digital divide (West, 2015). These challenges are particularly acute in rural areas, where access to stable internet connections and affordable data plans remains limited (de Freitas & Spangenberg, 2019).

Digital literacy poses another challenge, particularly among students unfamiliar with leveraging MDs for educational purposes (Lamptey & Boateng, 2017). Many students lack the skills to effectively utilize MDs for academic tasks. This gap in digital literacy is compounded by a lack of support systems. According to Winskel et al. (2019), many learning institutions do not provide sufficient training to students on the best ways to integrate MDs in their learning (Winskel et al., 2019). Consequently, many students lack the skills and confidence needed to effectively utilize MDs for learning purposes. For example, most students tend to engage in non-learning activities while learning sessions were in progress. Students with poor digital literacy fail to establish clear boundaries regarding when, where, and for what purposes to use MDs.

Institutional culture present additional barriers to the effective use of mobile devices (MDs) in education, particularly in resource-limited settings. Due to traditional mindsets and conservativeness, many educators appear to discourage the adoption of new technologies. Conservative teachers tend to view the adoption of new technologies such as MD in education as distractions that hinder learning rather than as tools that can enhance educational outcomes. Resistance to laverage MDs in education can be influenced by institutional policies. These include rigid curricula, outdated teaching frameworks, and inadequate provisions for technology use in classrooms (Habibu et al., 2012; Nyakito et al., 2021). Additionally, the scarce of professional training opportnities leads to many educators lacking the skills and confidence needed to effectively utilize MDs for academic purposes. Consequently, they become less likely to a encourage others to do so in meaningful ways (Winskel et al., 2019). Where digital literacy is low, insufficient institutional support (e.g., inaccess to technical assistance and educational software) prevails, compounding these challenges (Nalaila et al., 2022). In such situations, the entire system appear to be unsupportive for students to lavergage MDs in their education.

Given the information above, the literature informs contextual differences in the ownership and scope of use of MDs. The use of mobile devices (MDs) among university students differs notably between developed and developing countries. In developed nations, where MDs are often integrated into structured curricula, students benefit from ecosystems designed to enhance mobile learning (Foen et al., 2017). For instance, Nikolopoulou et al. (2023) examined MD usage among university students in Turkey and found that 83% of students utilized MDs for accessing academic content, such as e-books, lecture notes, and research articles. Similarly, a study by Campbell and Sundaram (2018) reported that 78% of students in Canadian universities used MDs for collaborative projects, leveraging apps and platforms like Google Docs and Slack to enhance group work efficiency. Additionally, in European higher education institutions, MDs are integrated into blended learning models. For example, Gikas and Grant (2013) found that MDs were extensively used in flipped classrooms to watch pre-recorded lectures and collaborate on projects.

However, in developing countries, MDs are frequently used for non-academic purposes. For instance, Ahmad (2017) conducted a study involving 38 students from Kampala University, revealing that 76.31% (29 out of 38) used their MDs in classrooms to play interactive games unrelated to learning. Moreover, 84.21% (32 out of 38) used their devices to watch videos, while 50% (19 out of 38) engaged in social media networking, primarily on platforms like Facebook, Twitter, and LinkedIn. Similarly, a study by Sserunkuuma et al. (2023) on 269 medical students found that 74.34% were addicted to social media. In Tanzania, Kibona and Mgaya (2015) examined 100 university students, reporting that 65% used MDs for social activities, such as chatting with friends and accessing celebrity information. Alarmingly, 69.3% admitted to replying to messages during class, and 56.3% acknowledged that MD usage sometimes hindered their academic productivity.

3. Methodology

Research approach and Design - This study employed a cross-sectional survey design. As noted by Creswell (2009), this design is both cost-effective and efficient for studies involving large sample data collection at a single point in time. A quantitative approach was used to address the study's objective. This approach was selected to ensure the findings could be generalized to the entire population within the study area.

Population, sample size and sampling procedure - The study involved undergraduate (first degree) university students within two campuses of Sokoine University of Agriculture namely Edward Moringe and Solomon Mahlangu. The two campuses were selected because they are the oldest campuses and had many students compared to the other three. However, only second and third-year students were involved as these had completed at least one semester at the university, and therefore, could provide information about their GPA, an important variable for this study. The study aimed to recruit a sample of 1,058 respondents from 10,580 second year and third year undergraduate students enrolled at the two campuses during the time of this study. According to Nwana (1981) (as cited in ADEKEYE and Paulina, 2019), the 10% of the population is an appropriate sample. To ensure adequate representation of students from colleges and schools, the respondents were invited online through the link shared to degree-program class representatives through WhatsApp groups. Thus, respondents were obtained through self-selection. According to Vehovar et al (2016), online self-selection survey can be regarded as probability sampling method. The study included second- and third-year undergraduate students enrolled in a first-degree program at Sokoine University of Agriculture during the 2023/2024 academic year. Importantly, data were collected from participants who voluntarily consented and completed the survey. That is to say, students outside these undergraduate year levels and postgraduate students were excluded.

Instrument and data collection - Self-designed two-sectioned questionnaire was used to collect the primary data from respondents. The first section of the questionnaire collected respondents' demographic information (sex, registered campus, year of study and GPA). Note should be taken that the students' GPA, which indicated their academic performance levels, was self-reported akin to other collected data. The second section was 5-point Likert scaled consisting of 19 items measuring two sub-scale variables: the learning related uses of MDs variable (11 items) and the non-learning related uses of MDs variable (8 items). The 5-point Likert scaled

options ranged from Never (1), Seldom (2), Sometimes (3), Often (4) and Always (5). Experts review was used to insure the content validity of the questionnaire items. Further, the reliability of the two sub scales were ascertained using Cronbach's alpha coefficient. The reliability of the subscales was 0.719 and 0.768 for Academic related use of MDs and Nonacademic related use of MDs respectivelly. These values are above 0.7, which is recommended by academics such as Olaniyi (2019) and Taber (2018) as sufficient indicator of a good internal consistency of questionnaire items.

Before distributing the questionnaire, the research sough research ethic clearance from and research permit conduction from SUA. Each questionnaire had an introductory section where the purpose of the study and the freedom of participation and other research participation rights were highlighted. Every participant was required to sign a consent form showing willingness before responding to the questionnaire. Data collection was done online from 16/02/2024 to 04/03/2024 via google form. According to Nulty (2008), the online distributed questionnaires helps in avoiding several jams that would be encountered using manual data collection procedures. Upon receiving the predetermined number (581 from Edward Moringe and 477 from Solomon Mahlangu) of respondents from each campus, the researcher deactivated the link so that no more respondents could access.

Data analysis - Both descriptive and inferential statistical procedures were used to analyses the data collected. Descriptive statics (Mean and standard deviation) was used to analyze data collected to answer the first objective. Further, inferential statistical procedures, particularly the Chi-Square Test was used to analyze the data to answer the second research objective. Chi-Square was chosen since the tested variables (MDs usage for learning and academic performance) were categorical.

4. Results and Discussion

Demographic characteristics - The study aimed to reach 1058 respondents, however, only 1012 dully filled questionnaire was collected. This made the respondent rate of 95.6%, among other factors, regular reminder (Van Mol, 2017) sent to respondents WhatsApp groups is likely to have contributed to this good response rate. Table 2 provides a summary of demographic characteristics of respondents.

Table 2
Demographic characteristics of respondents

University campus	Sex	Counts and percent	Study level 2nd Year	3rd Year	Total
Edward Moring	Female	Count	155	111	266
		% within Sex	58.30%	41.70%	100.00%
	Male	Count	220	74	294
		% within Sex	74.80%	25.20%	100.00%
	Total	Count	375	185	560
		%	67.00%	33.00%	100.00%
Solomon Mahlangu	Female	Count	66	109	175
		% within Sex	37.70%	62.30%	100.00%
	Male	Count	98	179	277
		% within Sex	35.40%	64.60%	100.00%
	Total	Count	164	288	452
		%	36.30%	63.70%	100.00%
Total	Female	Count	221	220	441
		% within Sex	50.10%	49.90%	100.00%
	Male	Count	318	253	571
		% within Sex	55.70%	44.30%	100.00%
	Total	Count	539	473	1012
		%	53.30%	46.70%	100.00%

As it can be seen from Table 2, the sample was somewhat skewed towards male respondents, with 56.4% being male and 43.6% being female. However, following student's data from SUA Director of undergraduate studies office where males are 6227 and females 4353, this suggests that male's participation is only 9% of their total population while females are 10%. Thus, representativeness was almost equal and fair between females and males. Also, second-year students seem to be slightly more represented than third-year students. According to

population data, second year have been represented with 12% of the total population while third-year with only 8%. This signifies that second-year students appeared to willingly participated in the study than third-year students. This might be attributed by the finalist students being highly occupied with other activities like job searching compared to their counterparts. In case of campus representativeness, there were fair for both of two campuses.

Patterns of using MDs among university students - The descriptive statistical test (see Table: 3) was performed on the MDs usage categories (Learning related uses and Non-learning related uses). The results show students preferably use their MDs for learning related use (M = 1.67 and SD= .47). In contrast, non-learning related uses were uniformly rated low by all students with mean of 1(SD= 0). The analysis reveals significance variation in MDs usage preferences with learning related uses being the most preferred compared to non-learning related usage. The variation in learning related usage preference suggests differing in opinions amongst students.

Table 3

Usage categories

Usage category	Mean	Std. Deviation
Learning related uses	1.6709	0.47
Non-Learning related uses	1	0

These results show that the majority of university students who participated in this study predominantly use MDS for learning related purposes. While these results support those reported previously by Rockey et al (2023) and Bikumalla et al (2017) conducted in developed countries, they contradict with most of the other previous studies regarding the purpose for which students use MDs. For example, the qualitative study by Kaysi et al (2021) involving 34 participants conducted in Turkey found a significant number of students were not using MDs for following educational programs or improving learning. Surprisingly, the study by Kibona and Mgaya (2015) conducted in Tanzania using a sample of 100 HLI students, reported a majority (65%) of respondents using their MDs for non-academic uses, relative to only 20% who use for educational purposes. This difference may be due to variation in sample size used in the study. Furthermore, descriptive statistic was carried on each of the sub-scale items to establish which specific purpose the study respondents used their MDs for. As indicated in Table 4, the respondents' most frequent use of mobile devices was for accessing educational materials, such as lecture notes and e-books (M=3.631; SD=1.01), while the least frequent use was for taking notes during lecture sessions (M=2.86; SD=1.31). This is consistent with the study by Surjandy and Julisar (2017) where it was found 79% of respondents acknowledged to use their MDs for accessing educational resources particularly e-books.

Table 4

Learning related uses statistics

SN	Item	Never (%)	Seldom (%)	S/times (%)	Often (%)	Always (%)	Mean (M)	SD
1	I use my MD(s) for accessing course information (syllabus, assignments etc.)	40 4	94 9.3	244 24.1	228 22.5	406 40.1	3.92	1.77
2	I use my MD(s) for accessing educational materials (e.g., lecture notes, e-books).	11 1.1	71 7	222 21.9	286 28.3	422 41.7	4.02	1.01
3	I use my MD(s) to explore further topics covered during the lecture	44 4.3	110 10.9	261 25.8	300 29.6	297 29.3	3.69	1.13
4	I use my MD(s) for reading course materials provided by lecturers	38 3.8	95 9.4	217 21.4	294 29.1	368 36.4	3.85	1.13
5	I use my MD(s) to find reference materials for class activities and assignments	29 2.9	73 7.2	226 22.3	318 31.4	366 36.2	3.91	1.06
6	I use my MD(s) to view pictures (diagrams, maps, etc.) related to my courses	24 2.4	113 11.2	273 27	311 30.7	291 28.8	3.72	1.07
7	I use my MD(s) for multimedia content that aids in my learning	29 2.9	112 11.1	309 30.5	292 28.9	270 26.7	3.65	1.07
8	I use my MD(s) for audio or video	267	209	256	160	120		

	recording of class lectures	26.4	20.7	25.3	15.8	11.9	2.66	1.34
9	I use my MD(s) for communicating	22	94	246	264	386		
	with colleagues about class assignment	2.2	9.3	24.3	26.1	38.1	3.89	1.09
10	I use my MD(s) to schedule my	37	90	247	267	371		
	learning activities	3.7	8.9	24.4	26.4	36.7	3.83	1.13
11	I use my MD(s) for taking notes	194	213	294	162	149		
	during lecture sessions	19.2	21	29.1	16	14.7	2.86	1.31

KEY: N= 1012; Decision – Weighted average = 40/11= 3.64; Standard deviation = .609

Regarding non-academic related uses, analysis (see Table 5) shows that students mainly engaged on personal communication like texting, calls and chatting during the lecture sessions (M = 3.39; SD = 1.15). The least non-learning related uses of MDs were playing games during lecture sessions (M=2.38; SD=1.36). These findings echo those reported in the previous but current literature. For example, Kibona and Mgaya (2015) reported students using MDs for texting while waiting to receive calls during classrooms and that this practice significantly made them loose concentration in learning.

Table 5
Non- learning related use statistics

Sn	Item	Never (%)	Seldom (%)	S/times (%)	Often (%)	Always (%)	Mean	SD
1	I use my mobile device for personal communication	155	169	166	168	354	3.39	1.48
	(e.g., texting, calls, chatting) during lecture sessions]	15.3	16.7	16.4	16.6	35		
2	I engage in distracting activities on my mobile	347	214	199	132	120	2.47	1.38
	device, such as social media, during lecture sessions	34.3	21.1	19.7	13	11.9		
3	I use my mobile device to browse websites	320	183	252	156	101	2.54	1.34
	unrelated to the course content during lecture sessions	31.6	18.1	24.9	15.4	10		
4	I communicate with friends or engage in	383	193	204	134	98	2.38	1.36
	non-academic conversations during lecture sessions	37.8	19.1	20.2	13.2	9.7		
5	I prioritize non-academic activities on my mobile	209	255	265	147	136	2.75	1.3
	device over post-lecture learning	20.7	25.2	26.2	14.5	13.4		
6	I rarely use my mobile device for academic	108	186	243	225	250	3.32	1.31
	purposes after attending lectures.	10.7	18.4	24	22.2	24.7		
7	I find myself distracted by unrelated content on my	152	241	295	173	151	2.93	1.27
	mobile device during and post-lecture sessions	15	23.8	29.2	17.1	14.9		
8	After lecture session, I use my mobile device for	106	233	376	172	125	2.98	1.15
	entertainment than for learning	10.5	23	37.2	17	12.4		

KEY: N= 1012; Decision – Weighted average = 22.76/8= 2.845; Standard deviation = .819

Based on these results where weighted mean for learning related uses being 3.64 and that of non-learning related uses 2.845 yielding mean difference of 0.795 this suggests that there is moderate variation in these two usage categories.

Relationship between learning related use of MDs and students' academic performance - A Chi-square Test was conducted to examine the relationship between learning related uses of MDs and students' academic performance. On observing the contingency table's expected and observed values, the minor variation in values was noted. This implies that university students' academic performance is somewhat independent of MDs learning related uses. The Chi-square result table (see Table 6) revealed a non-significant relationship between these two variables (Learning related uses and academic performance) (X^2= 2.41, df=3, p = .492). Further, the Phi and Cramer's V values were found to be .049, with a p-value of .0492, which indicates that the Phi/Cramer's V value is relatively small and statistically insignificant. This means that there is no significant relationship between the MDs learning-related usage and students' academic performance. These results suggest that observed distribution of frequencies in the cross-tabulation table is likely to occur by chance. Therefore, it is an indication that there was no direct relationship between MDs learning related uses and students' academic performance.

As it was observed that students prioritized learning related uses of their MDs over non-learning, and therefore it was expected that results could show significant positive relationship between MDs learning related

usage and academic performance. However, the tests have shown the lack of significant relationship between the two variables (p-value = .492, CI=95%). This means that, regardless of students' use of their MDs for learning being high or low, their academic performance is independent of these uses. These findings alarm that students' academic performance may be influenced by many other factors apart from the use of MDs. This insignificant relationship of MDs learning related uses may be attributed by the preferred learning use. As it was found from descriptive analysis, the most preferred use was for accessing educational materials (e.g., lecture notes, e-books) having mean of 3.631 (SD=1.01). This type of use may have low impact on stimulating academic performance.

Table 6
Chi-square test results

Chi-Square Test	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.41a	3	0.49
Likelihood Ratio	2.44	3	0.49
Linear-by-Linear Relationship	0.42	1	0.52

Note; 'a' is degree of freedom.

The findings of the current study are consistent with previous research that examined the link between mobile device usage and academic performance (Joy & Lacificar, 2018; Imran et al., 2023). In their investigation of mobile device usage and its impact on the academic performance of college students, Joy and Lacificar (2018) observed moderate usage for learning-related activities; however, their analysis indicated no significant correlation between device usage and academic performance. Similarly, Imran et al (2023), in their cross-sectional survey involving 384 undergraduate students, found no significant relationship (p-value = 0.250) between mobile device usage and academic performance.

5. Conclusıon and recommendatıons

The current study investigated the relationship between MDs learning related usage and academic performance of the 2nd and 3rd year undergraduate students at SUA. Students' usage of MDs was characterized by both, learning-related and non-learning related activities. However, the findings revealed learning related uses on MDs to dominate and overweigh that of non-learning uses with the most use being accessing educational materials. Despite of learning related use overweigh its counterpart, it was found that students' academic performance is independent of the MDs learning related usage. Trend of students utilizing MDs more for learning related activities indicated a responsible and purposeful approach to technology integration in learning. Also, as non-learning usage found to be of less prevalence, this suggests that students were able to balance learning activities and non-learning. Based on the findings of this study, it is recommended for policy makers should plan university courses that are blended so that they cope with the students' digital characteristics. Additionally, educators should adapt online activities for students learning so that they can maximize their MDs uses for learning related activities. Moreover, it is recommended future research could investigate the factors that may influence the relationship between MD usage and students' academic performance while considering confounding variables like students' intelligence quotient.

Study limitations - Since both mobile device usage and GPA were self-reported, there's a possibility of bias or inaccurate reporting due to students overestimate or underestimate their academic performance or device usage, which can affect the accuracy of the findings. Also, the study was conducted via an online questionnaire, and the response rate may reflect only those students who are more tech-savvy or engaged in academic activities. This could introduce a non-response bias, as students who are less engaged may have been underrepresented. Finally, the study was limited to second- and third-year students from two specific campuses of SUA. As such, the findings may not be generalizable to other year groups, campuses, or universities with different demographic characteristics or academic environments.

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