East African Journal of Education and Social Sciences
EAJESS January-February 2025, Vol. 6, No. 1, pp. 65-77.
ISSN: 2714-2132 (Online), 2714-2183 (Print). Published by G-Card
DOI: https://doi.org/10.46606/eajess2025v06i01.0425.

Determinants of Mobile Devices Adoption amongst Students: A Case of Sokoine University of Agriculture, Tanzania

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Abstract: This study aimed to explore the factors influencing mobile device (MD) adoption and usage amongst students of Sokoine University of Agriculture (SUA) in Tanzania. A cross-sectional survey design was employed, utilizing a quantitative approach to assess MD usage patterns and related perceptions. The target population (10,580) consisted of second- and third-year undergraduate students, with a sample size of 1,058 respondents obtained through an online self-selection process. A self-administered questionnaire based on the Technology Acceptance Model was utilized, incorporating demographic section, Likert-scale items measuring perceived usefulness (PU), and perceived ease of use (PEoU) and a multiple selection part measuring the most preferred mobile applications. With the Statistical Pacage for Social Science (SPSS) v25, collected data was analyzed using descriptive and inferential statistics (independent-samples t-tests and binary logistic regression). Findings reveal that smartphone ownership is prevalent among students. Gender and family income were found to have significant contribution to students' will to adopt mobile devices for learning purposes. Male students are more likely to adopt MDs for learning than their female counterparts. Students from high income families are more likely to adopt mobile devices than those from low income families. Based on these findings, it is recommended that educational institutions develop inclusive curricula integrating MDs into learning experiences while addressing socioeconomic barriers through targeted support mechanisms for low-income families.

Keywords: Mobile devices; technology integration; higher education; digital literacy.

How to cite: Saidi, K. P., Jumanne, J. A., Makwinya, N. M., Lyimo, N. N. (2025). Determinants of Mobile Devices Adoption amongst Students: A Case of Sokoine University of Agriculture, Tanzania. East African Journal of Education and Social Sciences 6(1), 65-77. DOI: https://doi.org/10.46606/eajess2025v06i01.0425.

Introduction

Integration of technology has reformed traditional teaching and learning models, where teacher and student are not necessarily to be in the same geographical location (Dhawan, 2020). Mobile devices (MDs) in education have gained significant momentum globally, with both developed nations and developing countries observing a stream in their usage amongst students' population (Kaliisa & Picard, 2017). In developed economies, such as the United States and countries across Europe, MDs have become ubiquitous tools in facilitating learning experiences, enhancing accessibility to educational resources and promoting interactive learning environments (Timotheou et al., 2023).

However, MDs usage for educational purposes amongst students in many African nations, including Tanzania, is still at its early stage of development (Kaliisa & Picard, 2017). Nevertheless, there exists a growing recognition of their potential to bridge the digital divide and provide innovative solutions to enhance learning outcomes (Mtebe & Raisamo, 2014).

Research indicates that usage patterns of MDs among students often reflect unpredictable degrees of engagement and application within academic contexts. For instance, studies show that while some students utilize mobile devices for accessing online resources and collaborative platforms actively, others may use them primarily for social or leisure activities (Bhandarkar et al., 2021). Furthermore, there exists gender disparities concerning perceptions related to the usefulness (PU) and ease of use (PEoU) of MDs in learning settings (Santos, 2015). Male students tend to report higher levels of confidence in utilizing technology effectively compared to their female counterparts; however, some studies indicate that female students may perceive increased value from using these technologies due to enhanced collaborative opportunities (Sandholzer et al., 2015).

The Technology Acceptance Model (TAM) by Davis (1989) posits that perceived usefulness (PU) and perceived ease of use (PEoU) directly influence individuals' attitudes towards adopting new technologies. However, in learning settings, several factors influence mobile device adoption among learners beyond just perceived ease of use and perceived usefulness. A study conducted in Canada by Orser and Riding (2018) found that gender impacts the will for technology adoption. Further, the results uncovered that males are more likely to be familiarized to technology compared to their female counterparts. According to Antee (2021), family income is amongst critical determinants for individuals' access to technology and digital literacy. Students from higher-income backgrounds are generally more likely to own advanced digital devices than those from lower-income families.

In Sub-Saharan Africa, despite the moderate high penetration of educational technology integration among students, MDs access and ownership rate are approaching that of developed nations. A study conducted in West Algeria by Meziane Cherif et al. (2024) found that majority (97.4%) were owning smartphone. Surprisingly, 77% of the students were using their device for more than 3 hours daily. During lecture sessions, an average of 60% of students spent over 10 minutes sending and receiving messages and entertaining videos to and from their classmates while lessons were in progress. Another study in Ghana by Essel et al (2018), examining the usage of smartphone and tablet among students, found that 73.2% used their MDs for research purposes. Additionally, 51.9% were using MDs for checking class works given and 25.7% for notes taking or lecture recording. For non-learning uses, 65% were using MDs for listening music and 20.8% to watch movies. In addition, 79.8% were active on WhatsApp while 57.4 used Facebook and 54.6 % used YouTube for video tutorials streaming.

In Tanzania, Rumanyika and Mashenene (2015), surveying 200 students and 30 instructors from the College of Business Education, found that students are owning various MDs and they use them while in class for receiving calls, texting, social media uses and surfing information. The most used application students engaged with were Facebook, twitter and WhatsApp. Additionally, a study by Kavuta (2018) at the Institute of Accountancy Arusha found that 89% of 185 respondents owned or had access to smartphone. However, the students used most of their time for social media charting and music listening. The students used their little time with their MDs for learning activities like watching instructional movie via YouTube, reading lecture notes and downloading course materials.

MDs are seen to be indispensable within HLI student's population. The ability of MDs to facilitate access to learning resources (Shaibu et al., 2016), online libraries (Delcker et al., 2016), course

materials and communication platforms, makes them crucial devices for students. Students may use them for research, note-taking, assignment completion and collaboration (Kim, 2018). Despite existing literature addressing various aspects related to mobile device utilization within education on both global scales and specific regional contexts, including gender and financial resource influences, research focusing explicitly on Tanzanian higher learning institutions remains limited. There is a notable gap regarding empirical data explaining the factors influencing mobile device adoption amongst university-level students, specifically within Tanzania's unique socio-economic landscape, a gap this study sought to address. On these grounds, this study investigated the influencing factors for the MDs adoptions amongst HEI students and their usage patterns.

Related Literature

It is acknowledged that the integration of technology has reshaped traditional teaching and learning paradigms. Technology has broken down traditional classroom barriers, promoting a more engaging, accessible and individualized learning environment (Kaushik *et al*,. 2021). According to Mbabazi *et al* (2018), digital tools, for example MDs and resources have enhanced instructional methods, offering interactive and personalized learning experiences. On the other hand, educational technologies, such as e-learning platforms, virtual classrooms and online resources enable access to a wealth of knowledge and educational opportunities, breaking down geographical and time-based obstacles. This has been crucial, particularly during times of crisis, such as the COVID-19 pandemic, where remote learning became of necessity rather than an option (Naciri et al., 2020). These advancements support diverse learning styles and needs, fostering an inclusive and dynamic educational environment. This enhanced flexibility accommodates a variety of learning styles and enables on-the-go knowledge acquisition (Ekmekçi *et al*,. 2018). More importantly, MDs usage for learning maximizes motivation and interest amongst students (Osman & Hamzah, 2020) while fostering students' engagement and information retention (Selvakumar & Sivakumar, 2023).

The invention of MDs has profoundly influenced the integration of technology by encouraging use of flipped classrooms (Banele, 2019) and other forms of blended learning (Aslan, 2023). MDs, which in this context includes smartphones, tablets and portable laptops, are portable computing devices with advanced processing capabilities and internet connectivity (Sharma & Madhusudhan, 2017). These MDs have powerful processors, high-speed internet access and a wide range of applications designed specifically for educational purposes. For example, Duolingo, a language learning app, utilizes MDs to help students learn new words interactively through gamification (Amin, 2021). Additionally, simulations available on MDs enable students to virtually learn science concepts and gain hands-on experience without directly interacting with real objects (Ammanna, 2018). Overall, the portability and multifunctionality of MDs make them essential in both formal and informal learning environments, fostering continuous and collective learning.

Prior research suggests that teachers' perceptions of the ease of use and usefulness of technology vary based on gender, age and work experience (e.g., Olipas & Leona, 2022; Teo et al., 2015). For example, a study by Teo et al. (2015) indicated that male teachers are generally more confident in using technology compared to their female counterparts, often perceiving it as easier to integrate into teaching. Additionally, younger teachers, who are more digitally native, tend to adopt technology more readily than older teachers, who may require additional training and support (Olipas & Leona, 2022). The influence of age is further reveled by investigating the impact of work experience on technology-education integration. A study by Amin (2021), for example, suggest that teachers with more years in the profession may be less inclined to adopt new technologies due to familiarity with traditional methods.

Irrespective of gender and age differences, variations in technology use in education can be further explained by contextual differences. Notable disparities exist between developed and developing countries regarding access, device types, usage patterns and educational objectives (Lorencowicz et al., 2016; Essel et al., 2018; Rockey et al., 2023). In developed nations, mobile devices are extensively integrated into the learning process. According to Lorencowicz et al. (2016), 100% of students in developed countries have access to smartphones and approximately 90% of them use laptops, notebooks, or tablets. These devices are routinely employed for a variety of academic tasks, such as accessing e-learning platforms, participating in interactive lessons, conducting research, completing assignments, and collaborating with peers,

underscoring their vital role in enhancing educational outcomes. In contrast, the situation in developing countries is markedly different. Although mobile device ownership is on the rise, the types of devices available and their usage remain limited. Essel et al. (2018) found that while around 80.87% of students in these regions used smartphones, only 4.92% of them also had access to tablets. Consequently, mobile devices in developing countries are predominantly used for non-academic purposes (e.g., messaging and gaming) compared to education purposes.

These differences in mobile device access and usage reflect broader socio-economic and infrastructural disparities. Developed countries benefit from robust internet connectivity and advanced technological infrastructure, which facilitate the effective use of a wide range of devices for academic purposes (Rockey et al., 2023). Conversely, developing countries often struggle with poor internet connectivity and insufficient infrastructure (Aseey & Andollo, 2019). Additionally, the high cost of advanced mobile devices further limits access, particularly among students from low-income or remote areas, thereby restricting their ability to engage fully in digital learning environments (Essel et al., 2018; Garg & Sengupta, 2019).

Technology Adoption Framework

Developing a strong theoretical framework is pertinent to understanding how students adopt MDs for learning. One of the models used to understand users adoption of technology in their life aspects is the Technology Acceptance Model (TAM) developed by Davis (1989). This framework allows us to understand what drives individuals' decision to adopt MDs into their life activities. According to TAM, perceived usefulness (PU) and perceived ease of use (PEoU) are key predictors of technology acceptance and adoption. PU denotes a student's idea that using MDs would improve their learning outcomes. This can include enhanced access to educational resources, increased engagement through interactive activities and the ability to learn at their own speed (Mwalukasa, 2022). Besides, PEoU refers to the degree to which a person believes that using a specific mobile device will require less effort (Batmetan & Palilingan, 2018).

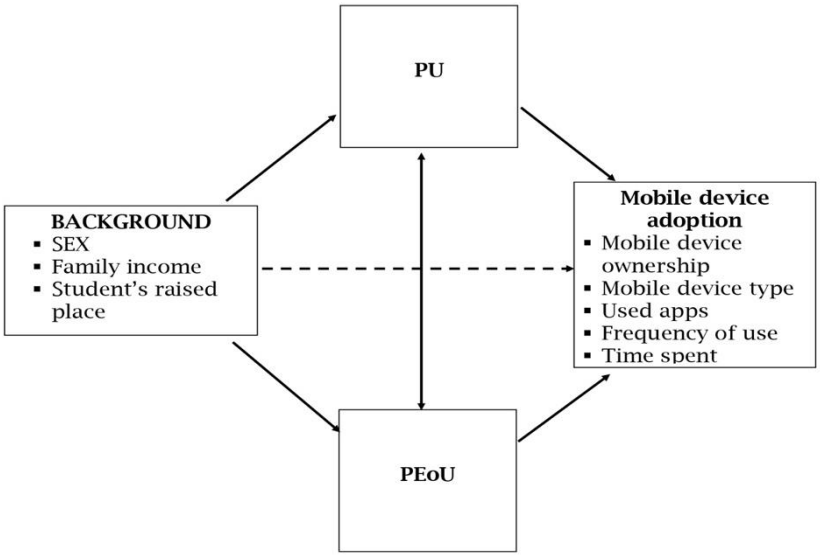

Figure 1: Conceptual framework

Additionally, the TAM acknowledges the influence of external variables like demographics and socio-economic factors towards PEoU and PU. These include individual's social economic status (SES) and demography (gender, sex, education, family and peers, experience and age). Indeed, their influence on technology adoption has been substantiated by literatures, including the study of Gerosa et al. (2022) and García-Martínez *et al.,* (2019). This conceptual model, therefore, helps researchers and developers of technology to review into the relationships between different factors, basically PEoU, PU, Sex, income and individual's raised location against ones' choice on using MDs for learning. Additionally, the application of the TAM framework supports the understanding of understanding of:

- The perception by students of key factors (PEoU and PU) from the theory on MDs for learning.

- How such perceptions impact their decision to adopt MDs for learning.
- The extent to which the TAM adequately explains the adoption of MDs for learning in Tanzanian Higher Learning Institutions.

The foundation of this theoretical framework led to the formulation of research questions, designing of the survey instrument and analysis of data. Through establishing the roots of the study in this framework, the researchers aimed at bringing out some light into the already existing pool of knowledge on MDs adoption for learning, specifically to Tanzanian HLIs context. Previous studies, like that of Davison and Argyriou (2016), Orser and Riding (2018), have worked on the influence of sex and year of study in relation to MDs adoption. However, few studies examined the influence of family income, family's higher level of education and nurture on MDs adoption (Riddell and Song, 2017; Walker, 2019;Yan & Ge, 2024).

Methodology

This section details the methodological approach employed in this study. It outlines the research design, including justification for its selection, followed by a description of the target population and sampling strategy used to recruit participants. The section then details the data collection procedures, specifying the instruments used and the steps taken to gather information from the selected sample. Finally, it describes the data analysis techniques employed to analyze the collected data.

Research Design

This study employed a cross-sectional survey design. A cross-sectional research design is ideal for this study as it allows for the collection of data from a large population of students at a single point in time (Creswell, 2009), providing a snapshot of their mobile device usage for learning and the factors influencing adoption. Additionally, this study opted for the cross-sectional design as it enables the examination of relationships between variables (Cvetkovic-Vega et al., 2021), offering valuable insights. As this study investigated factors that influenced students' adoption of mobile devices for educational purposes, the choice of this design was deemed relevant.

Population and Sampling

Tanzanian universities generally exhibit similar technological profiles (UNESCO, 2022), which makes any institution suitable for this type of study. Nonetheless, Sokoine University of Agriculture (SUA) was deliberately selected due to its convenience as well as its historical significance as one of the country's oldest public universities. The research was carried out at two of SUA's five campuses—Edward Moringe and Solomon Mahlangu—chosen purposefully because they had larger student populations compared to the other three campuses. The study excluded first-year students because they were less likely to have consistent experience with mobile device usage for academic purposes, as they were still adapting to university life and may not have yet fully integrated mobile devices into their learning. From a total of 10,580 second and third-year undergraduate students at these campuses, a random sample of 1,058 students (representing 10% of the population) was selected, which aligns with the sample size recommendation by Nwana (1981) as cited by Adekeye and Paulina (2019).

Instruments

Informed by the TAM as the theoretical lens, a Self-administered two-sectioned questionnaire was used to collect data. The first section of the questionnaire collected respondents' demographic information (sex, place of residence before they joined university education and ownership of MDs). The second section included eighteen (18) items on a 5-point Likert scale (strongly disagree through neutral to strongly agree) to assess perceptions of perceived ease of use (8 items) and perceived usefulness of (10 items), along with one multiple- selection question that gathered information on the most commonly used applications on their mobile devices (MDs). To ensure broad representation, students were invited online via a link circulated through WhatsApp groups managed by degree-program class representatives, resulting in self-selection, a method that Vehovar et al. (2016) regards as a probability sampling technique.

Validity and Reliability

Content validity of the questionnaire was established through expert review. Specialists in the field of educational technology and mobile learning evaluated the instrument to determine its appropriateness for measuring the intended constructs. These experts assessed the clarity, relevance and comprehensiveness of the items, ensuring they adequately represented the domain of interest. Feedback from the specialists was then incorporated to refine the questionnaire, addressing any identified weaknesses and strengthening the

instrument's overall validity. This rigorous review process enhanced the confidence in the data collected and its alignment with the research objectives. Further, the instrument was piloted with 70 first-year undergraduate students (not participants in the study) and reliability test took place using the Cronbach's Alpha Coefficient. As detailed in Table 1, the obtained alpha values were above the 0.7 coefficient as recommended by Taber (2018) for quantitative surveys.

Table 1: Cronbach's Alpha Table Result

Sub scale	Number of items	Cronbach's alpha coefficient
Perceived Ease of Use	8	0.732
Perceived useful	10	0.811

Ethical consideration

Informed consent was secured from respondents using a questionnaire introduction section that outlined the study's aim, procedures and potential risks and benefits. Ethical criteria mentioned in study guidelines, such as voluntary participation and anonymity, were ensured by not gathering any identifiable information from participants as part of security protocols. Eungoo and Hwang(2023) suggest that understanding and applying anonymity and confidentiality in research is key for credible research.

Statistical Data of Treatment

Only 1012 out of 1058 filled questionnaire sheets were found downright after data clearing. Before carrying out the required statistical tests, checking for inconsistences and errors took place. Descriptive (mean and standard deviation) and inferential statistical analysis (t-test and binary logistic regression) were carried out with the help of the Statistical Package for Social Science (SPSS) v25 software. The study used descriptive statistics analysis for research question one. Further, the independent sample t-test was used to analyse research question two. On addressing research question 3, the binary logistic regression was carried out to find out the influence of sex, family income, MDs usefulness and ease of over mobile device adoption.

Results and Discussion

This section presents the findings of the study. It begins by presenting the descriptive statistics of the data, followed by an analysis of the key research questions. The discussion part then interprets the results in the context of existing literature.

Table 2: Demographic Information of Respondents

Category	Item	Frequency	Percent
Sex of respondents	Female	441	43.6
	Male	571	56.4
	Total	1012	100
Age of the respondents	18 - 25	810	80
	26 - 33	178	17.6
	34 - 41	20	2
	42 - 50	4	0.4
	Total	1012	100
Students with ownership/access to MDs before joining university:	Rural Area	511	76
	Urban Areas	294	87
	Total	805	80
Students without ownership/access to MDs before joining university:	Rural Area	164	24
	Urban Areas	43	13
	Total	207	20

The response rate was 95.7% (1012 completed questionnaire sheets out of 1058). This excellent outcome was most likely the result of two crucial factors. First, the questionnaire was sent over a two-week holiday period, which reduced competing demands on students' time and made the completion easier. Second, the survey was brief, taking an average of 10-12 minutes to complete, which possibly increased the participants' willingness to participate in the study.

Demographic Information of Respondents

Findings in table 2 show the demographic characteristics of the respondents, including sex, age and MDs ownership experience before joining the university. In respect to sex, the majority of the respondents (n=571; 56.4%) were males, who outweighed the females (n=441; 43.6). The majority of respondents concentrated within the age of 18-25 (n=810, 80.0%). Furthermore, the MDs ownership experience is shown to be 76% (n=511) for students raised in rural and 87% (n=294). Those who didn't own or have access to MDs are 24% (n=164) from rural and 13% (n=43) from urban. These results alert the digital divide between rural and urban areas in terms of MDs accessibility. While ownership rates of MDs is relatively high in both rural and urban areas, a significant percentage of rural students did not possess a mobile device before entering the university. This finding supports the study result of Yawson and Mahmoud (2024), which reported the existence of digital divide in mobile devices access and ownership between urban and rural residents. Several factors may have contributed to this disparity. According to Kalula *et al* (2023), rural areas in Tanzania face challenges in terms of physical access to mobile networks and internet connectivity. Limited network coverage and infrastructure gaps has likely restricted students with rural backgrounds the ability to acquire and use MDs effectively.

In developing countries, rural populations generally have lower income levels and higher poverty rates compared to urban areas(Charles et al., 2023). The cost of purchasing and maintaining a mobile device, along with associated data costs, has likely prohibited rural families to buy these devices for their children.

Research question 1: What are usage patterns of MDs amongst university students at SUA?

This research question sought to ascertain type of mobile device used, frequency of use of MDs, time spent in MDs daily and most use application categories.

Mobile Device Type Used

The results from table 3 show that the primary mobile device used by students is smartphones (90.1%), followed by laptops (11.6%) and tablets (4.4%). The findings indicate that smartphones are the most commonly used MDs for learning among this student population. This aligns with the results of a study by Essel *et al*. (2018) conducted in Ghana, a developing country, which found that a significant majority (84.7%) of students used smartphones compared to 15.3% who used tablets. The predominance of smartphones over tablets and laptops in this study could be attributed to their affordability and portability, as suggested by Essel *et al* (2018). Affordability of smartphones makes them manageable to be purchased by majority of students, particularly those with tight budget, unlike tablets or laptops which are being sold with a higher price over that of smartphones. Furthermore, smartphones' mobility remains more comfortable over the tablets and laptops, which require bags to move with around constantly.

Table 3: Mobile Device Type Used

Category	Item	Frequency	Percent
Device type	Smartphone	912	90.10%
	Tablet	45	4.40%
	Laptop	117	11.6%

MDs Usage Frequency and Time Spent

Descriptive statistics included time spent (hour) and the frequency of use of MDs (see Table 4). The results reveal a high frequency of mobile device use, with 86.8% (*n* = 878) of respondents reporting to use their devices in daily basis. In addition, the other side of frequency of use, less common usage habits included utilizing MDs between 3 and 4 days a week (*n* = 83, 8.2%) or between 1 and 2 days a week (*n* = 51, 5.0%). Furthermore, analysis shows that majority (n=543, 54%) of students spent between 4 to 6 hours daily with their MDs. These findings concur with research from other developing countries, including that of Joy and Lacificar (2018)

and Abdulkadir and Maifata (2018), which reported that significant numbers of students spent (in hours) on average 5-8(51%) and 3-6(36.3%) hours per day respectively. The results of the present study highlight the extensive integration of mobile devices (MDs) in students' learning activities. This trend is likely driven by the increased availability of digital learning resources and the use of social media apps that are largely used for both communication and learning (Sofi-Karim et al., 2023). This conclusion is informed by the study by Rumanyika and Mashenene (2015), which observed regular students' engagement with apps like WhatsApp, Facebook, YouTube and Twitter.

Table 4: Mean Time and Frequency of Use in a Week

Category	Item	Frequency	Percent
Frequency of mobile device(s) usage	Daily	878	86.8
	3-4 days a week	83	8.2
	1-2 days a week	51	5
Average time spent (Hours)	1-2	469	46
	4-6	543	54

Table 5. Used Applications in Mobile Devices

Application	Mean	Std. Deviation
WhatsApp	0.76	0.425
Dictionary	0.6	0.49
YouTube	0.73	0.444
Artificial Intelligence (AI)	0.62	0.485

Used Applications

In Table 5, the study examined how frequently students use different mobile apps, rating their usage from 0 (not used) to 1 (used a lot). It showed that WhatsApp is the most popular, with an average score of 0.76. YouTube follows closely with a score of 0.73. Then come Artificial Intelligence (AI) tools, which scored 0.62. Surprisingly, dictionary apps were the least used, scoring 0.60. This means students mainly used apps that help them communicate and watch videos for learning. AI and dictionary apps are not popular. These findings indicate that students prefer apps for social interaction and video watching rather than those for specific academic tasks. This situation presents an opportunity for teachers to encourage more use of less popular apps by integrating them into lessons or providing special training.

The results indicate that communication platforms (WhatsApp) and video-sharing services (YouTube) are integral to students' educational experiences, demonstrating higher average engagement levels compared to other applications under investigation, including AI tools and dictionary resources. One possible explanation for WhatsApp's high mean score could be its dual function as both a social networking tool and an academic collaboration platform, facilitating real-time communication between peers on university-related topics, group tasks or assignments (Gasaymeh, 2017). This aligns with existing literature by Grewal et al (2020), supporting mobile messaging platforms as effective facilitators of students' interaction within educational environments. Moreover, YouTube's significant engagement suggests its utility in providing visual and auditory learning experiences that can enhance the understanding through multimedia content—an essential factor considering varied learning preferences among students (Bhandarkar et al., 2021).

Additionally, lower engagement with AI applications reveals emerging but comparatively limited integration within traditional educational contexts; however, it raises questions regarding accessibility or awareness concerning available AI tools (eg. Robot assistance, Robot teacher, Learning outcome detection and personal teaching tools) tailored for academic purposes among students (Gocen & Aydemir, 2020). Furthermore, dictionary apps showed similar patterns of low usage rates, which may point toward barriers, such as lack of familiarity or perceived necessity in contemporary learning environments where digital resources abound (Mwabungulu & Mungwabi, 2017). These findings

underscore an opportunity for educators to explore strategies that increase students' interaction with less utilized resources while enhancing utilization of popular platforms like WhatsApp and YouTube by embedding them into instructional practices more effectively.

Research question 2: Do male and female students perceive the same the usefulness (PU) and ease of use (PEoU) of MDs for learning?

This research question sought to establish differences in perceptions amongst males and females on the usefulness (PU) and ease of use (PEoU) of mobile devices. To capture this, a total of 18 Likert scale items were used where 10 items measured PU and 8 items measured PEoU.

Mobile Devices' Usefulness

An independent-samples t-test was performed to establish whether there was difference in perception for mobile devices usefulness between males and females. The results (Table 6) indicate no significant difference in the scores for female (M=3.9519, SD=.5694) and male (M=3.9207, SD=.6422), p = 0.42. Hence, the study failed to reject the null hypothesis (There is no significant variation in perception on mobile devices usefulness between males and females' students). This result align with the study result by Teo et al (2015), where it was found no significant difference between females and males on the perceived usefulness on technology use. The lack of significant difference ($p > 0.05$) implies that gender does not play a critical role in influencing how students view the usefulness of mobile devices for learning.

Table 6: Independent Sample T-Test for Students' Perceptions on Mobile Device Usefulness and Ease of Use

Perception	Sex	N	Mean	Std. Deviation	*t*	*df*	*p*-value	Mean Difference
Mobile device usefulness	Female	441	3.9519	0.5694	0.806	1010	0.42	0.0313
	Male	571	3.9207	0.6422				
Mobile devece ease of use	Female	441	3.8101	0.6071	-0.412	1010	0.68	-0.0174
	Male	571	3.8275	0.7084				

Table 7: Binary Logistic Regression Results

	b	S.E.	Wald	*df*	Sig.	Odds ratio	95% C.I.for EXP(B) Lower	Upper
Sex of respondent (1)	0.57	0.166	11.766	1	0.001	1.768	1.277	2.45
Family income (1)	0.477	0.171	7.804	1	0.005	1.612	1.153	2.253
Mobile devece ease of use	0.08	0.164	0.237	1	0.626	1.083	0.785	1.495
Mobile device usefulness	0.07	0.175	0.159	1	0.69	1.072	0.761	1.51
Constant	0.246	0.52	0.223	1	0.637	1.279		

Mobile Devices Ease of Use

The independent-samples t-test was conducted to compare students' perception for mobile devices ease of use. The results (Table 6) show that there was no significant difference in the scores for female (M=3.8101, SD=.6071) and male (M=3.8275, SD=.7084), p = 0.68. Therefore, the null hypothesis was not supported. This result matches with a study by Michael and Aremu (2013), where it was found that no significant variation existed in perceived ease of use of computer based technologies between females and males. In addition, the lack of a significant difference implies that gender does not play a significant role in influencing how students view the mobile devices' ease of use for learning.

Research question 3: What is the influence of Sex, family income, Perceived Easy of Use and Perceived Usefulness on the MDs adoption for learning at SUA?

Predictors of MDS Adoption

The results in table 7 reveal a significant association between students' sex and the increased likelihood of mobile device adoption (b= 0.57, p= .001). Male students (coded 1), were 1.768 more likely to adopt the mobile devices usage for learning than their female (coded 0) counterparts. These findings suggest gender disparity for females being less adopters of MDs for learning. This disparity may be attributed by family cultural backgrounds, which favors boys rather than girls in technological devices access to and ownership (Sultan et al., 2019). The

results support that of Orser and Riding (2018) indicating women are less involved in technology compared to men.

Additionally, family-income (high-income coded 1, low-income coded 0) was statistically significant in determining whether students would use mobile devices for educational purposes (b= 0.477, *p*= 0.005). Students from families with higher income were 1.612 times more likely to use mobile devices for learning than those from low income families. The positive relationship between income and mobile device use for learning indicates that students from higher-income families are more inclined to use mobile devices for educational activities. This is consistent with William's (2016) research on the adoption of mobile phone technology, which reported the power of income in determining access to and use of technology. These results indicate that a student's economic status may play a more significant role in their decision to use mobile devices for learning than traditional factors related to user perception.

Conclusion and recommendations

Conclusions

The study concludes that students at Sokoine University of Agriculture relied heavily on smartphones over laptop and tablets for their daily task, 90.1% of them using these devices. Most students, about 86.8%, spent 4 to 6 hours each day using their MDs, mainly for chatting on apps like WhatsApp and watching videos on platforms like YouTube. Both male and female students found MDs equally useful and easy to use for their studies, showing that both genders valued these devices for learning. However, the likelihood of students using these devices was influenced by gender and family income. Male students and those from wealthier families were more likely to adopt mobile devices. This highlights ongoing cultural and economic challenges, such as differences in access based on gender and financial limitations, which can increase the digital divide.

Recommendations

To align with the high reliance on smartphones (90.1%) and extensive daily usage (4–6 hours), Sokoine University of Agriculture (SUA) should prioritize mobile-friendly curricula that leverage platforms such as WhatsApp and YouTube for content delivery, collaborative learning and multimedia engagement. Furthermore, despite equivalent perceptions of mobile devices' (MDs) utility and ease of use across genders, SUA must implement gender-inclusive policies—including subsidized device loans or scholarships for female students—to address cultural barriers that might hinder equitable access. Concurrently, partnerships with governments and NGOs are critical to mitigate economic disparities through initiatives such as low-cost MDs, maximizing free Wi-Fi zones, and subsidized internet for low-income students. Additionally, training programs should expand beyond dominant platforms like WhatsApp to incorporate underutilized tools (e.g., AI applications, digital dictionaries), fostering diversified and interactive learning experiences. Finally, future research should adopt mixed-methods approaches to establish how cultural norms (e.g., gendered access) and infrastructural limitations (e.g., rural connectivity) influence adoption patterns, enabling context-specific interventions at SUA.

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