

Smartphone use in pharmacy education in Uganda: A cross-sectional pilot study.

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Abstract

Background

Smartphones are increasingly used in health education. Understanding student acceptance is important for integrating mobile learning into pharmacy training. The Technology Acceptance Model (TAM) provides a framework for examining perceived ease of use, usefulness, attitude, and behavioral intention.

Method

A cross-sectional pilot study was conducted at Fort Portal College of Health Sciences in Uganda. Forty-seven pharmacy students completed a structured TAM-based questionnaire via Google Forms. Data were analyzed using SPSS version 23. Reliability was assessed with Cronbach's alpha; descriptive statistics summarized perceptions; and Pearson correlations and linear regressions examined relationships among TAM constructs. Bootstrapping with 1,000 resamples generated bias-corrected confidence intervals (BCa CI).

Results

Reliability analysis produced an overall Cronbach's alpha of .91. Students reported positive perceptions of smartphone use, with mean scores above the midpoint across constructs. TAM variables were positively correlated. Regression analyses showed that perceived ease of use predicted usefulness ($\beta = 0.36$), usefulness predicted attitude ($\beta = 0.85$), and attitude predicted behavioral intention ($\beta = 0.54$). When entered simultaneously, usefulness and attitude did not uniquely predict behavioral intention, likely reflecting construct overlap in this small sample. These findings support the feasibility of applying TAM in larger studies of mobile learning in Ugandan pharmacy education.

Conclusion

TAM was applicable for examining smartphone acceptance in Ugandan pharmacy education. Positive perceptions and reliable measurement suggest feasibility for larger studies.

Recommendations

Future studies should increase the sample size, include multiple cohorts, and apply structural equation modeling to clarify overlapping effects.

Keywords: *Technology Acceptance Model; mobile learning; smartphone use; pharmacy education; Uganda; pilot study.*

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Background

Globally, smartphone use in higher education has expanded rapidly, with mobile learning widely adopted to support

flexible access to resources, enhance learner engagement, and strengthen digital participation in medical and health sciences education. A recent systematic review of

Technology Acceptance Model (TAM) studies in medical education found extensive global use of TAM for evaluating digital learning tools and confirmed its relevance across diverse educational environments (Lee et al., 2025). Similarly, a systematic review of mobile learning in higher education reported that mobile technologies have increasingly become integral components of online and blended learning systems in universities worldwide, particularly during and after the COVID-19 pandemic (Qazi et al, 2024; Yaqin et al, 2025).

Across Africa, mobile phones have become central to digital learning due to increasing internet access and widespread smartphone ownership. Countries such as Uganda, Kenya, Morocco, and South Africa have been identified as emerging hubs of educational innovation supported by expanding mobile connectivity. Continental priorities also reflect this trend (Xue et al., 2024; Lazaro & Duart, 2023). The Africa EdTech 2030 Vision highlights mobile learning as a practical and scalable approach for expanding higher education access and strengthening digital transformation efforts across African institutions (United Nations, 2025).

In East Africa, smartphones and tablets are used widely in classroom settings to supplement limited learning materials. Research from Uganda, Tanzania, and Sudan shows that mobile technologies support increased student engagement, though challenges such as low digital literacy, limited infrastructure, and inconsistent institutional support remain common across the region (Mtenzi, 2016; Tairab et al, 2017; Suhail, 2017; Faustino et al., 2024). Earlier work by Mtenzi (2016), Suhail (2017), and Tairab et al. (2017) offers foundational insights into mobile learning in East Africa. Although these studies are older, they help trace the evolution of digital learning in the region and complement more recent findings, such as those reported by Faustino et al. (2024). In Uganda, smartphones are often the primary means for students to access the internet, especially in health training institutions. This makes it important to understand how pharmacy students perceive smartphone use for learning. The Technology Acceptance Model (TAM), developed by Davis (1989), provides a structured framework for examining perceived usefulness, ease of use, attitudes, and behavioral intentions. Global reviews confirm TAM's applicability in medical and health sciences education. Studies in developing-country contexts show that TAM constructs predict mobile learning adoption among medical students, indicating that the model is suitable in settings where smartphones play a central learning role (Suliman et al, 2025; Lee et al., 2025).

Despite these developments, limited empirical research exists on mobile learning in Ugandan pharmacy education. Pilot studies are therefore needed to test instrument reliability, identify early perception patterns, and examine

initial relationships among TAM constructs before scaling up to larger studies.

This pilot study at Fort Portal College of Health Sciences aimed to:

1. Assess the reliability of the TAM instrument among pharmacy students.
2. Describe preliminary trends in student perceptions of smartphone use for learning.
3. Examine relationships among TAM constructs, including perceived ease of use, perceived usefulness, attitude, and behavioral intention.

Methods

Study design

This was a cross-sectional pilot study conducted at Fort Portal College of Health Sciences (FPCOHES) in Western Uganda. Cross-sectional surveys are widely used in technology acceptance research to capture perceptions at a single point in time (Jime et al., 2024; Sabbar et al., 2025; Yang et al., 2025).

Study setting

Fort Portal College of Health Sciences is a government health-training institution in Western Uganda. The college trains students in pharmacy, clinical medicine, anaesthesia, theatre techniques, and health leadership and management, and collaborates with Fort Portal Regional Referral Hospital for clinical training. High smartphone use among trainees makes the college an appropriate setting for studying mobile learning acceptance.

Sample size determination

The total number of students was based on the pharmacy students enrolled at FPCOHES during the study period. These students formed the accessible population for recruitment. Because this was a pilot study, formal power calculations were not required. Methodological guidance instead recommends small but sufficient samples for feasibility work and preliminary instrument testing. Bell, Whitehead, and Julious (2018) note that pilot studies often use 12-35 participants to assess feasibility. Bujang et al. (2024) similarly recommend a minimum of 30 participants for pilot studies evaluating questionnaire reliability. The final sample of 47 consenting students, therefore, exceeded established guidance and was appropriate for the exploratory aims of this study.

Participants

A total of 415 registered pharmacy students at FPCOHES were invited to participate. A total population sampling approach was used. Eligible students were those who were present during data collection, owned or routinely used a smartphone, and provided electronic consent. Students who

declined participation, were absent, or submitted incomplete responses were excluded. Forty-seven students completed the questionnaire. Two responses missing age data were excluded only from age-related analyses (Bryman, 2016).

Instrument

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Data were collected using a structured questionnaire based on the Technology Acceptance Model (TAM) (Davis, 1989). The instrument measured four constructs: perceived ease of use (PEOU), perceived usefulness (PU), attitude toward use (ATT), and behavioural intention (BI). Each construct was assessed using multiple items on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree), consistent with TAM applications in higher education (King & He, 2006; Munabi et al., 2020; Dou & Feng, 2025). Demographic and background variables (sex, year of study, program, internet access, phone type, weekly smartphone hours, and age) were also collected to contextualize responses.

Procedure

The questionnaire was administered electronically via Google Forms, a platform widely used for survey distribution in educational research (Nguyen et al., 2018). A link to the form was shared with pharmacy students through the different cohort WhatsApp groups. Students were briefed on the purpose of the study and assured of confidentiality before completing the online form. Responses were automatically captured in the Google Forms database and exported for analysis.

Bias mitigation

As a pilot study, some selection and response bias were expected. Participation was voluntary, the survey was anonymous, and no incentives were given. Students were informed that taking part would not affect their academic standing. Data were collected electronically to limit the researcher's influence. These steps helped reduce the

likelihood of systematic bias for this exploratory phase (Hassan et al., 2006; Creswell & Creswell, 2017).

Data analysis

Data were analysed using SPSS 23. Reliability was assessed with Cronbach's alpha, following the conventional threshold of .70 for acceptable internal consistency (Nunnally, 1978). Descriptive statistics (means, standard deviations, frequencies, percentages) were calculated for demographic variables and TAM constructs. Relationships among TAM constructs were examined using Pearson correlations and simple linear regressions. Bootstrapping with 1,000 resamples generated BCa confidence intervals, an approach recommended for small samples (Tibshirani & Efron, 1993).

Ethical considerations

Approval to conduct the study was obtained from the administration of FPCOHES. According to the Uganda National Guidelines for Research Involving Humans as Research Participants (UNCST, 2025), anonymous and minimal-risk studies that do not involve identifiable information may be exempt from REC review (Section 4.5.2.3). The study met these conditions; therefore, no REC approval number was required.

Informed consent

Electronic informed consent was obtained through a mandatory "I agree" confirmation before students accessed the questionnaire.

Results

Participant flow

A total of 415 students were invited to complete the questionnaire. Of these, only 52 students accessed the questionnaire link; 363 did not. Five responses were excluded because they did not meet the inclusion criteria or were incomplete, leaving 47 eligible and complete responses for analysis. Two responses lacked age data and were excluded only from age-related analyses.

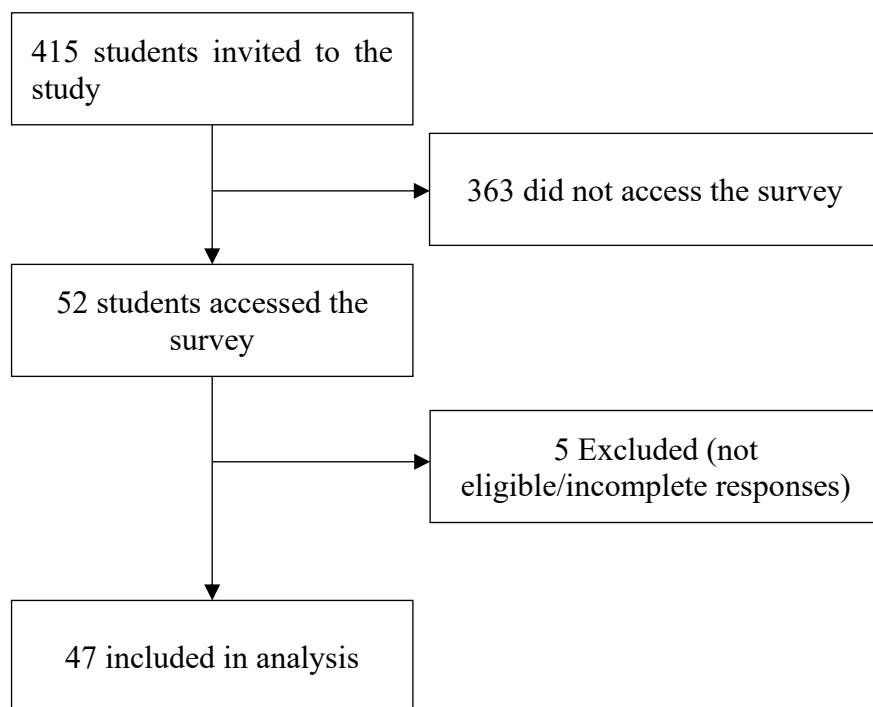


Figure 1 participant flow chart

Demographics

Table 1 presents the demographic characteristics of the sample. Most participants were male (61.7%) with a mean age of 22.3 years (SD = 2.75). The majority were first-year students (42.6%) enrolled in either certificate (51.1%) or

diploma (48.9%) programs. Daily internet access was common (70.2%), and most students used Android phones (76.6%). Weekly smartphone use varied: 40.4% reported 5-10 hours, 23.4% reported 11-20 hours, and nearly one-third (29.8%) reported more than 21 hours.

Table 1. Demographic characteristics of participants (n = 47)

Variable	Categories	%
Sex	Male	61.7
	Female	38.3
Year of study	First	42.6
	Second	31.9
	Third	25.5
Program	Certificate	51.1
	Diploma	48.9
Internet access	Daily	70.2
	Weekly	4.3
	Occasional	21.3
	None	4.3
Phone type	Android	76.6
	iPhone	12.8
	Basic	10.6
Age (years)	M = 22.3, SD = 2.75	-

Note. Percentages may not total 100 due to rounding.

Reliability of the instrument

Table 2 presents the item-total statistics for the TAM scale. Reliability analysis produced an overall Cronbach's alpha of .91. Perceived usefulness (.88) and attitude (.88) met expected reliability standards. Perceived ease of use (.72)

and behavioural intention (.70) also fell within acceptable ranges. Item-total correlations were generally satisfactory, although a few items (PEOU2, PEOU3, PEOU4, and BI3) had lower correlations in the .30-.35 range. Removing these items did not materially affect the overall alpha, which remained high.

Table 2. Item-total statistics of the tam constructs

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
PEOU1: My smartphone is easy to use for accessing pharmacy study materials	67.74	122.064	.518	.904
PEOU2: Learning pharmacy apps on my smartphone required little effort	68.13	127.244	.303	.910
PEOU3: Smartphone notifications help me remember pharmacy study deadlines	67.96	126.650	.352	.908
PEOU4: Using my smartphone camera to record practical skills demos is simple	67.96	128.650	.316	.908
PEOU5: My smartphone interface makes navigation through pharmacy apps easy	68.11	124.532	.500	.904
PU1: Smartphones improve my understanding of pharmacy concepts and drugs	67.72	121.465	.619	.901
PU2: Pharmacy apps help me do dosage calculations more accurately	68.13	122.722	.585	.902
PU3: My smartphone helps me complete pharmacy assignments faster	67.70	119.866	.710	.898
PU4: Smartphone drug reference apps improve my learning efficiency	67.85	117.086	.766	.896
PU5: Overall, smartphones make pharmacy learning more effective	67.96	116.694	.744	.896
ATT1: I enjoy using my smartphone for pharmacy coursework	67.85	119.999	.753	.897
ATT2: Using smartphones for pharmacy learning is a good idea	67.89	114.575	.773	.895
ATT3: Smartphone learning feels natural for pharmacy studies	68.09	122.558	.497	.904
ATT4: My overall experience with smartphone learning is positive	67.87	115.722	.803	.895
BI1: I plan to continue using smartphones for pharmacy studies	67.74	120.325	.717	.898
BI2: I will recommend smartphone learning to other pharmacy students	67.72	126.422	.463	.905
BI3: I would struggle without my smartphone for pharmacy learning	68.15	124.912	.296	.913
BI4: I intend to use pharmacy apps daily for my coursework	67.98	123.891	.606	.901

Preliminary trends in perceptions

Table 3 shows descriptive statistics for the TAM constructs. Mean scores were above the scale midpoint for all constructs, indicating generally positive perceptions of smartphone use for learning.

Table 3. Descriptive statistics for TAM Constructs (N = 47)

Construct	M (SD)	95% CI (BCa)
PEOU	3.94 (.73)	[3.73, 4.11]
PU	4.04 (.85)	[3.80, 4.27]
ATT	3.99 (.93)	[3.71, 4.24]
BI	4.02 (.75)	[3.81, 4.22]

Note. Confidence intervals are bias-corrected accelerated (BCa) based on 1,000 bootstrap samples.

Initial relationships among TAM constructs

Correlation analysis

Pearson correlations indicated positive associations among all TAM constructs. Confidence intervals based on 1,000

bootstrap resamples supported the stability of these estimates. As shown in Table 4, perceived usefulness correlated strongly with attitude, and both attitude and perceived usefulness showed moderate correlations with behavioural intention.

Table 4. Correlations among TAM Constructs with bootstrapped confidence intervals (n = 47)

Pair	r	p-value	95% BCa CI
PEOU – PU	0.36*	0.013	[-.08, .76]
PEOU – ATT	0.34*	0.018	[-.10, .76]
PEOU – BI	0.43**	0.002	[.05, .74]
PU – ATT	0.85**		[.64, .94]
PU – BI	0.54**		[.15, .84]
ATT – BI	0.54**		[.14, .84]

*Note. *p < .05, **p < .01 (two-tailed). Confidence intervals are bias-corrected accelerated (BCa) based on 1,000 bootstrap samples.*

Regression analysis

Regression analyses examined the relationships among the TAM constructs. As shown in Table 5, perceived ease of use predicted perceived usefulness, perceived usefulness predicted attitude, and attitude predicted behavioural

intention. When perceived usefulness and attitude were entered simultaneously to predict behavioural intention, neither variable remained a unique predictor, suggesting shared variance. Bootstrap confidence intervals are provided for transparency.

Table 5. Regression Results with Bootstrapped Confidence Intervals (n = 47)

Path	β	B	SE	p-value	R ²	95% BCa CI
PEOU → PU	0.36	0.42	0.16	0.01	0.13	[-.15, .99]
PU → ATT	0.85	0.93	0.09		0.72	[.70, 1.14]
ATT → BI	0.54	0.43	0.10		0.29	[.09, .82]
PU + ATT → BI	PU = .29	0.26	0.21	0.23	0.31	[-.21, 1.07]
	ATT = .29	0.23	0.19	0.22		

In summary, the sample was young and predominantly male, with high daily internet access and extensive smartphone use, mostly via Android devices. The TAM instrument showed acceptable reliability in this pilot. Students reported positive perceptions of smartphone use for learning, with stable mean scores across constructs. TAM pathways were supported: perceived usefulness strongly predicted attitude, and attitude predicted behavioral intention. When usefulness and attitude were entered together, neither remained significant, reflecting multicollinearity in this small sample.

DISCUSSION

This pilot study applied the Technology Acceptance Model to examine smartphone use in pharmacy education at Fort

Portal College of Health Sciences. The findings demonstrated strong instrument reliability, positive student perceptions, and preliminary support for expected TAM pathways. These results provide the foundation for the following discussion.

Reliability of the instrument

The TAM instrument showed excellent internal consistency in this Ugandan pharmacy education context. This aligns with global TAM research in medical education, where systematic reviews have consistently shown TAM to be a framework for evaluating technology uptake in teaching and learning environments (King & He, 2006; Munabi et al., 2020; Dou & Feng, 2025). Additionally, studies conducted

in developing-country contexts, such as Suliman et al. (2025), confirm that perceived usefulness and ease of use reliably predict learner attitudes toward mobile learning environments. Hence, supporting the validity of applying TAM among African health sciences students. The few weaker item-total correlations observed (e.g., PEOU2, BI3) are characteristic of pilot studies and provide opportunities for refinement before scaling. Establishing such reliability is essential, particularly in Uganda, where validated educational technology instruments remain limited.

Preliminary trends in perceptions

Students in this study reported positive perceptions of smartphone use for pharmacy learning. These findings align with multiple strands of existing literature across global, regional, and local contexts. These findings are consistent with global mobile-learning research, which highlights accessibility and convenience as key benefits for health sciences learners (Pimmer et al., 2013; Klímová, 2018; Zhang et al., 2021; Wu et al., 2025). The local context of Fort Portal aligns with evidence on mobile penetration and digital learning adoption in Uganda (Kaliisa & Picard, 2017).

These patterns also reflect broader African trends. UNESCO's regional analysis shows that several African countries, including Uganda, Kenya, Morocco, and South Africa, are emerging hubs for digital-learning innovation due to increasing mobile phone ownership and improved connectivity across the continent (UNESCO, 2021). This pattern is consistent with regional digital-education assessments by the African Union, which identify Kenya, Morocco, and other countries as leading adopters of digital-learning infrastructure (African Union, 2022). In East Africa, smartphones and tablets are widely used for teaching and help address persistent challenges such as limited textbooks, inadequate computer laboratories, and inconsistent electricity supply (Faustino et al., 2024). These devices also improve student engagement and access to learning resources across the region (Faustino et al., 2024). Evidence from developing-country contexts reinforces these patterns, with Al-Rahmi et al. (2022) showing that perceived mobile value, academic relevance, and self-management significantly shape students' attitudes and behavioral intention toward mobile learning, consistent with TAM pathways. At the continental level, the Africa EdTech 2030 Vision identifies mobile learning as a strategic approach for strengthening access and quality in African higher education (United Nations, 2025). The positive attitudes observed among pharmacy students at Fort Portal College therefore align with both global and regional evidence, indicating readiness for technology-enhanced learning.

Relationships among TAM constructs

Correlation and regression analyses largely supported the expected TAM pathways. Perceived ease of use predicted perceived usefulness, perceived usefulness strongly predicted attitude, and attitude predicted behavioral intention. These results are consistent with patterns observed in TAM research within medical and mobile learning contexts globally and in developing countries where smartphone-based learning is increasingly common (Lazaro & Duarte, 2023; Lee et al., 2025). Related TAM research on smartphone use in higher education also shows that usefulness and ease of use strongly shape student attitudes (Mejía-Mancilla & Mejía-Trejo, 2024).

Importantly, the strength of the relationship between perceived usefulness and attitude ($\beta = .85$) in this study echoes findings across East African digital-learning research (e.g., Mtebe & Raisamo, 2014; Munabi et al., 2020), where students adopt technologies for clear benefits like improved efficiency and resource access. Similarly, continent-wide education analyses show that usefulness perceptions drive technology engagement, especially when mobile devices are already embedded in learners' daily academic practices (Xue et al., 2024; Lee et al., 2025).

The observed multicollinearity between perceived usefulness and attitude in predicting behavioral intention is not unusual in small pilot samples. It reflects the conceptual overlap between these constructs, which future studies with larger samples, and potentially using structural equation modeling, could further clarify.

Implications of the study

The findings highlight clear opportunities for strengthening mobile learning in pharmacy education in Uganda. Since pharmacy students already rely heavily on smartphones, institutions can leverage this behavior by integrating structured mobile learning activities into coursework, such as digital drug references, dosage calculation apps, and collaborative learning platforms. Institutional readiness is also important, as managerial-level analyses during the COVID-19 period identified technology management, user support, and digital readiness as critical success factors for e-learning implementation (Alqahtani & Rajkhan, 2020).

From a regional perspective, the findings align with Africa's broader digital education transformation, where mobile learning is seen as a scalable and cost-effective strategy for expanding access and improving educational outcomes. In the East African region, where mobile devices are already widely used in instructional settings, this study contributes locally grounded evidence that can support institutional policy development and curriculum modernization efforts.

Generalizability

As a single-institution pilot, generalizability remains limited. However, the consistency of the findings with

broader African and global TAM literature suggests that similar patterns of smartphone acceptance may be observed across other health training institutions in Uganda and East Africa. Mobile technology use is growing rapidly across the region, and Uganda is recognized as a country experiencing significant EdTech innovation and expansion in mobile-based learning. Multi-institutional studies would help validate these pathways across more diverse learner groups.

CONCLUSION

This pilot study applied the Technology Acceptance Model to examine smartphone use in pharmacy education at Fort Portal College of Health Sciences in Uganda. Correlations showed that all constructs were positively related, with the strongest link between perceived usefulness and attitude and a moderate link between ease of use and behavioral intention. Regression analyses confirmed TAM pathways, with perceived ease of use predicting usefulness, usefulness predicting attitude, and attitude predicting behavioral intention. The overlap between predictors reflected the small sample size. Overall, TAM proved applicable in this context, supporting feasibility for broader studies and instrument refinement.

Limitations

The study involved only 47 participants from a single institution, limiting statistical power and generalizability. Reliance on self-reported perceptions may introduce bias, and the cross-sectional design captures responses at one point in time without accounting for changes over time.

Recommendations

Future research should expand the sample size, replicate across institutions, and apply structural equation modeling to clarify overlapping effects. Institutions may also support mobile learning by ensuring reliable internet access and providing structured guidance on effective smartphone use in academic contexts. Lessons from this pilot can refine survey administration and analysis, strengthening the evidence base for mobile learning in pharmacy education.

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Abbreviations

1. AI – Artificial intelligence
2. ATT – Attitude toward use
3. BCa CI – Bias-Corrected Accelerated Confidence Interval
4. BI – Behavioral Intention
5. FPCOHES – Fort Portal College of Health Sciences
6. PEOU – Perceived Ease of Use
7. PU – Perceived Usefulness
8. REC – Research Ethics Committee
9. TAM – Technology Acceptance Model
10. UNCST – Uganda National Council of Science and Technology

Author contributions

EM and WM conceptualized and designed the study with methodological input from MO. MO designed the instrument. EM, WM, and BN collected the data. MO conducted the data analysis. EM and WM prepared the original draft of the manuscript, while MO and HHN provided critical feedback and revisions.

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Conflict of interest

The authors declare no competing interests. The views expressed are entirely those of the authors and should not be taken as official positions at Fort Portal College of Health Sciences, Fins Medical University, Kampala International University, or Enabel.

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Use of artificial intelligence

Perplexity and Microsoft Copilot were used to refine language and improve clarity during manuscript drafting. All outputs were reviewed and approved by the authors, who take full responsibility for the final content. No generative AI tools were used to generate data or perform analysis.

Data availability

The data underlying this study can be accessed by contacting the corresponding author. Requests will be considered on a reasonable basis and require approval from FPCOHES.

REFERENCES

1. African Union. (2022). *Digital education strategy and implementation plan*. African Union Commission, Department of Education, Science, Technology and Innovation. <https://www.iicba.unesco.org/sites/default/files/medias/fichiers/2025/10/African%20Union%E2%80%99s%20Digital%20Education%20Strategy.pdf>
2. Alqahtani, A. Y., & Rajkhan, A. A. (2020). E-learning critical success factors during the COVID-19 pandemic: A comprehensive analysis of e-learning managerial perspectives. *Education sciences*, 10(9), 216. <https://doi.org/10.3390/educsci10090216>
3. Al-Rahmi, A. M., Al-Rahmi, W. M., Alturki, U., Aldraiweesh, A., Almutairy, S., & Al-Adwan, A. S. (2022). Acceptance of mobile technologies and M-learning by university students: An empirical investigation in higher education. *Education and*

- Information Technologies*, 27(6), 7805-7826. <https://doi.org/10.1007/s10639-022-10934-8>
4. Bell, M. L., Whitehead, A. L., & Julious, S. A. (2018). Guidance for using pilot studies to inform the design of intervention trials with continuous outcomes. *Clinical epidemiology*, 153-157. <https://doi.org/10.2147/CLEP.S146397>
5. Bryman, A. (2016). *Social research methods*. Oxford University Press.
6. Bujang, M. A., Omar, E. D., Foo, D. H. P., & Hon, Y. K. (2024). Sample size determination for conducting a pilot study to assess the reliability of a questionnaire. *Restorative dentistry & endodontics*, 49(1), e3. <https://doi.org/10.5395/rde.2024.49.e3>
7. Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage Publications.
8. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340. <https://doi.org/10.2307/249008>
9. Dou, G., & Feng, Y. (2025, November). Psychometric validation of the information technology acceptance scale for Chinese high school teachers. In *Frontiers in Education* (Vol. 10, p. 1678302). Frontiers Media SA. <https://doi.org/10.3389/educ.2025.1678302>
10. Faustino, A., Kaur, G., & Bussey, M. (2024). Instructional technologies of education in East African countries: An overview. *Journal of Interdisciplinary Studies in Education*, 13(S1), 236-252. <https://files.eric.ed.gov/fulltext/EJ1456473.pdf>
11. Hassan, Z. A., Schattner, P., & Mazza, D. (2006). Doing a pilot study: why is it essential?. *Malaysian family physician: the official journal of the Academy of Family Physicians of Malaysia*, 1(2-3), 70. <https://pmc.ncbi.nlm.nih.gov/articles/PMC4453116/pdf/MFP-01-70.pdf>
12. Jime, A. A., Saeed, B. M. A. R., & Gana, I. A. (2024). Students' Attitudes towards the Use of Mobile Learning in Universities of Northeast Nigeria. *Journal of Education in Developing Areas*, 32(2), 1-14. <https://journals.journalsplace.org/index.php/JEDA/article/viewFile/567/480>
13. Kaliisa, R., & Picard, M. (2017). A systematic review on mobile learning in higher education: The African perspective. *TOJET: The Turkish Online Journal of Educational Technology*, 16(1).
14. King, W. R., & He, J. (2006). A meta-analysis of the technology acceptance model. *Information &*

- management, 43(6), 740-755.
<https://psycnet.apa.org/doi/10.1016/j.im.2006.05.003>
15. Klímová, B. (2018). Mobile learning in medical education. *Journal of Medical Systems*, 42(10), 194. <https://doi.org/10.1007/s10916-018-1056-9>
 16. Lazaro, G. R. D., & Duart, J. M. (2023). Moving learning: A systematic review of mobile learning applications for online higher education. *Journal of New Approaches in Educational Research*, 12(2), 198-224. <https://doi.org/10.7821/naer.2023.7.1287>
 17. Lee, J. W. Y., Tan, J. Y., & Bello, F. (2025). Technology acceptance model in medical education: systematic review. *JMIR Medical Education*, 11(1), e67873. <https://doi.org/10.2196/67873>
 18. Mejía-Mancilla, J., & Mejía-Trejo, J. (2024). Technology acceptance model for smartphone use in higher education. *Scientia et PRAXIS*, 4(07), 113-158. <https://doi.org/10.55965/setp.4.07.a5>
 19. Mtebe, J. & Raisamo, R. (2014). Investigating students' behavioural intention to adopt and use mobile learning in higher education in East Africa. *International Journal of Education and Development using ICT*, 10(3). Open Campus, The University of the West Indies, West Indies. Retrieved March 27, 2026, from <https://www.learntechlib.org/p/148476/>.
 20. Mtenzi, F. J. (2016). A new educational mobile device platform for social inclusion in Tanzania. *International Journal of ICT Research in Africa and the Middle East (IJICTRAME)*, 5(2), 49-58. doi: 10.4018/IJICTRAME.2016070105
 21. Munabi, S., Aguti, J., and Nabushawo, H. (2020). Using the TAM Model to Predict Undergraduate Distance Learners' Behavioural Intention to Use the Makerere University Learning Management System. *Open Access Library Journal*, 7, 1-12. <https://doi.org/10.4236/oalib.1106699>
 22. Nguyen, H., Stehr, E. M., Eisenreich, H., & An, T. (2018). Using Google Forms to inform teaching practices. In *Proceedings of the Interdisciplinary STEM Teaching and Learning Conference (2017-2019)* (Vol. 2, No. 1, pp. 74-79). <https://doi.org/10.20429/stem.2018.020110>
 23. Nunnally, J.C. (1978). An Overview of Psychological Measurement. In: Wolman, B.B. (eds) *Clinical Diagnosis of Mental Disorders*. Springer, Boston, MA. https://doi.org/10.1007/978-1-4684-2490-4_4
 24. Pimmer, C., Linxen, S., Gröhbiel, U., Jha, A. K., & Burg, G. (2013). Mobile learning in resource-constrained environments: a case study of medical education. *Medical teacher*, 35(5), e1157-e1165. <https://doi.org/10.3109/0142159x.2012.733454>
 25. Qazi, A., Qazi, J., Naseer, K., Hasan, N., Hardaker, G., & Bao, D. (2024). M-Learning in education during COVID-19: A systematic review of sentiment, challenges, and opportunities. *Helijon*, 10(12), e32638. <https://doi.org/10.1016/j.helijon.2024.e32638>
 26. Sabbar, S. D., Kadir, A. R., Nohong, M., Mannan, A., Taha Alkanan, O. M., & Anter, S. A. (2025). Adoption of Mobile Learning: Education's Use of App-Based Learning Management Systems & Ethical Implementation. *International Journal of Interactive Mobile Technologies*, 19(18). DOI: 10.3991/ijim.v19i18.57611
 27. Suhail, N. A. (2017). Assessing Mobile Learning Readiness in Kampala University, Uganda. *International Journal of Computer Applications*, 170(2), 30-34.
 28. Suliman, M. A., Zhang, W., Suluman, R. A., & Sleiman, K. A. A. (2025). Medical students' acceptance of mobile learning: Integrating the TAM model with perceived reusability. *Education and Information Technologies*, 30(3), 3621-3644. <https://doi.org/10.1007/s10639-024-12917-3>
 29. Tairab, A., Huang, R., & PERRIS, K. (2017, December). Mobile learning in higher education in Sudan. In the *International Conference on Computers in Education*. <https://library.apsce.net/index.php/ICCE/article/view/2219/2095>
 30. Tibshirani, R. J., & Efron, B. (1993). An introduction to the bootstrap. *Monographs on statistics and applied probability*, 57(1), 1-436.
 31. Uganda National Council for Science and Technology. (2025). *National guidelines for research involving humans as research participants*. <https://uncst.go.ug/files/downloads/NATIONAL%20GUIDELINES%20FOR%20RESEARCH%20INVOLVING%20HUMANS%20AS%20RESEARCH%20PARTICIPANTS%202025.pdf>
 32. UNESCO. (2021). *The digital learning turn in Africa: The role of local ecosystems* (ED/GEC/2021/03). United Nations Educational, Scientific, and Cultural Organization. <https://unesdoc.unesco.org/ark:/48223/pf0000377725>
 33. United Nations. (2025). *Empowering Africa through education technology: The Africa EdTech 2030 Vision*. <https://africarenewal.un.org/sites/default/files/documents/africaedtech2030visionandplandraft-1.pdf>



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34. Wu, X., Zhan, F., Zhang, X., & Wang, T. (2025). Innovation and entrepreneurship education for medical students: a global bibliometric analysis (2000–2024). *Medical Education Online*, 30(1), 2515385.
<https://doi.org/10.1080/10872981.2025.2515385>
35. Xue, L., Rashid, A. M., & Ouyang, S. (2024). The unified theory of acceptance and use of technology (UTAUT) in higher education: A systematic review. *Sage Open*, 14(1), 21582440241229570.
<https://doi.org/10.1177/21582440241229570>
36. Yang, H. J., Lee, J. H., & Lee, W. (2025). Factors influencing health care technology acceptance in older adults based on the technology acceptance model and the unified theory of acceptance and use of technology: meta-analysis. *Journal of Medical Internet Research*, 27, e65269.
<https://doi.org/10.2196/65269>
37. Yaqin, A. M., 'Ainul, Muqoffi, A. K., Rizalmi, S. R., Pratikno, F. A., & Efranto, R. Y. (2025). Hybrid learning in post-pandemic higher education systems: an analysis using SEM and DNN. *Cogent Education*, 12(1).
<https://doi.org/10.1080/2331186X.2025.2458930>
38. Zhang, X., Lo, P., So, S., Chiu, D. K., Leung, T. N., Ho, K. K., & Stark, A. (2021). Medical students' attitudes and perceptions towards the effectiveness of mobile learning: A comparative information-need perspective. *Journal of Librarianship and Information Science*, 53(1), 116-129.
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