

# Advancing Mobile Application Technology for Learning: Assessing the Role of Capacity Building and Training Intervention in Improving Undergraduate Students' Knowledge

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**Abstract-** The study explores the role and impacts of capacity building and training interventions to improve undergraduate students' knowledge of mobile application technology. A cross-sectional study was carried out among undergraduate students at David Umahi Federal University of Health Science. Their knowledge pre-and post-capacity building and training intervention was assessed using a structured questionnaire distributed to the participants. The findings reveal that half of the participants (52.78%) spend 4-6 hours on their smartphones, suggesting high intensity of engagement. In addition, the YouTube mobile app dominates the mobile applications used and downloaded by students for educational purposes. However, the majority of participants lack awareness (51.39%) of capacity-building and training interventions, suggesting a critical knowledge gap for skill development. Assessment results of the post-capacity building and training intervention reveal that the training was highly accepted by the participants (80%) and the concept of mobile application technology was clearly explained

## I. INTRODUCTION

Mobile technology and mobile-based education have transformed the learning landscape (Subbarao et al, 2025). Various mobile devices, such as smartphones, tablets, and other portable devices, are increasingly being integrated into education and learning (Carvalho and Ferreira, 2015). The integration has led to new forms of learning and teaching that support personalization and on-demand learning on the go (Bollavarapu, 2024). With mobile technology, students prominently engage with course material that transcends physical boundaries,

(87.5%). Moreover, participants (91.7%) reported high confidence in using the introduced mobile applications after the training and can deploy them for collaboration (76.4%). In addition, the majority of the participants (94.4%) agree to explore the mobile apps beyond the training and introduce them to their peers. Overall, the results obtained indicate a remarkable performance across different aspects of the assessment (82-94%) and show that the capacity building and training intervention was highly effective and needs to be extended to both students and staff. The study recommends technology-based learning, integrating mobile application technology into the university academic programmes to improve students' skills and competencies, and further structured training interventions to strengthen mobile application technology adoption for learning.

**Keywords-** mobile applications, mobile learning, capacity building, students' academic performance, technology-enhanced learning

communicate effectively, collaborate with other students, and access educational resources (Arifudin, 2025).

Mobile-based education provides a scalable, inclusive, and flexible learning system that accommodates students from diverse backgrounds, learning styles, and requirements (Ahmad et al, 2024). The system is made possible by the use of mobile platforms and digital technologies that are collectively studied under mobile learning.

Mobile learning (m-learning) is the use of mobile devices for learning, and it provides affordable educational

systems across technologies, time, subjects, and contexts (Crompton and Burk, 2018). The mobile platform leverages the portability, connectivity, and accessibility of the mobile system to offer a new experience and provide access to a vast amount of information to undergraduate students through specialized applications. It helps to share ideas, facilitate their learning activities, and use them in more dynamic ways (Pedraja-Rejas et al, 2025). Mobile learning platforms come in various forms, such as educational games, learning management systems, virtual instructor-led training, context-aware learning, etc. (Zou et al, 2025; Pedraja-Rejas et al, 2025). Mobile application-based education is increasingly being adopted in undergraduate education and learning due to its ability to provide instant access to multimedia content, digital libraries, and interactive tools that improve understanding and engagement (Husnita et al, 2023; Sophonhiranrak, 2021).

Although mobile application-based education is a great step towards inclusive education (Kakavand et al, 2026), its adoption in undergraduate learning is largely dependent on the capacity of the users. Over the years, researchers have designed different capacity-building and training intervention frameworks to enhance the capacity of users to utilize the mobile application technology platform appropriately (Li and Li, 2024). For instance, Uddin et al (2022) explore the impact of mobile application-enhanced capacity building in rural development professional-based education and how technological tools would assist in personalized learning activities. Trede et al (2019) discussed how to enhance learning in a university environment through an effective mobile technology capacity-building workshop.

Capacity building and training interventions provide an avenue for improved skills, competencies, and pedagogical knowledge to use mobile applications. The training interventions come in informs of workshops, practical sessions, and guided tutorials (Saroyan and Frenay, 2023). Moreover, capacity building and training interventions have been shown to improve students' digital confidence and willingness to adopt mobile applications in daily learning tasks (Alotaibi, 2025; Kakyand et al, 2026; Alfalah, 2023).

Even though mobile application platforms have greatly supported technology-based collaborative learning and problem solving, the role of capacity building and training intervention to enhance the effective usage of the technology to improve students' knowledge has been largely ignored (Li et al, 2020). Most of the studies in mobile application technology focus on technology adoption and user acceptance using various theoretical models. For instance, Alotaibi (2025) utilized the theory of planned behaviour (TPB) to investigate how factors such as technostress, technology additions, and technophobia could impede the adoption of mobile application technology by undergraduate students. The

study found that mobile technology enhances academic performance, but its adoption is hampered by factors outlined earlier. Alanzi et al (2026) explored the use of the unified theory of acceptance and use of technology 2 (UTAUT 2) model to examine factors that influence the adoption of mobile learning in higher education. Similarly, Yi et al (2016) investigated the use of the task-technology fit (TTF) model to explore factors that influence undergraduate students' usage of mobile applications to improve academic performance. The study noted that factors such as attitude toward use and social norms greatly affect academic performance. In addition, a recent study by Xin et al (2026) studied the use of the technology acceptance model (TAM) to examine acceptance and use of mobile application-based education among Chinese vocational students. The result of the study indicated positive impacts of factors such as perceived ease of use, usefulness, and attitude on mobile application adoption.

However, students' willingness to integrate mobile application-based education is hinged on their understanding and training support available. The majority of the students utilize their smartphones for unproductive activities such as social media and entertainment instead of academic activities (Sunarto et al, 2020; Maryani et al, 2025). This is a direct consequence of a lack of awareness, training, and capacity building frameworks (Hayat et al, 2021; Myer et al, 2022). Moreover, it creates disparities in digital skills and inequalities in learning outcomes.

To bridge the gap between undergraduate students' willingness to adopt mobile applications for educational purposes, knowledge, skills, and infrastructure requirements, this paper investigated the roles of capacity building and training intervention to improve undergraduate students' knowledge of mobile application technology for learning. First, the study provides a pre-training assessment to the students to understand their current knowledge of mobile application technology for learning. Then, conducted structured and instructor-led training on mobile learning applications. In addition, the paper assesses the post-training knowledge of the students. The study provides valuable insight into how structured capacity building and training interventions can improve the digital competencies and knowledge of undergraduate students, which could improve their academic performance.

The remainder of the paper is organized as follows: Section II discusses the methodology. Section III presents the results obtained for the pre- and post-capacity building and training intervention assessment. Section IV describes the summary of the findings and policy implications. recommendations. Section V concludes the study.

## II. RESEARCH METHOD

### A. Study Aim

The study aims to assess the knowledge of undergraduate students on mobile application technology to improve academic performance prior to and after a capacity-building intervention. The study further evaluates the effects of capacity-building interventions on undergraduate students using mobile applications for educational performance improvement.

### B. Research Design

The paper utilized a quantitative cross-sectional study to collect information from undergraduate students in 100- to 400-levels across various faculties and departments at David Umahi Federal University of Health Sciences, Uburu, Ebonyi State.

### C. Study Population

The study population is made up of undergraduate students in the first year to the fourth year of their programme at David Umahi Federal University of Health Sciences, Uburu, Ebonyi State, Nigeria. These undergraduate students are in different faculties and departments with academic disciplines ranging from Basic Medical Sciences, Health Engineering, Natural Sciences, Health and Allied Sciences, and Computing. The students were assessed before the capacity building on knowledge of mobile applications, mobile application usage, capacity building strategies, innovative learning practices, learning environment and infrastructure, and expectations and attitudes towards mobile learning and education. Using the information from the pre-training, a one-day capacity-building intervention was conducted for the students, and assessed on the knowledge gained after the training intervention. The use of undergraduate students who are digital natives in the university helps to uncover the knowledge and readiness to adopt mobile applications for learning and lectures.

### D. Sample Size and Sampling Techniques

A total of seventy-two (72) undergraduate students participated in the research and completed the questionnaire, which was used for the pre-training and post-training data analysis. Considering the large number of undergraduate students at David Umahi Federal University of Health Sciences, a complete enumeration approach was used as a sampling technique, where all the students were invited to participate in the study. The questionnaire was shared through WhatsApp and personal email. The sampling approach helps to minimize bias and enhance the generalization of the study results obtained from the survey.

### E. Research Instrument

The study utilized a structured questionnaire as the primary research instrument. The questionnaire comprises fifty-nine (59) questions for the pre-training

and post-training data collection and was administered using Google Form distributed through undergraduate students' WhatsApp groups and emails. The questionnaire was organized into different themes to capture the students' mobile application usage behaviour, demographic information, knowledge and awareness, learning practices, impact of mobile application, relevance of capacity building, mobile application skills, and attitude and behaviour to utilize mobile applications for education and training. The instrument was organized into different sections. In the pre-training questionnaire, the first section captures the demographic information, including age, gender, level of study, smartphone ownership status, and the number of hours the students use their smartphones per day. In the second section, students' mobile application usage was captured. These include whether the student uses mobile applications, types of mobile applications used, the purpose, and challenges faced when using the mobile applications. The third section assesses the undergraduate students' knowledge and the impact of capacity building, and whether mobile applications could aid capacity building and training interventions. Other sections of the questionnaire examine innovative learning practices, sustainable education approaches, learning environment and infrastructure, and expectations and attitudes of the undergraduate students to attend capacity building and training intervention training. These sections cover the type of learning preferred by the students, the interactive nature of mobile applications, how mobile applications promote sustainable education, the infrastructure that improves mobile education, and whether the students are willing to attend or continue with the capacity building on mobile applications for undergraduate education.

The post-training questionnaire explores and assesses the undergraduate students' knowledge of mobile applications after the training. The questionnaire is divided into five sections. These sections include training relevance, mobile application skills and confidence, roles of mobile technology in innovative and sustainable learning, attitude and behavioural intentions after the training, and impacts and future applications of the training to improve learning. The use of Google Forms and emails facilitates ease of access, real-time data collection, anonymity of response, and automated data export for statistical data analysis.

### F. Ethical Consideration

Ethical approval was obtained from the David Umahi Federal University of Health Science Ethical Research Committee (DUFUHS-REC), and participants provided informed consent and were informed about the research process, use, and confidentiality of the data collected.

### G. Methods of Data Analysis

Descriptive statistics were used to analyze the collected data. The descriptive statistics considered include the frequency counts, percentages, and mean scores. These help to summarize the responses obtained from the undergraduate students and assess the level of their knowledge, usage, and proficiency in the use of mobile applications for learning after the training.

### III. RESULTS AND DISCUSSION

This section discusses the results from pre-capacity-building and post-capacity-building training intervention. These include the demographic information, mobile information usage, pre-capacity building intervention, and post-capacity building intervention organized for the undergraduate students.

#### A. Biodata and Smartphone usage of the participants

The section presents the results obtained from the survey of the participants' demographic information and mobile information usage.

#### 1) Demographic Information of the participants

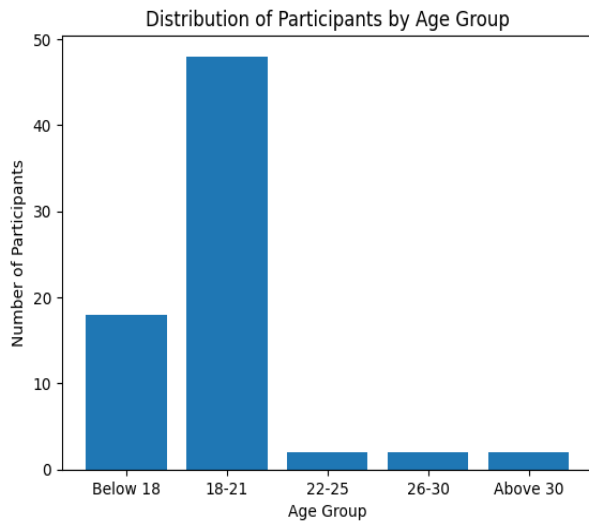


Figure 1. Participants' Demography: Age Distribution

Figure 1 depicts the participants' age distribution. The demographic profile reveals a highly concentrated youthful population, with 66.66% of respondents falling within the 18–21 age bracket, followed by 25% below 18 years. All other age categories (22–25, 26–30, above 30) collectively account for less than 10% of the sample. This distribution indicates a strong positive skew toward early undergraduate age groups, suggesting that the dataset predominantly reflects the perceptions of relatively young learners who are typically more adaptable to emerging technologies.

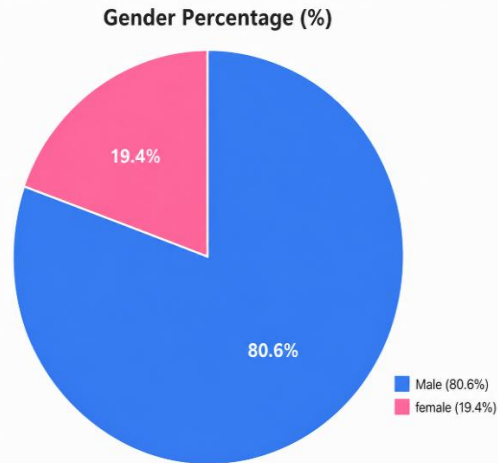


Figure 2. Gender distribution

Figure 2 presents the gender distributions of the participants. Out of the 72 undergraduate students who participated in the training, 58(80.60%) were male, while 14(19.40%) were female. This shows that male students were more interested in learning about mobile applications and the development process than their female counterparts.

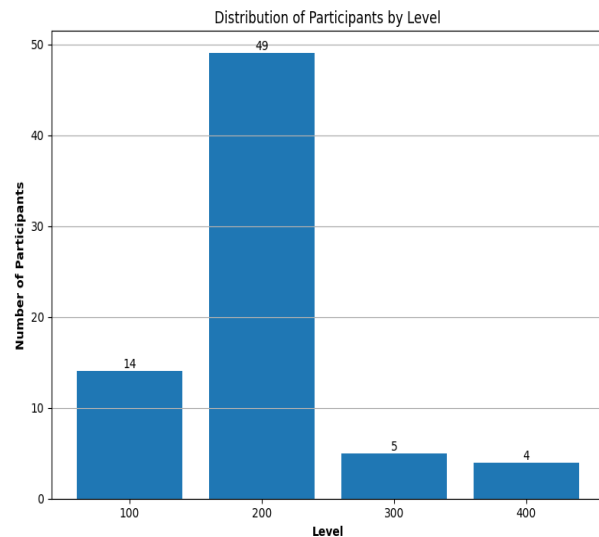


Figure 3. Level of the participants

Figure 3 shows the academic level of the participating undergraduate students. The survey participants' academic levels are mostly at the 100-level (19.40%) and 200-level (68.06%). These academic levels account for the majority of undergraduate students at DUFUHS. The survey results particularly indicated a decrease in the number of participants with an increase in academic level, with the lowest found in the 400-level (5.60%) and 300-level (6.94%).

**2) Number of Participants with Smartphones and Duration of Usage**

Table 1 shows the smartphone ownership and usage by the participants. Smartphone ownership is nearly universal (98.6%), establishing a critical enabling condition for mobile learning. From an inferential standpoint, this eliminates device access as a limiting variable, thereby allowing subsequent findings to be interpreted primarily in terms of behavioural, infrastructural, and cognitive factors rather than hardware constraints.

**Table 1.** Smartphone ownership and usage by the participants

Mobile phone Dimension	Category	Freq.	Percentage (%)
Own smartphone	Yes	71	98.6
	No	1	1.40
Usage hours	Less than 1 hour	0	0.00
	1-3 hours	6	8.33
	4-6 hours	38	52.78
	7-10 hours	19	26.39
	More than 10 hours	8	12.50

Daily usage patterns show that over half of respondents (52.78%) spend 4–6 hours on mobile devices, while an additional 38.89% spend more than 6 hours. This indicates a high-intensity engagement environment, suggesting that mobile platforms are deeply integrated into students' daily routines. Statistically, this high exposure level increases the likelihood of mobile applications influencing learning behaviours, making the population particularly suitable for interventions involving digital learning tools.

*B. Pre-capacity building and training intervention assessment*

**1) Mobile application usage**

Table 2 shows the mobile application usage choice of the participants. The table shows that 52.8% of the participants use mobile apps frequently. The data indicate that mobile application usage is both frequent and functionally integrated into learning activities, with 52.78% of respondents reporting frequent use and none indicating non-use. This suggests a near-universal adoption baseline, which is significant for intervention scalability.

**Table 2.** Mobile application usage

Mobile application Dimension	Category	Freq.	Percentage (%)	
Usage of Mobile Applications for Education	Never	0	0.00	
	Rarely	8	11.11	
	Occasionally	26	36.11	
	Frequently	38	52.78	
Mobile application used	Google classroom	11	15.28	
	Duolingo	11	15.28	
	Khan Academy	9	12.50	
	Quizlet	2	2.78	
	YouTube	34	47.22	
	Zoom	3	4.16	
	Others	2	2.78	
	Downloaded the application for educational use	Yes	72	100
		No	0	0.00
Comfort level using mobile apps	Very uncomfortable	8	11.11	
	Uncomfortable	2	2.78	
	Neutral	16	22.22	
	Comfortable	27	37.50	
Mobile apps VS traditional methods	Very comfortable	19	26.39	
	Strongly disagree	2	2.78	
	Disagree	7	9.72	
	Neutral	22	30.56	
	Agree	21	29.16	
Challenges using mobile apps	Strongly agree	20	27.78	
	Lack of data/internet	43	59.72	
	Poor interface	1	1.39	
	Device limitations	2	2.78	
	Distractions	13	18.06	
	Lack of support	2	2.78	
	None	11	15.28	

A breakdown of mobile application types reveals that YouTube dominates usage (47.22%), far exceeding

platforms such as Google Classroom (15.28%), Duolingo (15.28%), and Khan Academy (12.5%). This pattern highlights a preference for informal, video-based learning ecosystems over structured educational platforms. From a pedagogical perspective, this aligns with cognitive load theory and multimedia learning principles, where audiovisual content enhances comprehension and retention.

All respondents (100%) reported downloading applications specifically for educational purposes, indicating intentional adoption rather than incidental usage. However, comfort levels vary: while 63.89% report being comfortable or very comfortable, a non-trivial proportion (13.89%) experience discomfort. This suggests the presence of usability or digital literacy gaps, which may moderate the effectiveness of mobile learning interventions.

Perceptions comparing mobile applications to traditional learning methods show a balanced but positive tilt, with 56.94% agreeing or strongly agreeing that mobile apps are superior. However, the relatively high neutral response (30.56%) indicates cognitive ambivalence, suggesting that while mobile learning is accepted, it has not fully displaced traditional paradigms.

**2) Learning environment and infrastructure**

Table 3 presents the learning environment and infrastructure. Despite high adoption and positive attitudes, infrastructural limitations are severe. A significant 68.06% of respondents report lacking reliable internet access. This represents a critical structural constraint, likely to impede effective utilization of mobile learning platforms.

**Table 3.** Learning environment and infrastructure

Learning Dimension	Category	Freq.	Percentage (%)
Access to reliable internet	Yes	49	68.06
	No	23	31.94
	Sometimes	0	0.00
Technical issues with mobile apps	Slow loading	42	58.33
	App crashes	8	11.11
	Storage problems	9	12.50
	Device incompatibility	2	2.78
	No issues	11	15.28
Training from the University?	Yes	24	31.33
	No	48	68.67

Encouragement to use Mobile apps by lecturers	Yes	16	22.22
	No	14	19.45
	Sometimes	42	58.33

Technical challenges are also prevalent, particularly slow loading (58.33%), which further compounds the connectivity issue. These findings indicate that system performance and network reliability are major determinants of user experience.

Institutional support appears weak, with 68.67% reporting no training from the university and only 22.22% receiving encouragement from lecturers. This suggests a systemic gap between student readiness and institutional facilitation, which may hinder large-scale adoption.

**3) Knowledge of Capacity Building**

The knowledge and awareness of the participants on capacity building and training intervention are depicted in Figure 4. Awareness of capacity building is almost evenly split, with 48.61% indicating knowledge and 51.39% lacking it.

**Table 4.** Knowledge of capacity building

Knowledge Dimension	Category	Freq.	Percentage (%)
Knowledge of capacity building	Yes	35	48.61
	No	37	51.39
Capacity building skills required	Skill development	53	73.61
	Infrastructure development	7	9.72
	Community service	0	0.00
	Not sure	12	16.67
Capacity building aids Mobile apps knowledge	Strongly disagree	2	2.78
	Disagree	0	0.00
	Neutral	13	18.06
	Agree	37	51.39
	Strongly agree	20	27.77

This near-equal distribution is statistically significant because it suggests the absence of a dominant trend, pointing to a knowledge gap within the population. When capacity building is conceptualized, 73.61% associate it with skill development, while very few link

it to infrastructure or community service. This indicates a narrow cognitive framing, where capacity building is predominantly viewed through an individualistic lens rather than a systemic or institutional one.

Encouragingly, 79.16% of respondents agree or strongly agree that mobile applications can aid capacity building. This demonstrates a strong perceived utility, even among those who may not fully understand the concept itself. The implication is that attitudinal readiness exceeds conceptual clarity, creating an opportunity for targeted educational interventions.

#### 4) Innovative Learning Practices

Innovation learning practices currently observed by the participants are shown in Table 5. The table indicated that 81.9% of the participants adopted a self-paced learning method for their study, while 65.3% adopted a gamification model. 79% of the participants agreed that learning with mobile apps is more engaging than the traditional method.

**Table 5.** Innovative learning practices

Innovation learning Dimension	Category	Freq.	Percentages (%)
Self-paced learning with mobile apps	Yes	59	81.94
	No	12	16.66
Usage of multimedia content in mobile apps	Never	1	1.39
	Rarely	10	13.89
	Sometimes	20	27.78
	Often	33	45.83
Used gamified educational apps	Always	8	11.11
	Yes	47	65.28
Are mobile apps interactive encouraging?	No	25	34.72
	Strongly disagree	0	0.00
	Disagree	2	2.78
	Neutral	13	18.06
	Agree	45	62.50
	Strongly agree	12	16.66

Generally, there is strong evidence of constructivist learning behaviour, where learners actively engage and control their learning pace.

94.4% of the participants alluded to the Lifelong Learning approach as a means of staying relevant in their chosen field of study. In the same vein, 76.4% of the participants accepted that the application of mobile app

technology has addressed the learning gap. It is therefore very trite to say that mobile apps are perceived as high-impact tools for sustainability in education, especially in access and continuity of learning.

#### 5) Sustainable Education

The response of the participants on how mobile application technology promotes sustainable education and learning is presented in Table 6. Participants overwhelmingly recognize the role of mobile applications in promoting sustainable education, particularly through increasing access to quality resources (48.60%) and supporting remote learning (43.06%). These findings suggest that students perceive mobile technologies as tools for educational equity and accessibility.

**Table 6.** Sustainable Education Through Mobile Application Technology

Sustainability Dimension	Category	Freq.	Percentage (%)
Mobile apps promote sustainable education by	Reducing the use of paper	3	4.17
	Supporting remote learning	31	43.06
	Increasing access to quality resources	35	48.60
Mobile apps reduce the use of paper	Not sure	3	4.17
	Strongly disagree	2	2.78
	Disagree	5	6.94
	Neutral	12	16.66
	Agree	40	55.56
	Strongly agree	13	18.06
	Mobile apps bridge learning gaps	Yes	55
	No	4	5.54
	Not sure	13	18.06
Mobile apps support lifelong learning	Yes	68	94.44
	No	4	5.56

Agreement that mobile apps reduce paper usage is high (73.62% agree or strongly agree), indicating awareness of environmental sustainability benefits. Furthermore, 76.4% believe mobile apps help bridge learning gaps, and an even higher 94.44% affirm their role in supporting

lifelong learning. These figures are statistically compelling and suggest that mobile learning is perceived not just as a convenience but as a transformative educational tool with long-term impact.

**6) Learning Expectations and Attitude**

Table 7 presents the expectations and attitudes of the participants towards mobile application technology-based education. From the table, willingness to participate in capacity-building workshops is high, with 59.72% expressing readiness and an additional 19.45% indicating potential interest. This suggests a strong latent demand for structured interventions.

**Table 7.** Learning expectations and attitude

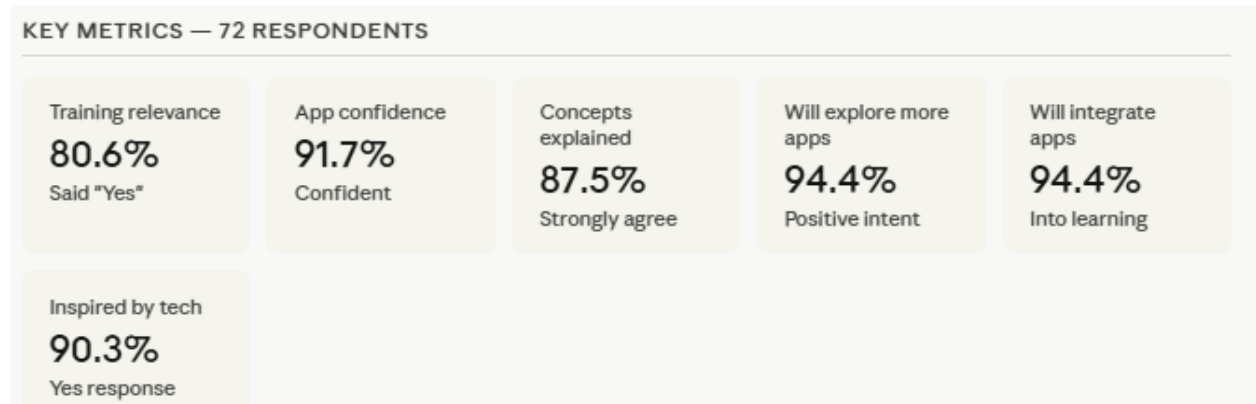
Expectation Dimension	Category	Freq.	Percentage (%)
Willing to attend the mobile apps capacity building workshop?	Yes	68	94.44
	No	0	0.00
	Maybe	4	5.46
Skills expected using Mobile apps	Time management	12	16.66
	Research	10	13.89
	Communication	8	11.11

Academic writing	20	27.78
Coding/data analysis	22	30.56

In terms of expected outcomes, students prioritize coding/data analysis (30.56%) and academic writing (27.78%), indicating a focus on high-impact, career-relevant digital competencies. This aligns with global trends in digital skill demand and suggests that students are forward-looking in their learning expectations.

*C. Post-Capacity Building and Training Intervention*

This section presents the results of the quantitative survey obtained from the participants of the capacity-building and training intervention on mobile applications to improve academic performance. All the participants (72) who participated in pre-capacity building also completed the post-capacity building and training intervention. The survey centered on feedback and relevance of the training to their educational attainment, current knowledge of the mobile application, innovative and sustainable learning, and attitude and behavioural intention to take knowledge beyond the capacity building and training intervention. The key components of the research were analysed according to their key metrics, as shown in Figure 4, to visually summarize the key findings of the research.



**Figure 4.** Graphical summary of the research outcome

**1) Training Feedback and Relevance**

The training was broadly well-received, as shown in Figure 5. Over 80% of respondents confirmed the

content was relevant to them, and 81.9% felt the duration was sufficient.

SECTION A — TRAINING FEEDBACK & RELEVANCE

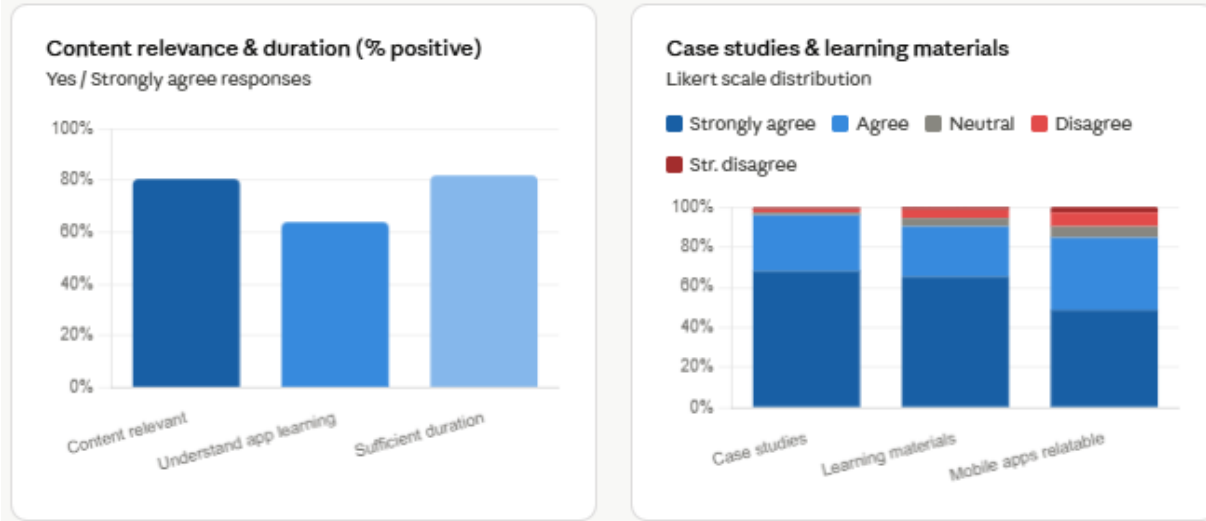


Figure 5. training and feedback relevance

The clearest standout is concept clarity, 87.5% strongly agreed that concepts were clearly explained, with zero disagreements recorded. Learning materials scored well (90.3% combined agree/strongly agree), though "relatable mobile apps for academics" had the weakest satisfaction (84.7% agree/strongly agree), with 9.7%

expressing disagreement, the only item in this section drawing meaningful pushback.

2) Mobile Apps skills and Confidence

A commanding 91.7% reported confidence in using mobile apps for academic learning after the training, and 94.4% said they could now use apps for open educational resources, as contained in Figure 6.

SECTION B — MOBILE APP SKILLS & CONFIDENCE

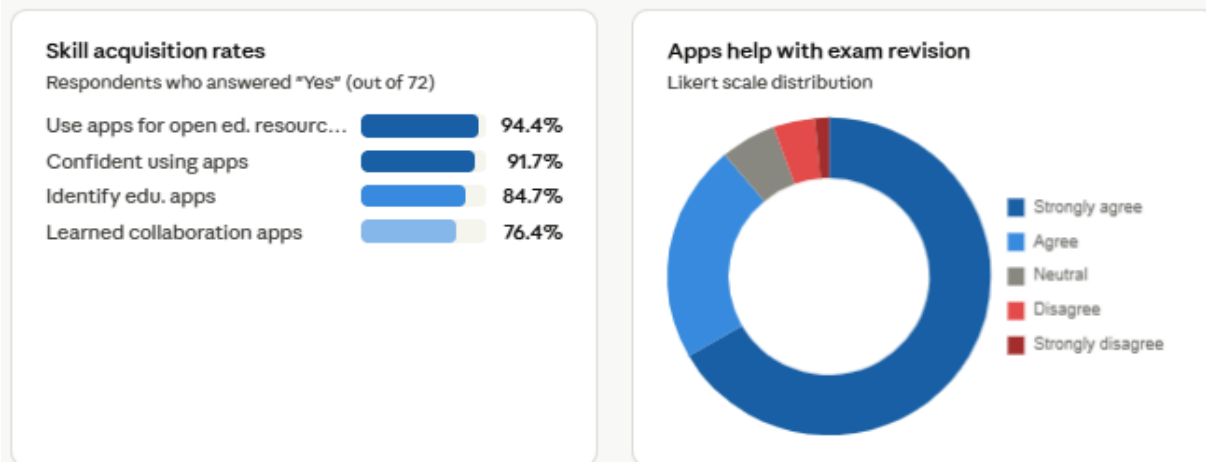


Figure 6. Mobile app skills and confidence

Identifying educational apps (84.7% yes) and learning collaboration tools (76.4%) were slightly lower, suggesting that skills requiring more nuanced judgment took slightly longer to be embedded. Regarding exam preparation, 88.9% agreed or strongly agreed that mobile apps help, a very strong endorsement.

3) Innovative and Sustainable Learning

Understanding of innovative learning concepts was solid at 84.7%, and 86.1% felt ready to apply what they learned in real life, as shown in Figure 7.

SECTION C — INNOVATIVE & SUSTAINABLE LEARNING

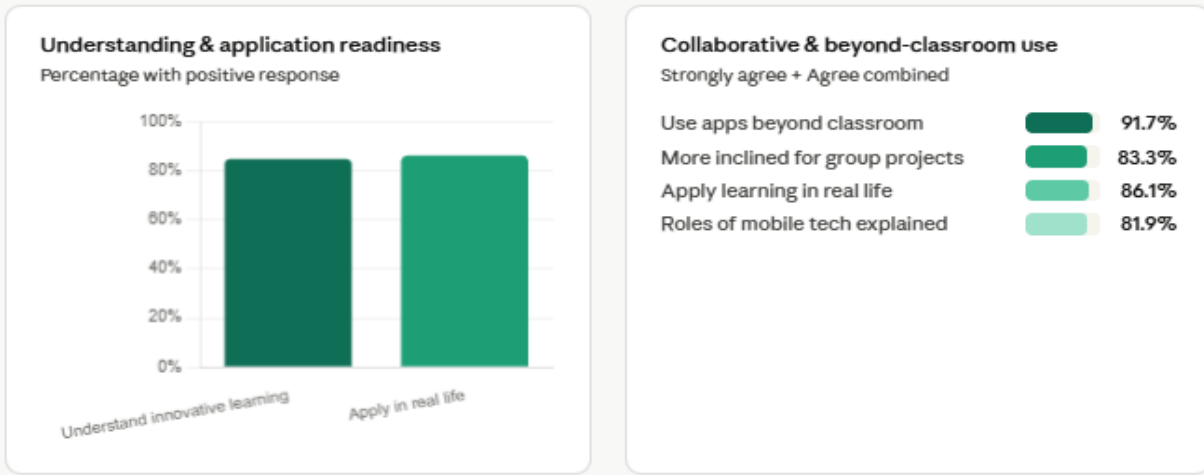


Figure 7. Innovative and Sustainable Learning

The finding that 91.7% agreed they could use apps beyond the classroom is especially important; it signals transfer of learning beyond the training context. Group project collaboration intent was high (83.3% agree/strongly agree), though 12.5% remained neutral, the highest neutral rate in this section, possibly reflecting uncertainty about peer adoption.

After the training, the impacts and applications of the capacity-building intervention were assessed, and the results are presented in Figure 8. There was noticeable evidence that the majority of the participants have started practicing what they learnt (91.67%), can explain the concepts of the capacity building clearly to others (76.39%), and apply what they learnt to improve their performance in more than one course (73.61%).

4) Training Impacts and Applications

SECTION E — TRAINING IMPACT & APPLICATION

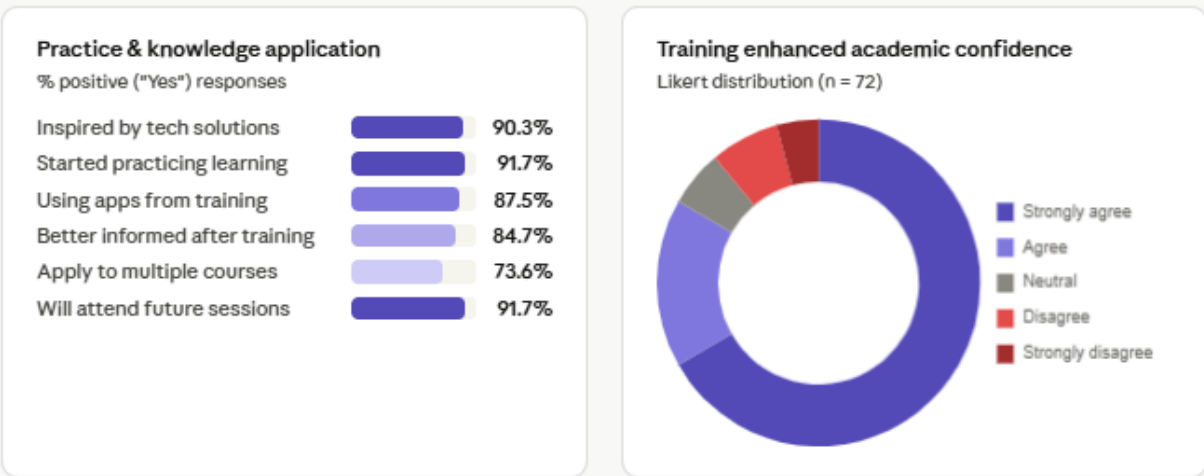


Figure 9. training impact and application

In addition, more than half of the participants agreed that the training had enhanced their academic confidence and better informed them about mobile learning applications (66.67%). Furthermore, a vast majority of the participants have started using the mobile application from the training venue (87.50%), inspired to use

technology-based learning solutions (90.28%), and willing to attend further capacity building and practical sessions on mobile application development (91.67%).

5) Attitude and Behavioural Intention

Figure 8 explores the intentions and willingness of the participants to recommend mobile applications to other

students, integrate the technology into daily learning, and explore more educational mobile applications beyond training. These questions were designed to elicit responses that will guide their attitude to technology adoption and improve future capacity building and intervention training for students at various levels and academic staff in David Umahi Federal University of Health Sciences, Uburu. There were overwhelmingly positive responses from the respondents to integrate the

learned apps into daily learning (94.44%), recommending the mobile applications to other students (86.11%), and downloading these mobile applications for education and learning (94.44%). The positive responses suggested the importance and timely nature of the capacity building and training intervention to our undergraduate, postgraduate students, and academic staff of David Umahi Federal University of Health Sciences, Uburu.

SECTION D — ATTITUDES & BEHAVIORAL INTENTION

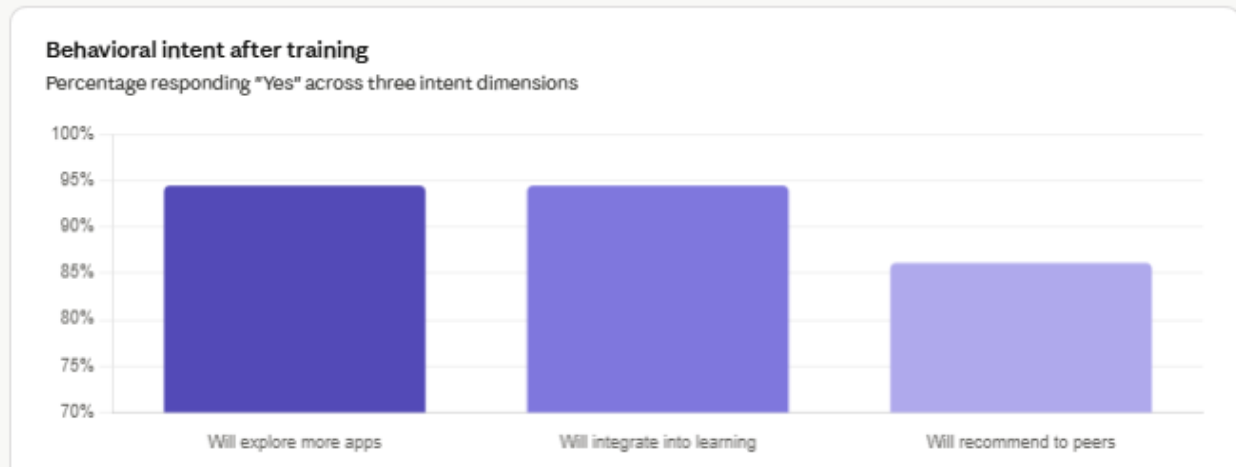


Figure 8. Attitudes and Behavioural Intention

The radar chart reveals a remarkably consistent performance across sections, all clustering between 82–92% average positive response rates, as shown in Figure 10. Section D (Attitudes & Intent) tops the radar at ~91.7%, while Section E (Training Impact) is slightly lower at ~83.5%, reflecting that real-world application

lags behind intention, a well-documented pattern in training evaluation literature. Section B (Skills & Confidence) and Section A (Training Feedback) are nearly equal, suggesting that the program successfully translated good instruction into competencies and skills.

Section-level positive response rates

Average % of positive responses per section (Yes / Strongly Agree / Agree)

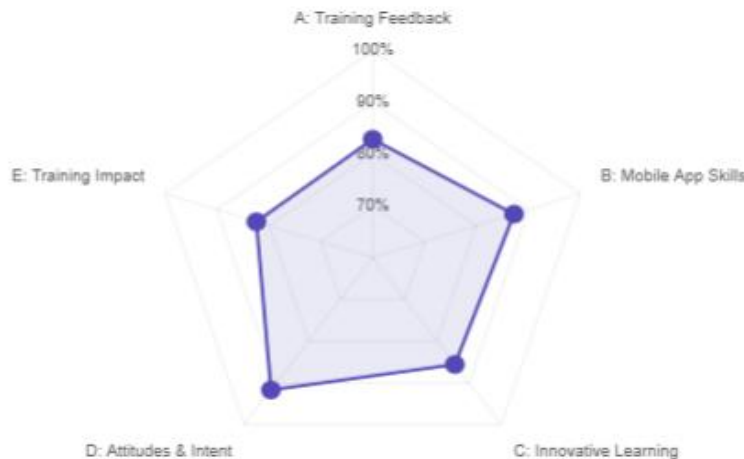


Figure 10. Research training performance rating

Conclusively, the training was highly effective across all measured dimensions. Concept clarity, confidence, and behavioural intent were the strongest outcomes. The marginal weaknesses, cross-course application, and collaboration skills are logistical rather than motivational, suggesting follow-up sessions or structured peer practice opportunities could close these gaps. The near-universal intent to attend future sessions (91.7%) makes a compelling case for continuity of the program.

#### IV. DISCUSSION

Analysis of the demographic information indicated that there are more male participants in the study when compared with the female participants. This is necessitated by their readiness to embrace digital exposure, confidence, and perceived competencies. However, this is not conclusive, as some studies suggest equal participation when given the opportunity (Wai et al, 2018). The results showed that 200-level students have higher familiarity with the academic environments, with more focus on exploring different learning processes compared to other levels. They are more inclined to learn digital tools to improve their academic performance (Fasae et al, 2015).

Widespread adoption and usage among undergraduate students are not surprising, and this has been widely reported by various students in recent times. The world is becoming highly interconnected, and smartphones have become primary tools of communication, collaboration, and doing group projects by undergraduate students. One major challenge is the productive use of smartphones. These smartphones, possessed by the undergraduate students, have become distractions used only for entertainment and accessing social media content (Yuan et al, 2025).

Long hours of usage by undergraduate students indicate a high level of familiarity and dependence on smartphones. Some studies suggest positive outcomes from long hours of usage, as it might help with mobile learning adoption; however, students might be using the mobile device for non-educational activities. Consequently, there is a need for structured guidance for the students to tailor the usage for learning (Irielle et al, 2024). Multimedia content has long become part of mobile learning, and the YouTube platform provides lots of multimedia content for learning in various fields. Therefore, students' preference for YouTube as a tool for learning is supported by recent studies showing that video-based learning on the YouTube platform enhances understanding and retention of learnt content (Mohamed et al, 2022).

A critical finding of the study is that a stable internet connection is an important component of mobile technology learning assistance, enabling the streaming of content, the access to cloud-based resources, and

participation in online lectures. Lack of stable internet creates a barrier to learning, minimizes students' engagement, and affects the usability of internet and mobile applications (Alfayez et al 2024; Arifudin, 2025). In addition, pre-capacity assessment indicated that students are not familiar with capacity building and training interventions. Studies show that a lack of familiarity is a result of awareness and support by many Nigeria university to their undergraduate students. The university provides no formal training to undergraduate students, even though such training would help them to successfully adopt new technology and promote active mobile application-based education engagements. Consequently, the participants choose to engage in capacity building and training intervention as such training has been found to provide practical supports, motivate students, enhance digital skills, and competence (De-Juan-Vigaray et al, 2024).

The post-capacity-building and training intervention was organized to provide students with hands-on training on mobile applications to enhance academic performance. Post-training assessments found that the capacity-building provided a relevant roadmap for students' academic growth, enhancing their use of mobile applications and improving their digital competence; however, the outcomes primarily depend on the quality of the learning materials and students' needs. Moreover, we observed divergent views on the quality of the contents as some of the participants observed that the contents did not fully meet their needs. Recent studies have shown that the presence of dissatisfactions depicts differences in learners' needs and content alignment (Dagenais et al, 2026; Al-Azawei et al, 2019; Pereira and Rodrigues, 2013). There was also general agreement by the participants that the training materials were adequate and properly structured to meet their intellectual needs. The material was organized to be clear and contextually specific for the participants using the pre-training assessment (Okai-Ugbaje, 2021). The participants utilized the knowledge gained to evaluate the communication and collaborations, thereby demonstrating the effectiveness of the training. The in-depth knowledge of collaborative learning improves their engagement and peer-to-peer interaction (Asad et al, 2026; Uz-Bilgin and Gul, 2020).

One of the important aspects of the training supported by various studies was the role of mobile applications for education purposes (Dahri et al, 2023; Moya and Carnacho, 2024). Benefits such as increased confidence, behavioural changes, and knowledge of mobile applications were shown by the results obtained from the assessments. According to recent studies, increased confidence enhances undergraduate students' willingness to adopt technology-based learning, sustained usage, and improved cognitive ability to use mobile applications (Ayomide, 2025; Odede, 2021; Shagour et al, 2021). In

addition, undergraduate students expressed a positive response to adopting the mobile application in various educational settings and tasks. This will help to sustain the application, extending beyond the current training intervention, which is a key factor for long-term adoption. Studies have shown that sustained usage and interest in future capacity building denote its recognized importance and high skill development in technology-based education (Okai-Ugbaje et al, 2022; Qureshi et al, 2020).

Consequently, the importance of the capacity building and training intervention for the undergraduate students cannot be overemphasized. The training helps to improve undergraduate students' knowledge, skills, humility, cultural capacity, and confidence in the use of mobile applications for educational development (De Corby-Watson et al, 2018; Farsangi et al, 2023). Furthermore, the capacity-building and training intervention advances collaboration, teamwork, and meaningful learning outcomes.

Despite the positive outcomes obtained, there is still a need to incorporate more training that traverses the current number of undergraduate students, taking into consideration their diversity, inclusiveness, and learning materials. The further training will assist the university in maximizing the impact of the training and mobile applications-based learning (Ramanadhan et al, 2020).

#### A. Policy Implications and Recommendations

1. **Technology-based learning:** This involves incorporating mobile applications into the DUFUHS academic programme. With the enhanced mobile learning platform, students will have access to an interactive learning environment, collaboration, group work, and problem-solving. A functioning information and communication (ICT) infrastructure, device compatibility, data privacy, availability of technical support, and reliable internet connection can serve as the driving force to actualize technology-based learning.
2. **Improved academic performance and standard:** Capacity building and training intervention improve the academic performance of students by enabling them to use a mobile application for academic purposes. Consequently, the integration will help to develop students' digital competencies and skill development. There is a need to integrate mobile learning for teaching. This will provide personalized learning, higher academic engagement, and learning flexibility for undergraduate students.
3. **Implementation of structured capacity building and training intervention for both students and academic staff:** Established a

clear and structured pathway to conduct capacity building and training intervention for DUFUHS students and staff. The training should center on the use of mobile applications and technology-based educational content development, assessment, conducting lectures, and learning. Appropriate infrastructure, such as a reliable internet connection and adequate resource allocation are required for the full implementation

#### V. CONCLUSION

This study reveals the impact of capacity building and training intervention on undergraduate students' knowledge of mobile application technology for academic performance improvement. Mobile applications such as YouTube, Google Classroom, Zoom, Khan Academy, etc., are regularly utilized by students for academic activities. Even though undergraduate students know mobile application technology, they lack awareness of capacity building and training interventions. Capacity building and training interventions help students to have high confidence in using mobile learning applications. In addition, there was considerable performance on the use of different mobile applications after the capacity building and training intervention, and recommend further interventions for a larger number of undergraduate students and staff of the university.

Future study will focus on capacity building and training intervention for academic staff, mobile application adoption processes for the university, and training for students on artificial intelligence and programming.

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