ISSN: 2723-9535

Available online at www.HighTechJournal.org

HighTech and Innovation Journal

Vol. 6, No. 2, June, 2025

Digital Transformation in Higher Education: Enhancing Support Services Through Mobile Apps

Anusuyah Subbarao [1], Nasreen Khan [1], Aysa Siddika [1*], Muhammad A. Fathullah [1], Mohd A. Sanwani [1], Fia F. Adam [2], Debrina V. Ferezagia [2], Melisa B. Altamira [2]

[1] *Centre for Management and Marketing Innovation (CMMI), COE for Business Innovation and Communication, Faculty of Management, Multimedia University, Cyberjaya Campus, Cyberjaya, Malaysia.*

[2] *Vocational Education Program, Universitas Indonesia, Jawa Barat 16424, Indonesia.*

Received 04 February 2025; Revised 19 May 2025; Accepted 26 May 2025; Published 01 June 2025

Abstract

The fourth industrial revolution has considerably enhanced technology, resulting in disruptive developments across various industries, including higher education. Generation Z, known as digital natives, has specific digital preferences, making mobile applications essential for improving their educational experience. The present study aims to investigate the digital transition in higher education, emphasizing using mobile applications as campus support services for Generation Z students. The study investigates the factors influencing mobile app acceptance and usage, intending to enhance educational support services' efficiency and quality among 100 students from different universities. By performing multiple linear regression, the study revealed that perceived usefulness is the most critical factor driving students' intention to use mobile apps in higher education. In contrast, other elements such as ease of use, competence, accessibility, and data privacy were not deemed significant concerns by the students. The findings are intended to advise higher education institutions on integrating mobile apps to assist Generation Z better, eventually leading to increased student engagement and satisfaction. This study emphasizes the significance of mobile technology in current educational contexts and offers practical insights for universities looking to use digital technologies to improve campus support services. However, the outcome may vary for students from different demographic and socio-economic backgrounds.

Keywords: Digital Transformation; Mobile Apps; Higher Education; Gen Z; Campus Support Service.

1. Introduction

The fourth industrial revolution has led to significant technological improvements that frequently invade crucial elements of our everyday lives, causing disruptive shifts in various industries, including higher education sectors. Digital transformation is one of the ways where innovation takes place in higher education institutions today, intending to enhance the efficiency and quality of data by digitising processes and services [1]. In this regard, mobile applications have emerged as essential tools enabling a simplified and engaging approach to campus support services, mainly among Generation Z, who are digital natives and thus grew up with the technology environment.

A mobile app (or mobile application) is a software program that runs on tiny, wireless computing devices like smartphones and tablets rather than desktop or laptop computers [2]. They may offer various services and are not limited to communication, social networking, money and education. Mobile apps have existed since the early 1990s when

* Corresponding author: aysa.siddika@mmu.edu.my

http://dx.doi.org/10.28991/HIJ-2025-06-02-015

simple mobile games like "Snake" were introduced on Nokia phones. However, the actual evolution of mobile applications began with the introduction of the iPhone in 2007 and the subsequent establishment of the App Store in 2008 [3]. Mobile applications are frequently classified according to whether they are web-based or native apps designed expressly for a particular platform. A third category is hybrid applications, which mix elements of both native and online apps [2]. Mobile apps have been instrumental in the modern dynamic world since they are convenient, accessible and useful. Mobile apps provide educational institutions with a platform to deliver various support services, improving students' experiences.

Campus support systems are made of various services offered to aid the students in keeping up with their academic and personal life. Campus Support Services include counselling, tutoring, mentorship, career planning assistance, financial aid programmes, and scholarships. It also provides personalised counselling for personal, career, and academic guidance [4]. The campus support system, also known as Student Support Services, or SSS, was a 1960s project providing services to needy students. Higher education institutions then chose SSS to aid with college expenses and essential prerequisites to persuade students to complete their university studies [5]. Initially, all these were provided at a physical location and through face-to-face interactions. However, increased digitisation has encouraged the provision of these same services through mobile applications, making them more convenient, efficient and accessible.

Gen Z refers to someone born between the mid-1990s and early 2010s and defined basically by their early exposure to digital technology [6]. This generation relies more on digital interactions than conventional ones, emphasizing convenience, immediacy and ease of use. Research says that many young adults access smartphones and leverage mobile apps for numerous purposes. As a result, higher education institutions must move according to their students' demands to satisfy them successfully. There are several benefits associated with using mobile applications as campus support services. For example, Generation Z's digital habits are aligned with mobile applications, which feature a user-friendly interface to help students access core services. Second, mobile apps can facilitate a personalized experience through a push of alerts, chatbots, and real-time updates that ensure timely and relevant information to students. Thirdly, using mobile applications increases productivity by reducing the necessity of physical contacts and paperwork and speeding up administration activities. Studies have demonstrated high acceptance and significant positive impacts of mobile apps on learning outcomes, with learners benefiting from features like flexibility, interactivity, and personalized learning [7, 8]. (Moreover, in another study on promoting stress management in students through mobile apps, Alhasani & Orji [9] observed that mobile apps enhanced students' time management skills and sense of control, boosting their confidence and overall well-being. Recent studies on mobile apps focus on technological innovation and the need for robust design frameworks focusing on pedagogy, usability, and inclusivity [10], educational impact [10, 11], and faculty and students' perception of mobile learning systems [7, 8].

Among the few studies on campus support system, studies observed that integrated mobile applications led to stronger student satisfaction and retention rates [12]. So, with these apps, students can access support services on a 24/7 basis, schedule meetings with their advisors, receive real-time updates about campus activities, and even access mental health resources through their phones. As support services on campus are moving into the digital era, attention to the needs of the first digital-native Generation Z (Gen-Z) university students, who have grown up in a world of always-connected handheld mobile devices. Hernandez-de-Menendez et al. [13] opined that the average Gen Z student depends on the mobile app to maintain a schedule, communicate with peers and faculty, gain access to academic resources and navigate campus. Overall, it makes sense to promote the implementation of mobile apps to improve how campus support services are structured and better position these services in line with the needs and expectations of Gen Z.

However, there are serious issues and costs to using mobile apps for campus support services. There are concerns about accessibility and equity, as not all students have equivalent resources, income, device access, and technological competence. There is a question about data privacy and security in academics, finances, and personal details from admission to bill-pay, which are kept in these electronic files. At the same time, Koenaite et al. [14] mentioned that mobile apps must be effective in their usability, functionality, and usefulness to Gen-Z students so that they can work as support services for students on campus. Developing an app because it is easy and beneficial to create one for the university without a previous understanding of target user needs and requirements could result in low adoption rates and a lack of efficacy. Therefore, it can be said that using mobile apps helps integrate campus support services with students' digital preferences, especially those of Gen Z. However, as colleges and universities experiment with new digital ways to support mental health, there are important issues of promise, peril and ethics to weigh.

Most existing literature on mobile apps in higher learning institutions focuses on learning apps, creating a gap in studies regarding campus support services and mobile apps. Therefore, this study aims to identify and analyse the factors that influence the acceptance and use of mobile apps for educational support systems in higher education institutes. The study would benefit higher education institutions by helping them understand the factors that affect students' usage of these mobile apps. This, in turn, will enhance collaboration and support and implement digital support services that can appropriately cater to students' needs.

From this point on, the paper is divided into the following sections: Section 2 focuses on the related literature review. Section 3 presents the research methodology utilized in this study. Sections 4 and 5 present the results and their interpretations. Lastly, Section 6 presents the conclusion of the study.

2. Literature Review

2.1. Theoretical Background

The Technology Acceptance Model (TAM) is one of the most popular theories for research in educational technology. The model also predicts the acceptance and use of new technology across educational institutional settings [15] and investigates the interaction between technology and student behaviours and objectives [16]. As technology became more prevalent, there was a rising need to understand why people accept or reject it. In the beginning, psychological theories were used to explain and predict decision-making. The theory of planned behaviour by Ajzen [17] and the theory of reasoned action by Ajzen & Fishbein [18] are the sources of TAM. Fred Davis introduced the technology acceptance Model TAM in 1986, based on the theory of reasoned action, to forecast real technology adoption [19]. It has also emerged as the most often used paradigm in research on technology in education and campus support services.

According to TAM, user adoption of technology is primarily influenced by perceived ease of use (PEOU) and usefulness (PU). Davis defines PEOU as "the degree to which a person believes that using a particular technology would be free from effort".

The PEOU reflects how simple it is to use. If the mobile app used for campus support services is not efficient, likely, students will not use it at all, and this creates a bad impression on them. Meanwhile, perceived usefulness (PU) shows how much a student's experience with the app would benefit their academic experience and campus life. Not only that, but students will also value the campus support service app if it saves them time and helps them tackle their academic duties more efficiently. Social influence and technological competence can impact these two independent variables. To investigate and explain the link between Gen-Z students' use of mobile apps and the factors determining their adoption PU and PEOU are important factors to be considered [20].

The Diffusion of Innovation (DOI) theory is one of the earliest ideas in social science [21]. DOI describes how new ideas, technologies or practices spread within a social system [22]. As Nsereka [23] mentioned, the theory hypothesises a normal distribution curve with innovators and early adopters marking the leading edge of innovation establishment and laggards trailing at the opposite end. The factors that impact the diffusion are the relative advantages, compatibility, complexity, trialability and observability. Gen-Z students might be considered early adopters of mobile apps that support campus services since they are generally more predisposed towards digital technology and more open to experimentation with new tools. Thus, early adopters can facilitate an early uptake of mobile apps on campus. Because younger Gen Z has a high level of connections and engagement among its members, the diffusion of innovation can occur faster through networking and the influence of peers' behaviours, recommendations, and reviews. Therefore, this study leverages TAM and DOI to examine the factors determining the intention to adopt mobile apps for the campus support system. By adopting the PU and PEOU from TAM theory and accessibility, technological competence, and data privacy and security concerns from DOI theory, the present study focuses on behavioural drivers and broader environmental and social factors influencing intention to adopt. Together, these concepts encompass both user perceptions and external context.

2.2. Hypotheses Development

Perceived usefulness (PU) pertains to the degree of perceived usefulness that a student would get when they use apps to enhance his/her performance in the university [24]. The benefits include saving time on administrative matters, easy access to learning materials, improved connectivity with lecturers and students and more. Generation Z students' PU of mobile applications is crucial in applying, adopting and using mobile apps for support services on campus. Similarly, PEOU plays a central role in determining the inclination to use and continuously use mobile apps for organisational assistance on campus. This concept refers to the degree to which students believe using the apps will be effort-free [25]. If users expect high usability, then this can be explained by the fact that Generation Z has grown up surrounded by sensible technology and rational designs. They prefer using simple programs to avoid spending time on programs which they will not be able to use effectively. León-Garrido et al. [8] noted that perceived usefulness (PU) and perceived ease of use (PEOU) are crucial dimensions in adopting mobile apps for educational purposes. Similarly, Mgeni et al. [7] observed that both variables positively impact mobile applications for learning management systems. These two variables focus on the behavioural drivers towards adopting the campus support services mobile apps. Hence, the following hypothesis is developed (see Figure 1):

H1: Perceived usefulness positively correlates with the IAMA for campus support services.

H2: Perceived ease of use positively correlates with the IAMA for campus support services.

Environmental and social factors also play an important role in adopting new products or technology, alongside behavioural factors. Accessibility has important implications concerning the intention to adopt and use mobile apps (IAMA) for campus support services. Accessibility refers to how easily students can access these applications despite physical, technological, situational, or other special difficulties [26]. To be effective, any apps must be accessible to all student groups, such as students with functional diversity or those with socioeconomic or technical issues. Mgeni et al. [7] emphasize that mobile apps for higher education must address diverse user needs to ensure all students have equitable access. Likewise, technological competence (TC) is the element that seems to have a significant effect on the extent of adoption and successful use of mobile apps for campus support services. Users' level of TC significantly impacts their willingness to adopt mobile apps. TC refers to students' skill level and familiarity with technology and digital tools [27]. Generally, Generation Z pupils, commonly called digital natives, are normally comfortable with technology since they grew up in a digitally connected society. Their technological savvy means they can pick up new apps quickly and easily, so they would be more disposed to use mobile solutions to seek campus support services. Pandita & Kiran [12] discuss how the technology interface and user engagement are critical for sustainable satisfaction with mobile apps. Additionally, Ramli et al. [10] stressed that the incorporation of advanced features like augmented reality and gamification would enhance the learning experience when users have adequate technological skills. It also means that developers can implement complex features and functionality in the knowledge that users will be able to handle sophisticated interactions. Advanced features like in-app chatting, the ability to integrate with calendar apps for scheduling, or real-time alerts are some things that could be done to make an app very useable without necessarily overwhelming its users [28].

Studies have observed that data privacy and security issues greatly influence the adoption rate of mobile applications and their use [9, 29]. Alhasani & Orji [9] observed that perceived privacy and security are key factors that influence users' trust and adoption [9]. Students are more aware of the risks associated with disclosing personal information in a world where data breaches and other types of cyber threats have advanced [30]. Since Generation Z has grown up with technology, has always been a concern for them. Most importantly, they want any mobile app they use, especially those offered through educational institutions, to incorporate tight security provisions to protect their personal and academic information from unauthorised access and manipulation [31]. As a result, the following hypotheses have been formulated in the context of campus support services among Generation Z students for this study:

H3: Accessibility is positively correlated with the IAMA for campus support services.

H4: Technological competence positively correlates with the IAMA for campus support services.

H5: Data privacy and security concerns positively correlate with the IAMA for campus support services.

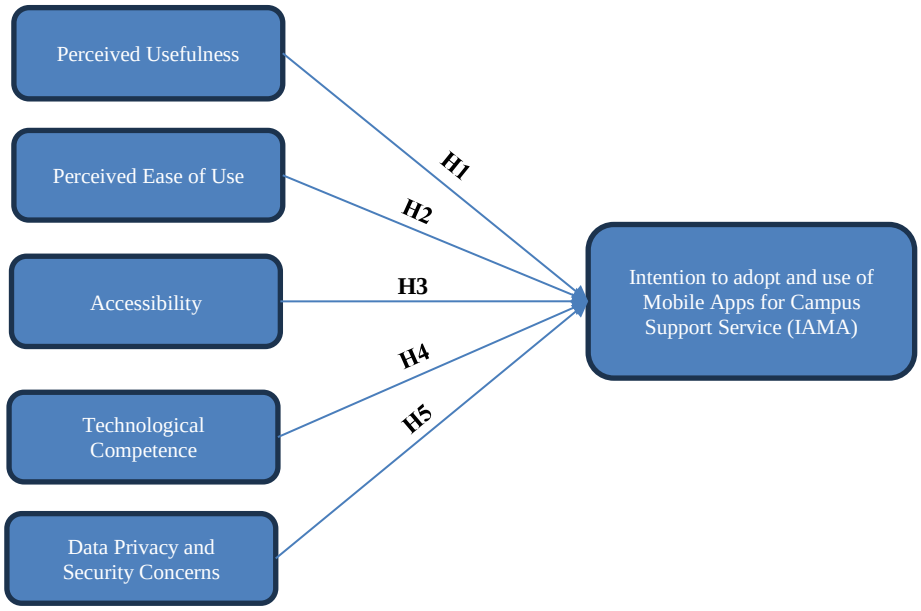

Figure 1. The theoretical framework of the study

3. Research Methods

Since this study is quantitative, positivism is the dominant research paradigm. This method guarantees that the information gathered is impartial and unaffected by the researchers' prejudices [32]. Consistent with the positivist framework, the research endeavours to ascertain the requirements and evaluate the variables that impact the results, furnishing a transparent and objective comprehension of the variables involved.

3.1. Sample and Research Instrument

This study investigates the factors influencing the intention to adopt and use of mobile apps for educational support systems in higher education institutes among Generation Z students. A quantitative research strategy was adopted for this study. In the present study, the target age range of the respondents was 19 to 27, who were born between 1997 and 2005. A structured self-administered questionnaire was distributed to different university students, clubs, and associations through Google form. The clubs and associations also include welfare-based student communities of foreign nationals, emphasising their community, which ensures the inclusion of international students in the sample. 250 students were sent the link to fill out the questionnaire. The survey remained open for responses for 3 to 5 weeks, and responses were subsequently reviewed and cleaned to ensure data quality. Participants were encouraged to complete the questionnaire independently, ensuring anonymity and confidentiality. The study followed ethical standards, including participant confidentiality and data protection guidelines. The current study employs a purposive sampling design, which is a non-probability sampling method. This approach concentrates on specific population characteristics pertinent to addressing the research questions [33].

Using G*Power, the sample size for this study is calculated to be 92 at a 5% error level. The questionnaire underwent a pretest with 30 students to refine it and ensure the study's feasibility. 200 questionnaires were distributed among the respondents, 145 of which were returned. Finally, 100 questionnaires were considered usable for analysis. While collecting the data, we encountered various challenges. One of the primary challenges was the low response rate, which may be due to an oversight or a lack of student interest. We sent the link to 200 students within a time frame of 3 weeks. However, due to the slow response, we extended the data collection time to 5 weeks and sent periodic reminders and follow-ups. Along with incomplete responses, another challenge was response bias, where the participants chose the extremes regardless of item content. This occurs when the respondents do not carefully evaluate each question. Therefore, while cleaning and preparing the data, we eliminated those responses.

The questionnaire was designed to allow respondents to indicate their level of agreement on a scale from "strongly disagree" to "strongly agree".

3.2. Measurement of Item and Scale

The measurement items and scales are developed based on the literature. Table 1 provides precise measurements for each built measuring scale. Each item is rated on a five-point Likert scale ranging from strongly disagree (1) to Strongly agree (5). Annex I presents the items used to measure the constructs used in the present study.

Table 1. Measurement of scale

Variable	Number of Question	References
Intention to adopt and use mobile apps for campus support services	5	Malik et al. (2020) [34]
Perceived Usefulness	5	Edumadze et al. (2022) [35]
Perceived Ease of Use	5	Cheung & Vogel (2013) [25]
Accessibility	5	Malik et al. (2020) [34]
Technological Competence	5	Murugan et al. (2017) [36]
Data Privacy and Security Concerns	5	Dang et al. (2021) [37]

3.3. Method of Analysis

The study used descriptive statistics to illustrate the dataset's properties and uniformity. The analysis includes skewness-kurtosis analysis, reliability analysis, and regression analysis. Cronbach's alpha assessed the reliability of the constructs. Multiple regression analysis evaluated the linear relationship between independent and dependent variables. Figure 2 presents the overview of the research phases for the present study.

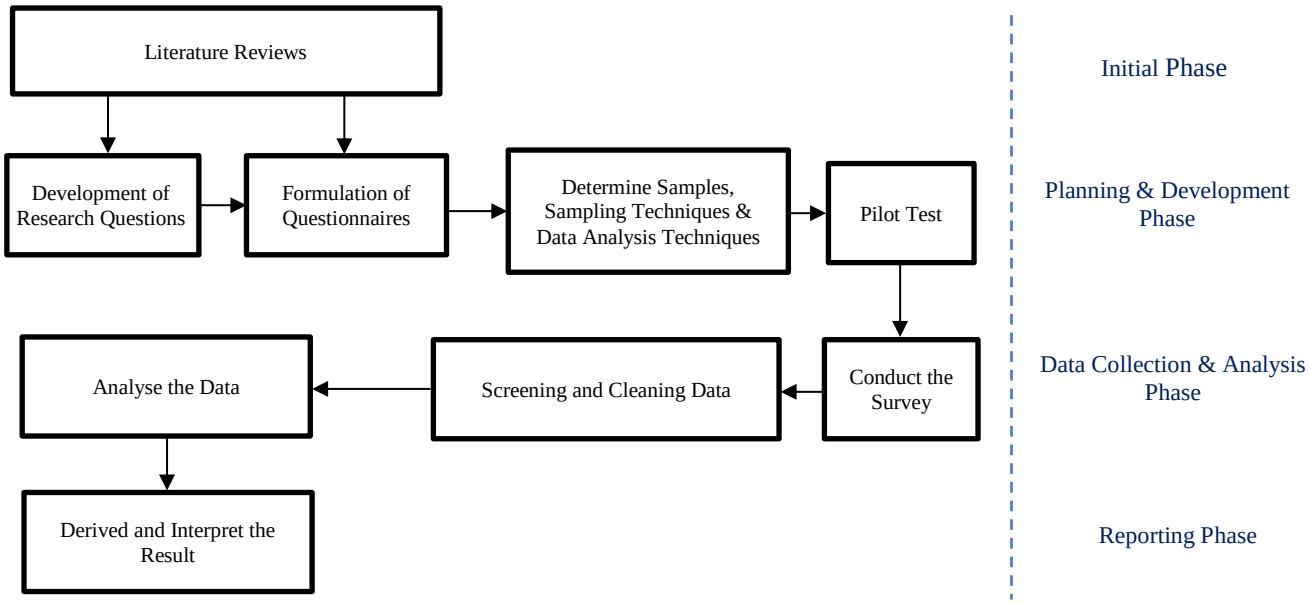

Figure 2. Overview of Research Phases

4. Results

4.1. Reliability Analysis

The results for Cronbach's Alpha for each variable are presented in Annex II. The Cronbach's alpha value ranges from 0.804 to 0.909. The intention to adopt and use mobile apps scores 0.903. Among the independent variables, Perceived usefulness, perceived ease of use, and accessibility stand at 0.904, 0.900, and 0.909, respectively. Technological competence scores 0.890, followed by data privacy and security concerns 0.804. Hence, all of the values meet the threshold level of 0.70, and all of these variables are considered for further analysis.

4.2. Normality Analysis

Table 2 presents the skewness and kurtosis of the variables, which provides insights into the shape and distribution of the data. The statistics show that the skewness values range from -1.156 to -1.693, which aligns with the benchmark of -0.50 to 0.50 [38]. Hence, the data is symmetrical. Similarly, the Kurtosis ranges from 3.174 to 3.909 except for one variable (Accessibility), 5.782. DV, IV1, IV2, IV3, IV4, and IV5 indicate close to the normal distribution (Kurtosis 3).

Table 2. Normality Analysis of Study Variables

Item	Variable	Skewness		Kurtosis	
		Statistic	Std. Error	Statistic	Std. Error
DV	Adoption and use of mobile apps for campus support services	-1.258	0.241	3.174	0.478
IV1	Perceived Usefulness	-1.156	0.241	3.830	0.478
IV2	Perceived Ease of Use	-1.173	0.241	3.404	0.478
IV3	Accessibility	-1.693	0.241	5.782	0.478
IV4	Technological Competence	-1.271	0.241	3.199	0.478
IV5	Data Privacy and Security Concerns	-1.300	0.241	3.909	0.478

4.3. Descriptive Analysis

According to Table 3, the age brackets of the respondents were categorised into 3 groups, which were Below 20, 21-24, and 25-27. Out of 100 respondents, 48% of the respondents are below 20, followed by 32% in the age group of 21-24 years. Moreover, most respondents (61%) are familiar with the campus support mobile apps, and nearly 40% remain uninformed (see Figures 3 and 4).

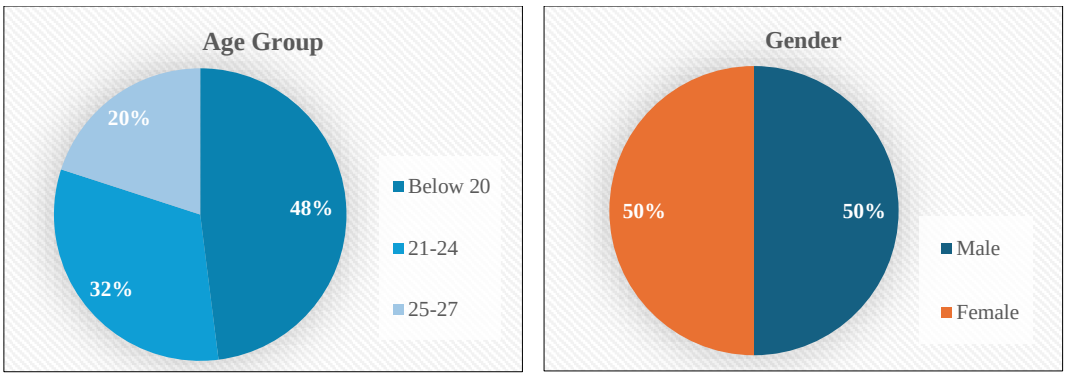

Figure 3. Demographic Profile of the Respondents

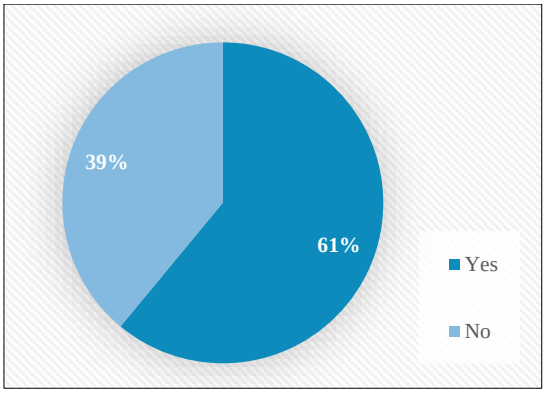

Figure 4. Familiarity with the campus support mobile apps

4.3.1. Mean and SD Analysis of the Variables

Table 3 shows the mean and standard deviation of the dependent variable and the four independent variables. The mean value ranges from 3.84 to 3.982. Respondents expressed a positive overall intention to use these apps and usefulness, with a mean score of 3.8720. The perceived ease of use also scored a mean of 3.8720, indicating that the apps will be user-friendly and save time and costs. Accessibility had a mean of 3.9820, technological competence scored 3.8680, and data privacy and security concerns had a mean of 3.8400.

Table 3. Mean and standard deviation for the dependent variable and the independent variables

Item	Variable	Mean	Standard Deviation
DV	Intentions to adopt and use of mobile apps (IAMA)	3.8720	0.80429
IV1	Perceived Usefulness (PU)	3.8860	0.71478
IV2	Perceived Ease of Use (PEU)	3.8720	0.73554
IV3	Accessibility (ACC)	3.9820	0.71186
IV4	Technological Competence (TEC)	3.8680	0.75168
IV5	Data Privacy and Security Concerns (DPS)	3.8400	0.70553

4.4. Multiple Regression Analysis

4.4.1. Model Summary

Table 4 presents a summary of the multiple regression analysis. The R-squared value is 0.641, suggesting that the independent variables have a significant relationship with the dependent variable, the intention of adoption and use of mobile apps for campus support services. The independent variables explain 64.1 percent of the variance in the dependent variable.

Table 4. Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.801[a]	0.641	0.622	0.49469

[a] Predictors: constant, PU, PEU, ACC, TEC, DPS.

4.4.2. ANOVA

According to Table 5, the F-value of the Anova test is 33.539, with a p-value of <0.001, which is less than 0.05. This indicates that at least one of five independent variables, which are perceived usefulness, perceived ease of use, accessibility, technological competence, and data privacy and security concerns, can explain the dependent variable, adoption and use of mobile apps for campus support services that are tested in this study.

Table 5. ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	41.038	5	8.208	33.539	<0.001
Residual	23.003	94	0.245		
Total	**64.042**	**99**			

4.4.3. Coefficients and Hypothesis Testing

Table 6 presents the coefficients from the multiple linear regression analysis and the p-values for each independent variable. The results of the hypothesis testing are shown in Table 7, revealing that all four hypotheses (H2, H3, H4, and H5) were rejected, with only H1 being accepted. The results indicate that perceived usefulness significantly correlates with students' intentions to adopt and use mobile apps for campus support services (H1: Accepted, p=0.003, p<0.05). However, other factors—such as ease of use (H2: Rejected, p=0.124, p>0.05), accessibility (H3: Rejected, p=0.542, p>0.05), technological competence (H4: Rejected, p=0.858, p>0.05), and data privacy and security concerns (H5: Rejected, p=0.822, p>0.05)—were found to be insignificant.

Table 6. Coefficients

Model	Unstad. coefficients		Stand. coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.293	0.299		0.980	0.330
IV1	0.555	0.182	0.494	3.047	0.003
IV2	0.270	0.174	0.247	1.551	0.124
IV3	0.098	0.160	0.086	0.612	0.542
IV4	0.024	0.133	0.022	0.179	0.858
IV5	-0.028	0.123	-0.024	- 0.226	0.822

Table 7. Hypothesis Testing Summary

Hypothesis	Statement	Findings
H1	Perceived usefulness positively correlates with the intention to adopt and use mobile apps for campus support services.	Accepted (0.003, P < 0.05)
H2	Perceived ease of use is positively correlated with the intention to adopt and use of mobile apps for campus support services.	Rejected (0.124, P > 0.05)
H3	Accessibility is positively correlated with the intention to adopt and use of mobile apps for campus support services.	Rejected (0.542, P > 0.05)
H4	Technological competence is positively correlated with the intention to adopt and use of mobile apps for campus support services.	Rejected (0.858, P > 0.05)
H5	Data privacy and security concerns are positively correlated with the intention to adopt and use of mobile apps for campus support services.	Rejected (0.822, P > 0.05)

5. Discussion

This research's main goal and objective was to analyse the factors influencing the adoption and use of mobile apps for campus support services.

The first research objective sought to understand the extent to which perceived usefulness is related to the acceptance and the use of mobile applications catered for campus support services among Generation Z students. The results revealed that perceived usefulness strongly correlates with the intention to adopt the app. This means that students are more willing to accept and make regular use of the mobile campus support applications when these applications are perceived to help carry out academic and administrative activities. This finding is consistent with the TAM, which suggests that technology acceptance is primarily determined by perceived relative advantage [19]. Existing studies such as Al-Emran et al. [39] and Arokiasamy [40] corroborate these findings and address mobile app design's importance in

embracing academic performance and a responsive campus experience. For the younger generation, Generation Z, most often regarded as 'net users,' the usefulness of the technology is a direct determinant of whether they will use it. In summary, understanding the relationship between perceived usefulness and acceptance of mobile applications intends to help higher learning educators focus on the usage of mobile apps in a more targeted fashion rather than on the generic encouraging increase in mobile app usage.

Universities can focus on offering specialized features that support students' academic and administrative needs to enhance the usage of their PU of mobile apps. Features such as fee payments, enrolment, scholarship applications, status monitoring, visa applications, and monitoring for international students, room reservations, and academic features like class schedules, grades, and assignments should be offered in a single app. The app can increase its appeal by improving the user experience by paying attention to students' preferences and offering real-time updates. Furthermore, regular feedback collection and prompt app updates will make it more valuable to the students.

Another key objective of the research was to determine if perceived ease of use extends significantly to the use and adoption of campus-support mobile apps by Generation Z students. The study found no significant correlation between ease-of-use perception and intention to adopt apps. Therefore, although ease of use is perceived to be crucial in adopting technology and other products, the results show that for Generation Z students, usefulness is more crucial than ease of use in adopting campus apps. This result is inconsistent with the TAM, where ease of use is considered an important predictor of adopting biometric technology. However, it is acceptable that Generation Z students, as children of the Internet, are used to using digital things, and they do not consider ease of use a handicap unless it is exceedingly bad [41]. A study by Cheung & Vogel [25] supported this study by saying that ease of use is not a concern to the users when technology is familiar. In summary, though ease of use is still accepted as an indicator of general user satisfaction, the results suggest that Generation Z students care more about what the mobile apps can do for them than how easy they are to use.

The third research objective aimed at establishing the significance of accessibility in the acceptance and usage of mobile applications intended for campus support services. The results showed that there was not a strong correlation between accessibility and the adoption of apps. This suggests that while Generation Z students may have varying levels of access to technology, they do not consider accessibility a significant factor in their decision to use these apps. This may be attributed to the high availability of mobile gadgets and the high literacy level of people in this age group, making accessibility an afterthought [42]. In previous research, it has also been observed that though accessibility is a requirement, users with technological ability can face few barriers unless there are other factors like disability present [43]. Notwithstanding, providing access to all students, including the impaired population, is important because it enhances equity. To sum up, it can be stated that while most students from Generation Z do not regard accessibility as a major issue still, tertiary education providers should aim at reconfiguring mobile technologies' applications in such a way that they ensure everyone has equal access independently, notwithstanding any capacity or mobility limitations that may be present.

The fourth research objective targeted whether technological competency affects the acceptance and usage of mobile apps for campus support services. Results indicated that no appreciable positive relationship existed between technological competence and intention to app adoption. Technological competence is not correlated with continually using the campus apps for this generation Z students. This is further in line with the assertion that Generation Z has been born in a world where technology is free-flowing and, therefore, does not experience any challenges in using mobile applications for any degree of complexity, regardless of the nature of the application [44]. With modern mobile applications, design and interfaces have become so user-friendly in their approach that it no longer requires an advanced degree of technical skills to operate them, especially among young users. If the application is well-designed, then even low technical skill users can easily adopt and use the service, which makes technological competence a lesser determinant of app adoption. According to research, intuitive design features influence app acceptance more than the users' technological competency [45]. In summary, even though the use of technology competency affects the success of the mobilisation of the app adoption, especially for Gen Zs, sufficient instructions, encouragement and resources should be made available rather than assuming that the students can understand the applications entirely.

The last objective touches on the connection between concerns in data privacy and security and the adoption of mobile apps by students in Generation Z. Results show there is no significant relationship between data privacy and security concerns and app adoption; this means that data privacy and security concerns do not significantly influence the decisions of students in the use of campus support apps. Gen Z users are more willing to give up privacy for the privileges of using an app. Research by Bordonaba-Juste et al. [46] suggests that while Gen Z users take data privacy risks seriously, they value the comfort and usefulness of apps even more. If an app has a service that is valuable to students, this will reduce the magnitude of the concerns about privacy, for they are less likely to let the matter of privacy get in the way. In addition, students are not concerned about security when using mobile apps for campus services since they may think that such technology has been successfully used by institutions before. According to Vu et al. [47],

students trust universities to save their data more than commercial apps; therefore, they feel less concerned about privacy and security when using campus apps. However, a previous study by Greller & Drachsler [48] discusses potential privacy concerns and observed that students might not fully trust universities with their data. After all, data privacy and security may be the last thing students consider. However, universities should set high levels of security and transparency as far as information handling is concerned since the protection of sensitive information and building trust in their digital services toward students goes without saying.

In the present study, the acceptance of H1 indicates that students primarily focus on PU of mobile apps in their campus experience to solve their specific needs. Hence, most students have already adapted to using different mobile apps daily, so ease of use and technological competence may not be important to them. Other factors, like data privacy and security concerns, did not resonate strongly; hence, the students trusted their institution to provide the app. Accessibility was also not significant, possibly because of high internet penetration. In addition, few private universities offer free internet connections to their students, making it not a significant concern.

However, the acceptance of mobile apps for campus services could differ in institutions with lower technological infrastructure or different economies. In that case accessibility, ease of use, technological competence and security issues might become more important. For instance, Limited access to reliable internet and high costs can create problems with accessibility. This may cause the students to prefer apps that work offline or need minimal data usage. In contexts where people have limited technological familiarity, ease of use and technological competence can be influential factors. Therefore, simple app designs would encourage students to use them more. Students in developing economies may prioritize cost-effectiveness, while those in developed countries might focus more on data security [49].

6. Conclusion

The present study investigated the factors determining the intention of Generation Z students to adopt and use campus support services mobile app in higher education settings. The TAM and DOI theory provided the conceptual models for this research study. The outcomes showed that perceived usefulness significantly correlated positively with the adoption of mobile apps. However, perceived ease of use, accessibility, and data privacy were less influential variables of students' behaviour. The findings of this present study provided an understanding that was very important in the context of higher educational institutions in improving student engagement through mobile technology. With respect to functionality and usefulness development, universities can develop apps so that, at an increased adoption rate, superior digital services could be delivered to students. This research also encourages future studies to investigate various factors to deepen the understanding of digital transformation in education.

However, this study has some limitations that can direct future avenues for research. This research focuses on Generation Z students, who are tech-savvy and familiar with mobile applications. Therefore, their responses might have had some positive bias towards adopting mobile apps for campus support services. Another limitation is the geographic location where the study was conducted. The study was conducted in higher education institutions in a region that may be more technologically advanced than others. Students who study in areas with poor technological infrastructure or support may face different difficulties regarding mobile app adoption, which might result in different results. Thus, the results may not be generalised for students in areas of lower technological advancement or with less availability of digital tools. Affordability, perceived usefulness, and data privacy concerns may vary based on a region's socioeconomic conditions.

Hence, future studies can broaden the scope to include other areas within and beyond Malaysia. This would facilitate the researchers' understanding of how geographical and technological differences in the use of applications influence higher education in a more specific and detailed way. In addition, future research might be expanded to other demographics than Generation Z students, such as older students from different age brackets. It would extend the understanding of how other generations adopt and use campus support apps to those less familiar with and comfortable using mobile technology. In addition, the current study could employ the qualitative approach if it decided to conduct further research, for example, through interviews or focus groups. This will extend the understanding of students' mobile application usage experiences, attitudes, and concerns; thus, it would provide a richer perspective if the key reasons influencing adoption or resistance decisions were explored.

7. Declarations

7.1. Author Contributions

Conceptualization, A.Su., N.K., and M.S.; methodology, A.Su., N.K., and M.F.; software, A.Su. and A.Si.; validation, A.Su., F.A., and D.F.; formal analysis, N.K. and A.Si.; investigation, M.F. and M.A.; resources, A.Su.; data curation, M.F.; writing—original draft preparation, A.Su. and A.Si.; writing—review and editing, A.Si.; visualization, A.Su.; supervision, A.Su.; project administration, A.Su.; funding acquisition, A.Su. All authors have read and agreed to the published version of the manuscript.

7.2. Data Availability Statement

The data presented in this study are available in the article.

7.3. Funding

This research is funded under MMU-UI (Universitas Indonesia) with Project ID MMUI/240009 under Multimedia University.

7.4. Institutional Review Board Statement

Not applicable.

7.5. Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

7.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

8. References

[1] Valdés, K. N., Alpera, S. Q. Y., & Suárez, L. M. C. (2021). An institutional perspective for evaluating digital transformation in higher education: Insights from the chilean case. Sustainability (Switzerland), 13(17), 9850. doi:10.3390/su13179850.

[2] Hanna, K. T., & Wigmore, I. (2023). mobile app. What is a mobile app (mobile application)? WhatIs. Available online: https://www.techtarget.com/whatis/definition/mobile-app (accessed on May 2025).

[3] Johnson, L. (2019). The History of Mobile Apps. Invention land. Available online: https://inventionland.com/blog/the-history-of-mobile-apps/ (accessed on May 2025).

[4] Salako, L., & Salako, L. (2024). What is Student Support and What Can it Do for You? Urbanest. Available online: https://uk.urbanest.com/journal/what-is-student-support/ (accessed on May 2025).

[5] Amberstudent. (2024). Student Support Services: Everything You Must Know. Amberstudent. Available online: https://amberstudent.com/blog/post/student-support-services-everything-you-must-know (accessed on May 2025).

[6] Tung, H. T., & Nguyen, V. M. (2024). Trends of Using Technology Devices of Vietnam's Gen Z Generation. Social Science and Humanites Journal, 8(5), 3685-3697. doi:10.18535/sshj.v8i05.1098.

[7] Mgeni, M. S., Haji, H. A., Yunus, S. A., & Abdulla, A. A. (2024). Adoption of mobile application for enhancing learning in higher education: Students' views from the State University of Zanzibar, Tanzania. African Journal of Science, Technology, Innovation and Development, 16(2), 265–273. doi:10.1080/20421338.2023.2289248.

[8] León-Garrido, A., Gutiérrez-Castillo, J. J., Barroso-Osuna, J. M., & Cabero-Almenara, J. (2025). Evaluation of the use and acceptance of mobile apps in higher education using the TAM model. RIED-Revista Iberoamericana de Educacion a Distancia, 28(1), 107–126. doi:10.5944/RIED.28.1.40988.

[9] Alhasani, M., & Orji, R. (2025). Promoting Stress Management among Students in Higher Education: Evaluating the Effectiveness of a Persuasive Time Management Mobile App. International Journal of Human-Computer Interaction, 41(1), 219–241. doi:10.1080/10447318.2023.2297330.

[10] Ramli, R. Z., Sahari Ashaari, N., Mat Noor, S. F., Noor, M. M., Yadegaridehkordi, E., Abd Majid, N. A., Dahlan, H. A., & Abdul Wahab, A. N. (2024). Designing a mobile learning application model by integrating augmented reality and game elements to improve student learning experience. Education and Information Technologies, 29(2), 1981–2008. doi:10.1007/s10639-023-11874-7.

[11] Jordan, K., Myers, C., Damani, K., Khagame, P., Mumbi, A., & Njuguna, L. (2025). Supporting equitable access to learning via SMS in Kenya: Impact on engagement and learning outcomes. British Journal of Educational Technology, 56(4), 1530–1552. doi:10.1111/bjet.13533.

[12] Pandita, A., & Kiran, R. (2023). The Technology Interface and Student Engagement Are Significant Stimuli in Sustainable Student Satisfaction. Sustainability (Switzerland), 15(10), 7923. doi:10.3390/su15107923.

[13] Hernandez-de-Menendez, M., Escobar Díaz, C. A., & Morales-Menendez, R. (2020). Educational experiences with Generation Z. International Journal on Interactive Design and Manufacturing, 14(3), 847–859. doi:10.1007/s12008-020-00674-9.

[14] Koenaite, M., Maziriri, E., & Chuchu, T. (2021). Attitudes Towards Utilising Mobile Banking Applications Among Generation Z Consumers in South Africa. Journal of Business and Management Review, 2(6), 417–438. doi:10.47153/jbmr26.1452021.

[15] Ball, D. M., & Levy, Y. (2008). Emerging Educational Technology: Assessing the Factors that Influence Instructors' Acceptance in Information Systems and Other Classrooms. Journal of Information Systems Education, 19(4), 431–444.

[16] Alharbi, S., & Drew, S. (2014). Using the Technology Acceptance Model in Understanding Academics' Behavioural Intention to Use Learning Management Systems. International Journal of Advanced Computer Science and Applications, 5(1), 20. doi:10.14569/ijacsa.2014.050120.

[17] Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. Action control: From cognition to behavior. Springer, Berlin, Germany.

[18] Ajzen, I. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, New Jersey, United States.

[19] Davis, F. D. (1989). Technology acceptance model: TAM. Al-Suqri, MN, Al-Aufi, AS: Information Seeking Behavior and Technology Adoption, 205, 219.

[20] Lestari, D. (2019). Measuring e-commerce adoption behaviour among gen-Z in Jakarta, Indonesia. Economic Analysis and Policy, 64, 103–115. doi:10.1016/j.eap.2019.08.004.

[21] Rogers, E. M., & Cartano, D. C. (1962). Methods of Measuring Opinion Leadership. Public Opinion Quarterly, 26(3), 435–441.

[22] García-Avilés, J. A. (2020). Diffusion of innovation. The international Encyclopedia of Media Psychology, 1(8), 1-8.

[23] Nsereka, B. G., & Nwanze, T. (2021). Evangelism in the Era of New Media. International Journal of Research and Innovation in Social Science, 05(08), 643–648. doi:10.47772/ijriss.2021.5834.

[24] Eveleth, L. B., & Stone, R. W. (2020). User's perceptions of perceived usefulness, satisfaction, and intentions of mobile application. International Journal of Mobile Communications, 18(1), 1. doi:10.1504/ijmc.2020.104431.

[25] Cheung, R., & Vogel, D. (2013). Predicting user acceptance of collaborative technologies: An extension of the technology acceptance model for e-learning. Computers and Education, 63, 160–175. doi:10.1016/j.compedu.2012.12.003.

[26] Timbi-Sisalima, C., Sánchez-Gordón, M., Hilera-Gonzalez, J. R., & Otón-Tortosa, S. (2022). Quality Assurance in E-Learning: A Proposal from Accessibility to Sustainability. Sustainability (Switzerland), 14(5), 3052. doi:10.3390/su14053052.

[27] Zhao, B., & Bilen, H. (2021). Dataset Condensation with Differentiable Siamese Augmentation. Proceedings of Machine Learning Research, 139, 12674–12685.

[28] Dardamanis, D., Navez, J., Coubeau, L., & Navez, B. (2018). A Retrospective Comparative Study of Primary Versus Revisional Roux-en-Y Gastric Bypass: Long-Term Results. Obesity Surgery, 28(8), 2457–2464. doi:10.1007/s11695-018-3186-z.

[29] Balapour, A., Nikkhah, H. R., & Sabherwal, R. (2020). Mobile application security: Role of perceived privacy as the predictor of security perceptions. International Journal of Information Management, 52, 102063. doi:10.1016/j.ijinfomgt.2019.102063.

[30] Sayaf, A. M., Alamri, M. M., Alqahtani, M. A., & Alrahmi, W. M. (2022). Factors Influencing University Students' Adoption of Digital Learning Technology in Teaching and Learning. Sustainability (Switzerland), 14(1), 493. doi:10.3390/su14010493.

[31] Mkpojiogu, E. O. C., Hussain, A., & Agbudu, M. O. (2021). Security Issues in the Use of Mobile Educational Apps: A Review. International Journal of Interactive Mobile Technologies, 15(6), 124–137. doi:10.3991/ijim.v15i06.20631.

[32] Hartas, D. (2021). Quantitative Research as a Method of Inquiry in Education. Educational Research and Inquiry, 65. doi:10.5040/9781474243834.ch-004.

[33] Andrade, C. (2021). The Inconvenient Truth About Convenience and Purposive Samples. Indian Journal of Psychological Medicine, 43(1), 86–88. doi:10.1177/0253717620977000.

[34] Malik, S. I., Al-Emran, M., Mathew, R., Tawafak, R. M., & AlFarsi, G. (2020). Comparison of E-learning, M-learning and game-based learning in programming education. International Journal of Emerging Technologies in Learning, 15(15), 133–146. doi:10.3991/ijet.v15i15.14503.

[35] Edumadze, J., Ditlhokwa, G., & Demuyakor, J. (2022). Students' Acceptance and Perceptions of Perceived Usefulness of Mobile Learning Devices in Higher Educational Institutions. Online Journal of Communication and Media Technologies, 12(2), 202209. doi:10.30935/ojcmt/11539.

[36] Murugan, A., Sai, G. T. B., & Agnes Liau, W. L. (2017). Technological Readiness of UiTM Students in Using Mobile Phones in the English Language Classroom. Malaysian Online Journal of Educational Technology, 5(2), 51–67.

[37] Dang, Y., Guo, S., Guo, X., Wang, M., & Xie, K. (2021). Privacy concerns about health information disclosure in mobile health: Questionnaire study investigating the moderation effect of social support. JMIR MHealth and UHealth, 9(2), 19594. doi:10.2196/19594.

[38] Blanca, M. J., Arnau, J., López-Montiel, D., Bono, R., & Bendayan, R. (2013). Skewness and kurtosis in real data samples. Methodology, 9(2), 78–84. doi:10.1027/1614-2241/a000057.

[39] Al-Emran, M., Elsherif, H. M., & Shaalan, K. (2016). Investigating attitudes towards the use of mobile learning in higher education. Computers in Human Behavior, 56, 93–102. doi:10.1016/j.chb.2015.11.033.

[40] Arokiasamy, A. R. A. (2017). A systematic review approach of mobile technology adoption in higher education. Economics, Management and Sustainability, 2(2), 48-55. doi:10.14254/jems.2017.2-2.5.

[41] Alruthaya, A., Nguyen, T. T., & Lokuge, S. (2021). The Application of Digital Technology and the Learning Characteristics of Generation Z in Higher Education. Australasian Conference on Information Systems, Proceedings, ACIS 2021, 1-7. doi:10.48550/arXiv.2111.05991.

[42] Lazar, A., Koehler, C., Tanenbaum, T. J., & Nguyen, D. H. (2015). Why we use and abandon smart devices. UbiComp 2015 - Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing, 635–646. doi:10.1145/2750858.2804288.

[43] Arora, A., Bansal, S., Kandpal, C., Aswani, R., & Dwivedi, Y. (2019). Measuring social media influencer index- insights from facebook, Twitter and Instagram. Journal of Retailing and Consumer Services, 49, 86–101. doi:10.1016/j.jretconser.2019.03.012.

[44] YALÇIN İNCİK, E. (2022). Generation Z Students' Views on Technology in Education: What They Want What They Get. Malaysian Online Journal of Educational Technology, 10(2), 109–124. doi:10.52380/mojet.2022.10.2.275.

[45] Szymkowiak, A., Melović, B., Dabić, M., Jeganathan, K., & Kundi, G. S. (2021). Information technology and Gen Z: The role of teachers, the internet, and technology in the education of young people. Technology in Society, 65, 101565. doi:10.1016/j.techsoc.2021.101565.

[46] Bordonaba-Juste, M. V., Lucia-Palacios, L., & Pérez-López, R. (2020). Generational differences in valuing usefulness, privacy and security negative experiences for paying for cloud services. Information Systems and E-Business Management, 18(1), 35–60. doi:10.1007/s10257-020-00462-8.

[47] Vu, P., Adkins, M., & Henderson, S. (2020). Aware, But Don't Really Care: Students' Perspective on Privacy and Data Collection in Online Courses. Journal of Open, Flexible and Distance Learning, 23(2), 42–51. doi:10.61468/jofdl.v23i2.350.

[48] Greller, W., & Drachsler, H. (2012). Privacy and analytics in online education. Journal of Online Learning and Teaching, 8(2), 181–194.

[49] Suleiman, I. B., Okunade, O. A., Dada, E. G., & Ezeanya, U. C. (2024). Key factors influencing students' academic performance. Journal of Electrical Systems and Information Technology, 11(1), 41. doi:10.1186/s43067-024-00166-w.

Appendix I

Table AI. Questionnaire Items

Variable	Question
Perceived Usefulness	1. Using campus support mobile apps will enhance my effectiveness in managing academic tasks.
	2. Campus support mobile apps make it easier to access necessary services and information.
	3. The use of the campus support mobile app will improve my overall academic performance.
	4. Campus support mobile apps will be a great tool to stay on top of deadlines
	5. Campus support mobile apps will significantly contribute to my satisfaction with the services provided.
Perceived Ease of Use	1. The campus support mobile apps will be easy to navigate.
	2. Interacting with campus support mobile apps will not require much mental effort.
	3. I will have no trouble getting the mobile app to accomplish what I want.
	4. Learning to use campus support mobile apps will be simple for me.
	5. I will be able to perform tasks easily using the campus support mobile apps.
Accessibility	1. Easy to access campus support mobile apps from my mobile device.
	2. I am glad if campus support mobile apps is available whenever I need them.
	3. It is helpful when Information needed is easy to find within the campus support mobile apps
	4. I prefer campus support mobile apps which are compatible with various devices and operating systems.
	5. I must be able to access support services through apps even when off-campus.
Technological Competence	1. I will be able to use campus support mobile apps without assistance.
	2. I can troubleshoot and solve common issues with campus support mobile apps on my own.
	3. I can quickly learn new features and update in campus support mobile apps when needed.
	4. I prefer to use one campus support mobile app for different services.
	5. I will keep myself updated with the latest technological trends and advancements implemented to campus support mobile apps.
Data Privacy and Security Concerns	1. I will trust the campus support mobile app to secure my personal information.
	2. I will be concerned about my data privacy when using campus support mobile apps.
	3. I will feel confident if my academic records are protected.
	4. I will be hesitant to use campus support mobile apps due to security concerns.
	5. I will ensure that campus supports mobile apps follow strict data privacy regulations.
Intention to adopt and use of mobile apps for campus support services	1. Assuming I had mobile apps for campus support services, I intend to use them.
	2. If I have campus support mobile apps, I will use them frequently.
	3. I plan to use campus support mobile apps in the future.
	4. I will recommend campus support mobile apps to my friends.
	5. I will depend on on-campus support mobile apps to manage my academic and personal affairs.

Appendix II

Table AII. Reliability Analysis of Study Variables

Item	Variables	Cronbach's Alpha	Number of items
DV	Intention to adopt and use of mobile apps	0.903	5
IV 1	Perceived Usefulness	0.904	5
IV 2	Perceived Ease of Use	0.900	5
IV 3	Accessibility	0.909	5
IV 4	Technological Competence	0.890	5
IV 5	Data Privacy and Security Concerns	0.804	5