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Parental involvement and M-learning adoption in distance higher education: Structural equation analysis

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Abstract: This work examined the utilization of mobile learning (m-learning) among distance learning undergraduates and the influence of parental involvement on its usage. The study is underpinned by the Technology Acceptance Model (TAM). It employed a descriptive survey research design that surveyed 676 distance learning students in Southwest Nigeria through an online questionnaire titled "Parental Involvement on M-learning Utilization Questionnaire." Data were collected over eight weeks and analyzed using PLS-SEM in SmartPLS 4. The study revealed that attitudes towards m-learning significantly influence its use among distance-learning undergraduates. Additionally, perceived ease of use positively influences attitudes, perceived usefulness, and m-learning usage, while perceived usefulness influences m-learning usage but not attitudes. Also, it was found that parental involvement in communication enhances perceived ease of use and usefulness but does not influence attitudes. In addition, parental involvement in decision-making positively influences attitudes, perceived ease of use, and perceived usefulness, whereas involvement in home learning shows no significant influence on attitudes, perceived ease of use, or perceived usefulness of m-learning. This should encourage the stakeholders of tertiary institutions in Nigeria to embrace and utilize m-learning for a smooth academic calendar. Also, developers and educators need to consider user experience on m-learning platforms by simplifying interfaces, offering clear instructions, and guaranteeing technical assistance, which may improve students' perceptions and, ultimately, engagement levels.

Keywords: *Distance-learning undergraduates, m-learning, Parental involvement, Technology acceptance model.*

1. Introduction

The interest of many nations in ensuring equity in education for their citizens has driven the establishment of distance learning programmes, particularly in developing countries. These programmes provide opportunities for individuals who cannot attend regular tertiary institutions to access quality education. In Nigeria, distance learning emerged in response to the need for citizens to pursue higher education when access to formal tertiary education was limited under the colonial administration [1]. Consequently, working-class learners increasingly turned to distance learning to access higher-quality education. In recent times, distance learning has expanded beyond employed and mature adults seeking personal development and career advancement. Teng [2] observed that distance learning now offers quality education to learners across all social strata, making it a viable option for anyone seeking to further their education.

The outbreak of COVID-19 further highlighted the importance of distance learning, as social distancing and isolation measures necessitated integrating information and communication technology into educational practices. Owansuan Olalere and Soyemi [3] noted that many instructors and

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institutions who were initially hesitant or indifferent to digital tools have adapted by using mobile applications to support teaching and learning. Despite these developments, early distance learning programmes were characterized by several challenges. Ergin et al. [4] identified problems such as poor attendance, limited practical-oriented courses, inadequate learning experiences, weak interaction between facilitators and students, lack of learning resources, and students' indifferent attitudes. Addressing these issues requires providing enabling learning materials and innovative instructional platforms.

Among the innovative platforms, electronic learning, mobile learning, online learning, and open educational resources have been identified as transformative approaches for distance education [5-8]. Mobile learning, in particular, has emerged as a highly accepted and promising educational platform in the twenty-first century [9]. It offers learners the flexibility to study at convenient times and locations, supports individualized learning, and encourages active engagement with educational content Criollo-C, et al. [10] and Falebita et al. [11]. Aremu [12] and Maketo et al. [13] further highlighted that mobile learning enhances students' commitment, provides motivating learning experiences, and accommodates multiple learning activities, including revision and self-paced study. These advantages make mobile learning an appealing option for distance learners seeking flexibility, comfort, and meaningful engagement with their studies.

The attractiveness of mobile learning has also led to increased access to mobile devices among students, further supporting its integration into distance education [14, 15]. However, challenges persist in the Nigerian context, including the cost of acquiring devices, unreliable internet connectivity, and limited parental involvement. While distance learning is not limited to employed adults [2, 16] and some learners are unable to gain admission into conventional tertiary institutions due to space and time constraints [17], many young adults, including those dependent on parental support, now participate in distance learning. This underscores the need to examine factors influencing mobile learning, particularly the role of parental involvement in supporting learners who are still dependent on their families.

Given the growing adoption of mobile learning and its potential to transform distance education, it is essential to promote its effective use among students. Despite its importance, research on parental involvement in mobile learning experiences for distance learners remains scarce. Therefore, investigating how parental involvement influences the utilization of mobile learning is necessary to enhance learning outcomes and support educational equity.

2. Literature Review

2.1. Parental Involvement

Parental involvement, which encompasses paying school fees and providing and acquiring educational resources for learners, enables meaningful learning. Manalo et al. [18] opined that parental involvement in students' education helps students build knowledge, achieve the stipulated learning outcomes, be punctual in school, demonstrate competencies, show better performance, and meaningfully adjust in class. This indicates that parental involvement in learners' instructional experiences applies to learners' physiological needs, intellectual needs, intermediation with school, preparedness, and presence in the learning environment. Parental involvement refers to parents' participation in meetings that affect students, their financial and material contributions to learning activities, the supervision of students' academic standing, and the encouragement of discipline in students. Buno and Callo [19]. Eden et al. [20] considered that parental involvement in a child's activities at home, at school, and in society functions as a channel for all-around improvement in the child's life. In fact, the involvement of parents in a child's educational experience fosters a sense of belonging, easy integration into society, and reverence for societal and educational values.

Parental involvement can, in fact, lead to communal responsibility in educational reforms and the endorsement of equity in educational opportunities for citizens [20]. Studies have identified various benefits of parental involvement on students' social and academic well-being. Kantova [21] stated that

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parental involvement affects learners' academic prospects. Also, Lauricella and Cingel [22] conclude that parental involvement positively contributes to students' attitudes. In this present work, parental involvement is recognized as the supply of m-learning devices such as iPads, iPhones, tablets, laptops, and PDAs that are connected to the internet and provide other supports for effective learning experiences. Researchers such as Aremu and Adeoluwa [5], Dias and Victor [23], and Liu [24] have shown that m-learning classes typically require mobile electronic devices with internet access to support learning. Past researchers have examined the relationships among parental involvement, digital learning, online learning, and distance learning. One of these studies, carried out by Kiugu et al. [25], revealed that parental involvement and learners' preparations for digital learning are interconnected. This study, however, focuses on the influence of parental involvement and m-learning, which previous studies have not comprehensively explored.

2.2. Utilization of M-Learning

M-learning is rapidly gaining widespread acceptance, and it is quickly becoming an unavoidable channel for making learning experiences available worldwide. Unfortunately, some less developed countries are not keeping pace with the use of m-learning for academic purposes. Learners in these countries face challenges in acquiring the required mobile devices, inadequate funds for subscriptions, poor internet service, and incompetent instructors in m-learning [26]. These struggles may lead to absenteeism in class, insignificant student commitment to m-learning, and possibly restrict the implementation of m-learning in those countries. Nevertheless, the conventional mode of instructional delivery may not offer the learning experiences that m-learning channels can provide, and it might impair the learning experiences of many students in Nigeria, especially those in 21st-century distance education [27]. To reduce learners' struggles in less developed countries, all stakeholders in the industry need to be involved in decision-making, training, financing, and related activities.

Ayodele [17] also conducted a study on the application of m-learning in higher education in Kwara State. The study surveyed the opinions of 146 teachers and students from three schools in Kwara State, Nigeria. The study noted that m-learning is an essential instructional mechanism that is not limited by location. It was found in the study that both lecturers and students have diverse forms of devices for m-learning, but experience unstable internet services, which hamper the utilization of m-learning in Nigeria. The study finally concluded that stable internet services will promote the implementation of m-learning by teachers and students in Nigeria. However, not many studies have considered the factors that contribute to the utilization of m-learning, particularly in the context of distance learning in Nigeria.

Studies have shown that parental involvement can promote the guided use and accessibility of m-learning devices. The level of parental involvement influences how students use m-learning devices in the classroom. It is so critical for parents to support the availability of these m-learning devices for students [28]. This includes how they evaluate, commit to, and support the devices, as well as the devices' intended use in improving students' educational experiences [29, 30]. In the argument of Koch et al. [31], the ability to effectively utilize electronic devices for various educational activities in the 21st century is greatly influenced by parents, especially those who are technologically inclined and utilize various technological devices. There is broad awareness among parents in Nigeria about the advantages and disadvantages of m-learning [32]. Parental involvement in the adoption or utilization of m-learning influences students' attitudes [22]. However, no studies examine parental involvement in the utilization of m-learning in distance learning from the technology acceptance model perspective.

2.3. Theoretical Framework

The Technology Acceptance Model (TAM), established by Davis [33], provides a core framework for understanding how people learn to embrace and employ new technology. At its foundation, TAM

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claims that two major factors, perceived ease of use (PEU) and perceived usefulness (PU), substantially affect users' attitudes toward technology, which in turn affect their behavioral intentions and actual use [33]. This theory has been extensively employed across multiple areas to examine how individuals engage with technology resources. The degree to which a person thinks that utilizing a specific technology would be stress-free explains PEU, while PU is the degree to which a person feels that applying a given technology will boost their job performance or educational outcomes [34]. In m-learning, these components might play a key role in determining students' desire to utilize m-learning platforms. There are varied conclusions regarding the conceptions of TAM, attitudes, and the adoption of technology from diverse scholars. Other research has indicated that PEU impacts attitudes [34-37] while other studies have also shown that it does not substantially impact it [36]. Similarly, while some studies have revealed that PU substantially influences attitude or intention [34-37], some showed that it does not significantly influence it [38, 39]. In addition, research has shown that attitudes significantly influence user adoption [34, 36, 37]. Also, PEU significantly affects PU [34, 38]. In the context of m-learning, this study provides the interplay between parental involvement, the construct of TAM, attitude, and the use of m-learning among distance-learning students of higher education; we therefore propose that:

H_1: Attitude towards m-learning influences m-learning usage among distance-learning undergraduate students.

H_2: M-learning perceived ease of use influences attitude toward m-learning among distance-learning undergraduate students.

H_3: M-learning PEU influences m-learning PU among distance-learning undergraduate students.

H_4: M-learning PEU influences mobile-learning usage among distance-learning undergraduate students.

H_5: M-learning PU influences attitude towards m-learning among distance-learning undergraduate students.

H_6: M-learning PU influences mobile-learning usage among distance-learning undergraduate students

H_7: Parental involvement in communication influences the attitude towards m-learning among distance-learning undergraduate students

H_8: Parental involvement in communication influences m-learning PEU among distance-learning undergraduate students,

H_9: Parental involvement in communication influences m-learning PU among distance-learning undergraduate students

H_{10}: Parental involvement in decision-making influences attitude towards m-learning among distance-learning undergraduate students

H_{11}: Parental involvement in decision-making influences m-learning PEU among distance-learning undergraduate students

H_{12}: Parental involvement in decision-making influences m-learning PU among distance-learning undergraduate students

H_{13}: Parental involvement in home learning influences attitude towards m-learning among distance-learning undergraduate students

H_{14}: Parental involvement in home learning influences m-learning PEU among distance-learning undergraduate students

H_{15}: Parental involvement in home learning influences m-learning's PU among distance-learning undergraduate students.

3. Methodology

In this quantitative study, our focus is on parental involvement in the utilization of M-learning among distance-learning students. We adopted a descriptive survey design for the study to help gain access to several participants, which could enable the generalization of the study's findings. Specifically, we sampled the opinions of 676 students attending institutions that provide distance education in southwestern Nigeria. Three institutions offering distance education in Southwestern Nigeria were

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purposively selected: the University of Ibadan, Oyo State; Federal University Oye-Ekiti, Ekiti State; and Obafemi Awolowo University, Ile–Ife, Osun State. To enhance response rates and reduce nonresponse bias, the authors employed convenience sampling via personal WhatsApp and snowball sampling by encouraging known individuals associated with the population to share the questionnaire link within their networks. This set of students carries out their academic activities online without necessarily having physical contact with lecturers and classmates. With the M-learning system, students can have virtual contact with educators, classmates, learning materials, and assessment tasks at their convenience from anywhere, provided they have internet connectivity. Table 1 indicates that 58.58% of respondents are male, while 41.42% are female, suggesting that most of the respondents are male. Also, most respondents, representing 39.05%, were in the 20–24-year age bracket, which affirms them as digital natives [40]. Additionally, most respondents, representing 33.73%, are in the second year of their academic program. With the indicators associated with our focal variable being four, the study established a required sample size of over 40 participants for PLS-SEM analysis based on the ten-times rule, which suggests that the sample must exceed ten times the number of paths to the most complex variable, ensuring sufficient statistical power and significance [41].

3.1. Instrumentation

The online questionnaire consists of two sections. The first section requests the demographic information of the respondents, while the second section comprises items on parental involvement and the utilization of m-learning devices. This section includes seven constructs, each with three items. The constructs of the instruments, Parental Involvement in Decision Making (PIDM), Parental Involvement in Communication (PIC), Parental Involvement in Home Learning (PIHL), m-Learning Perceived Usefulness (MLPU), m-Learning Perceived Ease of Use (MLPEU), Attitude towards m-Learning (ATML), and m-Learning Usage (MLU), were adapted from existing instruments. These items were rated using a 4-point Likert-type scale from strongly agree to strongly disagree. The items of MLPU, MLPEU, ATML, and MLU were adapted from Falebita and Kok [34], which focuses on artificial intelligence tools; the items were restructured to fit this study's context. In their study, the MLPU, MLPEU, ATML, and MLU constructs demonstrated reliability coefficients of 0.834, 0.853, 0.838, and 0.870, respectively. Additionally, the items of PIDM, PIC, and PIHL were adapted from the Turkish parental involvement scale developed and validated by Gürbüztürk and Şad [42], with a reliability coefficient of 0.929. The items relevant to this study were modified and contextualized accordingly.

3.2. Data Analysis

Owing to its flexibility with data that may not follow a normal distribution and its need for small sample sizes, PLS-SEM was used for data analysis [43]. In this work, PLS-SEM was employed for various purposes using SmartPLS 4 software [44]. Analyzing complex models, like the one in this study with seven variables and many paths, PLS-SEM is efficient. It is commonly used in higher education research and is suitable for estimating behavioral variables. Additionally, this approach allows for explaining variances in research designs. The study comprised two key phases: the structural model, which examines relationships among variables, and the measurement model, which assesses the validity and reliability of the constructs [45].

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Table 1.
Characteristics of Respondents.

Characteristics	Level	N	%
Gender	Male	396	58.58
	Female	280	41.42
Age	20 – 24years	264	39.05
	25 – 28years	176	26.04
	29 – 32years	168	24.85
	Above 32years	68	10.06
Level	100L	92	13.61
	200L	228	33.73
	300L	76	11.24
	400L	128	18.93
	500L	152	22.49
	Total	**676**	**100.0**

4. Results

4.1. Measurement Model Assessment

In PLS-SEM, the first phase assesses the outer model, also known as the measurement model, which analyzes the reliability and validity of the proposed constructs before proceeding to the inner model, also called the structural model, where hypotheses are tested. To pass this evaluation, two reliability requirements and two validity conditions must be met. The two prerequisites for reliability are internal consistency and indicator reliability. As suggested by Hair Jr et al. [46], items with loading values less than 0.7 were not considered in the analysis. One item of the MLPU construct with an outer loading of 0.573 and one item of the PIHL construct with an outer loading of 0.596 were removed. Table 2 and Figure 1 show that the outer loading ranges from 0.718 to 0.886. This approach ensured that indicator reliability was achieved, enabling further analysis with only those items that passed the threshold. Also, all items' VIF values were below 5, ranging from 1.353 to 2.101, indicating no collinearity among the items. The internal consistency was then examined to ensure that respondents consistently understood the scales. This was done by calculating composite reliability (CR) and Cronbach's alpha (CA), with all values above 0.7, showing that the items adequately assessed their respective constructs. The CR values range from 0.706 to 0.842, while the CA values range from 0.706 to 0.838.

Regarding validity, both convergent validity and discriminant validity were tested. The Average Variance Extracted (AVE) for all constructs exceeded the permissible limit of 0.5, indicating high convergent validity [47]. This signifies that the items for each variable explained over 50% of the variation associated with that variable. The AVE values for the constructs in this study range from 0.632 to 0.773. Discriminant validity was examined using the Fornell and Larcker method. The Fornell and Larcker test proved discriminant validity as the square root of the AVE for each construct was larger than the correlations with other components, as shown in Table 3 [48]. In general, the measurement model assessment shows that the constructs are reliable and valid, which then provides an avenue for the structural model assessment.

4.2. Assessment of the Structural Model

Several criteria were used to examine the structural model; these include collinearity among constructs (measured by VIF), path coefficients (β & p), R^2 values for endogenous variables, and predictive relevance (Q^2). Collinearity issues were evaluated using VIF, where values above 5.0 indicate potential problems [49]. In this study, all VIF values for the constructs are below 5.0, ranging from 1.778 to 4.851, indicating no collinearity among the latent variables. The examination of path coefficients and their significance, as shown in Table 5, indicated that out of 15 hypotheses analyzed, 10 were accepted, and five were rejected. The criteria for rejection included p-values greater than 0.05 and t-values below 1.96, consistent with established statistical standards. The results of the path coefficient analysis for the sample are shown in Figures 1 and Table 4. The path sizes ATML → MLU, MLPEU

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→ ATML, MLPEU → MLPU, MLPEU → MLU, MLPU → ATML, MLPU → MLU, PIC → MLPEU, PIC → MLPU, PIDM → ATML, PIDM → MLPEU, and PIDM → MLPU show positive and significant relationships at the 0.05 level of significance. Therefore, this supports hypotheses H1 to H4, H6, and H8 to H12. Meanwhile, the path coefficients PIC → ATML, PIHL → ATML, PIHL → MLPEU, PIHL → MLPU show a positive but not significant relationship at the 0.05 level of significance. The results indicate that attitude towards m-learning influences mobile-learning usage (β = 0.247; p = 0.010) among undergraduates. Also, m-learning PEU influences attitudes towards m-learning (β=0.364; p=0.000), m-learning PU (β=0.376; p=0.000), and mobile-learning usage (β=0.233; p=0.023) among distance-learning undergraduate students. In addition, m-learning PU influences mobile-learning usage (β=0.302; p=0.001) but does not influence attitude towards m-learning (β=0.041; p=0.617). Additionally, parental involvement in communication influences m-learning PEU (β=0.661; p=0.000) and m-learning PU (β=0.377; p=0.000) but does not influence the attitude towards m-learning (β=0.119; p=0.344). Also, parental involvement in decision-making influences attitudes towards m-learning (β=0.300; p=0.001), m-learning PEU (β=0.177; p=0.032), and m-learning PU (β=0.153; p=0.046) among undergraduate students in distance-learning programs. However, parental involvement in home learning does not influence attitudes towards m-learning (β=0.080; p=0.197), m-learning PEU (β=0.036; p=0.496), or m-learning PU (β=0.002; p=0.976) among distance-learning undergraduate students.

To assess the model's explanatory capacity, R^2 values were obtained. R^2 reflects the strength of associations in the model, with thresholds $R^2 \geq 0.19$ considered weak, $R^2 \geq 0.33$ as moderate, and $R^2 \geq 0.67$ considered strong explanatory power [50]. In this research, R^2 values for ATML (0.668), MLPEU (0.701), and MLPU (0.725) suggested strong explanatory power, while MLU (0.513) indicated moderate explanatory power. The Q^2 values were computed to assess the model's predictive relevance, with values greater than zero indicating sufficient predictive power [51, 52]. The Q^2 values for the endogenous variables ATML, MLPEU, MLPU, and MLU were 0.608, 0.691, 0.666, and 0.471, respectively, all larger than zero. This indicates that, for ATML, the model has good predictive relevance; for MLPEU and MLPU, both values demonstrate strong predictive relevance, suggesting the model effectively forecasts outcomes for these constructs. For MLU, the value indicates relatively lower predictive relevance, hinting at potential areas for improvement. As shown in Table 6, the RMSE and MAE values indicate that prediction accuracy varies among the constructs, with MLPEU showing the best accuracy (RMSE: 0.563, MAE: 0.410), while MLU exhibits the highest prediction errors (RMSE: 0.737, MAE: 0.596). This suggests the model may need refinement by considering other factors influencing MLU. Overall, ATML and MLPU show moderate prediction accuracy, indicating areas for potential improvement.

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Table 2.
Measurement Model Assessment Results.

Construct	Indicator	Outer Loading	VIF	AVE	CR	CA
Attitude towards m-learning (ATML)	ATML1	0.886	2.101	0.755	0.842	0.838
	ATML2	0.860	2.009			
	ATML3	0.861	1.838			
M-learning Perceived Ease of Use (MLPEU)	MLPEU1	0.866	1.750	0.702	0.795	0.788
	MLPEU2	0.844	1.760			
	MLPEU3	0.803	1.521			
M-learning Perceived Usefulness (MLPU)	MLPU2	0.878	2.092	0.737	0.822	0.822
	MLPU3	0.836	1.683			
	MLPU4	0.863	1.900			
M-learning Usage (MLU)	MLU1	0.718	1.353	0.632	0.735	0.711
	MLU2	0.856	1.553			
	MLU3	0.804	1.360			
Parental Involvement in Communication (PIC)	PIC1	0.897	1.971	0.694	0.802	0.779
	PIC2	0.819	1.711			
	PIC3	0.779	1.456			
Parental Involvement in Decision Making (PIDM)	PIDM1	0.859	1.914	0.731	0.818	0.816
	PIDM2	0.838	1.677			
	PIDM3	0.868	1.892			
Parental Involvement in Home Learning (PIHL)	PIHL1	0.879	1.425	0.773	0.706	0.706
	PIHL2	0.879	1.425			

Table 3.
Discriminant Validity.

Constructs	Fornell-Larcker Criterion						
	ATML	MLPEU	MLPU	MLU	PIC	PIDM	PIHL
ATML	(0.869)						
MLPEU	0.765	(0.838)					
MLPU	0.699	0.804	(0.859)				
MLU	0.637	0.665	0.662	(0.795)			
PIC	0.753	0.830	0.817	0.690	(0.833)		
PIDM	0.751	0.747	0.746	0.646	0.827	(0.855)	
PIHL	0.574	0.567	0.550	0.374	0.634	0.631	(0.879)

Table 4.
Assessment of Structural Model Results.

Path	B	VIF	t-value	p-value
ATML → MLU	0.247	2.532	2.584	0.010
MLPEU → ATML	0.364	3.864	3.625	0.000
MLPEU → MLPU	0.376	3.348	4.766	0.000
MLPEU → MLU	0.233	3.666	2.280	0.023
MLPU → ATML	0.041	3.640	0.500	0.617
MLPU → MLU	0.302	2.971	3.278	0.001
PIC → ATML	0.119	4.368	0.946	0.344
PIC → MLPEU	0.661	3.390	8.118	0.000
PIC → MLPU	0.377	4.851	3.929	0.000
PIDM → ATML	0.300	3.562	3.481	0.001
PIDM → MLPEU	0.177	3.372	2.150	0.032
PIDM → MLPU	0.153	3.477	1.993	0.046
PIHL → ATML	0.080	1.783	1.289	0.197
PIHL → MLPEU	0.036	1.778	0.681	0.496
PIHL → MLPU	0.002	1.783	0.028	0.978

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Table 5.
Hypotheses Result Summary.

H No.	Hypothesis	Decision
H1	Attitude towards m-learning influences m-learning usage among distance learning undergraduate students.	S
H2	m-learning PEU influences attitudes towards m-learning among distance-learning undergraduate students.	S
H3	m-learning PEU influences m-learning PU among distance learning undergraduate students.	S
H4	m-learning PEU influences mobile-learning usage among distance-learning undergraduate students.	S
H5	m-learning PU influences attitudes towards m-learning among distance-learning undergraduate students.	NS
H6	m-learning PU influences mobile-learning usage among distance-learning undergraduate students	S
H7	Parental involvement in communication influences the attitude towards m-learning among distance learning undergraduate students	NS
H8	Parental involvement in communication influences m-learning PEU among distance-learning undergraduate students,	S
H9	Parental involvement in communication influences m-learning PU among distance-learning undergraduate students	S
H10	Parental involvement in decision-making influences attitude towards m-learning among distance learning undergraduate students	S
H11	Parental involvement in decision-making influences m-learning PEU among distance-learning undergraduate students	S
H12	Parental involvement in decision-making influences m-learning PU among distance-learning undergraduate students	S
H13	Parental involvement in home learning influences attitude towards m-learning among distance learning undergraduate students	NS
H14	Parental involvement in home learning influences m-learning PEU among distance-learning undergraduate students	NS
H15	Parental involvement in home learning influences PU of m-learning among distance-learning undergraduate students.	NS

Note: S=Supported; NS=Not Supported.

Table 6.
PLS Predict Assessment Summary.

Construct	R^2	Q^2predict	RMSE	MAE
ATML	0.668	0.608	0.632	0.485
MLPEU	0.701	0.691	0.563	0.410
MLPU	0.725	0.666	0.583	0.462
MLU	0.513	0.471	0.737	0.596

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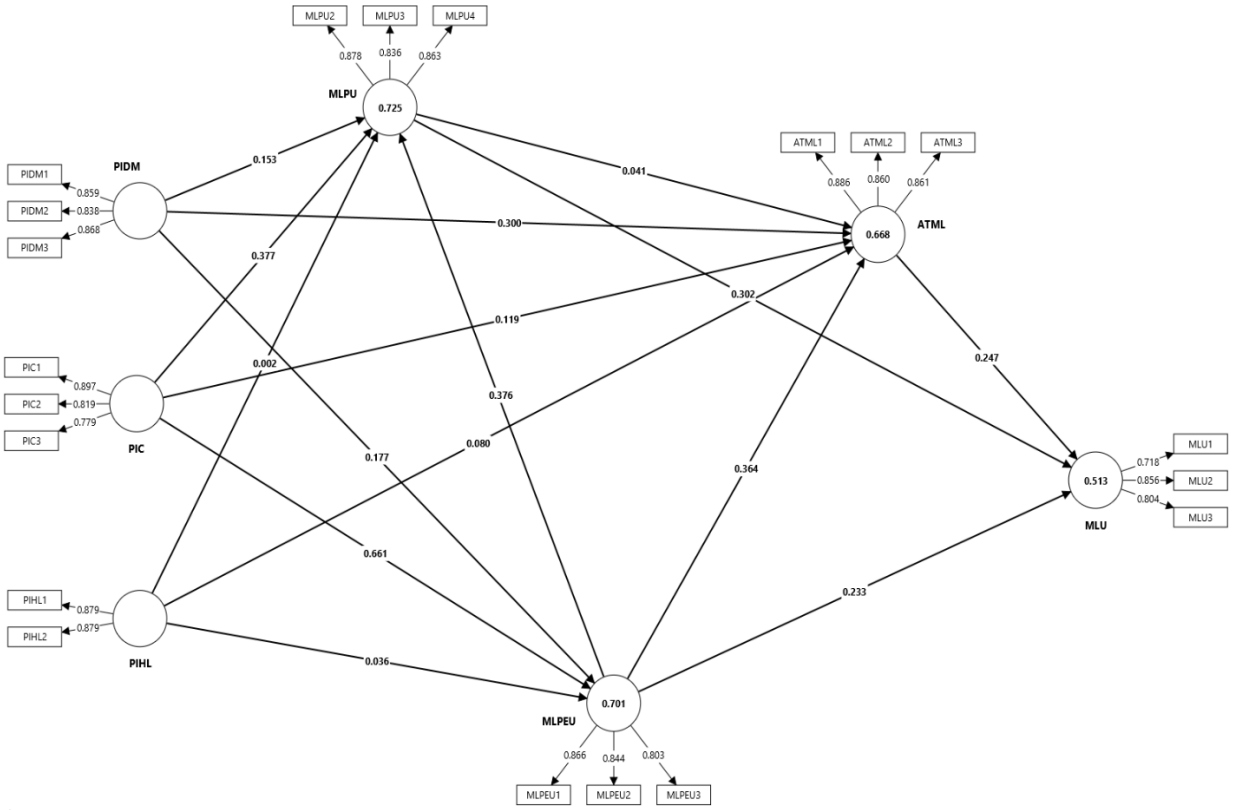

Figure 1.
Structural Model of Parental Involvement and m-Learning Adoption.

5. Discussion and Implications

Distance learning provides access to education without geographical barriers or the need to be physically present in the classroom. With the flexibility to learn while working or around personal schedules, mobile learning makes distance education achievable. The study results acknowledge the influence of both attitudes and parental involvement in the utilization of m-learning among distance-learning undergraduate students. The study found that attitude towards m-learning influences the actual usage of m-learning among undergraduates. This finding aligns with Gunawan et al. [36] and Nuryakin et al. [37], who both agreed that attitudes towards a given technology influence its actual use, especially in educational settings. The influence of attitude towards m-learning on its utilization signifies the need to develop a positive perspective among students. This finding suggests that when students have a positive attitude towards m-learning, they are more likely to interact with it actively. It alludes to the importance of educational institutions developing environments that foster positive experiences with m-learning devices, especially through directed training, seminars, or introductory sessions that emphasize the advantages and ease of use.

Moreover, this study demonstrates that m-learning PEU influences attitude towards m-learning, aligning with the findings of Kim et al. [38] and Elkaseh et al. [35], who both emphasize that user-friendly interfaces and intuitive design enhance individual positive perceptions and willingness to engage with the platforms. Also, the finding from this study shows that m-learning PEU influences its PU, which supports Falebita and Kok [34] and Kim et al. [38], who both assert that when individuals find a given technology easy to navigate, they are more likely to recognize its value and effectiveness in enhancing their experience. In addition, this study shows that m-learning PEU influences m-learning usage among distance-learning undergraduate students. This is consistent with the findings of Gunawan et al. [36], which highlight that user-friendly platforms encourage greater engagement and

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utilization by individuals, ultimately enhancing their experiences. These findings emphasize an important factor: if students find m-learning tools straightforward and user-friendly, they are more likely to acquire a positive attitude and recognize their value. This connection indicates the necessity for developers and educators to consider user experience in the development and adoption of m-learning apps. Simplifying interfaces, offering clear instructions, and guaranteeing technical assistance may increase students' perceptions, eventually generating better engagement levels.

In addition, the study reveals that m-learning PU influences m-learning usage, a finding that resonates with the research of Gunawan et al. [36], Falebita and Kok [34], and Nuryakin et al. [37], which all emphasize that individuals are more likely to engage with platforms they believe will enhance their educational outcomes and overall experience. However, m-learning PU was found not to influence attitudes towards it, aligning with the findings of Kim et al. [38] and Moses et al. [39], suggesting that other factors may play a more significant role in shaping attitudes. Yet, this result contradicts the conclusions of Gunawan et al. [36] and Nuryakin et al. [37], who reported a positive correlation between PU and attitudes toward technology usage. These findings indicate that although PU increases m-learning utilization, it does not change attitudes towards m-learning. As crucial as this difference is, it suggests that even if students grasp the practical advantages of m-learning, this awareness does not always translate into a more positive attitude. Educators could examine measures to bridge this gap by incorporating real-life applications of m-learning into the curriculum, thereby helping students realize the relevance and influence on their academic progress.

Additionally, the results show that parental involvement in communication influences m-learning PEU and m-learning PU, but not attitude towards m-learning. This finding suggests that while parental support may enhance how students perceive and utilize m-learning tools, it does not necessarily shape their attitudes, which contrasts with Kantova [21], who argued that meaningful parental involvement enhances learners' academic prospects, and Eden, et al. [20] who highlighted that such involvement reinforces learning activities both within and outside school settings in Nigeria. The favorable influence of parental involvement in communication on both PEU and PU implies that when parents interact with their children about m-learning, it promotes the students' knowledge and adoption of these technologies. This association underscores the idea that active family involvement may improve children's educational experiences, indicating that schools can benefit from increasing parental participation through instructional sessions or tools that help families understand m-learning platforms. Conversely, the absence of substantial influence of parental involvement in home learning on attitudes and perceptions of m-learning presents a promising area for further investigation. It raises issues about how home surroundings might effectively facilitate m-learning. It may be that parental involvement in home learning has to be more organized or concentrated on having a quantifiable influence.

Furthermore, the study's findings show that parental involvement in decision-making influences attitudes towards m-learning, m-learning PEU, and m-learning PU among undergraduate students in distance-learning programs. This aligns with Aleksandraki and Zaranis [29], who noted that parental involvement impacts learners' use of mobile learning devices through their examination, commitment, support, and the intended purpose of these devices in enhancing educational experiences. Additionally, this is supported by Koch et al. [31], who found that students' ability to utilize 21st-century electronic devices effectively is primarily shaped by parental influence. This suggests that when parents are engaged in educational decisions, their children may feel more supported and competent in utilizing m-learning tools. Schools might nurture this participation by providing parents with information on how to support their children's successful engagement with m-learning technology.

Also, this study's findings reveal that parental involvement in home learning does not influence attitudes towards m-learning, m-learning PEU, and m-learning PU among distance-learning undergraduate students. This contrasts with Lauricella and Cingel [22], who argued that parental involvement positively affects attitudes towards various learning devices. This discrepancy raises questions about the dynamics of parental engagement, especially given that Poudel and Subedi [28] emphasized the importance of parental support in providing necessary learning tools. Furthermore,

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while parents in Nigeria are generally informed about the benefits and drawbacks of m-learning, Adigwe and van der Walt [32]. Boonk et al. [30] highlighted that effective utilization of m-learning often relies on parental assistance and encouragement, suggesting that the nature of parental involvement may need further exploration to understand its impact on m-learning outcomes. The lack of influence from parental involvement in m-learning suggests that parents may not actively engage with their children's educational experiences, possibly believing that, as young adults, students can manage their learning independently. While fostering autonomy is essential, this hands-off approach may lead to missed opportunities for meaningful engagement with m-learning tools. Parents could enhance their children's perceptions of m-learning by maintaining open communication about educational goals and discussing the value of these technologies. Providing parents with resources or workshops on supporting their children's learning effectively could empower them to play a more constructive role. This balanced approach would encourage student independence while reinforcing the critical support needed to improve attitudes and engagement in m-learning, ultimately benefiting distance-learning undergraduate students.

6. Conclusion

Distance education in Nigeria offers unique learning possibilities that must be seized at the individual level to overcome the barrier of physical presence. For different reasons, young undergraduate students use the platform when their parents support them. At that time, however, the parents appear to be unconcerned about how they are engaged in the learning process during distance education. The study analyzes the relationship between parental involvement and the utilization of m-learning platforms in distance education. The conclusions of the study indicate that the way distance-learning undergraduate students view m-learning significantly affects m-learning usage, and that this, in turn, is positively related to m-learning usage. Additionally, it is concluded that m-learning PEU significantly affects students' attitudes towards m-learning, m-learning PU, and their m-learning usage as distance-learning undergraduates. Similarly, m-learning PU has a significant influence on m-learning usage, but not on attitudes towards m-learning among distance-learning undergraduates.

The study also investigates parental involvement at three levels: communication, decision-making, and home learning. Therefore, this study asserts that parental involvement in communication has a substantial effect on the m-learning PEU and m-learning PU among distance-learning undergraduate students. Nevertheless, parental involvement in communication does not significantly affect the attitude of distance-learning undergraduate students towards m-learning. Moreover, the attitudes of undergraduate students toward m-learning, m-learning PEU, and m-learning PU are also significantly influenced by parental involvement in decision-making. Regarding parental involvement in home learning, it does not significantly influence attitudes toward m-learning, PEU, and PU among distance-learning undergraduate students.

Educational institutions should initiate strategies to promote and facilitate open communication between parents and students about m-learning technologies to enhance the efficacy of parental involvement in supporting distance learning for undergraduate students. Organizing seminars or workshops by the institution or other stakeholders to educate parents about the benefits and aspects of m-learning will assist parents in participating and holding conversations with children more effectively. Secondly, schools should also involve parents in their children's education, making them feel part of the process and consequently improving feelings of cooperation and mutual responsibility. Also, strategies and resources should be provided to enable parents to establish appropriate home learning environments that foster positive attitudes towards m-learning, ensuring that all elements of parental involvement are aligned to support student achievement.

6.1. Limitations and Future Research

Some observed limitations require further research. The study essentially focuses on undergraduate students in distance learning, which may limit the generalizability of the results to other forms of

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education, such as conventional on-campus learning, as well as to non-undergraduate groups. Therefore, future studies should examine m-learning across various educational environments, such as conventional classroom settings and at different educational levels. In addition, the research did not examine the possible effects of other characteristics, such as cultural background, socioeconomic status, or prior experience with technology, which might affect students' involvement in m-learning. It may also be helpful to investigate how these other variables are involved to better understand the dynamics at work. Furthermore, this study is quantitative and may not provide explanatory information on how parental involvement affects m-learning usage among undergraduates. As such, future research investigating the nature of parental involvement and its implications for students' m-learning experiences should be conducted using qualitative research approaches, such as interviews or focus groups. Finally, results regarding parental participation, especially in home learning, reveal a possible gap in understanding the unique nature and context of parental engagement, which warrants further research. Thus, future research should examine effective methods for increasing parental involvement in m-learning to provide insights that inform educators and institutions on how to facilitate students' learning journeys.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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