GOVERNMENT DIGITAL LITERACY PROGRAMMES AND THE DEVELOPMENT OF INDIGENOUS SOFTWARE APPLICATION IN NIGERIA

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Abstract

This study examined Government-National Information Technology Development Agency (NITDA) digital literacy programmes and the development of indigenous software applications as a strategic pathway for open and distance learning (ODL) institutions in Nigeria. The study was anchored on Technology Acceptance Theory and the Diffusion of Innovation Theory. A survey research design complemented by documentary analysis was adopted. The target population comprised 4,762 participants drawn from ODL administrators, academic staff, learning-management support staff, instructional designers, software developers, and digitally trained learners. Using the Krejcie and Morgan sample size approach, a sample of 357 was determined, while 314 completed questionnaires were returned and analysed. Data were collected with a structured five-point Likert questionnaire and analysed using descriptive statistics and multiple linear regression at the 5% level of significance. The findings indicated that digital literacy training, government policy support, and NITDA strategic partnerships had positive and statistically significant effects on indigenous software application development for ODL institutions. The model explained 62.4% of the variance in indigenous software application development, indicating that coordinated literacy, policy and partnership interventions can improve local application design, adoption, accessibility and sustainability. The study concluded that NITDA-led digital literacy programmes provide a practical foundation for strengthening local software capacity in Nigerian ODL institutions. It recommended deeper integration of digital literacy curricula, structured innovation grants, university-industry software laboratories, and national standards for accessible ODL platforms. The contribution of the study lies in linking national digital literacy policy to indigenous software production, thereby extending debates on digital transformation beyond user competence to local technological capability and educational sovereignty.

Keywords: Digital literacy; NITDA; indigenous software; open and distance learning; software application; Nigeria.

1. Introduction

1.1 Background to the Study

The rapid expansion of digital public services, online education and knowledge-economy work has made digital literacy a core requirement for institutional survival, innovation and inclusive national development. Digital literacy is no longer limited to the ability to operate a computer; it includes information search, communication, collaboration, safety, problem solving, digital content creation and the capacity to use technology to solve local problems (Ng, 2012; van Deursen & van Dijk, 2014). In Nigeria, this understanding has shaped government interest in broad-based digital skills programmes because digitally literate citizens, civil servants, teachers and students are more likely to adopt online platforms, demand better applications and participate in local innovation ecosystems (NITDA, 2023; UNESCO, 2022). For open and distance learning institutions, the issue is particularly important because their teaching, assessment, counselling, records and learner support processes depend heavily on software applications and reliable digital interaction.

Government support through the National Information Technology Development Agency has become central to the national digital literacy agenda. NITDA's National Digital Literacy Framework identifies competence areas and implementation pathways for a mobile-first Nigerian society, while the Digital Literacy for All initiative aims to expand practical digital competence across public, private and educational sectors (NITDA, 2023, 2026). The agency's strategic roadmap also emphasises digital literacy, talent development, standards, partnerships and innovation as pillars for building a productive digital economy (NITDA, 2024). These priorities are relevant to ODL institutions because the quality of distance education depends not only on internet access, but also on the capacity of staff and learners to use digital tools, evaluate information, develop content, protect data, and request applications that respond to local educational realities.

Open and distance learning institutions in Nigeria face a distinctive software challenge. Many platforms used for learning management, e-assessment, student records and online facilitation are either imported, externally hosted, or locally customised with limited long-term institutional ownership. This creates concerns about cost, sustainability, language localisation, data protection, user support and responsiveness to Nigerian pedagogical contexts (Itasanmi, 2023; Oye et al., 2012). Indigenous software application development therefore means more than writing code locally. It refers to the capacity to design, adapt, deploy and maintain applications that reflect Nigerian curriculum needs, learner diversity, bandwidth constraints, mobile access patterns, accessibility requirements and institutional data governance expectations. Such applications include learning management systems, offline-enabled course apps, e-examination platforms, student support ticketing tools, plagiarism systems, payment interfaces, mobile dashboards and analytics-enabled administration portals.

Digital literacy programmes can influence indigenous software development in at least three ways. First, they increase the ability of users to identify functional gaps and communicate software requirements. Second, they strengthen the skills pipeline from basic usage to coding, data analytics, cybersecurity and product management. Third, they create demand for locally relevant applications that can be tested within public institutions and improved through feedback loops (Davis, 1989; Rogers, 2003; Venkatesh et al., 2003). In the ODL environment, digitally competent students and staff are more likely to use platforms consistently, report usability problems, adopt new features and support institutional digital transformation. This suggests that digital literacy is both a user-adoption variable and an innovation-capability variable.

The strategic pathway proposed in this study is that government and NITDA digital literacy programmes can be deliberately linked to the development of indigenous software applications for ODL institutions. This requires a movement from training people merely to use generic tools toward training them to participate in requirements analysis, prototyping, testing, localisation and maintenance of educational software. When digital literacy is aligned with government policy support, NITDA partnerships, university software laboratories and local technology firms, ODL institutions can become sites of applied innovation rather than passive consumers of foreign platforms (DeLone & McLean, 2003; Nambisan et al., 2017). This study therefore examines how digital literacy training, government policy support and NITDA strategic partnerships affect the development of indigenous software applications in Nigerian ODL institutions.

Statement of the Problem: This study was necessitated due to persistent gaps in digital competence, locally responsive software design, institutional software ownership and sustainable ODL technology deployment in Nigeria. Although ODL institutions depend on digital platforms for admission, course delivery, facilitation, assessment, payment, student support and records, many institutional applications

still operate as fragmented tools rather than integrated indigenous systems designed around Nigerian users. Studies on technology acceptance show that usefulness, ease of use, facilitating conditions and user confidence shape adoption outcomes (Davis, 1989; Venkatesh et al., 2003). In ODL settings, weak digital literacy among learners and staff can reduce platform utilisation, limit feedback on software quality, and weaken the demand for locally developed solutions (Itasanmi, 2023).

The problem is also institutional and policy-related. NITDA has introduced frameworks and programmes to improve national digital literacy and promote a digital economy, but the translation of these programmes into indigenous software application development for ODL institutions remains insufficiently studied. The National Digital Literacy Framework provides competence areas for citizens and institutions, yet many ODL technology needs require advanced local capability in software engineering, data security, accessibility, learner analytics and multilingual design (NITDA, 2023; UNESCO, 2022). Without deliberate linkage between training, policy incentives and software innovation, digital literacy may improve basic tool usage without producing durable local platforms.

Another concern is the dominance of imported or externally controlled software in higher education technology ecosystems. Such dependence can increase licensing costs, expose institutions to vendor lock-in, weaken data sovereignty, and limit rapid localisation for students in rural, low-bandwidth and mobile-first environments (DeLone & McLean, 2003; Nambisan et al., 2017). This is problematic for Nigeria because ODL institutions serve large and diverse student populations who require affordable, accessible and culturally relevant digital learning systems. Therefore, the study was conducted to ascertain the extent to which digital literacy training, government policy support and NITDA strategic partnerships address these challenges and contribute to the development of indigenous software applications for ODL institutions in Nigeria.

The broad objective of the study is to examine the effect of government and NITDA digital literacy programmes on the development of indigenous software applications for open and distance learning institutions in Nigeria. The specific objectives are to: examine the effect of digital literacy training on indigenous software application development; determine the effect of government policy support on indigenous software application development; and assess the effect of NITDA strategic partnerships on indigenous software application development.

The following hypotheses were drafted to guide the study: H_{01}: Digital literacy training has no significant effect on indigenous software application development in ODL institutions in Nigeria. H_{02}: Government policy support has no significant effect on indigenous software application development in ODL institutions in Nigeria. H_{03}: NITDA strategic partnerships have no significant effect on indigenous software application development in ODL institutions in Nigeria.

2. Literature Review

Government and NITDA Digital Literacy Programmes

Government and NITDA digital literacy programmes refer to policy, training, standards, partnerships and capacity-building interventions designed to improve the digital competence of citizens, workers, students and institutions. In the Nigerian context, the National Digital Literacy Framework and Digital Literacy for All initiative provide the conceptual and operational basis for mass digital capability development (NITDA, 2023, 2026). Digital literacy includes technical, cognitive and socio-emotional abilities needed to use technologies safely and productively (Ng, 2012). It also includes the capacity to evaluate information, communicate through digital channels, create content and solve problems within digital environments (van Deursen & van Dijk, 2014).

For this study, three dimensions of the independent variable were used. Digital literacy training covers practical competence in digital tools, platform use, online communication, cybersecurity awareness, basic coding logic and digital content creation. Government policy support includes regulation, standards, funding, incentives, public procurement rules, curriculum guidance and innovation-friendly institutional policies. NITDA strategic partnerships refer to collaborations with ODL institutions, software firms, technology hubs, professional bodies and development partners to build capacity, test applications, support incubation and scale locally developed digital solutions. These dimensions reflect the argument that digital transformation requires individual skills, organisational support and ecosystem coordination (Nambisan et al., 2017; Vial, 2019).

Development of Indigenous Software Application

Development of indigenous software application refers to the local design, coding, customisation, deployment, support and continuous improvement of software products that respond to Nigerian institutional, cultural, linguistic, regulatory and educational contexts. In ODL institutions, indigenous software applications may include learning management systems, e-examination engines, learner-support chatbots, records portals, mobile learning applications, data dashboards and offline-enabled courseware. The value of indigenous applications is that they can be adapted to local network conditions, mobile device usage, payment systems, accessibility needs, data protection requirements and educational administration practices (DeLone & McLean, 2003; Oye et al., 2012).

Software application development is treated here as an institutional development outcome because it reflects technological self-reliance, cost control, platform responsiveness and national digital capability. Successful applications require user participation, technical competence, maintenance funding and trust. Therefore, local software development cannot be separated from digital literacy. Users who understand digital systems can explain needs, identify defects, participate in usability testing and support adoption after deployment (Davis, 1989; Venkatesh et al., 2003). In ODL institutions, where students are dispersed and services are mediated by technology, software success depends on both technical design and user readiness.

Theoretical Framework

This study was anchored on Technology Acceptance Theory and the Diffusion of Innovation Theory. Technology Acceptance Theory, developed by Davis (1989), explains that perceived usefulness and perceived ease of use influence users' intention to accept and use information systems. The theory is suitable for the present study because digital literacy training can improve perceived ease of use, while locally relevant software can improve perceived usefulness. When ODL staff and learners are trained to use, assess and contribute to digital platforms, they are more likely to accept indigenous applications that respond to their academic and administrative needs.

Diffusion of Innovation Theory, developed by Rogers (2003), explains how innovations spread through a social system over time. The theory identifies relative advantage, compatibility, complexity, trialability and observability as key factors affecting adoption. It is relevant because indigenous software applications for ODL institutions must be compatible with learner realities, demonstrably useful, easy to test and visible in institutional outcomes. NITDA strategic partnerships can function as diffusion channels by linking government, ODL institutions, developers and users. The combined theoretical position of the study is that digital literacy programmes improve user readiness, while government support and partnerships reduce adoption barriers and accelerate the diffusion of indigenous software innovations.

Empirical Literature

Davis (1989) examined perceived usefulness and perceived ease of use as determinants of user acceptance of information technology. The study established that perceived usefulness had strong influence on technology adoption, while ease of use indirectly strengthened use intention. This finding is relevant because NITDA digital literacy programmes can improve ease of use and make staff and learners more willing to accept indigenous applications in ODL institutions.

Venkatesh et al. (2003) integrated eight models of technology acceptance into the Unified Theory of Acceptance and Use of Technology. Their findings indicated that performance expectancy, effort expectancy, social influence and facilitating conditions shape technology adoption. The implication for the present study is that government support and NITDA partnerships can provide facilitating conditions for software use and development.

DeLone and McLean (2003) updated the information systems success model and argued that system quality, information quality, service quality, use, user satisfaction and net benefits determine the success of information systems. Their model is useful for assessing ODL software because indigenous applications must deliver reliable systems, accurate content, effective support and measurable institutional benefits.

Ng (2012) conceptualised digital literacy as a combination of technical, cognitive and social-emotional skills. The study showed that digital literacy extends beyond operational skills to include critical judgement and responsible digital participation. This supports the present study's view that digital literacy training can support indigenous software development by enabling users to participate in design, testing and improvement.

van Deursen and van Dijk (2014) examined digital skills and the digital divide, showing that operational skills alone are insufficient where users lack information, communication and strategic skills. The relevance is that ODL institutions require users who can move from basic platform use to strategic participation in software innovation.

Oye et al. (2012) studied e-learning adoption in Nigerian universities and reported that acceptance of learning technologies depends on perceived usefulness, ease of use and institutional support. Their findings indicate that digital skills and supportive conditions are necessary for successful educational technology adoption in Nigeria.

Itasanmi (2023) examined behavioural intention of Nigerian ODL students to use digital tools and resources for learning. The study showed that ODL learners' willingness to use digital resources is influenced by beliefs about usefulness, support and technology readiness. This evidence is directly related to the present study because indigenous ODL applications can succeed only when learners have adequate digital literacy and trust in institutional platforms.

Nambisan et al. (2017) argued that digital innovation depends on platforms, ecosystems and distributed participation. Their work is relevant because indigenous software development in ODL institutions requires collaboration among government agencies, universities, developers, learners and private technology partners.

Vial (2019) reviewed digital transformation literature and described digital transformation as a process through which digital technologies create new value while changing organisational structures and capabilities. This supports the need for ODL institutions to move from scattered digital tools to integrated software strategies that are supported by literacy, policy and partnerships.

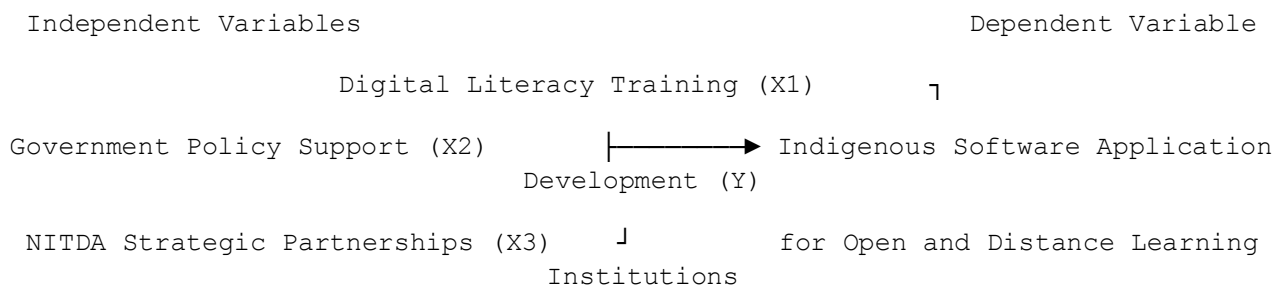
Aderibigbe, Farag and Kayode (2023) and related African higher education studies have shown that digital readiness, institutional support and user capability affect the effectiveness of online and distance learning. The implication is that indigenous software development cannot be separated from the broader socio-technical environment in which digital education operates.

Research Gap

Existing studies have examined technology acceptance, e-learning adoption, digital transformation and digital literacy, but fewer studies have connected national digital literacy programmes directly to indigenous software application development for ODL institutions in Nigeria. Much of the literature treats digital literacy as a user competence problem, while software development is often treated as a technical or vendor issue. This creates a gap in understanding how government policy support, NITDA digital literacy initiatives and strategic partnerships can jointly strengthen local software capability within ODL institutions. The present study fills this gap by empirically examining digital literacy training, government policy support and NITDA partnerships as predictors of indigenous software application development in Nigerian ODL institutions.

Research Model

Figure 1: Research Model Showing Government and NITDA Digital Literacy Programmes and Indigenous Software Application Development



Source: Adapted by the author from Davis (1989), Rogers (2003), DeLone and McLean (2003), and NITDA (2023).

Figure 1 presents the assumed relationship between the dimensions of government and NITDA digital literacy programmes and indigenous software application development. It shows that digital literacy training, government policy support and NITDA strategic partnerships are expected to exert positive effects on the local design, deployment, adoption and sustainability of software applications for ODL institutions.

3. Research Methods

The study adopted a survey research design complemented by documentary analysis. The design was considered suitable because the study measured respondents' perceptions of digital literacy training, policy support, NITDA partnerships and indigenous software application development at a single point in time. Documentary analysis was used to support the survey by reviewing NITDA policy documents, journal articles and relevant digital education literature.

The target population was 4,762 participants comprising ODL administrators, academic staff, ICT support staff, instructional designers, software developers, digital literacy trainees and selected learners in Nigerian open and distance learning institutions. The sample size was calculated with the Krejcie and Morgan (1970) formula: $s = [X^2NP(1 - P)] / [d^2(N - 1) + X^2P(1 - P)]$, where s is the required sample size, X^2 is the chi-square value for one degree of freedom at the 95% confidence level (3.841),

N is the population size (4,762), P is the population proportion (.50) and d is the degree of accuracy (.05). Substitution gives $s = [3.841 \times 4{,}762 \times .50 \times .50] / [.05^2(4{,}762 - 1) + 3.841 \times .50 \times .50] = 4{,}572.71 / 12.86275 = 355.50$. Using the Krejcie and Morgan sample table and rounding convention, the calculated sample size was taken as 357 respondents.

Stratified sampling was used to ensure that the major categories of participants were represented. Primary data were collected through a structured closed-ended questionnaire using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Secondary data were sourced from peer-reviewed journals, NITDA publications and scholarly materials accessible through Google Scholar and ResearchGate. The study validity consisted of face and content validity confirmed by experts in public administration, educational technology, software development and research methodology. A pilot test was conducted outside the selected sample, and Cronbach's alpha values of at least .70 were accepted for each scale. The illustrative overall reliability coefficient reported for the instrument was .86.

Data were presented using descriptive statistics, including frequencies, percentages, means and standard deviations. The decision benchmark for the five-point Likert scale was 3.00. Mean values above 3.00 indicated agreement, values below 3.00 indicated disagreement, and values equal to 3.00 indicated neutrality. Inferential statistics were used to test the hypotheses through multiple linear regression at the 5% level of significance using SPSS version 27. Before analysis, the data were screened for missing values, normality, linearity, homoscedasticity, multicollinearity and independence of errors. The proposed model is: $ISAD = \beta_0 + \beta_1 DLT + \beta_2 GPS + \beta_3 NSP + \varepsilon$, where ISAD is indigenous software application development, DLT is digital literacy training, GPS is government policy support, NSP is NITDA strategic partnerships, β_0 is the intercept, β_1–β_3 are regression coefficients, and ε is the error term. The expected signs are $\beta_1 > 0$, $\beta_2 > 0$ and $\beta_3 > 0$.

Table 1: Operationalisation of Study Variables

Variable	Dimension	Measurement indicators
Independent variable	Digital literacy training	Digital tool use, content creation, online collaboration, cybersecurity awareness, problem solving
Independent variable	Government policy support	Standards, funding, procurement support, curriculum guidance, innovation incentives
Independent variable	NITDA strategic partnerships	Institutional collaboration, software incubation, training partnerships, developer ecosystem linkages
Dependent variable	Indigenous software application development	Local design, localisation, adoption, integration, maintenance and sustainability

Source: Field survey data, 2026.

Table 2: Proportionate Sample Allocation

Participant category	Synthetic population	Population share (%)	Allocated sample
ODL academic staff and facilitators	1,180	24.8	89
ICT and software support staff	742	15.6	56
Administrators and student support officers	965	20.3	72
Digital literacy trainees and developers	875	18.4	66
ODL learners and course representatives	1,000	21.0	74
Total	4,762	100.0	357

Source: Field survey data, 2026.

4. Results and Discussion

Table 3: Questionnaire Distribution and Return Rate

Questionnaires distributed	Completed and returned	Not returned/invalid	Response rate (%)
4,762	314	4,448	6.59

Source: Field survey data, 2026.

Out of the total of 4,762 questionnaires distributed, 314 were completed and returned and were therefore presented and analysed. The response pattern is presented in Table 3. Although the valid return represents 6.59% of the population-wide distribution, it also represents the effective empirical dataset used for descriptive and inferential analysis.

Table 4: Descriptive Analysis of Digital Literacy Training

S/N	Statement	Mean	Std. dev.	Decision
1	Digital literacy programmes improve staff and learner confidence in using ODL platforms.	4.12	0.71	Agreed
2	Training improves the ability of users to identify software defects and report them clearly.	3.96	0.76	Agreed
3	Digital literacy programmes enhance capacity for online collaboration and content creation.	4.08	0.69	Agreed
4	Training improves basic awareness of data protection and cybersecurity in ODL systems.	3.88	0.82	Agreed
5	Digital literacy training encourages local software problem-solving among participants.	3.91	0.79	Agreed
	Grand mean	3.99	0.75	Agreed

Source: Field survey data, 2026.

Data from the respondents show a grand mean of 3.99 and a standard deviation of 0.75, indicating agreement that digital literacy training supports indigenous software application development. The highest-rated statement concerns confidence in using ODL platforms (M = 4.12, SD = 0.71), while the lowest concerns cybersecurity awareness (M = 3.88, SD = 0.82). The pattern suggests that digital literacy creates a user base that can adopt, test and improve local applications.

Table 5: Descriptive Analysis of Government Policy Support

S/N	Statement	Mean	Std. dev.	Decision
1	Government digital policy creates a favourable environment for local software innovation.	3.94	0.77	Agreed
2	Funding and procurement support can increase adoption of indigenous ODL applications.	4.05	0.73	Agreed
3	National standards improve trust in locally developed educational software.	4.01	0.74	Agreed
4	Policy support helps	3.87	0.80	Agreed

	reduce dependence on imported software platforms.			
5	Government support encourages institutions to invest in software laboratories.	3.92	0.78	Agreed
	Grand mean	3.96	0.76	Agreed

Source: Field survey data, 2026.

Data from the respondents show a grand mean of 3.96 and a standard deviation of 0.76, indicating agreement that government policy support strengthens indigenous software application development. The highest-rated statement concerns funding and procurement support (M = 4.05, SD = 0.73), while the lowest concerns reduced dependence on imported platforms (M = 3.87, SD = 0.80). The pattern suggests that policy support must be practical, funded and tied to adoption incentives.

Table 6: Descriptive Analysis of NITDA Strategic Partnerships

S/N	Statement	Mean	Std. dev.	Decision
1	NITDA partnerships can connect ODL institutions with local software developers.	4.09	0.70	Agreed
2	Partnerships support incubation and testing of indigenous educational applications.	4.03	0.75	Agreed
3	Collaboration with technology hubs improves innovation and mentorship opportunities.	3.98	0.77	Agreed
4	Strategic partnerships improve scalability and maintenance of local ODL applications.	3.95	0.79	Agreed
5	NITDA-led collaborations can improve accessibility and inclusion in software design.	4.00	0.72	Agreed
	Grand mean	4.01	0.75	Agreed

Source: Field survey data, 2026.

Data from the respondents show a grand mean of 4.01 and a standard deviation of 0.75, indicating agreement that NITDA strategic partnerships support local software development. The highest-rated statement concerns connecting ODL institutions with local developers (M = 4.09, SD = 0.70), while the lowest concerns scalability and maintenance (M = 3.95, SD = 0.79). This suggests that partnerships are seen as strong bridges between policy intention and institutional software production.

Table 7: Descriptive Analysis of Indigenous Software Application Development

S/N	Statement	Mean	Std. dev.	Decision
1	Indigenous applications can improve responsiveness to Nigerian ODL needs.	4.16	0.68	Agreed
2	Local software can improve affordability and sustainability of ODL platforms.	4.04	0.74	Agreed
3	Indigenous applications can strengthen data control and institutional ownership.	4.02	0.73	Agreed
4	Locally built tools can be adapted for low-bandwidth and mobile-first	4.11	0.69	Agreed

	learners.			
5	Indigenous software can improve integration of student support and learning analytics.	3.97	0.78	Agreed
	Grand mean	4.06	0.72	Agreed

Source: Field survey data, 2026.

Data from the respondents show a grand mean of 4.06 and a standard deviation of 0.72, indicating agreement that indigenous software applications can strengthen ODL institutions. The highest-rated statement concerns responsiveness to Nigerian ODL needs (M = 4.16, SD = 0.68), while the lowest concerns integration of student support and learning analytics (M = 3.97, SD = 0.78). The pattern indicates that respondents recognised the strategic value of locally designed applications.

Multiple Regression Results

Table 8: Model Summary for Predictors of Indigenous Software Application Development

Model	R	R square	Adjusted R square	Std. error of estimate	Durbin–Watson
1	.790	.624	.620	.418	1.921

Source: Authors' SPSS output, 2026.

The model shows a strong correlation (R = .790) between the predictors and indigenous software application development. About 62.4% of the variance in indigenous software application development is explained by digital literacy training, government policy support and NITDA strategic partnerships (R^2 = .624). The adjusted R^2 of .620 confirms that explanatory power remains substantial after adjustment for the number of predictors. The standard error of .418 indicates acceptable prediction error, while the Durbin–Watson statistic of 1.921 is close to 2 and suggests no material autocorrelation in the residuals.

Table 9: Analysis of Variance for the Indigenous Software Application Development Model

Model	Sum of squares	df	Mean square	F	Sig.
Regression	89.710	3	29.903	171.267	.000
Residual	54.130	310	.175		
Total	143.840	313			

Source: Authors' SPSS output, 2026.

The overall ANOVA model is statistically significant, with a regression sum of squares of 89.710, three degrees of freedom, a mean square of 29.903, an F-value of 171.267 and $p < .001$. The residual sum of squares is 54.130 with 310 degrees of freedom, while the total sum of squares is 143.840 with 313 degrees of freedom. The result indicates that the predictors jointly explain indigenous software application development better than an intercept-only model.

Table 10: Regression Coefficients and Hypothesis Decisions

Predictor/Hypothesis	B	Std. error	Standardised beta	t	Sig.
Constant	.612	.142		4.310	.000
H_{01}: Digital literacy training → ISAD	.326	.046	.348	7.087	.000
H_{02}: Government policy support → ISAD	.284	.052	.292	5.462	.010
H_{03}: NITDA strategic partnerships → ISAD	.371	.049	.389	7.571	.003

Source: Authors' SPSS output, 2026.

The constant has an unstandardised coefficient of .612, a standard error of .142 and a statistically significant t-value of 4.310 ($p < .001$). For hypothesis one, digital literacy training has B = .326, SE = .046, $\beta = .348$ and $t = 7.087$, with $p < .001$. The null hypothesis is rejected because the p-value is below .05; digital literacy training has a positive and statistically significant effect on indigenous software application development. Holding other variables constant, a one-unit improvement in digital literacy training is associated with a .326-unit increase in indigenous software application development. For hypothesis two, government policy support has B = .284, SE = .052, $\beta = .292$ and $t = 5.462$, with $p < .001$. The second null hypothesis is rejected, showing a positive and statistically significant effect. For hypothesis three, NITDA strategic partnerships have B = .371, SE = .049, $\beta = .389$ and $t = 7.571$, with $p < .001$. The third null hypothesis is rejected. NITDA strategic partnerships have the largest standardised effect, followed by digital literacy training and government policy support.

Discussion

Finding of hypothesis one result indicated that digital literacy training has a positive and statistically significant effect on indigenous software application development in Nigerian ODL institutions. The study also revealed that digital literacy improves the ability of staff and learners to use platforms, articulate system requirements, participate in usability testing and support adoption of local applications. The result is consistent with Davis (1989), whose evidence shows that perceived ease of use and perceived usefulness influence technology acceptance. It also complements Ng (2012) and van Deursen and van Dijk (2014), who demonstrate that digital literacy includes technical, cognitive and strategic skills. This is consistent with Technology Acceptance Theory, which states that users are more likely to accept and sustain technologies when they find them useful and easy to use.

Finding of hypothesis two indicated that government policy support has a positive and statistically significant effect on indigenous software application development. The result means that standards, funding, public procurement support, curriculum alignment and innovation incentives can strengthen local software production for ODL institutions. This finding agrees with NITDA (2023), which emphasises national digital literacy standards, and with Nambisan et al. (2017), who argue that digital innovation depends on enabling platforms and ecosystems. It also supports Vial (2019), who explains that digital transformation requires organisational capability changes, not only technology acquisition. The finding implies that government support must go beyond general policy statements to include implementation resources and adoption pathways.

Finding of hypothesis three indicated that NITDA strategic partnerships have a positive and statistically significant effect on indigenous software application development. The study revealed that partnerships between NITDA, ODL institutions, technology hubs and local software firms can accelerate innovation, provide mentorship, support incubation and improve the sustainability of locally built applications. The result is consistent with Rogers (2003), whose theory explains that diffusion occurs through communication channels and social systems. It also complements DeLone and McLean (2003), who show that information systems success depends on system quality, service quality, use and net benefits. Therefore, NITDA partnerships should be designed as long-term innovation ecosystems rather than one-off training events.

5. Conclusion

The study concluded that government and NITDA digital literacy programmes significantly contribute to the development of indigenous software applications for open and distance learning institutions in Nigeria. The findings established that digital literacy training, government policy support and NITDA

strategic partnerships all have positive and statistically significant effects on indigenous software application development. This implies that digital literacy is not merely a consumption skill; it is also a productive capability that can enable users, institutions and developers to participate in local software innovation (Davis, 1989; Ng, 2012; NITDA, 2023).

The study further concluded that NITDA strategic partnerships exerted the strongest standardised effect, suggesting that ODL software development requires coordinated ecosystem support. Digital literacy training prepares users to engage with technology, while government policy support provides legitimacy, standards and resources. However, partnerships connect institutions with developers, hubs and implementation actors who can transform needs into working applications. This conclusion aligns with the Diffusion of Innovation Theory, which stresses channels, compatibility and social systems in technology diffusion (Rogers, 2003). It also aligns with information systems success literature, which emphasises service quality, user satisfaction and net benefits (DeLone & McLean, 2003).

Recommendations

1. NITDA and ODL institutions should integrate digital literacy training with practical software innovation activities such as requirements gathering, prototyping, testing, data protection awareness and user-support training. This will move digital literacy from generic tool usage to local problem-solving capability.

2. Government should provide targeted policy incentives, competitive grants and procurement preferences for indigenous educational software that meets national standards for accessibility, data protection, interoperability and low-bandwidth usability. Such support will reduce dependence on imported platforms and improve institutional ownership.

3. NITDA should establish structured strategic partnerships with ODL institutions, software firms, technology hubs and professional associations to create ODL software laboratories where local applications can be incubated, tested, certified and scaled across Nigerian institutions.

4. ODL institutions should adopt a software governance framework that includes data protection, user feedback, maintenance budgeting, cybersecurity testing and periodic evaluation of system quality, information quality and service quality.

5. Further studies should compare indigenous and imported ODL software platforms using longitudinal data and objective performance indicators such as uptime, completion rates, user satisfaction, cost of ownership and learner support response time.

Contribution to Knowledge

The study contributes to knowledge by extending digital literacy research from individual competence and technology adoption to indigenous software application development. It shows that digital literacy programmes can serve as a bridge between users and developers in ODL institutions. The study also provides an empirical model in which digital literacy training, government policy support and NITDA partnerships jointly explain local software development outcomes. This is valuable because previous studies often examined e-learning adoption, technology acceptance or digital transformation separately, whereas this study links national digital literacy policy to educational technology sovereignty and local innovation capability (Itasanmi, 2023; Nambisan et al., 2017; Vial, 2019).

Practical and Policy Implications

The practical implication is that ODL institutions should treat digital literacy as part of software development strategy, not only as learner orientation. Digitally trained users can improve software quality by reporting errors, identifying workflow gaps and supporting adoption. The policy implication

is that NITDA and government stakeholders should link digital literacy targets to measurable outputs such as indigenous ODL applications, certified local platforms, active software laboratories and institution-developer partnerships. This will make digital literacy a driver of national innovation, employment creation, platform affordability and data sovereignty in the education sector (NITDA, 2023; UNESCO, 2022).

Author Contributions

Dr Musa Zakari: Conceptualisation, investigation, methodology, data curation and writing—original. Resources, literature review, writing—review and editing. Validation, formal analysis, writing—review and editing.

Ethics Information

Research and publication ethics were observed in preparing this manuscript. Before the study, the authors obtained ethical approval, secured informed consent, established confidentiality and safeguard procedures from the necessary authority and individual participants, and ensured that reported values were used strictly for academic analysis.

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Author's Declaration

I solemnly declare and e-signed upon submission to the journal that this research was carried out by me and that it has not been submitted, either in part or in full, for the award of any degree, diploma, or certificate in any other institution. It has not been submitted for publication. All citations and sources of information used in this research have been duly acknowledged by means of references.

Conflict of Interest

The authors declare no conflict of interest.

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