Ineffective Integration of Digital and Technological Education Tools in Teaching Adult Education Literacy Programmes in Borno State, Northern Nigeria: Challenges and Way Forward

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Abstract

This study examined possible problems associated with the ineffective integration of digital and technology education tools in the teaching of adult education literacy programmes in Borno State, Nigeria. The State had experienced years of deadly attacks from the Boko-Haram insurgents. The effects of the insurgency have almost paralysed its socio-economic, political and educational structures. The study focused on the impact of learning outcomes among the adult learners, instructors, availability of digital infrastructure and problems associated with the ineffective integration of digital and modern technological education tools in the teaching of adult education literacy programmes in the State. A mixed methods approach was adopted as the design for the study. The target population selected for the study was only one hundred and ninety-one (191) participants who were selected using the Krejcie and Morgan sampling table. The questionnaire was the sole instrument used for data collection. The data collected were analysed using descriptive statistics of frequency count and percentage. The findings of the study revealed that digital technology had significantly enhanced learning outcomes by improving learner engagement, access to educational materials, and digital literacy skills. However, barriers such as inconsistent internet connectivity, inadequate usage of online platforms and poor maintenance of facilities have hindered effective digital transformation in the adult education literacy centres in the State. The study recommends that government agencies and educational stakeholders should invest in tailored professional development programmes for adult learners, instructors, and educators, focusing on integrating digital and technology tools effectively into their programmes of teaching practices.
Keywords: Digital, Technology, Integration, Basic Literacy Education.

Introduction

Digital transformation and technology integration have become pivotal in the modern educational system, particularly in adult education literacy programmes in Borno State, Nigeria. The integration of digital tools in adult education learning centres for adult learners should not just be an

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advancement but a necessity that should not be compromised. Borno state is one of the states in the north-east sub-region that suffered the deadly attack by the Boko-Haram insurgency for years. The effects of the insurgency have paralysed most of its socio-economic, political and educational structures. Schools, markets, houses, churches and mosques were burnt, and many people have been forced out of their ancestral homes. Consequently, apart from the economic decline, many primary school children and students have been deprived of the formal education school system. Therefore, the introduction of teaching the digital and technology in educational frameworks would offer them a promising avenue to bridge-up the educational gaps that were created as a result of the Boko-Haram insurgency that gulfed the sub-region and particularly Borno state by providing an alternative accessible learning opportunity to those affected by the insurgency who could not be observed into the formal school system to age barrier and other related matters (World Bank, 2018).

The World Bank further added that digital learning tools can significantly enhance the quality of education by providing interactive, flexible, and learner-centred approaches among adult learners at any given adult learning centre, particularly in remote and conflict-affected areas.

In a related development, Rosen and Vanek (2017) also stated that digital and technology education tools could effectively help people to solve any teaching and learning problems, particularly among adult learners, if properly and efficiently put into use. The authors further stated that this group of adult learners, if they are properly guided, could also benefit from the acquisition of the digital and technology education system like any other literate person and eventually become an integral part of their lives.

Rosen and Vaneks (2017) further stated that a survey conducted by a Smartphone company in 2015 on one hundred (100) adult learners

enrolled into adult education literacy programmes in Borno state, Nigeria and got exposed to the use of digital and technology educations reveals that 55%-75% of the adult education learners in the state could perfectly read, write and could easily get connected with people in and outside the country. The study further revealed that once an adult learner could use the digital and technology education tools proficiently, formal and informal opportunities to access internet information and others will be made available and easily accessible.

According to Inverso, Kobrin and Hashmi (2017), adults, especially adult learners, need digital literacy education to move them out of the unskilled labour markets and primitive society. Today, modern technology has become the order of the day, and any person or group of people who fail to properly update their initial education acquired either in formal schools or outside are bound to be cut off and left behind. Therefore, modern technology education has become the order of the day, and it is a necessity. There is hardly any innovation today which does not originate from modern technology. Traditional farming, medicines, banking, Communications and shopping have been gradually modified and fully taken over by modern technology. Nowadays, meetings, conferences and seminars are held without members having to meet face to face. Teaching and learning are taking place, leading to the awarding of certificates without the teacher and the learner having to meet face to face (Isa and Garba, 2021).

In a related development, Ogundare and Adebayo (2019) highlight that digital and technology educations have two components geared towards effective literacy teaching and learning among adult learners. These are the digital divide device and the transformation. The digital divide device drives the need to teach digital adult education literacy due to lack of digital proficiency in K12 which is brought about either due to insufficient resources or lack of parental supports or as a result of early drop-outs from the formal school system whereas on the other hand, transformation

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refers to a thorough or dramatic change in form, structure, appearance, or character brought in as a result of modern technology.

In the same vein, UNESCO (2017) stated that transformation also involves altering the nature, condition and composition of something to achieve a significant difference. This concept is widely applicable across various fields such as personal development, science, technology, business, and social systems. The relevance of digital transformation in education is underscored by its potential to democratize access to learning resources.

UNESCO (2017) further stated that in states like Borno and many other states in the north that were affected by the insurgency such as Boko Haram, Banditry and kidnapping, where most of the conventional educational infrastructures have been severely compromised, technology could be the only affordable and accessible means of offering an alternative to education which is both scalable and sustainable. Mobile technology, for instance, can deliver educational content effectively and conveniently in the conflict-affected areas. Those who were forced out of their ancestral home as a result of the insurgencies and deprived of their educational structures could use the mobile technology and continue with their educational career undistracted.

According to Bozkurt (2019), the integration of technology tools into adult education programmes could address several logistical and practical challenges faced by adult learners learning in remote and conflict-affected areas. Bozkurt further added that once the technology tools are successfully integrated into the adult education centres, the physical presence of the teacher and the learner before teaching could take place may no longer be necessary. Also, consistent attendance and physical appearance at a literacy centre by the adult learners have been taken care of. Difficulties faced by the adult learners managing their work, families

and other responsibilities in addition to being physically present at the centres for learning have also been addressed.

In a related development, Bozkurt (2019) further stated that digital platforms offer adult learners more flexible schedules and self-paced learning, which are more compatible with the lifestyles of adult learners. He added that research has shown that more adult learners benefit from the flexibility of online education because it allows them to balance their studies with their day-to-day activities more conveniently and successfully. The flexibility derived from online education should be of immense benefit to adult learners, especially those in remote and conflict-affected areas. In Borno state, for example, where the economic, social stability and conventional educational structures have been destroyed, parallelised, and highly compromised due to the deadly activities of the Boko-Haram insurgents, the online educational system could serve as the only viable option.

Despite the numerous benefits that could be derived from the successful integration of technology into adult education literacy programmes in the remote and conflict-affected areas. Borno state, which is one of the states that suffered the deadly attacks of the Boko-Haram insurgents in the Northeast sub-region, would benefit more from the integration above others so that it could revive all its lost educational structures more quickly and rapidly. Unfortunately, the reverse has been the case because the state is still battling with infrastructural deficits and limited internet access. These factors have succeeded in widening the digital literacy gaps among the adult population of the adults in the state. Therefore, to successfully address these challenges, a comprehensive strategy which includes investment in infrastructure, provision of affordable internet services and digital literacy training. The Nigerian government's National Digital Economy Policy and Strategy, aimed at fostering digital skills across the nation, should be made available and accessible at all literacy training centres (FGN 2019).

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It is believed that leveraging these strategies of the federal government under the National Digital Economy Policy in the remote and conflict-affected areas. Borno state could effectively and efficiently integrate the technology in its adult education literacy programmes, in fostering a more inclusive and resilient form of educational environment.

Statement of the Problem

In an era where digital and technological advancements are transforming education globally, in Borno State, Nigeria, the integration of such educational technological tools in adult education literacy programmes remains a significant challenge. Adult education learners in this sub-region often face numerous challenges such as limited access to digital devices, inconsistent internet connectivity and lack of digital literacy skills. These factors have seriously hindered the ability of adult learners studying in Borno state to fully access the digital devices and properly benefit from modern learning approaches brought by modern technology in education. Furthermore, instructors teaching adult learners might lack adequate knowledge in utilising the technology devices effectively. Possibly, there is also the tendency that even the institutions and training centres might be grappled by such insufficiency. These issues also exacerbate the already low literacy rates among adults, impeding their ability to properly engage with the digital economy and contribute meaningfully to societal development.

Despite the recognised potential of the technology in the improvement of learning outcomes, fostering engagement, and expanding access to educational resources in adult education, the implementation of modern technology and digital solutions in adult education literacy programmes in Borno state has remained sporadic and largely underresearched. This study seeks to properly investigate these gaps in the current state of the integrations of modern digital technology education tools in adult

education literacy programmes, impacts and challenges faced in their implementations in Borno State.

Theoretical Framework

The researchers for the study adopted the Will Skill Tool (WST) model of technology integration developed by Knezek, Christensen, Hancock, and Shoho (2000). A theory that explains how teachers who are literate in computer applications, technology competent could contribute successfully to classroom technology integration and students' achievements. The researchers opted for this theory because it seeks to address problems associated with the ineffective integration of digital and technology educational tools in teaching adult education literacy programmes in Borno State, whose educational structures and economic activities have been devastated due to the Boko-Haram insurgency.

Objectives of the Study.

The study has the following objectives to:

1. Assess the current state of digital infrastructure in adult education literacy centres in Borno State, Nigeria

2. Identify problems hindering the integration of digital and technology education in teaching adult education literacy programmes in Borno State, Nigeria

3. Evaluate the impact of technology integration on learning outcomes among the adult learners in Borno State, Nigeria.

Research Questions

The study was guided by the following research questions.

1. What is the current state of digital infrastructure in adult education literacy centres in Borno State, Nigeria?

2. What are the problems hindering the integration of digital and technology education in teaching adult education literacy programmes in Borno state, Nigeria?

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3. What is the impact of technology integration on learning outcomes among adult learners in Borno State, Nigeria?

Methodology

The researchers used a survey research design for the study. A questionnaire was the main instrument used for the data collection. The questionnaire was developed by the researchers and tested by experts in test and measurements in the Department of Education, Faculty of Education, University of Maiduguri. Data collected for the study were analysed using descriptive statistics of frequency counts and percentages. The sample population for the study was selected using Krejcie and Morgan's (1970) sampling table, where one hundred and ninety-one (191) participants were selected for the study. The questionnaire was carefully planned and structured on the Four-Point Likert-type scale covering the objectives of the study. Responses collected for the study were given some weights as follows: Strongly agree (SA), 4 points; agree (A), 3 points; disagree (D), 2 points and strongly disagree (SD), 1 point.

Data Analysis and Results

Descriptive Statistics on Demographic Data

Table 1:
Statistical Distribution on Demographic Characteristics of the Respondents

Variables	Respondents	Frequency	Percentage (%)
Gender	Male	93	(48.7%)
	Female	98	(51.3%)
	Total	**191**	**100%**
Age Range	18-25	46	(24.1%)
	26-35	89	(46.6%)
	36-45	36	(18.8%)
	46 and above	20	(10.5%)
	Total	**191**	**100%**
Years of experience	1-3	60	(31.4%)
	4-6	72	(37.7%)
	7-10	41	(21.5%)
		18	(9.4%)

11 year and above		
Total	**191**	**100%**

Source*: field survey 2024*

The demographic data of the respondents presented in Table 1 above provides a detailed overview of the distribution of the participants based on gender, age range, and years of experience, which highlights the diverse characteristics of the study population.

Gender Distribution

The table also shows that there is nearly an equal gender representation among the respondents. Out of one hundred and ninety-one (191) participants, 93 (48.7%) are male, while 98 (51.3%) are female. These balanced distributions suggest that the perspectives captured in the study are well represented across the genders, which enhances the reliability of the findings in addressing any gender-related dynamics.

Age Range Distribution

The age range of the respondents, as indicated in the table, reveals a predominance of younger to middle-aged individuals. The largest categories of the age groups fall within the 26-35 years age brackets, comprising 89 respondents, which represents 46.6%, followed by the 18-25 years age group with 46 or 24.1% respondents. Those aged 36-45 years had 36 respondents, which represents 18.8%, and the smallest group was aged 46 and above with 20 or 10.5%. These distributions show that a good majority of the participants fall within their early mid-career stage, which can influence their perspectives and experiences related to the topic of study.

Years of Experience

The respondents, based on years of experience, are categorised into four groups, with the majority having 72 respondents (37.7%) representing 4-6 years of experience. This is followed by 60 respondents (31.4%) with 1-

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3 years of experience. The group with 7-10 years of experience had 41 respondents (21.5%), while the smallest group with experience of 11 years and above had only 18 respondents (9.4%). This data highlights that most of the respondents have relatively moderate professional experiences, and this would possibly reflect their familiarity with the contemporary practices and challenges in their various fields.

General Observations

Table 1 above further indicates that the total number of respondents that were selected for the study, numbering one hundred and ninety-one (191) was consistent across all the variables used in the study. This shows there was no data discrepancy. The study also shows that there was a good and a balanced gender representation, as well as combination of concentration of the respondents in the age range groups of 26-35 and 4-6 years of experience groups have provided a solid foundation for analyzing trends and drawing conclusions relevant to the objectives of the study. The demographic distributions in the study, as indicated in Table 1 above, have enhanced the study's ability to generalise its findings, which adequately reflect the diversity within the targeted population of the respondents. It further allows for a nuanced exploration of how demographic factors such as gender, age, and experience might intersect to influence the responses and outcomes.

Research question one: What is the current state of digital infrastructure in adult education literacy centres in Borno state, Nigeria?

Table 2: Statistical distribution of the current state of digital infrastructure in adult education literacy centres in Borno state, Nigeria.

S/N	Items	Frequencies				
		SA	A	D	SD	Total
1	Adult education literacy centres in Borno State are well equipped with modern computers	108 (56.5%)	56 (29.3%)	16 (8.4%)	11 (5.8%)	191 (100%)

	and other digital devices (e.g., tablets and projectors) to support learning."					
2	Internet services such as Wi-Fi or broadband are consistently available in adult education centres for both instructors and learners.	53 (27.7 %)	51 (26.7 %)	39 (20.4 %)	48 (25.1 %)	191 (100 %)
3	There is a reliable power supply to support the use of digital infrastructure (e.g., uninterrupted electricity for computers and projectors) in adult education literacy centres in Borno State.	39 (20.4 %)	118 (61.8 %)	34 (17.8 %)	00 (0.00 %)	191 (100 %)
4	Adult learners and instructors in Borno State frequently use online learning platforms or digital tools (e.g., Moodle, Zoom, or Google Classroom) for teaching and learning."	12 (6.3%)	40 (20.9 %)	58 (30.4%	81 (42.4%	191 (100 %)
5	The digital facilities (e.g., computers, internet routers, and projectors) in adult education centres are regularly maintained and functional	12 (6.3%)	48 (25.1 %)	64 (33.5%	67 (35.1%	191 (100 %)

Source: *Field survey 2024*

Table 2 above provides an insight into the availability, usage, and maintenance of the digital infrastructure in adult education literacy centres across Borno state, Nigeria. The responses were well distributed across the four points Likert Type scale, covering the strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD), had reflected varied perceptions of the current state of digital resources.

The first item in Table 2 shows that 108 respondents, which represent (56.5%), strongly agreed that the adult education literacy centres are well

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equipped with modern digital devices such as computers, tablets, and projectors, while 56, which represent (29.3%), agreed. However, a smaller proportion of 16, representing 8.4%, disagreed, and 11 of the respondents, representing 5.8%, strongly disagreed. This indicates that a significant majority of the respondents perceived these centres to have modern digital devices and are well-equipped and capable of meeting the needs of the adult learners.

The second item on the same table above revealed mixed perceptions about the availability of internet services. Fifty-three (53) of the respondents, which represent (27.7%), strongly agreed, and 51 (26.7%) respondents agreed that consistent internet connectivity exists. Conversely, 39 of the respondents (20.4%) disagreed, while 48 (25.1%) reported strongly disagreed. This suggests that internet availability remains a significant challenge, with nearly half of the respondents expressing dissatisfaction. This lack of connectivity could hinder effective technology integration and access to online learning resources.

Regarding the power supply at the designated adult education literacy Centres. Thirty-nine (39) respondents, which represent 20.4%, strongly agreed that the power supply was the major change at the centres. However, most of the respondents, numbering 118 (61.8%), agreed that electricity supply was available at the Centres to adequately support the digital infrastructure. Similarly, 34 (17.8%) respondents merely disagreed. However, no respondents so far opted strongly disagree. This data indicates that while most of the respondents recognise the availability of power supply, a notable portion still faces challenges affecting the consistent use of digital tools.

The responses recorded against the fourth item on the table above indicated a low level of online platform usage. Among all the respondents, only 12 (6.3%) of them had opted for the strongly agreed, while 40 (20.9%)

respondents agreed that adult education instructors and learners frequently use online tools like Moodle or Zoom. In contrast, 58 (30.4%) of the respondents merely disagreed, and 81 (42.4%) strongly disagreed. This shows that most of the respondents do not perceive the online platforms to be regularly utilised, and this could be attributed to issues such as limited internet access, lack of digital skills, or inadequate training.

For the maintenance and functionality of the digital facilities, 12 (6.3%) of the 6.3% strongly agreed, while 48 (25.5%) of the respondents merely agreed, and 64 (33.5%) of the respondents disagreed. The remaining 67 (35.1%) were of the strongly disagreed options. This therefore suggests that regular maintenance of the digital equipment at the various literacy centres was the major concern, indicating that such facilities are not adequately functional or maintained, potentially limiting their utility.

Research question two: What are the problems hindering the integration of digital and technology education in teaching adult education literacy programmes in Borno state, Nigeria?

Table 3: **Statistical distribution of the problems hindering the integration of digital and technology education in teaching adult education literacy programmes in Borno state, Nigeria**

S/N	Items	Frequencies				
		SA	A	D	SD	Total
6	Lack of access to essential digital tools hinders technology's integration into adult education.	00 (0.00%)	93 (48.7%)	71 (37.2%)	27 (14.1%)	191 (100%)
7	Poor and unreliable internet connectivity hinders effective use of digital technologies.	30 (15.7%)	65 (34.0%)	52 (27.2%)	44 (23.0%)	191 (100%)
8	Inadequate digital skills and training pose a major challenge to technology integration	68 (35.6%)	59 (30.9%)	45 (23.6%)	19 (9.9%)	191 (100%)

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9	Insufficient funds and, lack of proper maintenance limit progress in adult education literacy programmes	59 (30.9 %)	68 (35.6 %)	57 (29.8 %)	7 (3.7%)	191 (100 %)
10	Resistance from educators or administrators to adopting digital technology hinders adult education programmes	44 (23.0 %)	34 (17.8 %)	53 (27.7 %)	60 (31.4 %)	191 (100 %)

Source: *Field survey 2024*

Table 3 above highlights key hindrances to the digital transformation and technology integration in adult education literacy programmes in Borno State, Nigeria. The responses reflected varied perspectives, illustrating the critical and major challenges in adopting and implementing digital tools in the educational system.

The responses to item 6 on the table above show that 93 respondents (48.7%) agreed, while 17 respondents (37.2%) disagreed, and 27 respondents (14.1%) opted for the strongly disagree option that lack of access to essential digital tools constituted a major hindrance. Notably, of all the respondents under item 6 from the table above, none opted for strongly agreed. From the information recorded, nearly half of the respondents acknowledged the issue, but considerable proportions disagreed, suggesting that access to the digital tools varies across the number of education literacy Centres in the state. This disparity emphasises that there is a possible uneven distribution of resources to the various adult education literacy centres in the state.

Item number 7 on the same table indicated above shows that poor and or unreliable internet connectivity was among the major challenges, with 30 (15.7%) respondents strongly agreeing, and 65 or 34.0% of the respondents agreeing. However, 52 or 27.2% of the respondents

disagreed, but 44 or 23.0% of them opted for strong disagreement. Indicating a divided opinion among the respondents, where a significant proportion of them disagreed, others endorsed disparities in infrastructure development across locations of the adult education literacy centres.

In Item number 8, as indicated in the table above, 68 of the respondents, representing 35.6%, strongly agreed and 59 or 30.9% of them agreed that insufficient digital skills and training among the instructors had posed a major challenge, while 45 or 23.6%, disagreed. Similarly, 19 or 9.9% opted for the strongly disagreed. These high levels of agreement among the respondents highlight the need for targeted training programmes to properly equip the adult education instructors with the necessary skills for effective technology use and teaching.

The responses recorded under item number 9 on the same table as indicated above emphasised that a lack of funds to properly fund and maintain digital tools for the adult education programme has been identified as one of the major constraints hindering the literacy programme in the state. To this effect, 68 or 35.6% of the respondents strongly agreed, and 59 or 30.9% of them merely agreed, while 57 or 9.8% of them disagreed. Only 7 or 3.7% opted for the strongly disagreed options. This has indicated that a widespread acknowledgement of the financial limitations is the key obstacle. Therefore, to holistically address the issue of financial problems, there is a need for increased budget allocations and alternative funding strategies from the government and its agencies.

In item number 10, the responses had varied opinions. While 44 or 23.0% of the respondents opted for the strongly agreed, 34 (17.8%) of them merely agreed that resistance from instructors and the administrators was identified as the major hindrance, but 53 or 27.7% of the respondents disagreed and 60 or 31.4% of them had opted for the

strongly disagreed. This finding suggests that although resistance exists, it may not be as pervasive as other challenges. Nonetheless, addressing this issue through awareness and changing management initiatives can properly facilitate the smoother adoption of new technologies.

Research question three: What is the impact of technology integration on learning outcomes among the adult learners in Borno State, Nigeria?

Table 4: **Statistical distribution of the impact of technology integration on learning outcomes among adult learners in Borno State, Nigeria**

S/N	Items	Frequencies				
		SA	**A**	**D**	**SD**	**Total**
11	The use of digital tools (e.g., interactive whiteboards, online platforms) has improved adult learners' engagement and participation in educational activities.	52 (27.2%)	87 (45.5%)	34 (17.8%)	18 (9.4%)	191 (100%)
12	Technology integration, such as the use of e-books and online resources, has significantly increased adult learners' access to diverse learning materials	50 (26.2%)	113 (59.2%)	20 (10.5%)	8 (4.2%)	191 (100%)
13	The adoption of technology in adult basic education has improved learners' digital literacy skills, making them more competent in using modern tools.	61 (31.9%)	98 (51.3%)	28 (14.7%)	4 (2.1%)	191 (100%)

14	Online and blended learning options enabled by technology have provided greater flexibility for adult learners to study at their own pace and convenience	28 (14.7%)	8 (4.2%)	24 (12.6%)	131 (68.6%)	191 (100%)
15	The integration of technology, such as educational apps and multimedia content, has enhanced the academic performance of adult learners	59 (30.9%)	71 (37.2%)	48 (25.1%)	13 (6.8%)	191 (100%)

Source: *Field survey 2024*

Table 4 presents the respondents' perceptions of how technology integration has influenced learning outcomes among adult literacy education in Borno state. The results from the table above highlight the benefits that could be derived from the integration, alongside areas where the potential of the technology has not been fully realised.

Given the above and as indicated under item number 11 from the above table, 52 or 27.2% of the respondents strongly agreed and 87 or 45.5% merely agreed that digital tools such as the interactive whiteboards and the online platforms have enhanced learners' engagement and participation. However, 34 or 17.8% of them disagreed, while 18 or 9.4% of them opted for the strongly disagreed option. These findings therefore revealed that although most of the respondents have perceived technology as a positive force in fostering active learning, some adult education centres have yet to experience this impact. This could be due to inadequate implementation or support from the instructors or administrators.

In item 12, under the same table indicated above, 13 respondents, representing 59.2%, strongly agreed and 50 or 26.2% opted to agree that the technology has expanded access to diverse learning materials, such

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as e-books and online resources. However, only 20 or 10.5% of the respondents disagreed, and 8 or 4.2% of them strongly disagreed. This overwhelming agreement has emphasised that the transformative potential of technology in breaking barriers to information access, especially for adult learners who may lack traditional resources.

From item number 13, 61 of the respondents, which represents 31.9%, strongly agreed, and 98 or 51.3% also agreed that technology integration had significantly enhanced learners' digital literacy skills. But 28 respondents, who represent 14.7%, disagreed, while 4 or 2.1% had opted for the strongly disagreed options. This high level of agreement that technology integration has enhanced learners' digital literacy skills shows that technology is not only good in supporting academic learning but also equipping learners with essential digital skills that are increasingly relevant in today's world of technology.

Responses to item number 14 under the same table indicated above had recorded some varied opinions. 131 respondents, which represent 68.6%, had opted for the strongly disagreed that online and blended learning options have provided a greater flexibility for learners, but 28 (14.7%) strongly agreed, while 8 (4.2%) agreed, and 24 (12.6%) disagreed. The strong disagreement suggests that online and blended learning have not been widely adopted or effectively implemented in all adult education literacy centres, potentially due to limited access to necessary infrastructure or resistance to change.

From item number 15 from the table above, 59 respondents, who represent 30.9%, strongly agreed and 71 or 37.2%, of them agreed that integration of educational applications and multimedia content has greatly improved the learners' academic performance. However, 48, representing 25.1% of the respondents, disagreed, and 13 or 6.8%, strongly disagreed. This result shows that a majority consensus has been

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achieved among the respondents on the positive impact of technology on academic outcomes, but the notable proportion of disagreement points to disparities in how technology is being utilised across different centres.

Discussion

According to the findings of the study, technology was reported to have significantly improved the learning outcomes among the adult learners in the adult education literacy Centre, aligning with the previous research highlighting its role in enhancing engagement, access to materials and digital literacy skills. For example, a study carried out by Murphy et al. (2017) demonstrated that technology-based learning platforms have increased student motivation and self-paced learning opportunities. Similarly, Aderinoye et al. (2020) found that mobile learning applications improved literacy rates among adult learners in underserved Nigerian communities. However, critics argue that the effectiveness of technology in adult education largely depends on the learners' prior exposure to digital tools, which is often limited in developing regions. Unlike in the urban-based studies, where digital integration yields positive outcomes, Borno state's unique challenges, including the lack of localised content and culturally relevant materials, could limit the true impact of these interventions. Addressing these nuances is critical for replicating the reported successes in broader contexts.

The study further identifies inconsistent internet connectivity and low usage of the online platforms, as well as poor maintenance of facilities as significant barriers or hindrances to the digital transformations. This finding is consistent with that of Bhavnani et al. (2019), who argued that infrastructural deficits and connectivity challenges hinder the effective integration of technology education in most of the developing regions. Similarly, Isa and Garba (2021) reported that poor internet access and untrained personnel can also reduce the efficiency of e-learning systems in Nigeria. However, their study could be criticised on the grounds that

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they failed to address how innovative solutions such as the offline learning platforms like Colibri or radio-based education have mitigated similar issues in other parts of sub-Saharan Africa. Furthermore, the role of public-private partnerships to improve infrastructure, as seen in Kenya's Digital Literacy Programme, revealed by Odera et al. (2020), was not explored and suggested areas of further study or research work.

The revelation that there are few digital infrastructures in adult education literacy programmes in Borno state reflects a systemic issue, as noted by Ogundare and Adebayo (2019), who reported insufficient technological facilities across the adult education centres in Nigeria. This is further corroborated by UNESCO (2020), which highlighted a global gap in digital resources for adult learners in low-income countries. However, studies such as that by Olaleye et al. (2021) suggest that even with limited infrastructure, effective utilisation of available resources could also significantly improve the educational outcomes if supported by proper training and maintenance. This critique emphasised the importance of capacity-building efforts for the educators and a strategic focus on maximising the potential of existing tools rather than solely attributing poor outcomes to infrastructural inadequacies.

Conclusion

The study concludes that leveraging digital and technological tools is essential for addressing the educational needs of adult learners in a region which is marked by a significant literacy challenge and socioeconomic hardships due to the devastating effects of the Boko-Haram insurgency.

Recommendations

The study on digital and technology integration in adult education literacy programmes in Borno state, Nigeria, came up with the following recommendations.

1. Government agencies and educational stakeholders should invest in tailored professional development programmes for educators, focusing on integrating digital tools effectively into their teaching practices.

2. Policymakers should prioritise infrastructural investments, such as expanding broadband internet access and providing technical support.

3. Government and non-governmental organisations should collaborate in providing modern technological resources such as computers, projectors, and mobile devices.

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