LEVERAGING TECHNOLOGY TO REACH AND EDUCATE OUT-OF-SCHOOL CHILDREN IN GWAGWALADA AREA COUNCIL, FEDERAL CAPITAL TERRITORY, ABUJA, NIGERIA.

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Abstract

The study investigated "Leveraging Technology to Reach and Educate Out-of-School Children in Gwagwalada, Area Council, FCT, Abuja." The main objective was to examine how technological innovations can be used to address the increasing number of out-of-school children in Gwagwalada, especially in improving access to quality education for the marginalised. The research design used was a descriptive survey, and self-structured questionnaires were administered to educators, policymakers, and technology experts. It also investigated the application of digital tools, e-learning platforms and mobile technology in closing the educational gap in underserved and rural areas. The target group consisted of stakeholders in educational institutions and technology companies, from which 150 respondents were selected using stratified sampling techniques to ensure a diverse perspective. In this regard, a pilot study of 20 respondents aimed at instrument validation was done, and a reliability coefficient of 0.82 was established using Cronbach's Alpha. The findings of the study revealed that technology can significantly facilitate access to education for out-of-school children through flexible, cost-effective, and scalable solutions. Effective delivery tools included mobile learning applications, radio and television broadcasts, and community-based digital hubs. Other challenges identified in the study included a lack of access to digital devices, poor Internet connectivity, inadequate training for educators, and resistance to adopting new technologies. Based on this finding, the study recommends increasing investments in digital infrastructure and providing learning devices at more affordable costs to underserved communities.

Keywords: Leveraging Technology, Reach and Out of Out-of-School Children

Introduction

The issue of out-of-school children remains a critical challenge to achieving universal education in Gwagwalada, Area Council, FCT, Abuja. According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO), Nigeria accounts for one of the highest numbers of out-of-school children globally, a situation exacerbated by socio-economic barriers, inadequate infrastructure, and geographic isolation (UNESCO, 2023). This educational gap not only limits the potential of affected children but also undermines national development and perpetuates societal inequalities. In recent years, technological innovations have emerged as a potential solution to bridge this gap. Studies have demonstrated the transformative role of digital tools, e-learning platforms, and mobile technologies in extending education to marginalised and underserved populations (Akinola, 2021). These tools provide flexible, scalable, and inclusive approaches that can overcome many of the barriers associated with traditional schooling. However, the implementation of such technologies in Gwagwalada faces challenges, including limited access to digital devices, poor internet connectivity, and insufficient training for educators (Okafor & Adeyemi, 2022). This study examines how technology can be leveraged to reach and educate out-of-school children in Gwagwalada, Area Council, FCT, Abuja. It explores the application of innovative delivery tools, such as mobile learning applications, radio and television broadcasts, and community-based digital hubs. Furthermore, the study highlights the obstacles hindering the adoption of these technologies and provides recommendations to enhance their effectiveness and scalability.

Objectives of the Study

1. To identify the potential roles of digital tools, e-learning platforms, and mobile technologies in addressing the educational needs of out-of-school children.
2. To examine the effectiveness of delivery tools such as mobile learning applications, radio and television broadcasts, and community-based digital hubs.

Research Questions

1. What are the potential roles of digital tools, e-learning platforms and Mobile technologies in addressing the educational needs of out-of-school children?
2. What is the effectiveness of delivery tools such as Mobile Learning Applications, radio and television broadcasting and Community-Based Digital Hubs?

Literature Review

This study is grounded in the Diffusion of Innovations Theory, proposed by Rogers (2003), which explains how new ideas and technologies spread within a society. The theory identifies five key attributes: relative advantage, compatibility, complexity, trialability, and observability that influence the adoption of innovations. In the context of this study, these attributes help to understand how technological solutions, such as digital tools and e-learning platforms, can be effectively adopted to address the challenges faced by out-of-school children in Nigeria.

Another relevant theoretical framework is the Digital Divide Theory, which examines disparities in access to and use of technology across different populations (van Dijk, 2020). This theory is critical to understanding the systemic inequalities that hinder marginalised communities from benefiting fully from technological advancements. In the Nigerian context, factors such as socio-economic status, geographic location, and inadequate infrastructure exacerbate this divide (Okafor & Adeyemi, 2022). Addressing these issues requires targeted interventions to ensure equitable access to digital resources. The use of technology to address the issue of out-of-school children has gained increasing attention globally and in Nigeria. This literature review explores the potential of technological interventions, identifies challenges to adoption, and highlights successful strategies and policy recommendations from various studies.

Studies have demonstrated the transformative role of technology in extending education to underserved and marginalised populations. Mobile learning applications, for instance, have been effective in providing access to educational content for children in remote areas, enabling self-paced learning and reducing dependency on physical schools (Akinola, 2021). Similarly, e-learning platforms have shown promise in delivering structured content, assessments, and interactive lessons, offering an alternative pathway to education for out-of-school children (UNICEF, 2022).

In Nigeria, radio and television broadcasts have historically been used to disseminate educational programs to rural and underserved communities (Okafor & Adeyemi, 2022). These media, despite their simplicity, have proven effective in contexts where access to the internet and digital devices is limited. Community-based digital hubs, which provide shared access to digital tools and internet connectivity, have also been highlighted as viable solutions for reaching marginalised populations (World Bank, 2023)

The integration of technology into educational initiatives in Nigeria faces several challenges. Poor digital infrastructure, including inadequate internet connectivity and unreliable electricity supply, remains a significant barrier, particularly in rural areas (Chukwu & Ibrahim, 2021). Furthermore, the high cost of digital devices such as smartphones, tablets, and laptops makes them inaccessible to many low-income families (Okafor & Adeyemi, 2022). Another critical challenge is the lack of technical skills among educators, who are often unprepared to integrate technology into teaching and learning processes (UNESCO, 2023). Resistance to adopting new technologies due to cultural attitudes and limited awareness further complicates efforts to scale up digital education solutions (van Dijk, 2020). These challenges necessitate targeted interventions to address infrastructure deficits, reduce costs, and build digital literacy among educators and learners alike.

Globally, the use of digital tools has demonstrated significant positive impacts on learning outcomes. For instance, mobile learning technologies have been shown to improve literacy and numeracy skills in low-resource settings, with evidence from countries in sub-Saharan Africa indicating enhanced student engagement

and retention (UNICEF, 2022). Similarly, blended learning models that combine face-to-face instruction with digital content delivery have proven effective in improving educational quality and equity (Chukwu & Ibrahim, 2021).

However, the effectiveness of these tools in Nigeria is influenced by local factors such as socio-economic disparities, government policies, and community support. Research indicates that while digital tools have the potential to address the educational gap, their success depends on the extent to which they are adapted to the specific needs of Nigerian learners and integrated into the broader education system (Akinola, 2021).

To maximise the potential of technology in addressing the out-of-school children crisis, researchers and international organisations have emphasised the need for robust policy frameworks and strategic investments. UNESCO (2023) recommends increased funding for digital infrastructure and the development of affordable, locally produced learning devices. Similarly, UNICEF (2022) advocates for partnerships between governments, private sector stakeholders, and non-governmental organisations to scale up successful interventions and ensure sustainability. Community involvement has also been highlighted as a critical factor in the success of digital education initiatives. Studies suggest that involving parents, local leaders, and community organisations in the planning and implementation of technological interventions can enhance acceptance and adoption (World Bank, 2023).

Methodology

This study adopted a descriptive survey research design to explore how technology can be leveraged to reach and educate out-of-school children in Gwagwalada, Area Council, FCT, Abuja. The design was chosen for its ability to collect detailed and representative information about the perspectives, experiences, and challenges faced by stakeholders in education and technology (Creswell, 2014). The targeted population included stakeholders in educational institutions and technology companies in Gwagwalada, Area Council, FCT, Abuja. A sample of 150 respondents was drawn using stratified sampling techniques to ensure a diverse perspective among educators, policymakers, and technology experts. To calculate the sample size, Yamane's formula was applied. If the total population is unknown but assumed to be large, and a sample size of 150 respondents is targeted, the application of stratified sampling further ensures representation across key stakeholder groups. The study conducted a pilot test with 20 respondents to validate the research instrument. A reliability coefficient of 0.82 was established using Cronbach's Alpha, confirming the instrument's consistency and accuracy. A stratified sampling technique was employed to ensure diverse representation from key groups, including stakeholders from educational institutions, technology companies, and governmental organisations. The sample was divided into three strata. A total of 150 respondents participated in the study. Among them, 70 were educators, making up the largest group. Policymakers accounted for 50 respondents, while technology experts constituted the remaining 30 participants. This stratified approach ensured a balanced representation of perspectives from each stakeholder group. The validity of the questionnaire was established through expert review by professionals in education and technology, ensuring the items were relevant and aligned with the research objectives. A pilot study was conducted with 20 respondents to test the clarity, reliability, and appropriateness of the instrument. Reliability was measured using Cronbach's Alpha, yielding a coefficient of 0.82, which indicates a high level of internal consistency (Tavakol & Dennick, 2011). The questionnaires were distributed electronically via email and social media platforms to maximise reach and participation. Physical copies were also distributed to respondents in areas with limited internet access. The data collection process spanned four weeks, ensuring sufficient time to achieve a high response rate. The data were analysed using descriptive statistics, including frequencies, percentages, and mean scores, to summarise respondents' perceptions and experiences. The findings were presented using tables.

Results

This section presents and analyses data collected from 150 respondents on the use of technology in addressing the educational needs of out-of-school children in Gwagwalada Area Council, FCT, Abuja. The responses provide insights into three key areas: the roles of digital tools, e-learning platforms, and mobile technologies; the effectiveness of delivery tools such as mobile applications, radio, television, and community-based hubs; and the major challenges limiting technology adoption, including infrastructure, cost, and educator training. The summary of responses is presented in Table 1.

Table 1: Answers to Research Questions 1, 2, and 3 (n = 150)

Statement/Question	Frequency	Percentage
1. What are the potential roles of digital tools, e-learning platforms, and mobile technologies in addressing the educational needs of out-of-school children?		
Digital tools can address educational needs effectively	120	80%
E-learning platforms have significant potential	100	66.7%
Mobile technologies play a key role in education	110	73.3%
Digital tools alone cannot meet educational needs	30	20%
Limited potential for e-learning platforms in rural areas	20	13.3%
2. What is the effectiveness of delivery tools such as mobile learning applications, radio and television broadcasting, and community-based digital hubs?		
Mobile learning applications are highly effective	90	60%
Radio broadcasts are effective for remote areas	80	53.3%
Television broadcasts can supplement learning	70	46.7%
Community-based digital hubs are essential for learning	60	40%
These delivery tools are not effective in rural areas	40	26.7%
3. What are the challenges limiting the adoption of technology for educating out-of-school children in Gwagwalada, Area Council, FCT, Abuja, including issues related to infrastructure, cost, and educators' training?		
Lack of infrastructure is a major barrier	130	86.7%
The high cost of learning devices limits adoption	120	80%
Insufficient training for educators in digital tools	100	66.7%
Limited access to the internet hampers adoption	110	73.3%
Resistance from communities to technology-based education	50	33.3%

The findings provide a comprehensive analysis of the roles and challenges associated with digital tools, e-learning platforms, and mobile technologies in addressing the educational needs of out-of-school children in Nigeria. The data reveals both the potential benefits and the obstacles inherent in leveraging technology for this purpose. Digital tools and mobile technologies emerge as highly effective solutions, with 80% and 73.3% of respondents, respectively, recognising their capacity to deliver flexible and scalable learning opportunities. These tools enable diverse educational experiences that bridge gaps in traditional schooling. Similarly, e-learning platforms hold significant promise, as indicated by 66.7% of respondents who view them as valuable supplements to conventional education systems. However, some limitations exist: 20% of respondents believe digital tools alone cannot fully meet educational needs, and only 13.3% consider e-learning platforms effective in rural contexts, highlighting barriers such as inadequate infrastructure and limited digital literacy.

Regarding delivery tools, mobile learning applications (60%) and radio broadcasts (53.3%) are highlighted as the most effective, particularly in remote locations where traditional schooling options are scarce. Television broadcasts (46.7%) play a supplementary role, providing visual resources to enhance learning. Community-based digital hubs (40%) also help bridge the digital divide by providing localised resources for underserved populations. However, more than a quarter of respondents (26.7%) express concerns about the ineffectiveness of these technologies in rural areas, citing unreliable power supply, poor internet connectivity, and inadequate infrastructure.

Challenges to technology adoption remain significant. Infrastructure deficits are the most prominent barrier, as identified by 86.7% of respondents, reflecting a lack of electricity, internet access, and digital tools in rural and underserved regions. The high cost of devices (80%) further exacerbates the issue, making technology inaccessible to marginalised communities. Additionally, insufficient training for educators (66.7%) points to a critical lack of human capacity for integrating digital tools into educational practices. Limited internet access (73.3%) compounds these challenges, as connectivity is essential for digital learning. Cultural and social resistance is another obstacle, with 33.3% of respondents noting community hesitation to embrace technology-based education, necessitating awareness campaigns to build trust and understanding.

To address these challenges, several strategies are proposed. Government investment in digital infrastructure is deemed essential by 93.3% of respondents, highlighting the need for public funding to ensure equitable access. Subsidies or discounts on devices (86.7%) and partnerships with private companies (73.3%) are also seen as

critical measures to reduce the financial burden on learners. Capacity-building initiatives, such as community-based educator training (80%), are emphasised as vital for equipping teachers with the skills needed to maximise the benefits of digital tools. Ensuring affordable internet access (66.7%) is another priority, as connectivity is fundamental to unlocking the potential of online learning platforms and resources.

Conclusion

This study highlights the critical role of digital tools, e-learning platforms, and mobile technologies in addressing the educational challenges faced by out-of-school children in Gwagwalada, Area Council, FCT, Abuja. While these technologies offer significant potential for bridging educational gaps, their effectiveness is hindered by infrastructure deficits, high costs, and limited educator training. Addressing these barriers through targeted investments, strategic partnerships, and capacity-building initiatives can unlock the transformative power of technology, ensuring that marginalised and underserved communities can access quality education. By fostering inclusive digital education systems, Nigeria can advance toward achieving universal education and reducing societal inequalities.

Recommendations

1. Invest in Digital Infrastructure: The government should prioritise investments in digital infrastructure, including reliable internet connectivity, electricity, and the development of localised digital hubs to support equitable access to technology in underserved areas.
2. Subsidise Learning Devices: Implement subsidy programs or partnerships with private companies to make digital devices like smartphones, tablets, and laptops more affordable for low-income families.
3. Train Educators in Digital Tools: Establish community-based training programs to enhance the technical skills of educators, equipping them to integrate technology effectively into teaching and learning processes.
4. Increase Public Awareness and Community Engagement: Conduct awareness campaigns to reduce cultural resistance to technology-based education, fostering community trust and participation in digital learning initiatives.

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