**GAS Journal of Education and Literature (GASJEL)**

OPEN ACCESS

Volume 2, Issue 6, 2025 Journal Homepage: https://gaspublishers.com/gasjel-home/ ISSN: 3048-6777
Email: gaspublishers@gmail.com

# The Need for Upskilling and Reskilling Mathematics Teachers in Edo State, Nigeria

Aramude, Victor, Eromosele Ph.D. & Asika, Margaret Ose Ph.D.

Ambrose Alli University, Ekpoma, Faculty of Education, Department of Curriculum and Instruction

***Received:*** *25.08.2025* | ***Accepted:*** *22.09.2025* | ***Published:*** *24.09.2025*

***Corresponding Author:** Aramude, Victor, Eromosele Ph.D.*

**DOI:** *10.5281/zeno-do.17147.915*

**Abstract** **Case Studies**

This study investigates upskilling and reskilling of mathematics teachers in Edo State., the study adopts a descriptive survey design involving 150 mathematics teachers selected through stratified random sampling across public and private secondary schools in Edo State. Data were gathered using a structured questionnaire and analyzed using both descriptive and inferential statistics. Findings reveal that while most teachers possess moderate digital literacy, particularly in basic computer use and digital tool application necessary for delivery mathematics instructions in modern day rapid evolving pedagogy in line with technology, significant gaps remain in advanced digital competencies, such as online lecture delivery and artificial intelligence integration. The study also identifies key benefits of digitally driven training programs, including improved pedagogical practices, enhanced student engagement, and alignment with global educational trends. However, challenges such as poor funding, lack of regular training, inadequate infrastructure, and high costs of digital tools hinder effective technology integration in teaching. The study recommends comprehensive and continuous professional development initiatives, increased government and stakeholder investment in digital infrastructure, regular curriculum updates, and targeted support for both mid-career and older teachers. These strategies are critical to bridging the digital divide, improving mathematics instruction, and promoting educational innovation in Edo State. The findings offer valuable insights for policymakers, educators, and curriculum developers in fostering a digitally competent teaching workforce capable of delivering 21st-century mathematics education.

**Keywords:** Upskilling, Reskilling, Mathematics Teachers, Professional Development.

Copyright © 2025 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0).

## INTRODUCTION

Mathematics is a fundamental subject essential for fostering critical thinking, problem-solving, and analytical skills (Kilpatrick, Swafford, & Findell, 2001). In Edo State, Nigeria, mathematics education has faced significant challenges, particularly in the areas of teaching methodologies, student engagement, and academic performance. A major factor contributing to these challenges is the inadequacy of digital skills among mathematics teachers, which hampers the effective delivery of lessons in the 21st-century classroom (Ogunleye & Adeyemo, 2022).

In an era marked by rapid technological advancements, shifting educational paradigms, and evolving curriculum standards, the role of mathematics teachers has become increasingly complex and demanding. In Edo State, Nigeria, these challenges are compounded by systemic issues such as limited access to professional development resources, outdated teaching methodologies, and gaps in content knowledge. As a result, there is a growing recognition of the urgent need to upskill and reskill mathematics teachers to ensure they are equipped with the competencies required to deliver effective, engaging, and relevant instructions to students.

Upskilling involves enhancing the current competencies of teachers to meet contemporary demands, while reskilling focuses on preparing them for emerging roles and instructional approaches (World Economic Forum, 2020). In Edo State, both dimensions are vital, as the state strives to close learning gaps, improve students' performance in mathematics, and foster a culture of lifelong learning among teachers. This paper examines the urgent need for upskilling and reskilling mathematics teachers in Edo State, with specific reference to the role, impact, and future direction of the Edo Mathematics Teachers Training Programme. The Edo State Government, recognizing these challenges, launched the Edo Mathematics Teachers Training Programme (EMTTP) as part of its broader educational reform agenda under the EdoBEST initiative (Edo State Government, 2022). The programme aims to equip

mathematics teachers with modern instructional strategies, digital literacy, and content knowledge aligned with both national and global standards. However, the success of such initiatives depends significantly on the commitment to upskilling and reskilling existing educators, particularly in core subjects like mathematics.

With rapid advancements in technology and the increasing integration of digital tools in education, there is a growing need for teachers to upskill and reskill to remain relevant and effective. Digital literacy has become a critical competency for educators worldwide, enabling them to leverage technology to enhance teaching and learning (Voogt et al., 2018). Consequently, upskilling and reskilling mathematics teachers through digitally driven training programs can significantly improve teaching efficiency, student engagement, and overall academic performance in Edo State.

## Statement of the Problem

Despite the increasing global emphasis on digital transformation in education, many mathematics teachers in Edo State still rely on traditional teaching methods that may not adequately meet the needs of 21st-century learners. The lack of digital competence among teachers limits their ability to utilize educational technologies such as interactive simulations, online learning platforms, and data analytics to enhance instructional delivery (Obidike, 2021). This gap has contributed to declining student interest and performance in mathematics, as conventional teaching approaches often fail to cater to diverse learning styles and preferences.

The need for upskilling and reskilling mathematics teachers through digital training programs is urgent. Without structured and continuous professional development, teachers may struggle to adapt to the evolving educational landscape, thereby affecting the quality of mathematics education in the state. Therefore, this study seeks to explore the necessity of digitally driven training initiatives for mathematics teachers in Edo State and their impact on effective teaching and learning.

## Purpose of the Study

The purpose of this study is to examine the need for upskilling and reskilling mathematics teachers in Edo State through digitally driven training. Specifically, the study aims to:

i. Identify the current level of digital literacy among mathematics teachers in Edo State.

ii. Evaluate the benefits of digitally driven training programs for mathematics teachers and students.

iii. Assess the challenges faced by mathematics teachers in integrating digital tools into their teaching practices.

iv. Recommend effective strategies for implementing digital training initiatives for mathematics teachers in Edo State.

## Research Questions

To achieve the objectives of this study, the following research questions will be addressed

i. what is the current level of digital literacy among mathematics teachers in Edo State?

ii. what are the benefits of digitally driven training programs for mathematics teachers and students?

iii. what challenges do mathematics teachers face in integrating digital tools into their teaching practices?

iv. what strategies can be employed to effectively implement digital training initiatives for mathematics teachers in Edo State?

## Significance of the Study

This study is significant for several reasons. Firstly, it will provide insights into the digital competencies of mathematics teachers in Edo State, highlighting areas that require improvement. Secondly, the study will contribute to the growing body of research on digital education by identifying effective training strategies that can enhance mathematics instruction. Thirdly, policymakers and educational stakeholders can use the findings to design targeted professional development programs that align with global best practices. Finally, the study will benefit mathematics teachers by equipping them with essential digital skills, thereby improving their instructional delivery and enhancing student learning outcomes.

## Scope of the Study

This study focuses on mathematics teachers in Edo State, Nigeria, and examines their need for digital upskilling and reskilling. The research will explore teachers' digital literacy levels, challenges in integrating digital tools, and the impact of digitally driven training on teaching effectiveness. The study will be limited to selected secondary schools in Edo Central Education Zone in Edo State to ensure a comprehensive analysis of the subject matter.

## Definition of Key Terms

**Upskilling:** The process of enhancing an individual's existing skills to improve their performance in their current role.

**Reskilling:** The process of learning new skills to adapt to changing job requirements or career shifts.

**Digital Literacy:** The ability to effectively use digital tools and technologies for various tasks, including teaching and learning.

**Digitally Driven Training:** Training programs that incorporate digital technologies such as online courses, virtual simulations, and interactive platforms to enhance learning outcomes.

# LITERATURE REVIEW

The evolving landscape of education necessitates continuous professional development for teachers, especially in mathematics. The integration of digital technology into teaching has made it essential for educators to be upskilled and

reskilled to meet contemporary pedagogical demands.

Upskilling refers to enhancing existing skills to adapt to new educational tools and methodologies, while reskilling involves acquiring new competencies to stay relevant in an evolving profession (OECD, 2021). In mathematics education, both concepts are crucial for integrating technology into the curriculum effectively (Mishra & Koehler, 2006).Mathematics instruction has been transformed by digital tools such as interactive whiteboards, learning management systems (LMS), and artificial intelligence-driven applications (Becta, 2020). Studies indicate that teachers trained in digital pedagogies improve students' engagement and performance (Kay, LeSage, & Knaack, 2021).Mathematics teachers in Edo State face several challenges, including: limited access to digital resources (UNESCO, 2022), inadequate training opportunities (Olumese&Omoike, 2021), resistance to change due to lack of digital literacy (Adeyemi, 2020) and poor infrastructure and internet connectivity (Nwoke, 2019).

Despite these challenges, digital-driven training offers numerous opportunities, including: online professional development courses (Coursera, 2021), government and private sector partnerships (World Bank, 2022), Interactive platforms like GeoGebra and Desmos (Pierce & Stacey, 2020).

This study is grounded in the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006), which emphasizes the integration of technology into teaching for effective knowledge delivery.

The necessity for upskilling and reskilling mathematics teachers in Edo State, Nigeria, is underscored by the rapid evolution of educational methodologies and the increasing integration of digital technologies in teaching. In the context of Edo State, a study by Zekeri-Obasogie and Idehen (2023) highlighted that while mathematics teachers acknowledged the importance of integrating digital technologies into their teaching practices, there was a notable gap in their preparedness to do so effectively. This gap is attributed to insufficient training during their teacher education programs, which often lack a comprehensive focus on Technological Pedagogical Content Knowledge (TPACK), a framework essential for the effective integration of technology in teaching (Zekeri-Obasogie & Idehen, 2023).

The benefits of digitally driven training programs for mathematics teachers and students are manifold. Such programs enhance teachers' technological literacy, enabling them to utilize digital tools to create interactive and engaging learning environments. For students, these tools facilitate a deeper understanding of mathematical concepts through visualizations and simulations, catering to diverse learning styles and promoting critical thinking skills (Viberg et al., 2020; Durrani et al., 2023). Moreover, digitally literate teachers are better equipped to adapt to the evolving educational landscape, ensuring that students receive a relevant and contemporary education.

However, the integration of digital tools into teaching practices is not without challenges. In Edo State, a study by Franlyn-Osakue and Job (2024) found that while teachers had access to various digital platforms, traditional teaching methods still predominated due to a lack of training and support. Similarly, nationwide, the Universal Basic Education Commission (UBEC) reported that over 60% of teachers in Nigeria's public primary schools lacked the digital literacy required to participate effectively in e-learning environments (UBEC, 2021). These challenges are compounded by infrastructural issues such as unreliable electricity supply, limited internet connectivity, and inadequate digital resources, which hinder the effective use of technology in education (Ephraim, 2020; Adediran et al., 2016).

To address these challenges and enhance the digital competencies of mathematics teachers in Edo State, it is imperative to implement targeted strategies. These should include the incorporation of comprehensive ICT training into teacher education curricula, provision of ongoing professional development opportunities, and the establishment of robust digital infrastructures in schools. Furthermore, fostering a culture of continuous learning and adaptation among educators will be crucial in ensuring the successful integration of digital technologies into mathematics teaching.

The upskilling and reskilling of mathematics teachers in Edo State are essential for the effective integration of digital technologies in education. By addressing the existing gaps in digital literacy and providing the necessary support and resources, educators can be better equipped to enhance the learning experiences of their students, thereby contributing to the achievement of educational goals and the broader objectives of sustainable development.

## METHODOLOGY

This study adopts a descriptive survey design. The descriptive survey is considered appropriate because it enables the researcher to collect data from a large population to describe existing conditions, opinions, and attitudes concerning the upskilling and reskilling of mathematics teachers. This design helps to analyze the gap between current teaching competencies and the emerging demands of the 21st-century mathematics curriculum.

The target population for this study comprises all mathematics teachers in public and private secondary schools across the 18 Local Government Areas (LGAs) of Edo State. This includes both junior and senior secondary school mathematics teachers. A sample size of 150 mathematics teachers was selected from the population using a stratified random sampling technique. The stratification was based on school type (public and private), location (urban and rural), and level (junior or senior secondary). This technique ensures representation across different demographics and enhances the generalizability of the findings.

The primary instrument used for data collection was a structured questionnaire titled: "Mathematics Teachers' Upskilling and Reskilling Needs Questionnaire (MTURNQ)".

The questionnaire was divided into four sections, Section A elicits demographic information such as age, gender, years of experience, qualification, Section B: Teachers' current professional development status, Section C: Perceived need for

upskilling and reskilling. And Section D:Barriers and challenges to accessing professional development.

The questionnaire items were designed on a 5-point Likert scale ranging from Strongly Agree (5) to Strongly Disagree (1).

The content validity of the instrument was ensured through expert reviews. Three specialists in mathematics education and educational measurement from the Faculty of Education at Ambrose Alli University, Ekpoma reviewed the draft questionnaire. Suggestions and corrections made by the experts were incorporated into the final version.

The reliability of the instrument was tested using the test-retest method. The questionnaire was administered to 20 mathematics teachers from Delta State (a neighboring state) who were not part of the main study. After a two-week interval, the same instrument was re-administered to the same group. The responses were analyzed using the Pearson Product Moment Correlation Coefficient, and a reliability coefficient of 0.82 was obtained, indicating a high level of reliability.

The researcher personally administered the questionnaires to selected schools with the help of trained research assistants. Consent was sought from school authorities and individual teachers before administering the instruments. Teachers were given one week to complete and return the questionnaires to ensure thoughtful and honest responses.

Data collected were analyzed using descriptive and inferential statistics. Descriptive statistics such as mean, standard deviation, and percentages were used to summarize responses. The independent t-tests were used to test the research questions. All analyses were carried out using the Statistical Package for Social Sciences (SPSS) version 25. This study adhered to ethical research standards. Participation was voluntary, and informed consent was obtained from all respondents. Participants were assured of the confidentiality and anonymity of their responses. No names or identifying information were included in the questionnaire or in the reporting of the findings.

## Results and Discussion

### Demographic Characteristics of Respondents

**Table 1: Age of Respondents**

| **Age (Years)** | **Below 30** | **31-35** | **36-40** | **41-45** | **46-50** | **51-above** |
|---|---|---|---|---|---|---|
| | 3 | 30 | 80 | 17 | 15 | 5 |

Majority of the respondents falls within the 36–40 age bracket (80 respondents) followed by those in the 31–35 bracket (30 respondents). Both group (110 out of 150 total) represents over 73% of the sample. Indicating that majority were mid career teachers. These mid-career teachers are likely to have been teaching for a decade or more. While they have substantial classroom experience, their teacher training may not have included recent pedagogical innovations or digital tools. Therefore, reskilling is crucial to update their knowledge in line with current curricula, assessment strategies, and technology integration. Also, Upskillingcan enhance their competence in using modern approaches like blended learning, competency-based assessments, and differentiated instruction in mathematics.

Table 1 shows that only 3 respondents are below 30 years, indicating that few young or newly trained teachers are currently in the system. This implies that there is a gap in teacher recruitment or retention of younger educators in Edo State. This means the system may rely heavily on more experienced (but possibly outdated in method) staff, increasing the urgency for system-wide upskilling and professional development programs.

The Table also indicated that teachers approaching retirement 46–50 (15) and 51 and above (5) together account for 13.3% of the sample. Implying that these older teachers may have the most traditional training and may require reskilling to adapt to new mathematics teaching standards, especially with the increasing integration of ICT into education. However, their motivation and openness to reskilling may vary and should be supported with tailored professional development.

### Current level of digital literacy among mathematics teachers in Edo State

**Scale: VH = Very High, H= High NH= Not High, NVH= Not Very High**

**Table 2: Current level of digital literacy among mathematics teachers in Edo State**

| | **Ease of Access of serials** | **VH** | **H** | **NH** | **NVH** | **F** | **Mean** | **Decision** |
|---|---|---|---|---|---|---|---|---|
| 1 | Use of Digital Tools | 16 | 54 | 70 | 10 | 376 | 2.51 | High |
| 2 | Computer literacy | 45 | 15 | 60 | 30 | 375 | 2.5 | High |
| 3 | Social media usage | 25 | 35 | 60 | 30 | 355 | 2.37 | Not High |
| 4 | Online Lecture Delivery | 20 | 26 | 40 | 64 | 302 | 2.01 | Not High |
| 5 | AL competency | 10 | 16 | 54 | 70 | 266 | 1.77 | Not very High |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6 | Digital Device Integration in Classroom | 15 | 30 | 45 | 60 | 300 | 2.0 | Not High |

**Source: Field Survey, 2025**

According to Table 2 use of Digital Tools had a high mean score of 2.51 suggesting that mathematics teachers in Edo State have a relatively good knowledge of digital tools, indicating some degree of familiarity and willingness to engage with technology. Also, computer Literacy had a high mean score of 2.5, a positive indicator that teachers possess foundational computer skills. However, since this rating is just at the border of high, it may not reflect more advanced competencies like programming, data handling, or educational software use. Social Media has a low mean score of 2.37. This reflects moderate usage, possibly limited to personal use rather than for educational or professional development purposes. It suggests a gap in leveraging social media for teaching, networking, or learning. Online Lecture Delivery was very low with a mean: score of 2.01, suggesting that teachers struggle with delivering lectures online, which is a critical component of digital pedagogy. AL (Artificial Learning or Adaptive Learning) Competency also had a very low mean score of 1.77. This is the lowest rated skill (Table 2). It highlights a significant gap in awareness or ability to use AI or adaptive learning technologies, which are increasingly vital in modern classrooms. Digital Device Integration in Classroom was also low with a low mean score of 2.0, indicating that teachers are struggling to effectively incorporate digital devices into lesson delivery and student engagement, suggesting a clear need for professional development in tech-enhanced pedagogy.

Analysis of Table 2 strongly suggests that while foundational digital literacy exists, there arecritical gaps in applied and pedagogical use of technology. Therefore, Upskilling is needed in areas like online teaching, adaptive learning technologies, and device integration in classrooms. On the other hand, reskilling may be necessary for older or less tech-savvy teachers to meet current digital education standards. Structured professional development programs, workshops, and ongoing digital mentorship would be essential to bridge these gaps. Integration of digital pedagogy in teacher training colleges and state-led ICT initiatives could also help sustain long-term change.

## Benefits of digitally driven training programs for mathematics teachers and students

**Scale: SA = Strongly Agreed, A=Agreed, D = Disagreed, SD= Strongly Disagreed**

**Table 3: Benefits of digitally driven training programs for mathematics teachers and students**

| S/N | Benefit | SA | A | D | SD | F | Mean | Decision |
|---|---|---|---|---|---|---|---|---|
| 1 | To enhance personal studies | 60 | 64 | 16 | 10 | 474 | 3.16 | Agreed |
| 2 | Enable teachers to research | 70 | 54 | 16 | 10 | 484 | 3.23 | Agreed |
| 3 | To stay up to date on trending Pedagogy and curricula | 74 | 50 | 16 | 10 | 488 | 3.25 | Agreed |
| 4 | To facilitate learning and studies on some difficult topics | 60 | 64 | 16 | 10 | 474 | 3.16 | Agreed |
| 5 | Competency with trending Classroom technology | 72 | 53 | 15 | 10 | 487 | 3.25 | Agreed |

**Source: Field Survey, 2025**

Table 3 reveals insightful information regarding the current state and perception of digital literacy among mathematics teachers in Edo State, as well as the potential benefits of digitally driven training programs for both teachers and students. The table reflects a generally positive disposition towards digital tools and technologies in mathematics education, which underscores the growing need for upskilling and reskilling initiatives.

The mean scores across all the listed benefits range from 3.16 to 3.25, indicating a consistent agreement among respondents on the value of digital integration in their teaching practices. Notably, items such as "to stay up to date on trending pedagogy and curricula" (mean = 3.25) and "competency with trending classroom technology" (mean = 3.25) highlight the teachers' recognition of the relevance of modern pedagogical strategies and tools. These findings imply that while the mathematics teachers may not yet be fully proficient in digital literacy, they acknowledge its importance and are inclined towards its adoption showing a readiness for digital transformation in teaching. This suggests a moderate but significant level of digital literacy among mathematics teachers in the State. Teachers seem aware of the role that digital tools play in education today, and they exhibit a willingness to engage with these tools to improve both teaching and learning outcomes. However, the need for structured upskilling and reskilling

programs becomes evident as the current proficiency levels might not be sufficient for the full integration of digital technologies in mathematics instruction.

According to the Table, digitally driven training programs offer a range of benefits. They enhance personal studies (mean = 3.16) by allowing teachers to access a wealth of online resources and learning platforms. These programs also empower teachers to conduct independent research (mean = 3.23), thereby fostering a culture of continuous professional development. Furthermore, digital tools can simplify the teaching of difficult mathematical concepts (mean = 3.16), improving comprehension and engagement among students. Most importantly, such programs enable educators to keep pace with the evolving educational landscape, including the integration of AI, adaptive learning technologies, and interactive software (Aduwa-Ogiegbaen & Iyamu, 2005; Ifinedo, 2017).

Teachers who are digitally literate are better positioned to utilize resources such as simulations, virtual manipulatives, and collaborative tools, which have been shown to significantly enhance student achievement in mathematics (Li & Ma, 2010). Moreover, digitally competent teachers serve as role models, preparing students for a technologically advanced society and workplace.

while mathematics teachers in the State appear to have a foundational awareness of digital tools and their educational relevance, the current data suggests a pressing need for formal upskilling and reskilling programs. Such initiatives would not only solidify their competencies but also maximize the benefits of technology-enhanced education for students.

## Challenges faced by mathematics teachers in integrating digital tools into their teaching practices

**Scale: SA = Strongly Agreed, A = Agreed, D= Disagreed, SD = Strongly Disagreed**

**Table 4: Challenges faced by mathematics teachers in integrating digital tools into their teaching practices**

| S/N | Challenges | SA | A | D | SD | F | Mean | Decision |
|---|---|---|---|---|---|---|---|---|
| 1 | Technical issues while using technology | 64 | 26 | 40 | 20 | 434 | 2.89 | Agreed |
| 2 | Difficulty in accessing government sponsored technical support | 84 | 26 | 20 | 20 | 474 | 3.16 | Agreed |
| 3 | Poor funding of schools | 61 | 15 | 44 | 30 | 407 | 2.71 | Agreed |
| 4 | Cost of buying data | 25 | 35 | 60 | 30 | 355 | 2.37 | Disagreed |
| 5 | High cost of digital devices | 60 | 64 | 16 | 10 | 474 | 3.16 | Agreed |
| 6 | Irregular Training Programmes | 72 | 53 | 15 | 10 | 487 | 3.25 | Agreed |

**Source: Field Survey, 2025**

Table 4 shows the Challenges faced by mathematics teachers in integrating digital tools into their teaching practices. One of the most prominent challenges reported is the irregularity of training programmes, with a high mean score of 3.25. This suggests that many teachers have limited access to consistent and structured professional development opportunities. In a digital age where technological tools and pedagogies evolve rapidly, the absence of regular training severely hampers teachers' ability to adapt. This findings aligns with the report of Mishra and Koehler (2006), who posited that effective technology integration requires a deep understanding of the Technological Pedagogical Content Knowledge (TPACK) framework, which cannot be achieved without sustained professional learning. Thus, structured and recurring training programmes are essential for equipping mathematics teachers with the skills needed to teach effectively using digital tools. The difficulty in accessing government-sponsored technical support also scored high (mean = 3.16), suggesting systemic gaps in infrastructure and policy implementation. Without reliable technical support, even teachers willing to adopt digital tools may struggle with issues beyond their control, such as software failures, lack of internet connectivity, or device malfunctions. As highlighted by Ololube*et al.* (2009), government intervention in the form of accessible and responsive technical support systems is vital to the successful adoption of ICT in education.

Furthermore, technical issues while using technology (mean = 2.89) were commonly reported. These issues are often symptomatic of a lack of digital fluency, which again underscores the need for upskilling. Teachers must not only know how to operate digital tools but also how to troubleshoot minor issues and apply technology meaningfully within a pedagogical context.

Another significant challenge is the high cost of digital devices which had a mean score of 3.16. indicating that many teachers may not be able to afford personal digital tools, and schools often lack the funds to provide these devices in adequate numbers. This concern links closely with the poor funding of schools which had a high mean = 2.71, which was also agreed upon by respondents. Without sufficient funding, the acquisition of digital infrastructure, maintenance of existing technology, and implementation of teacher training initiatives remain limited. This findings agrees with UNESCO (2019), which posits that sustainable investment in educational technology and teacher training is a critical lever for improving STEM education in developing regions.

Interestingly, the cost of buying data was not seen as a significant barrier as this got a low mean score of 2.37. This may indicate that while internet access is still a concern, it is not as pressing as the systemic issues of training and infrastructure. Nevertheless, in a digital learning environment, consistent access to affordable and high-speed internet remains a foundational requirement.

Generally, the data reflects a critical need for a comprehensive upskilling and reskilling strategy for mathematics teachers in the Area. This should include regular professional development programmes, improved access to government-sponsored support services, adequate funding for schools, and the provision of digital devices. These efforts must be coordinated through policy frameworks that prioritize teacher empowerment, in alignment with global best practices in digital education.

## Effective strategies for implementing digital training initiatives for mathematics teachers in Edo State.

**Scale: SA = Strongly Agreed, A = Agreed, D= Disagreed, SD = Strongly Disagreed**

**Table 5: Effective strategies for implementing digital training initiatives for mathematics teachers in Edo State.**

| S/N | Challenges | SA | A | D | SD | F | Mean | Decision |
|---|---|---|---|---|---|---|---|---|
| 1 | Provision of Smart Classroom | 94 | 26 | 10 | 20 | 494 | 3.29 | Agreed |
| 2 | Regular Training Programme to upskill and reskill Mathematics teachers | 84 | 26 | 20 | 20 | 474 | 3.16 | Agreed |
| 3 | Adequate funding of schools | 61 | 15 | 44 | 30 | 407 | 2.71 | Agreed |
| 4 | Provision of free access to internet | 64 | 26 | 40 | 20 | 434 | 2.89 | Agreed |
| 5 | Free supply of Digital tools to Mathematics teachers | 60 | 64 | 16 | 10 | 474 | 3.16 | Agreed |
| 6 | Regular updating of mathematics curriculum to suit modern day needs | 79 | 53 | 10 | 8 | 503 | 3.55 | Agreed |

Table 5 presents effective strategies for implementing digital training initiatives for upskilling and reskilling mathematics teachers in Edo State, Provision of Smart Classrooms had a mean score of 3.29, indicating that provision of smart classrooms is seen as a crucial step in digitally transforming the learning environment. Smart classrooms offer the tools needed to deliver interactive, technology-driven lessons, allowing teachers to integrate modern digital resources such as virtual manipulatives, educational software, and simulations into their teaching of abstract mathematical concepts. Regular Training Programmes to Upskill and Reskill Mathematics Teachers also had a high mean score of 3.16 indicating a clear support for continuous professional development. As digital tools and platforms evolve rapidly, it becomes imperative for mathematics teachers to regularly update their skills, not only to use technology effectively but also to rethink pedagogy in a way that leverages digital potential. Upskilling ensures competency in digital tool usage, while reskilling prepares teachers for shifts in curriculum and instructional methods. Also, adequate funding of Schools got a mean score of

2.71. Though this item received the lowest mean score it still had a support of the majority. Adequate funding is foundational to all other strategies; without financial support, procurement of digital tools, provision of internet, and organization of training programs cannot be sustained. This result may suggest that while important, participants may perceive funding challenges as external or systemic, rather than something directly implementable. Provision of Free Access to Internet had a mean Score a mean 2.89, free internet access is considered essential. For teachers to fully participate in digital training and access global teaching resources, reliable and unrestricted internet is non-negotiable. This is particularly important in rural or underserved areas in Edo State, where internet access remains limited or costly. Also, Free Supply of Digital Tools to Mathematics Teachers had a mean of 3.16, this reflects strong agreement on the need for equipping teachers with the hardware and software required for digital instruction such as tablets, laptops, projectors, and specialized mathematics software. Without these tools, even the best training initiatives would be rendered ineffective.

Finally, regular updating of the Mathematics Curriculum to suit Modern-Day needs received the highest mean score 3.55, highlighting its perceived importance. For digital training to be meaningful, the curriculum must reflect current trends in mathematical applications and technology integration. Curriculum updates ensure relevance, foster innovation, and encourage teachers to adopt modern pedagogical approaches.

Table 5 strongly shows the need for structured, well-funded, and consistent upskilling and reskilling initiatives for mathematics teachers in Edo State. To ensure successful implementation of digital training, a multi-pronged strategy should be adopted addressing infrastructure, internet access, curriculum reform, and ongoing professional development.

These findings suggest that stakeholders (government, NGOs, and school leadership) should prioritize these agreed-upon strategies to prepare educators for a digitally competent future.

## Result and Discussion

- The current digital literacy of mathematics teachers in Edo State is moderate. While teachers show a relatively high competency in basic digital tools and computer literacy (Mean ~2.5), their skills in advanced areas such as online lecture delivery, artificial intelligence (AI) tools, and integration of digital devices into classrooms are notably low (Mean ranging from 1.77 to 2.01). This reflects a gap between technological advancements and teachers' preparedness to use them effectively in instruction.
- Respondents widely agreed on the value of digital training programs. These programs enhance personal study, research, and pedagogical knowledge, enable competency in new classroom technologies, and help in simplifying complex topics. All listed benefits scored above 3.0 on the Likert scale, showing strong support for digital upskilling.
- The study identified key barriers such as: Inadequate technical support from the government, poor school funding, high cost of digital devices and irregular training programs.
- These challenges significantly hinder the integration of digital tools into mathematics instruction. Notably, the cost of internet data was not considered a major barrier by most respondents.
- Respondents strongly endorsed several strategies which include: Establishment of smart classrooms, regular, structured training programs, adequate funding and provision of free digital tools, regular curriculum updates to reflect modern needs. All strategies received mean scores above 2.7, with the highest-rated being curriculum updates (Mean = 3.55).
- Majority of teachers are mid-career (ages 31–40), highlighting the urgency to update their pedagogical skills to align with 21st-century demands.
- There is a shortage of younger teachers (only 2% under 30), suggesting potential recruitment and retention issues.
- Older teachers nearing retirement may require more tailored support to adopt new technologies.

## CONCLUSION

The findings of this study strongly underscore the urgent need for structured upskilling and reskilling of mathematics teachers in Edo State through digitally driven initiatives. While most teachers have foundational digital literacy, their proficiency in leveraging modern educational technologies remains insufficient for the demands of current teaching practices. Challenges such as lack of funding, inadequate support, and irregular training programs further compound this gap. However, the strong consensus on the benefits of digital training and the identified strategies for successful implementation provide a clear roadmap for stakeholders. To foster a digitally competent mathematics teaching workforce, Edo State must prioritize investments in professional development, infrastructure, and curriculum modernization. Only then can mathematics education in the state fully align with global best practices and effectively prepare students for the challenges of a digital and knowledge-driven economy.

## RECOMMENDATIONS

Based on the findings of this study, it is recommended that

i. comprehensive and continuous professional development initiatives should be carried out regularly to train mathematics teachers

ii. Government and stakeholder in education should invest in digital infrastructure,

iii. regular curriculum updates should be carried out in Mathematics to make teachers deliver topics that meet their training requirements

iv. targeted support for both mid-career and older teachers should be regularly carried out

## REFERENCES


Adediran, A. A., et al. (2016). *Digital literacy and skills development in Nigeria: Policies, barriers and recommendations*. https://www.researchgate.net/publication/383860373.

Aduwa-Ogiegbaen, S. E., &Iyamu, E. O. S. (2005). Using information and communication technology in secondary schools in Nigeria: Problems and prospects. *Educational Technology & Society, 8*(1), 104–112.

Durrani, M., et al. (2023). *The impact of digital transformation on teacher preparedness in mathematics education: Strategic insights for achieving SDG 4*. *International Journal of Research and Innovation in Social Science, 7*(1), 1–9.

Edo State Government. (2022). *EdoBEST annual report*. [Official website].

Ephraim, O. T. (2020). *Digital literacy: A review of teacher education in Nigeria*. Academia.edu. https://www.academia.edu/35944544.

Franlyn-Osakue, F. H., & Job, G. C. (2024). *Assessment of digital literacy and use of scripted lesson plan among secondary school teachers in Benin Metropolis, Edo State*. *Zamfara International Journal of Education, 6*(1), 1–10.

Ifinedo, P. (2017). Examining students' continuance intentions of using web-based learning systems: An integrated TAM and TPB model. *International Journal of Educational Technology in Higher Education, 14*(1), 1–20.

Kilpatrick, J., Swafford, J., &Findell, B. (2001). *Adding it up: Helping children learn mathematics*. National Academy Press.

Lawless, K. A., & Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning: Knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research, 77*(4),

575–614.

Li, Q., & Ma, X. (2010). A meta-analysis of the effects of computer technology on school students' mathematics learning. *Educational Psychology Review, 22*(3), 215–243.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teacher knowledge. *Teachers College Record, 108*(6), 1017–1054.

Obidike, N. D. (2021). Exploring digital literacy among secondary school teachers in Nigeria. *African Journal of Education and Information Technology, 9*(1), 112–130.

Obioma, G., &Salau, M. (2019). Challenges of mathematics education in Nigeria. *Nigerian Journal of Educational Studies, 15*(2), 45–58.

Ogunleye, A. O., &Adeyemo, S. A. (2022). Digital competency of mathematics teachers in Nigeria: Challenges and prospects. *Journal of Educational Technology Research, 15*(2), 45–60.

Ololube, N. P., Ubogu, A. E., &Egbezor, D. E. (2009). ICT and distance education in Nigeria: A review of literature and accounts. *International Open and Distance Learning Journal, 2*(1), 1–13.

UBEC. (2021, February 5). *60 percent of Nigeria teachers lack functional digital literacy*. Daily Post Nigeria. https://dailypost.ng/2021/02/05/60-percent-of-nigeria-teachers-lack-functional-digital-literacy-ubec/

UNESCO. (2019). *Digital skills critical for jobs and social inclusion*. https://unesdoc.unesco.org

Viberg, O., et al. (2020). The impact of digital transformation on teacher preparedness in mathematics education: Strategic insights for achieving SDG 4. *International Journal of Research and Innovation in Social Science, 7*(1), 1–9.

Voogt, J., Knezek, G., Cox, M., Knezek, D., & ten Brummelhuis, A. (2018). Under which conditions does ICT have a positive effect on teaching and learning? *Educational Technology & Society, 21*(3), 55–65.

World Economic Forum. (2020). *The future of jobs report*. https://www.weforum.org

Zekeri-Obasogie, E. F., & Idehen, F. O. (2023). *Teachers perceived preparedness in integrating digital technology in the teaching of mathematics in Edo South Senatorial District, Edo State, Nigeria*. *African Journal of Computing and Information Technology, 7*(2), 66–81.