



## Perceptions and implementation of activity-based learning in Nigerian primary school mathematics education challenges and opportunities

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### Abstract

This study explores the perceptions of Nigerian primary school teachers regarding the use of activity-based learning (ABL) methods in teaching mathematics. Utilizing an online survey, data were collected from 30 primary school mathematics teachers across Nigeria. The findings reveal that while traditional lecture-based methods are still prevalent, there is a growing inclination towards ABL due to its effectiveness in enhancing student engagement and understanding. Teachers highlighted the need for comprehensive and continuous training to effectively implement ABL, alongside significant challenges such as limited resources, large class sizes, and insufficient time allocation. The study underscores the necessity for systemic changes, including improved training programs, better resource allocation, supportive policies, and community involvement, to facilitate the successful adoption of ABL methods in Nigerian primary schools.

**Keywords:** Activity-Based Learning (ABL); Mathematics Education; Nigerian Primary Schools; Teaching Methods; Teacher Training; Educational Resources

### 1. Introduction

Mathematics education in Nigerian primary schools plays a crucial role in the overall educational development of children (Omolafe, 2021). From the earliest stages of schooling, mathematics forms a foundation for cognitive development and problem-solving skills, which are essential for academic and life success. Given its foundational importance, ensuring effective mathematics instruction in primary schools is paramount (Olanrewaju, 2023). Mathematics supports understanding other subjects, such as science and technology, and fosters critical thinking and analytical skills that students carry into their future education and careers. In Nigeria, where education is seen as a vital tool for national development, the significance of strong mathematics education cannot be overstated (Onoshakpokaiye, 2020; Rabillas et al., 2023; Szabo, Körtesi, Guncaga, Szabo, & Neag, 2020).

Despite its importance, traditional mathematics teaching methods in Nigerian primary schools have faced significant criticism. The conventional lecture-based approach, where teachers dominate the classroom with little student interaction, has several shortcomings (Obidile, 2021). This method often results in passive learning, where students are mere recipients of information rather than active participants in their learning process. Such an approach has been linked to a lack of engagement, poor retention of mathematical concepts, and a general disinterest in the subject. Furthermore, the traditional method relies heavily on rote memorization, which fails to develop a deep understanding of mathematical principles and their applications (Salame, Ramirez, Nikolic, & Krauss, 2022).

In response to these challenges, there has been a shift towards adopting alternative teaching methodologies, with activity-based learning (ABL) emerging as a promising approach. ABL emphasizes active student participation, hands-

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on activities, and real-world problem-solving tasks. This method aims to make learning more engaging and effective by involving students directly in their educational experiences (Behera, Khuntia, & Kar; Gupta, 2023; Vansdadiya, Vasoya, & Gondaliya, 2023).

The aim of this study is to investigate the perceptions of Nigerian primary school teachers towards the use of activity-based learning methods in teaching mathematics. By understanding teachers' viewpoints, this research seeks to identify the effectiveness of ABL, the extent to which teachers are equipped and supported to use this method, and the challenges they encounter.

To achieve this aim, the study is guided by the following research questions:

- What are the most commonly used mathematics teaching methods in Nigerian primary schools?
- What are the views of Nigerian primary school teachers towards the training of teachers on the use of activity-based learning methods in teaching mathematics?
- What challenges do Nigerian primary school teachers face in using activity-based learning methods in mathematics lessons?

By addressing these questions, the study aims to provide insights into the current state of mathematics education in Nigerian primary schools and offer recommendations for enhancing teaching practices through the effective use of activity-based learning methods.

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## **2. Research Methodology**

### **2.1. Research Design**

This study employs an exploratory research design, aimed at gaining a deeper understanding of the perceptions of Nigerian primary school teachers regarding the use of activity-based learning methods in teaching mathematics. Exploratory research is particularly suitable for this study because it allows for investigating new insights and discovering patterns that may not be immediately apparent. This design is characterized by its flexibility and open-ended nature, which is crucial for exploring complex issues such as teaching methodologies and teacher perceptions.

Qualitative methods were utilized to capture the nuanced views and experiences of the teachers. Unlike quantitative methods that seek to measure and quantify phenomena, qualitative research focuses on understanding the meaning and interpretation of experiences from the perspective of the participants. This approach is well-suited for this study as it provides rich, detailed data that can reveal the depth and complexity of teachers' attitudes towards ABL.

### **2.2. Participants and Data Collection**

The participants in this study were primary school mathematics teachers in Nigeria. These participants were selected based on their direct involvement in teaching mathematics and their potential to provide valuable insights into the use of ABL methods. An online survey was chosen as the primary data collection method to reach diverse teachers across various regions and school types.

The online survey was designed using Google Forms, a versatile tool that allows for creating customized questionnaires. The survey included a mix of open-ended questions to encourage detailed responses and capture the participants' genuine thoughts and experiences. Questions were crafted to explore the most commonly used teaching methods, the effectiveness of ABL, the adequacy of training, and the challenges faced in implementing ABL.

The survey link was disseminated via email and social media platforms, particularly WhatsApp, which is widely used in Nigeria. This approach ensured broad reach and accessibility, allowing teachers from various geographical locations and school settings to participate. A total of 30 teachers responded to the survey, providing substantial qualitative data for analysis.

### **2.3. Data Analysis**

The data collected from the online surveys were analyzed using thematic analysis, a method well-suited for identifying, analyzing, and reporting patterns within qualitative data. Thematic analysis involves several steps: familiarization with the data, coding, generating themes, reviewing themes, defining and naming themes, and producing the final report.

Initially, the responses were read multiple times to understand the data comprehensively. This process helped in identifying preliminary patterns and themes. Subsequently, the data were coded, which involved labeling text segments relevant to the research questions. Codes were then grouped into broader themes that encapsulated the main ideas expressed by the participants. For instance, responses related to the most commonly used teaching methods were coded into categories such as "traditional methods," "activity-based methods," and "student-centered methods." Themes were generated by clustering similar codes together, revealing the data's overarching patterns. These themes were reviewed and refined to ensure they accurately represented the data and were distinct.

The final themes provided a clear and organized framework for presenting the findings. This thematic approach allowed for a structured analysis of the data, highlighting the key issues and insights regarding the use of ABL in mathematics education.

## 2.4. Ethical Considerations

Ethical considerations were paramount in this study to ensure the research process's integrity and the participants' protection. The study adhered to the ethical guidelines set forth by Liverpool Hope University, which provided ethical approval for the research. Participation in the study was entirely voluntary. Teachers were informed about the purpose of the research, the nature of their participation, and their right to withdraw at any time without any negative consequences. This information was included in the research information sheet, which accompanied the survey link.

Confidentiality and anonymity were strictly maintained throughout the study. Personal identifiers such as names and specific school affiliations were not collected to ensure that the participants could not be identified from their responses. Instead, participants were represented by codes (e.g., "Participant 1," "Participant 2"), which protected their identities while allowing for reference in the data analysis.

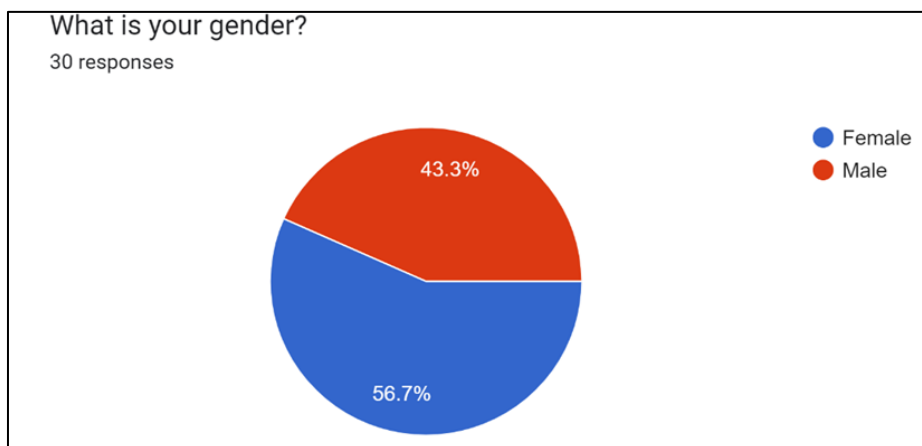
Informed consent was obtained from all participants. Before completing the survey, participants were required to read an introductory statement that explained the study's objectives, procedures, and ethical safeguards. By proceeding with the survey, participants indicated their consent to participate in the study. Data security was also a priority. The survey data were stored securely in a password-protected database, accessible only to the researcher. This ensured that the data were protected from unauthorized access and breaches of confidentiality.

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## 3. Result

### 3.1. Demographic Information

The demographic information of the survey participants provides a foundational understanding of the sample population, which is essential for contextualizing the study's findings. The participants were primary school mathematics teachers in Nigeria, a group that is central to the implementation and perception of activity-based learning methods in mathematics education. A total of 30 teachers participated in the survey, offering a diverse range of perspectives.



**Figure 1** Gender of the participants

The gender distribution of the participants was relatively balanced, with 56.7% male and 43.3% female teachers (Fig 1). This balance is important as it ensures that the findings reflect the experiences and viewpoints of both male and female educators, which might differ in their approach to teaching and their challenges.

The age distribution of the participants was also varied. The majority of the respondents (40%) were in the 36-40 age bracket, indicating a significant representation of mid-career teachers who likely have substantial teaching experience (Fig 2). Other age groups included 20% in the 26-30 bracket, 13.3% in the 31-35 bracket, 10% each in the 20-25 and 41-45 brackets, and 6.7% in the 46-50 bracket. This diverse age range helps to capture a wide array of experiences and perspectives, from younger teachers who may be more adaptable to new teaching methods to older teachers who might have more entrenched practices.

### 3.2. Themes and Findings

The analysis of the survey data revealed several key themes that provide insights into the use of ABL methods in Nigerian primary school mathematics education. These themes were identified through a systematic coding process and thematic analysis, ensuring a structured and comprehensive examination of the participants' responses.

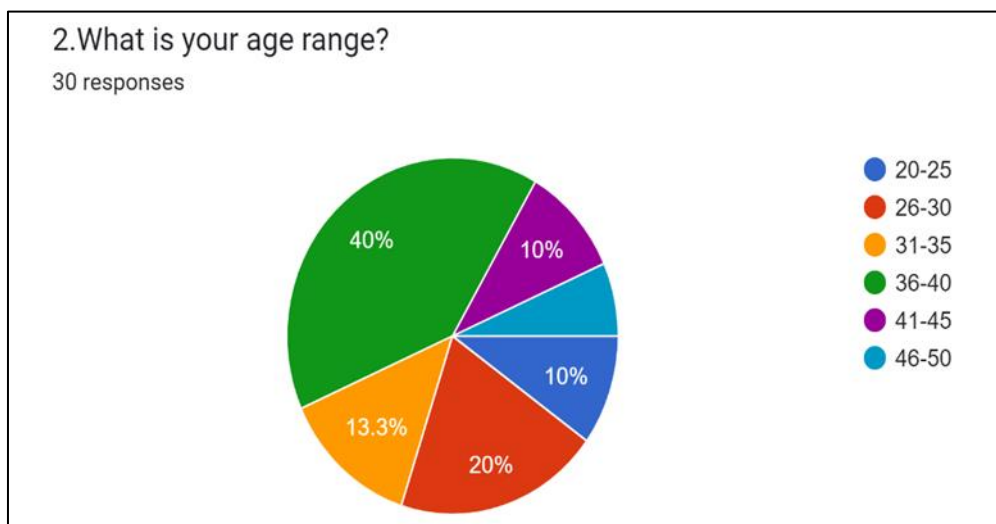


Figure 2 Age range of participants

#### 3.2.1. Most Commonly Used Teaching Methods

The survey responses indicated a significant reliance on traditional teaching methods in Nigerian primary schools. Many participants noted that the lecture method, often referred to as "chalk and talk," remain prevalent as presented in Table 1. This method involves the teacher delivering content while students passively receive information, often taking notes without engaging in interactive or hands-on activities (Khanna, Parasher, & Tripathi, 2022; Wright, Miller, Dawes, & Wrigley, 2020). However, the traditional method had the most occurrence.

Table 1 Most commonly used method

Themes	Codes	Occurrence
Most commonly used method of teaching mathematics in Nigeria	Activity-based learning method	10
	Teacher centered	5
	Conventional method	7
	Talk and chalk	5
	Traditional method	12
	Play away method	2
	Lecture method	10
	Student-centered	6

In addition, ABL methods were also notable. Teachers who use ABL described incorporating activities, tasks, and games into their lessons to enhance student engagement and understanding. This method was seen as more effective in fostering student participation and making learning more dynamic and enjoyable.

3.2.2. Effectiveness of Activity-Based Learning

A majority of the respondents expressed positive views towards ABL, highlighting its effectiveness in improving student engagement and understanding of mathematical concepts. Participants noted that ABL methods help students grasp abstract concepts more concretely through hands-on activities and real-world applications. For example, one participant mentioned that "activity-based learning allows students to see, touch, and manipulate objects, which aids in better retention and understanding."

Despite the positive feedback, some teachers pointed out that while ABL is effective, it can be time-consuming to prepare and implement (Table 2). The need for adequate training and resources was frequently mentioned as a prerequisite for successfully adopting ABL methods.

**Table 2** The most effective method

Theme	Code	Occurrence
The most effective method	Activity-based learning method (ABL)	28
	Traditional Method	1

3.2.3. Training and Support for Teachers

The survey revealed that many teachers feel inadequately trained to implement ABL methods effectively. Participants emphasized the importance of continuous professional development and training workshops focused on ABL. They also called for more support from school administrations and educational authorities to provide the necessary resources and training (Table 3).

One respondent stated, "Teachers need regular training sessions to update their skills and learn new methods. Without proper training, it is challenging to implement ABL effectively." This sentiment was echoed by many others, indicating a widespread need for enhanced training programs.

**Table 3** Teacher Training Responsibility

Themes	Code	Occurrence
Teacher training responsibility	Employers: School owners or government	14
		3
	Employees: Teachers	
	Employers & Employees:(Government, school owners, and teachers	8

3.2.4. Challenges in Implementing ABL

Several challenges were identified by the participants in relation to the implementation of ABL methods. A major challenge is the lack of sufficient time allocated to prepare and deliver ABL lessons. Teachers reported that designing activities and gathering materials require significant effort and time, which is often not feasible within their busy schedules. Another challenge is the large class sizes, which make it difficult to manage and engage all students in activities effectively. Teachers noted that with many students in a single class, providing individual attention and ensuring that all students actively participate becomes challenging.

As shown in Table 4, limited resources and materials were also highlighted as significant obstacles. Many schools lack the necessary tools and materials to support ABL, such as manipulatives, games, and other hands-on learning aids. This lack of resources hampers the ability of teachers to fully implement ABL methods.

**Table 4** Challenges encountered while using ABL

Themes	Codes	Occurrence
Challenges encountered while using ABL	The length of time allotted for ABL lessons is not sufficient (too short)	12
	Preparing for ABL lessons takes a lot of time.	5
	Large class size	4
	Limited materials/ equipment to facilitate ABL lessons	9
	Cumbersome scheme of work	4
	Students are easily distracted	2
	No hurdles	3

### 3.2.5. Recommendations for Enhancing ABL Implementation

The participants provided several recommendations to overcome the challenges associated with ABL. A key recommendation is increased funding and resources to equip schools with the necessary materials for ABL. Participants also suggested extending the time allocated for mathematics lessons to accommodate the additional activities and preparation required for ABL.

Furthermore, participants recommended regular training and professional development workshops for teachers. These workshops should focus on equipping teachers with the skills and knowledge needed to design and implement effective ABL activities. Additionally, providing incentives for teachers, such as grants or scholarships for further education and training, was suggested as a way to motivate and support teachers in adopting ABL methods.

**Table 5** Recommendations for Enhancing ABL Implementation

Themes	Codes	Occurrence
Ways in which teachers can be encouraged to utilize ABL in mathematics lessons	Providing sufficient time for ABL lessons	5
	Training for teachers	14
	Providing incentives, salary increases, scholarships, and grants for teachers	7
	Provision of learning materials	13

## 4. Discussion

### 4.1. Interpretation of Findings

The findings from this study provide a comprehensive understanding of the perceptions of Nigerian primary school teachers regarding activity-based learning methods in mathematics education. The study aimed to explore the most commonly used teaching methods, the views of teachers towards training on ABL, and the challenges they face in implementing ABL. The insights gathered highlight a mix of traditional and modern pedagogical practices, the readiness and willingness of teachers to embrace innovative methods, and the systemic and logistical barriers that hinder effective implementation.

### 4.2. Common Teaching Methods

The survey responses reveal a dual landscape in the teaching methods used in Nigerian primary school mathematics classrooms. The traditional lecture-based approach remains predominant, often termed the "chalk and talk" method. This method, characterized by teacher-centered instruction where the teacher delivers content and students passively receive information, is deeply entrenched in the educational system. It is favored for its simplicity and ease of implementation, especially in resource-constrained settings.

However, there is a growing shift towards incorporating ABL methods. Teachers who have adopted ABL describe a more interactive and student-centered approach, involving activities, tasks, and games designed to engage students actively in the learning process. This method emphasizes hands-on learning and real-world applications, which help students understand abstract mathematical concepts more concretely. Despite the prevalence of traditional methods, the positive feedback on ABL suggests a transition period where both methods coexist, with ABL gradually gaining more traction.

### **4.3. Teachers' Views on Training**

A significant portion of the study focused on understanding teachers' perceptions of the training they receive for implementing ABL methods. The findings strongly agree on the need for more comprehensive and ongoing professional development. Many teachers reported feeling inadequately prepared to implement ABL effectively due to a lack of proper training. They desired more regular and targeted workshops that provide practical skills and strategies for integrating ABL into their teaching.

Teachers highlighted the importance of continuous professional development to keep up with educational innovations and improve their teaching practices. They suggested that training should not be a one-off event but a sustained effort to ensure that teachers are equipped with the latest pedagogical tools and techniques. Additionally, teachers called for more support from school administrations and educational authorities to facilitate these training sessions. One teacher stated, "Regular training sessions are essential to update our skills and learn new methods. Without proper training, it is challenging to implement ABL effectively."

The need for training is also linked to the provision of resources. Teachers argued that training should include theoretical knowledge, practical demonstrations, and access to materials that can be used in the classroom. This hands-on approach to training would help teachers feel more confident and competent in applying ABL methods.

### **4.4. Challenges of ABL**

Despite the recognized benefits of ABL, several challenges hinder its widespread adoption in Nigerian primary schools. One of the most significant challenges identified by teachers is the lack of sufficient time. ABL methods require substantial preparation and planning, as teachers need to design activities, gather materials, and structure lessons that can engage students effectively. The current time allocations for mathematics lessons often do not provide enough flexibility to incorporate these activities, leading to a preference for quicker, traditional teaching methods.

Large class sizes pose another major obstacle. Managing a classroom with many students while trying to implement ABL can be daunting. Teachers reported difficulties in ensuring that all students participate actively and benefit equally from the activities. In overcrowded classrooms, maintaining order and providing individual attention become challenging, reducing the effectiveness of ABL (Bremner, Sakata, & Cameron, 2023; Chakawodza).

The shortage of resources and materials is also a critical issue. Many schools lack the necessary tools, such as manipulatives, educational games, and other hands-on learning aids that are essential for ABL. Teachers find creating an engaging and interactive learning environment difficult without these resources. One teacher noted, "The lack of materials and equipment makes it hard to implement ABL. We need better support in terms of resources."

Additionally, teachers mentioned that students' readiness and adaptability to ABL methods can vary. Some students are accustomed to the traditional teacher-centered approach and may resist more interactive and participatory methods. This resistance can make it challenging to shift to ABL, as teachers need to spend extra time and effort to engage these students and help them adapt to new learning styles.

To address these challenges, teachers suggested several solutions. Increasing funding and resources for schools to equip classrooms with the necessary materials for ABL is a top priority. Extending the time allocated for mathematics lessons would also give teachers more flexibility to incorporate activities and ensure thorough preparation. Furthermore, reducing class sizes or providing additional support, such as teaching assistants, could help manage large classrooms more effectively.

Regular and targeted professional development workshops were again emphasized as crucial. These workshops should focus on practical implementation strategies and provide teachers with the tools and resources needed to succeed. Additionally, creating a supportive community of practice among teachers, where they can share experiences, challenges, and solutions, would foster a collaborative environment that encourages the adoption of ABL.

## 5. Conclusion

The study aimed to explore Nigerian primary school teachers' perceptions of using activity-based learning methods in teaching mathematics. Through an online survey, insights were gathered from 30 teachers, revealing a blend of traditional and activity-based teaching methods. The findings indicate that while the traditional lecture-based approach remains prevalent, there is a growing inclination towards ABL due to its effectiveness in enhancing student engagement and understanding. However, implementing ABL faces significant challenges, including inadequate training, limited resources, large class sizes, and insufficient time allocation.

Teachers overwhelmingly supported the idea that ABL can make mathematics more engaging and comprehensible for students. They noted that hands-on activities and real-world applications help concretize abstract mathematical concepts. Despite this, many teachers feel ill-equipped to implement ABL due to a lack of comprehensive training and ongoing professional development. Furthermore, logistical barriers such as large class sizes and the scarcity of necessary materials impede the effective adoption of ABL methods.

The findings of this study have several important implications for teaching practices in Nigerian primary schools. Firstly, the persistent reliance on traditional teaching methods suggests a need for systemic change in pedagogical approaches. While traditional methods are easier to implement, they do not foster the level of engagement and understanding that ABL can achieve. As such, there is a critical need to shift towards more interactive and student-centered teaching methodologies.

Teachers' positive views on ABL underscore its potential to transform mathematics education. However, teachers must be adequately trained and supported so that ABL can effectively integrate into the curriculum. This means providing initial training and ensuring continuous professional development opportunities that focus on practical, hands-on implementation strategies.

Moreover, the challenges related to resource limitations and large class sizes highlight systemic issues that need addressing. Without adequate materials and manageable class sizes, the benefits of ABL cannot be fully realized. Schools must be equipped with the necessary resources, and policies should be put in place to reduce the student-teacher ratio, thereby allowing for more effective implementation of ABL methods.

### *Recommendations*

Based on the findings, several actionable recommendations can be made to enhance the implementation of ABL in Nigerian primary schools:

- There is a need for regular and comprehensive training programs focused on ABL methods. These programs should provide teachers with practical skills and strategies for incorporating activities and hands-on learning into their mathematics lessons. Training should be continuous, with follow-up workshops and refresher courses to keep teachers updated on the latest pedagogical innovations.
- Schools should be equipped with the necessary materials to support ABL. This includes manipulatives, educational games, and other hands-on learning aids that are essential for creating an interactive learning environment. Funding should be allocated to ensure that all schools, especially those in under-resourced areas, have access to these materials.
- Educational policies should be revised to support the implementation of ABL. This could include extending the time allocated for mathematics lessons to allow for the additional activities required by ABL methods. Policies should also aim to reduce class sizes, making it easier for teachers to manage and engage students effectively.
- School administrations should actively support the implementation of ABL by providing teachers with the time and resources needed for planning and execution. This includes scheduling regular professional development sessions and creating a supportive community where teachers can share experiences and best practices.
- Providing incentives for teachers who adopt and excel in using ABL methods could motivate more teachers to embrace this approach. Incentives could include grants for further education, recognition awards, and financial bonuses.



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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest exists among the Authors.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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