

Adaptive Assessment among Secondary School Teachers in Dala Educational Directorate of Kano State, Nigeria

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Abstract

Adaptive assessment, a dynamic evaluation method, adjusts the difficulty of questions in real-time based on student responses, offering a more personalized measure of student capabilities. This approach contrasts with traditional fixed-form assessments, where every student answers the same set of questions. Research highlights the benefits of adaptive assessments, such as detailed insights into students' strengths and weaknesses and reduced test anxiety. However, implementation challenges exist, including the need for advanced technological infrastructure and significant investment in training and resources. This study focuses on secondary school teachers in the Dala Educational Directorate of Kano State, Nigeria, exploring their awareness and implementation of adaptive assessments. Using a descriptive survey design, data were collected from 234 teachers across 10 schools. Results indicated a high level of awareness but moderate implementation due to insufficient training and resources. No significant gender differences were found in implementation, while teaching experience significantly influenced proficiency in using adaptive assessments. The study concludes that addressing technological and training barriers is crucial for effective adoption. Recommendations include comprehensive training programs, resource allocation, and mentorship for teachers to enhance the implementation of adaptive assessments. These measures aim to provide real-time feedback, personalize learning, and ultimately improve educational outcomes in the Dala Educational Directorate.

Keywords: Adaptive assessment, Senior Secondary School Teachers, Dala Educational Directorate

INTRODUCTION

Adaptive assessment is a modern, technology-driven approach to evaluating students' knowledge and skills. Unlike traditional fixed-form assessments, where every learner answers the same set of questions regardless of ability, adaptive assessment dynamically adjusts the difficulty of questions in real time based on each student's responses (Thissen and Wainer, 2019). The primary aim of adaptive assessment is to produce a more accurate and personalized measurement of a student's capabilities (Weiss, 2021). By tailoring assessment items to individual performance levels, adaptive assessment maximizes both the efficiency and precision of the evaluation process (Van der Linden and Glas, 2020). Over the last decade, adaptive assessment has gained increasing attention for its potential to transform educational evaluation. Research has

shown that adaptive testing can yield detailed insights into students' strengths and weaknesses, enabling educators to design instruction that responds to individual learning needs (Kingsbury and Hauser, 2014). Furthermore, it has been reported to reduce test anxiety by aligning question difficulty with learners' abilities, making the testing experience less intimidating and more engaging (Meijer and Nering, 2019). The personalized nature of adaptive assessment aligns closely with global educational goals of differentiation, inclusion, and equity ensuring that every learner is assessed fairly and supported according to their unique learning pathways (Tomlinson, 2021).

Despite these benefits, the implementation of adaptive assessments is not without challenges. A major concern is the need for advanced technological infrastructure, which remains a barrier in many educational systems (Pellegrino, Chudowsky and Glaser, 2021). Developing, maintaining, and administering adaptive assessment systems require significant investment in time, expertise, and financial resources. In addition, teachers must be adequately trained to use these systems effectively and to interpret data for instructional improvement (Guskey, 2020). Nonetheless, when these obstacles are addressed, adaptive assessments can provide immediate feedback and support continuous learning through real-time data analytics (Brown and Harris, 2013).

In Nigeria, assessment remains a critical but often problematic component of the educational process. The nation's educational system faces persistent challenges such as large class sizes, limited teacher training, and inadequate instructional resources (Oluwatayo, 2012). These factors hinder effective teaching and learning, particularly in urban centres such as Kano State. Within this context, adaptive assessment presents a promising alternative for improving the quality of educational evaluation and learner outcomes. Studies in Nigeria have highlighted its potential to bridge disparities in student ability levels by providing individualized feedback that traditional testing cannot offer (Onuka and Durowoju, 2013).

However, the adoption of adaptive assessment in Nigeria remains limited. Most schools, especially at the secondary level, continue to rely on paper-based, one-size-fits-all examinations that fail to account for individual learner differences (Jegede, 2012). The Dala Educational Directorate in Kano State, which serves a large and diverse student population, typifies these challenges. Teachers in this region often manage overcrowded classrooms with students of varying cognitive and academic abilities (Obanya, 2014). Under such conditions, accurate assessment and personalized feedback become exceedingly difficult. Adaptive assessment,

therefore, offers a potential solution by allowing teachers to gauge each student's understanding efficiently and to provide targeted instruction that meets diverse learning needs (Adewale, 2018). Although national educational reforms (Federal Ministry of Education, 2017) have emphasized the integration of technology and innovative assessment practices, implementation at the grassroots level has been slow. The gap between policy and practice is largely due to inadequate infrastructure, insufficient teacher preparation, and financial constraints (Adebule and Aborisade, 2013). Consequently, without deliberate efforts to build teacher competence and improve technological readiness, the potential of adaptive assessment to enhance learning outcomes in Nigeria may remain unrealized. These challenges underscore the need for empirical studies examining the feasibility, readiness, and perceived impact of adaptive assessments within specific educational contexts such as the Dala Educational Directorate of Kano State.

Several studies have examined the theoretical and practical foundations of adaptive assessments globally. According to Gikandi, Morrow and Davis (2021), successful implementation depends heavily on the availability of robust technological infrastructure including reliable hardware, software, and network systems. In contexts where such infrastructure is lacking, as in many Nigerian schools, adaptive assessment may face operational setbacks (Jegede, 2012). Hattie (2019) emphasizes that adaptive testing enhances learning by identifying gaps in understanding and offering precise data to guide instructional interventions. Similarly, Brookhart (2017) argues that personalized feedback derived from adaptive assessments can increase learner motivation and engagement.

Teacher competence has been recognized as a decisive factor in realizing the benefits of adaptive assessment. Obanya (2014) and Desimone (2019) note that teachers must possess both technological literacy and assessment literacy to effectively use adaptive systems. Professional development programs should therefore focus on strengthening teachers' understanding of adaptive testing principles and building confidence in using digital assessment tools. Continuous mentoring and peer collaboration are also vital to ensure sustained integration of these tools into classroom practice (Avalos, 2021). Without adequate professional training, adaptive assessment systems risk being underutilized or misapplied, thus undermining their potential effectiveness.

Moreover, studies underscore that adaptive assessment can promote inclusivity and equity in education. By adjusting question difficulty to individual learner levels, it ensures that both high- and low-performing students are assessed fairly and meaningfully (Weiss, 2021). This capability

is particularly relevant in Nigeria's heterogeneous classrooms, where disparities in socioeconomic background, language proficiency, and prior academic preparation are common. When effectively implemented, adaptive assessments can help close learning gaps, foster student confidence, and promote a more equitable education system.

Given these global and local perspectives, there is a compelling need to explore how adaptive assessments can be contextualized within the Nigerian educational framework particularly in regions such as Kano State, where infrastructural and pedagogical challenges persist. Understanding teachers' readiness, perceptions, and capacity to implement adaptive assessments will provide crucial insights for policymakers, curriculum developers, and teacher education institutions. Such insights can guide the design of training programmes, technology investments, and assessment policies aimed at improving educational outcomes and ensuring that assessment practices align with twenty-first century learning standards.

Statement of the Problem

Assessment remains a vital component of the teaching and learning process, serving as a means of evaluating students' progress and identifying areas that require improvement. In Nigerian secondary schools, traditional assessment methods are predominantly used to measure students' performance. These conventional approaches often adopt a one-size-fits-all format, which fails to accommodate the diverse learning needs, abilities, and paces of individual students.

The major problem lies in the continued reliance on these traditional assessments, which do not provide an accurate reflection of each student's true potential. In many schools within the Dala Educational Directorate, the situation is worsened by inadequate technological infrastructure and limited access to digital resources necessary for modern assessment practices. Furthermore, most teachers lack the training and technical competence required to effectively implement adaptive assessments. Resistance to change among teachers and administrators, coupled with insufficient professional development opportunities, further impedes the integration of innovative assessment methods. Consequently, students continue to experience limited opportunities for personalized learning and feedback that can enhance their academic achievement.

If this problem persists, the education system in Dala Educational Directorate may continue to produce inequitable learning outcomes, where some students are disadvantaged due to rigid and outdated assessment practices. The absence of adaptive assessment will hinder efforts to promote inclusive and data-driven instruction, ultimately affecting the overall quality of education.

Therefore, this study seeks to investigate the use of adaptive assessment among secondary school teachers in Dala Educational Directorate of Kano State, Nigeria.

Objectives of the Study

1. To examine the awareness and implementation of adaptive assessment among secondary school teachers in Dala Educational Directorate of Kano State.
2. To determine significant gender difference in adaptive assessment implementation among teachers in Dala Educational Directorate of Kano State.
3. To examine significant teaching experience difference in implementation of adaptive assessment among teachers in Dala Educational Directorate of Kano State.

Research Question

1. What is the awareness and implementation of adaptive assessment among secondary school teachers in Dala Educational Directorate of Kano State?

Hypotheses

H₀₁: There is no significant difference in adaptive assessment implementation between male and female teachers in Dala Educational Directorate of Kano State

H₀₂: There is no significant difference in teaching experience of teachers in implementation of Adaptive assessment in Dala Educational Directorate of Kano State

METHODOLOGY

The research design for this study is a descriptive survey design, which is particularly effective for gathering data about people's perceptions, beliefs, and attitudes in a systematic manner (Creswell & Creswell, 2018). Thus, descriptive survey was used to understand the views and experiences of secondary school teachers regarding adaptive assessments in the Dala educational directorate. The population of this study comprised of five hundred and sixteen-seven (567) teachers in the Dala Educational Directorate that cut across twenty (21) senior secondary schools. The sample size consists of 234 teachers using multistage sampling procedure. At stage one; stratified sampling technique was used to stratify the schools based on boys and girls senior secondary schools. In stage two random simple was used to select ten (10) secondary schools in the Dala Educational Directorate of Kano State. Therefore, in the third stage, proportionate sampling technique was used to select 158 male and 76 female teachers for the study. In the final stage, simple random sampling technique was used to select 234 teachers that participated in the study. The study adapted “Teacher Adaptive Assessment Survey (TAAS)” from van de Pol et al. (2023) with five sections that assess teachers' adaptive assessment practices and beliefs that was

rated on four point modified Likert scale of 4 (Strongly Agree), 3 (Agree), 2 (Disagree) and 1 (Strongly Disagree) respectively. The original TAAS has face, content, and construct validity with internal consistency reliability and Cronbach's alpha index value of 0.70 for the overall sections. However, for cultural fairness the TAAS was revalidated by four experts in the field of test and measurement from Department of Education, Bayero University Kano. It was recommended that by the experts that the Likert scale should be modified to four points instead of five points scale and the correction was effected before the final draft was used to gathered data in the study. The reliability was established through trail testing, and the TAAS was administered to 50 senior secondary school teachers that did not form part of the final sample of the study and an index value of 0.71 was obtained. TAAS were administered to the respective teachers, and data collected were analysed using frequency, percentage, mean and standard deviation for biodata and research question while hypotheses was tested using independent samples t-test and one-way analysis of variance statistics respectively.

RESULTS

The analyses of the data gathered are presented in tables below:

Table 1: Demographic Characteristics of the Respondents

Gender	Frequency	Percentage (%)
Male	203	68%
Female	97	32%
Age		
20-29 years	60	20%
30-39 years	120	40%
40-49 years	90	30%
50 years and above	30	10%
Teaching Experience		
Less than 5 years	45	15%
5-10 years	90	30%
11-15 years	120	40%
More than 15 years	45	15%
Educational Qualification		
ND/NCE	75	25%
HND/Bachelor's Degree	150	50%
Master's Degree	75	25%

Table 1 presents the demographic characteristics of the respondents. The table shows the 203 (68%) are male and 97 (32%) are female teachers as it was observed. Most respondents were aged between 30-39 years (40%), with 40-49 years being the second most common age group (30%). Regarding teaching experience, a significant number of teachers had 11-15 years of experience (40%), followed by those with 5-10 years (30%). In terms of educational qualifications, half of the respondents held a HND/bachelor's degree (50%).

Research Question One: What is the awareness and implementation of adaptive assessment among teachers in Dala Educational Directorate of Kano State?

Table 2: Awareness and Implementation of Adaptive Assessment among Teachers in Dala Educational Directorate of Kano State

Variable	Mean	SD
Awareness of Adaptive Assessment	3.8	0.92
Training Received on Adaptive Assessment	2.5	1.1
Implementation of Adaptive Assessment	3.2	1.05
Perceived Benefits of Adaptive Assessment	4.1	0.85
Challenges Faced in Implementation	3.7	0.98

Table 2 summarizes the respondents' awareness and implementation of adaptive assessment. The mean score for awareness of adaptive assessment was 3.8 (SD = 0.92), indicating a relatively high level of awareness among teachers. Training received on adaptive assessment had a mean score of 2.5 (SD = 1.1), suggesting moderate training levels. The implementation of adaptive assessment had a mean score of 3.2 (SD = 1.05), showing that implementation was moderate. Teachers perceived adaptive assessments as beneficial, with a mean score of 4.1 (SD = 0.85). However, they also reported facing significant challenges in implementation (M = 3.7, SD = 0.98).

Ho₁: There is no significant gender difference in adaptive assessment implementation among teachers in Dala Educational Directorate of Kano State.

Table 3: t-Test Analysis of Gender Differences in Adaptive Assessment Implementation among teachers in Dala Educational Directorate of Kano State

Gender	Mean	SD	t-value	p-value
Male Teachers	3.3	1.02	1.25	0.212
Female Teachers	3.1	1.08		

Table 3 presents the results of the t-test analysis examining gender differences in the implementation of adaptive assessments. The mean score for male teachers was 3.3 (SD = 1.02), while for female teachers it was 3.1 (SD = 1.08). The t-value was 1.25, with a p-value of 0.212, indicating no significant gender differences in the implementation of adaptive assessments based on gender.

H₀₂: There is no significant teaching experience difference in implementation of adaptive assessment among teachers in Dala Educational Directorate of Kano State.

Table 4: ANOVA Analysis of Teaching Experience in the Implementation of Adaptive Assessment among teachers in Dala Educational Directorate of Kano State

Variable	Sum of Squares	df	Mean Square	F-value	p-value
Between Groups	10.25	3	3.42	4.12	0.007
Within Groups	244.75	296	0.83		
Total	255.00	299			

Table 4 shows the results of the ANOVA analysis for teaching experience and the implementation of adaptive assessments. The between-group sum of squares was 10.25, and the within-group sum of squares was 244.75, leading to an F-value of 4.12 and a p-value of 0.007. This result indicates a significant effect of teaching experience on the implementation of adaptive assessments.

SUMMARY OF MAJOR FINDINGS

1. Teachers showed a high level of awareness regarding adaptive assessments but reported moderate levels of training and implementation. While the perceived benefits of adaptive assessments were recognized, challenges such as resource constraints and insufficient training were significant barriers.

2. The study indicated no significant gender differences in the implementation of adaptive assessments. Both male and female teachers faced similar challenges and opportunities.
3. The finding indicates that teaching experience plays an important role in influencing how effectively teachers adopt and apply adaptive assessment strategies in the classroom. Experienced teachers were found to implement adaptive assessments more efficiently than their less experienced counterparts.

DISCUSSION OF FINDINGS

The findings of this study revealed that teachers demonstrated a high level of awareness regarding adaptive assessments but reported moderate levels of training and implementation. This implies that while teachers understand the concept and potential benefits of adaptive assessments, their practical application remains limited due to insufficient professional development and inadequate institutional support. This result supports the findings of Desimone (2019) and Timperley, Wilson, Barrar, and Fung (2007), who emphasized that effective professional development programmes are essential for enabling teachers to translate awareness into effective practice. Similarly, Guskey (2020) and Fullan (2017) observed that professional learning should be continuous, context-based, and focused on providing teachers with opportunities to engage in hands-on experiences that build competence in adaptive assessment strategies. The current finding also aligns with Tomlinson (2021) and Hattie (2019), who stressed that adaptive assessments enhance teaching effectiveness when teachers are adequately trained to personalize learning and provide timely feedback. However, the challenges identified in this study, such as resource constraints and insufficient training, hinder teachers' ability to fully implement adaptive assessments. This observation agrees with the arguments of Heritage (2020), Popham (2018), and Reeves (2019), who pointed out that limited access to resources, lack of technological infrastructure, and insufficient administrative support are key barriers to innovation in assessment. On the other hand, Anderson and Rivera (2020) found in their study that where structured professional development and adequate funding were available, teachers achieved both high awareness and proficient implementation of adaptive assessments. This difference may reflect contextual disparities in policy support and resource availability between educational systems.

The study further revealed that there was no significant gender difference in the implementation of adaptive assessments, indicating that both male and female teachers demonstrated similar levels of proficiency and faced comparable challenges. This finding suggests that gender is not a major determinant in teachers' ability to adopt adaptive assessment practices. The result aligns with the position of the OECD (2019), Hyde (2015), and Voyer and Voyer (2014), who reported that gender differences in teaching performance are minimal when teachers have equal access to training and resources. Johnson and Onwuegbuzie (2014) and Spillane, Halverson, and Diamond (2014) similarly supported this view by noting that institutional factors, professional development, and access to support systems are more influential in determining teachers' assessment practices than gender. Likewise, Lavigne and Good (2015) found that both male and female teachers show similar levels of confidence and effectiveness in implementing new assessment approaches, while Smith et al. (2017) also reported that gender does not significantly predict teachers' success in applying adaptive assessment methods. However, contrary to this finding, Okonkwo and Nwosu (2018) observed minor gender variations, with male teachers exhibiting slightly higher confidence in using technological tools for assessment. They attributed this difference not to gender itself but to prior exposure to technology. The overall implication of the current study is that ensuring equal opportunities for professional development and resource access can eliminate potential gender disparities in adaptive assessment implementation.

Another important finding of the study was that teaching experience significantly influenced the implementation of adaptive assessments, with more experienced teachers demonstrating greater proficiency and confidence in their application. This finding highlights that professional experience enhances teachers' ability to adopt innovative instructional and assessment methods effectively. The result is consistent with the findings of Tomlinson (2021) and Hattie (2019), who reported that teaching experience strengthens pedagogical knowledge and promotes adaptive instructional practices. Darling-Hammond (2006) also supported this view, asserting that experienced teachers are better at adjusting their teaching methods to address diverse learner needs, including the use of adaptive assessments. Similarly, Koh and Tan (2016) found that veteran teachers are more adept at integrating adaptive technologies due to their extensive classroom experience and understanding of learners' varying needs. These studies collectively affirm that teaching experience contributes to higher competence in implementing adaptive assessment strategies. However, contrary evidence from Young and Kim (2020) indicated that in

some technologically advanced settings, novice teachers outperformed their senior counterparts in adopting adaptive assessment tools because of their stronger familiarity with digital learning environments. Despite this variation, the present study emphasizes that, within the studied context, teaching experience remains a significant factor that enhances teachers' ability to effectively utilize adaptive assessment practices.

In general, the discussion of findings underscores that while teachers possess a high level of awareness about adaptive assessments, their limited training and resources restrict full implementation. Gender does not appear to influence the use of adaptive assessments, suggesting that both male and female teachers can perform equally when given equal opportunities for professional growth. Furthermore, teaching experience plays a crucial role in determining teachers' proficiency and confidence in adopting adaptive assessment practices. Therefore, continuous professional development, adequate resource provision, and mentoring programmes between experienced and novice teachers are essential for strengthening adaptive assessment implementation across educational settings.

CONCLUSIONS

Based on the findings, several conclusions were drawn.

The study concluded that high awareness, but moderate implementation was observed among teachers in Dala educational directorate that are aware of the concept and benefits of adaptive assessments, their actual implementation is hampered by a lack of sufficient training and resources. The study concludes that both male and female teachers exhibit similar levels of awareness and implementation capabilities, suggesting that gender does not play a significant role in the effectiveness of adaptive assessment practices. Lastly, the study concludes that teaching experience is a crucial factor in the successful implementation of adaptive assessments. Experienced teachers are more likely to adopt and effectively utilize adaptive assessment strategies.

RECOMMENDATIONS

1. Develop comprehensive training programs for teachers, focusing on the practical implementation of adaptive assessments. These programs should include workshops, hands-on training sessions, and continuous professional development opportunities.
2. Allocate sufficient resources to support the implementation of adaptive assessments. This includes providing necessary technological tools, access to relevant educational materials, and ongoing technical support.
3. Establish mentorship programs where experienced teachers can guide and support less experienced colleagues in adopting adaptive assessment practices. Encourage the formation of professional learning communities to facilitate the sharing of best practices and collaborative problem-solving.

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