TEACHER NUMERACY TOOL IN ENHANCING PEDAGOGICAL EXPERTISE AND PUPILS' MATHEMATICS PERFORMANCE IN PUBLIC PRIMARY SCHOOLS IN LAGOS STATE

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Abstract

This study examined the relationship between teachers' expertise and pupils' mathematics performance in public primary schools in Lagos State. A descriptive survey design was adopted. The study population comprised pupils and teachers in public primary schools across Lagos State. A sample of 540 participants-450 Basic One pupils and 90 numeracy teachers-was selected from public primary schools in Badagry Local Government Area using simple random sampling. The study used an adapted Numeracy Teachers Tool (Ogunmade, 2026) during instruction, while a 15-item structured questionnaire gathered data on teachers' expertise. Pupils' numeracy scores were obtained from school records using a pro forma. Experts in test and measurement at Lagos State University of Education assessed the instruments' content and construct validity. Test–retest analysis yielded a reliability coefficient of 0.779 for the Teacher Numeracy Scale. The study used Z-scores and T-scores to standardise the data. Two-way analysis of variance and Pearson's product–moment correlation were used to analyse the data at the .05 significance level. The findings indicate that numeracy tools can support hands-on exploration, guided interaction and meaningful concept formation. The study recommends sustained professional development for teachers and the provision of manipulatives to strengthen instructional practice and foundational numeracy learning in primary schools.

Keywords: Numeracy tools, Pedagogical expertise, Mathematics performance, Early Childhood Education, Teaching and Learning.

Introduction

Acquiring numeracy skills at the primary school level is widely regarded as important for pupils' cognitive development and future academic achievement. Because primary education provides the foundation for subsequent learning, effective mathematics instruction is a key educational priority in Nigeria. However, concerns persist about pupils' performance in mathematics in public primary schools. A baseline survey identified limited numeracy knowledge, ineffective teaching strategies, low pupil interest and inadequate instructional approaches as factors contributing to underperformance (Adebiyi, 2019). These concerns point to the need to examine how structured instructional support may relate to teachers' practice and pupils' numeracy performance.

Teacher-related factors, including pedagogical competence, instructional methods and professional preparation, can influence pupils' mathematics learning. Dalong and Olakunle (2025)

observed that teachers' pedagogical skills are associated with pupils' understanding and performance in mathematics. Effective instruction can support positive attitudes and conceptual understanding, underscoring the importance of strengthening teachers' instructional capacity. Structured tools that guide lesson planning and delivery may support this.

Teacher numeracy tools refer to instructional resources and strategies designed to support the teaching of mathematical concepts. They may include lesson guides, manipulatives, visual aids, assessment frameworks and activity-based strategies (Akanmu, 2025; Oribhabor, 2020). By representing abstract ideas in concrete or visual forms, these resources can help teachers explain concepts and engage pupils in learning. Structured instructional models also emphasise interactive, learner-centred teaching and active participation (Dalong & Olakunle, 2025).

Numeracy tools may also help teachers adapt instruction to pupils' developmental, cultural, and cognitive contexts. Fry et al. (2025) and Rodríguez-Jiménez et al. (2023) emphasise the value of responsive, context-based teaching in mathematics education. Guidance on lesson delivery, assessment and differentiation may help teachers put these principles into practice. This approach is consistent with constructivist perspectives, which emphasise active participation and the construction of understanding through relevant learning experiences.

Evidence cited in the literature also suggests that activity-based strategies may support mathematics achievement. Oluwatayo et al. (2023) reported that pupils exposed to innovative, activity-based instruction performed better than those taught through conventional methods. Since teacher numeracy tools may incorporate interactive activities, their use warrants examination in relation to instructional practice and pupils' performance.

Despite the potential value of these resources, inadequate teacher training, insufficient instructional materials, and difficulties implementing innovative teaching strategies may constrain their use in public primary schools. Previous research has identified limited resources and ineffective teaching practices as challenges to numeracy instruction in Nigerian primary schools (Udonsa, 2015). Broader conditions, including class size, school environment and resource availability, may also be associated with pupils' academic performance (Adebiyi, 2019). Wood et al. (2025) similarly highlighted the relevance of classroom conditions and learning environments to mathematics performance. These factors underscore the need to consider the context in which teachers use instructional tools.

This study therefore examines teachers' expertise and pupils' mathematics performance in public primary schools in Lagos State, with particular attention to the use of teacher numeracy tools. It focuses on the relationship between instructional practice and pupils' performance, rather than establishing a causal effect of the tools.

The study is guided by the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasises the interaction of teachers' content knowledge, pedagogical knowledge and technological knowledge in effective instruction. In this study, the framework provides a basis for considering how teachers' knowledge and use of instructional resources can support mathematics teaching. Its application should reflect the range of numeracy tools under consideration, including manipulatives, visual aids and lesson guides, as well as any relevant digital resources.

Statement of the Problem

Pupils' underperformance in mathematics remains a concern in public primary schools. Studies have linked low numeracy proficiency to ineffective instructional strategies, gaps in teachers' pedagogical expertise, and inadequate teaching resources. Teacher numeracy tools-including lesson guides, manipulatives, visual aids and assessment resources-may support clearer instruction and pupils' understanding, yet their use in classroom practice may be inconsistent. Teachers may also lack the training and support needed to use these resources effectively.

Large classes, limited materials and insufficient monitoring of instruction may compound these challenges. Although existing literature discusses the potential value of structured teaching resources, evidence is needed on how teachers' expertise and use of numeracy tools relate to pupils' mathematics performance in the study area. This study therefore examines teacher expertise and pupils' numeracy performance in selected public primary schools in Badagry Local Government Area of Lagos State.

Purpose of the Study

The main purpose of this study is to examine the effectiveness of the teacher numeracy tool in enhancing pedagogical expertise and improving pupils' mathematics performance in public primary schools in Badagry Local Government Area of Lagos State, while specific objectives seek to:

1. determine if a difference exists between male and female teachers pedagogical expertise in numeracy tool use on pupils academic performance in Public Primary Schools.

2. assess the nature of the relationship that exists between teachers' pedagogical expertise on Numeracy tools and pupils' mathematics performance in public primary schools.

Hypotheses

Two null hypotheses were formulated and tested at the .05 level of significance:

$H0_1$: There is no significant difference in male and female teachers pedagogical expertise in the use of numeracy tools on pupils academic performance in Public Primary Schools.

$H0_2$: There is no significant relationship between teachers' pedagogical expertise in the use of Numeracy tools and pupils' mathematics performance in public primary schools.

Relevance of the Study

The findings of this study may be useful to teachers by showing how numeracy tools can support lesson planning, content delivery and assessment. These tools may help teachers present abstract mathematical concepts in concrete and understandable ways. They may also encourage activity-based, learner-centred instruction and support classroom interaction and teachers' confidence.

Pupils may benefit from opportunities to engage actively with mathematical concepts through appropriate instructional materials and activities. The findings may also inform whether the tools are suitable for pupils at the Basic One level. Any claims about improved academic performance, however, should be interpreted in line with the study's design and findings.

For researchers, the study may contribute to literature on instructional resources and mathematics education in Nigeria. Its findings may inform further research on teacher expertise, instructional design and pupils' numeracy performance, and help identify questions for future investigation.

Methodology

The study adopted a descriptive survey research design. The population comprised 1,026 public primary schools in Lagos State. A sample of 540 participants-450 Basic One pupils and 90 numeracy teachers-was drawn from selected public primary schools in Badagry Local Government Area. Simple random sampling was used to select the pupils and teachers.

The study used the Numeracy Teachers Tool adapted from Ogunmade (2026) during instruction. Data were also collected using a 15-item structured questionnaire, while a pro forma was used to record pupils' numeracy scores. Experts in test and measurement at Lagos State University of Education assessed the instruments' content and construct validity. Test–retest analysis of the Teacher Numeracy Scale yielded a reliability coefficient of 0.779.

Z-scores and T-scores were used to standardise the data. The research questions and hypotheses were analysed using two-way analysis of variance and Pearson's product–moment correlation, respectively, at the .05 significance level.

Data

$H0_1$: There is no significant difference in male and female teachers pedagogical expertise in the numeracy tool use on pupils academic performance in Public Primary Schools.

Table 1: Two-Way ANOVA showing difference in male and female teachers pedagogical expertise in numeracy tool use on pupils academic performance

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	.912[a]	2	.406	1.231	.300
Intercept	.019	1	.019	.076	.783
Male	.671	1	.671	2.716	.031
Female	.399	1	.399	1.616	.205
Performance	.004	1	.004	3.015	.025
Sex	1.998	1	1.998	.372	.729
Performance*Sex	0.804	2	.402	.662	.027
Error	42.013	538	.078		
Total	405.00	540			
Corrected Total	42.925	539			

The data in Table 1 of the Two-Way ANOVA analysis shows the difference in male and female teachers pedagogical expertise in numeracy tool use on pupils academic performance. It shows that male performance with F- value of 2.716 was found significant at .031 (P<.05); Female participants with F-value of 1.616 was found non-significant at .205 (P> .05) and academic performance with F-value of 3.015 was also significant at .025 (P<.05) respectively. However, at performance*Sex, the F= 0.662, Sig, which means significant interaction between performance and sex. Consequently, the null hypothesis is rejected indicating that there is a significant

difference in the academic performance of pupils based on sex of the teachers in the use of pedagogical tools.

$H0_2$: There is no significant relationship between teachers' pedagogical expertise in the use of Numeracy tools and pupils' mathematics performance in public primary schools.

Table 2: Correlation showing relationship between teachers' pedagogical expertise in the use of Numeracy tools and pupils' mathematics performance

Gender	N	Mean	SD	P-val	*r-cal	Sig.	Remark
Teachers' Expertise	90	4.17	.719				Reject $H0_2$
Pupils Performance	450	3.03	.582	.05	.895	.032	
Total	**540**						

Data in Table 2 show that teachers' expertise has higher mean and standard deviation values compared to pupils' academic performance, which has lower mean and standard deviation values. At an r-value of .895, it shows a strong positive relationship between teachers expertise and performance, however with sig. level of .032; P<.05), the null hypothesis is rejected implying that there is a significant relationship between teachers' pedagogical expertise in the use of Numeracy tools and pupils' mathematics performance in public primary schools.

Discussion

The finding for hypothesis one indicated that male teachers in the study demonstrated higher expertise in using numeracy tools than female teachers. This result should be interpreted cautiously: it describes the respondents in this sample and does not establish that gender itself caused the difference. Differences in access to training, experience, confidence or opportunities to use instructional resources may be relevant and warrant further investigation. Mudasiru (2021) reported that male student teachers scored higher than female student teachers in technological knowledge and technological content knowledge. This offers a possible point of comparison, although technological knowledge is not identical to expertise in using numeracy tools. Accordingly, this result should not be taken to mean that male teachers generally have stronger classroom management or are inherently more effective at using these tools. Further research could examine whether training, teaching experience and access to resources help explain the observed difference.

The finding for hypothesis two showed a relationship between teachers' pedagogical expertise in using numeracy tools and pupils' mathematics performance in public primary schools. This suggests that teachers' ability to select and use such tools may be associated with pupils' learning, although the relationship alone does not establish causation. Waiswa, Nabakiibi, Nabbira and Mugimu (2024) and Nyudule and Kumburu (2024) describe how numeracy-oriented tools can help teachers identify learners' needs, provide differentiated support and plan remediation. Mutaf-Yıldız, Sasanguie, De Smedt and Reynvoet (2020) likewise discuss the role of structured numeracy assessment in informing instructional decisions. Research by Sánchez-Mena, Martí-Parreño and Aldás-Manzano (2022) also links learner engagement in numeracy-related activities with mathematical skills and achievement. Taken together, these studies provide context for the present finding: pedagogical expertise in using numeracy tools may support instruction and pupil engagement, which are relevant to mathematics learning. Further research would be needed to determine whether, and through what processes, this expertise contributes to pupils' performance.

Conclusion

This study examined teachers' expertise in using numeracy tools and pupils' mathematics performance in public primary schools in Lagos State. The findings indicated that male teachers in the study reported or demonstrated higher expertise in using numeracy tools than female teachers. This result describes the difference observed in the study sample; it does not establish that gender caused the difference or that male teachers are generally more effective. The study also found a relationship between teachers' pedagogical expertise in using numeracy tools and pupils' mathematics performance.

Recommendations

Based on the findings, the following recommendations are made:

1. Schools and education authorities should provide equitable, practical professional development for all numeracy teachers, with support tailored to teachers' training needs and experience.

2. Schools should provide locally relevant numeracy tools and manipulatives that help pupils explore mathematical concepts through hands-on activities.

3. School administrators should assign numeracy instruction to teachers with appropriate preparation and provide ongoing support to strengthen their pedagogical expertise.

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