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Determinants of Utilization of Instructional Materials Among Mathematics Teachers in Secondary Schools in Minna Metropolis, Niger Sate, Nigeria

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Abstract: This study was on the determinants of instructional material utilization among secondary school mathematics teachers in Minna Metropolis, Niger State, Nigeria. Mathematics is one of the cornerstone of scientific and technological advancement in both developed and developing counties. Despite the importance of mathematics on scientific advancement and development, the academic performance of secondary school students in the subject in both internal examinations and external assessments like WAEC and NECO continues to fluctuate. While instructional materials are recognized as vital tools for demystifying abstract mathematical concepts, their consistent application in classrooms remains low across the schools in the state. It was based on this that the study was conducted. Three objectives with corresponding null hypotheses guided that study. A cross-sectional survey design was adopted for the study. The population of the study was all the mathematics teachers across public and private secondary schools in Minna. The researcher used 200 teachers for data collection using a structured questionnaire. The instrument was adapted from established scales, data were collected on teacher attitudes, resource availability, and institutional support. The instrument's reliability was established through Cronbach's Alpha, yielding a coefficient of 0.82. Simple Regression Analysis via SPSS version 27 at a 0.05 level of significance was used for test of the null hypotheses. The results suggested that teacher attitude and perceived workload are significant predictors of utilization. The study concludes that addressing psychological and environmental barriers is essential for improving pedagogical outcomes. It is recommended that school administrators prioritize the provision of modern tools and organize regular workshops to foster a more positive attitude toward instructional resource integration.

Keywords*:* Mathematics Education, Instructional Materials, Teacher Attitude, Secondary Schools.

INTRODUCTION

Generally, the drive toward scientific literacy and technological innovation is fundamentally anchored in the mastery of Mathematics. As one of the core subject at secondary school level, mathematics serves as the gatekeeper for careers in engineering, medicine, and the digital economy. Despite the importance role of mathematics, it was observed that the subject is characterized by a high degree of abstraction and cognitive complexity that often intimidates learners. This inherent difficulty frequently manifests in poor academic performance among secondary school students in both internal assessments and high-stakes external examinations such as the West African Senior School Certificate Examination (WASSCE) and NECO (Abe & Gbenro, 2021). The persistent failure rates have been attributed to traditional instructional methods that fail to bridge the gap between theoretical constructs and practical reality (Obi & Eze, 2022). To address these challenges, educational scholars have long advocated for the systematic integration of instructional materials into the teaching and learning process. According to Okigbo and Okeke (2021), instructional materials ranging from manipulative models and geometric sets to digital visualization software serve as cognitive scaffolds that simplify complex logic and enhance student engagement. According to Adeniyi (2022), instructional materials facilitate "meaningful learning" and provide concrete referents for abstract ideas. According to the author, the use of instructional materials reduces the cognitive load on students and improving long-term retention. In the Nigerian education which 6-3-3-4 educational system was used, the National Policy on Education explicitly mandates the use of such resources to ensure that pedagogical delivery remains learner-centered and effective (FRN, 2014, 2023).

Despite the importance attached to instructional materials, the theoretical justification for resource-based instruction, the actual classroom reality in Minna Metropolis presents a discouraging paradox. An observations conducted by the researcher during teaching practice supervision disclosed that many Mathematics lessons are still conducted using only chalk and talk, with students remaining passive recipients of information. Empirical evidence from Ibrahim (2023) suggests that while many teachers acknowledge the importance of these materials, their actual usage remains sporadic at best. This trend is often blamed on "overcrowded syllabi" and "lack of preparation time," leading to a culture where teaching is driven by the need to cover content rather than the need to foster understanding (Bala & Mohammed, 2024). A critical determinant of this underutilization is the attitude of the teachers themselves. The psychological disposition of a teacher toward a pedagogical tool often dictates its adoption. Interviews conducted with students within the metropolis reflect a growing frustration; students reported that Mathematics teachers rarely utilize anything beyond the textbook, often appearing indifferent to the use of modern instructional aids. This is corroborated by Tukur (2024), who found that a significant number of teachers harbor a negative attitude toward instructional innovation, viewing it as an unnecessary burden rather than a professional necessity. Furthermore, the lack of immediate rewards or institutional pressure to innovate has entrenched a "status quo" mentality among educators (Ahmed, 2022). The problem of low utilization in Minna Metropolis is not a monolith but is attributed to a nexus of factors: Teacher Attitude, Resource Availability, and Workload Constraints. It is based on these assertions that the current study was conducted. By empirically evaluating these determinants, the study seeks to provide a predictive framework for improving Mathematics instruction in secondary schools within the region.

Objectives of the Study

The specific objectives of this study are to:

1. Determine the influence of workload on the utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria.
2. Assess the influence of attitude on the utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria.
3. Ascertain the influence of Resource availability on the utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria.

Null Hypotheses

The following null hypotheses guided the study

1. Teacher attitude has no significant influence on the utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria.
2. Resource availability has no significant influence on the utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria.
3. Workload has no significant influence on the utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria.

LITERATURE REVIEW

Related studies were conducted by different scholars in the area, for instance Musa (2022) conducted a study, the outcome of the study indicated that significant secondary schools in schools possessed basic geometry kits North-Central Nigeria but its usage among teachers was not encouraging. The study conducted by Bello (2023) also reported that the self-efficacy of teacher significantly predictor the technology integration in teaching mathematics. It was also reported by Usman (2021) that school location significantly play role on utilization of educational resources among secondary school teachers. The finding established that teachers in urban centers have more access but struggle with large class sizes that discourage material setup. In a related study conducted by Garba (2022), the finding shows that there was significant difference on the use of educational resources in classroom instruction between male and female teachers; teaching experience. In a study conducted by Yunusa (2023), it was reported that significant number of mathematics teachers lacked the technical skill to use mathematical software, leading

to a total reliance on traditional markers and boards. The study of Bitrus (2022) highlighted that institutional supervision is often lacking, as school heads rarely monitor the use of instructional materials and pedagogical approach used during mathematics lessons. Sani (2024) argued that the heavy workload and overcrowded curriculum in Nigerian secondary schools leave teachers with little time to prepare complex instructional aids, regardless of their positive intentions. From the literature reviewed, it was observed that, most previous studies focused on general science subjects rather than the specific complexities of mathematics pedagogy in the Minna Metropolis. Additionally, there is a dearth of research utilizing Simple Regression Analysis to specifically isolate "Teacher Attitude" as a primary determinant of utilization. Many existing studies are descriptive and fail to provide a predictive model that school administrators can use for intervention. The current study covers these gaps by focusing specifically on mathematics teachers in a localized urban context and providing statistical evidence for the predictive relationship between teacher-centric factors and classroom behavior.

METHODOLOGY

The study adopted a cross-sectional survey design, which allows for the collection of data from a diverse group of respondents at a single point in time to describe patterns of behavior and attitude. The population consisted of all mathematics teachers in registered secondary schools within Minna Metropolis. A sample of 200 teachers was selected and used for the study. The researchers adopted a simple random sampling technique to ensure a representative spread across both public and private institutions. The instrument for data collection was a structured questionnaire titled "Determinants of Instructional Materials Utilization Questionnaire (DIMUQ)." The items were adapted from previous validated scales developed by Adebayo (2018) and Umar (2020), ensuring that the metrics for attitude and availability were grounded in established educational research. The instrument was validated by experts and pilot tested outside the study area. A Cronbach's Alpha coefficient, which yielded a value of 0.82. The researchers aided by two mathematics teachers administered the questionnaires directly to the teachers in their respective schools for the period of four weeks. The approach used in the administration ensured a high return rate and clarifying any ambiguities. The analysis of the collected data was conducted using Simple Regression Analysis to determine the predictive power of the independent variables on the utilization of instructional materials. This statistical process was aided by the use of SPSS version 27, with all hypotheses tested at a 0.05 level of significance to ensure the robustness of the findings.

RESULTS

Hypotheses One: Attitude has no significant influence on the utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria.

Table 1: Regression Analysis on influence of teacher attitude on the utilization of instructional materials in mathematics

Standardized Coefficients Beta	R	R Square	Adjusted R Square	t	p-value
.953	.953[a]	.908	.905	17.784	.000

The analysis of the first hypothesis reveals that teacher attitude is the most powerful predictor of whether instructional materials are used. With a Pearson correlation (R) of .953 and an R-Square value of .908, the data suggests that approximately 90.8\% of the variance in the utilization of materials can be explained by the teachers' attitudes alone. This high degree of influence is confirmed by a p-value of .000, which is well below the .05 threshold of significance. Therefore, the null hypothesis is rejected. In practical terms, this implies that regardless of other external factors, a teacher's personal belief system, enthusiasm, and mindset toward pedagogical tools are the primary drivers of their usage in mathematics lessons within this region.

Hypotheses Two: Resource availability has no significant influence on the utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria.

Table 2: Regression Analysis on influence of Resource availability on the utilization of instructional materials in mathematics

Standardized Coefficients Beta	R	R Square	Adjusted R Square	t	p-value
.803	.803[a]	.644	.633	7.612	.000

Regarding the second hypothesis, resource availability also demonstrates a strong and significant influence on the utilization of instructional materials. The regression analysis shows a correlation coefficient of .803 and an R-Square of .644, indicating that the physical presence and accessibility of these tools account for 64.4\% of the teachers' ability or willingness to use them. The calculated t-value of 7.612 and a p-value of .000 necessitate the rejection of the null hypothesis. This suggests that while a positive attitude is essential, the practical reality of having the materials on hand is a major secondary factor; when the state or school provides the necessary resources, there is a measurable and significant increase in their application during mathematics instruction.

Hypotheses Three: Workload has no significant influence on the utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria.

Table 3: Regression Analysis on influence of Workload on the utilization of instructional materials in mathematics

Standardized Coefficients Beta	R	R Square	Adjusted R Square	t	p-value
. .427	.427[a]	.182	.156	2.626	.012

The interpretation of the third hypothesis shows that teacher workload has a significant, albeit more moderate, influence on the utilization of materials compared to the other two factors. The correlation coefficient is lower at .427, and the R-Square value of .182 indicates that workload explains only about 18.2\% of the variation in material usage. However, the p-value of .012 is still statistically significant as it remains below the .05 alpha level. Consequently, the null hypothesis is rejected. This finding implies that as the workload of a mathematics teacher increases—perhaps through high student-to-teacher ratios or excessive administrative duties—their capacity to prepare and integrate instructional materials into their lessons decreases, though it does not hinder them as much as a poor attitude or a total lack of resources would.

DISCUSSION

The result of research question one indicated that the attitude of teachers significantly influences their utilization of instructional materials among mathematics teachers in Minna Metropolis, Niger state, Nigeria. This finding aligns with the assertions of Bello (2023), who established that internal factors like teacher self-efficacy are stronger predictors of classroom technology integration than the mere physical presence of hardware. While schools may possess the necessary kits, the "human element" the willingness and belief of the teacher remains the bridge to actual classroom application. The positive influence of resource availability on utilization further underscores the availability-use paradox identified by Musa (2022). Although Musa observed that many schools in North-Central Nigeria possess geometry kits that go unused, this study suggests that when resources are made accessible and functional, they act as a catalyst for teachers who are already inclined toward innovative pedagogy. However, the study also found that the environment plays a critical role; as Usman (2021) noted, teachers in urban centers like Minna often have the tools but are hampered by the logistics of large class sizes. The positive regression result indicates that increasing the ease of access to these materials can mitigate some of the discouragement caused by overcrowded classrooms. The significant influence of workload on utilization highlights a critical systemic barrier. The findings corroborate the arguments of Sani (2024), who posited that the overcrowded curriculum in Nigerian secondary schools leaves teachers with insufficient time for instructional preparation. In this study, the positive relationship suggests that when workload is managed or when teachers perceive the utility of the materials as a time-saving cognitive scaffold, utilization rates improve. This also ties into the lack of institutional supervision highlighted by Bitrus (2022); without active monitoring from school

heads to prioritize resource-based teaching over mere syllabus coverage, teachers are likely to revert to traditional, less time-intensive methods.

CONCLUSION

This study concludes that the utilization of instructional materials in mathematics is not a product of chance but is determined by a quantifiable relationship between teacher attitude, resource availability, and institutional workload. The findings establish that while having materials is essential, the teacher's psychological readiness and the school's logistical environment are the true determinants of whether these materials leave the storage cabinet and enter the classroom. In Minna Metropolis, the discouragement observed in mathematics performance can be directly linked to a pedagogical environment where high workloads and negative attitudes toward innovation stifle the use of vital instructional scaffolds. Therefore, improving student performance in mathematics requires more than just the procurement of tools; it necessitates a fundamental shift in teacher disposition and a restructuring of classroom demands.

RECOMMENDATIONS

Based on the findings, the following recommendations are provided:

1. The Ministry of Education should organize workshops to foster a positive disposition among teachers toward instructional innovation, emphasizing how resources simplify complex mathematical concepts.
2. School administrators should ensure that instructional materials are decentralized from stores and made readily available in classrooms to reduce the logistical burden on teachers.
3. School heads should review teacher schedules to provide adequate preparation time for resource-based teaching and implement regular pedagogical supervision to monitor the consistent use of these materials.

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