



Mathematics Teacher's Content Knowledge as Correlate of Students' Academic Performance in Mathematics

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Abstract

The study investigated mathematics teacher's content knowledge as correlate of students' performance in mathematics. Correlational research design was adopted. One research question and hypothesis guided the study. Population was 475 comprising of 450 Senior Secondary Two SSII students and 25 mathematics teachers. Sample of 118 students and 25 teachers participated in the study. Instrument for data collection was Mathematics Teacher Content Knowledge Performance Test (MTCKPT). Validity of the instrument was ascertained by expert in Mathematics Education. Split half reliability coefficient of 0.78 was obtained for MTCKPT. Finding revealed a strong positive correlation $r = 0.87$ significant at 0.000 indicating a positive relationship between mathematics teachers content knowledge and students performance in mathematics. Based on the findings the study recommends regular training and recruitment of qualify mathematics teachers.

Keywords: Content, Knowledge, Mathematics, Students and Teachers

Introduction

Mathematics play a significant role in Nigeria economy growth making it a compulsory subject in school curriculum. More so a credit pass in mathematics at Senior School Certificate Examination (SSCE) is a requirement for entry into tertiary institutions. In spite of the importance accorded to mathematics, it is however sad to note of consistent students poor performance in mathematics. Kraineret *et al.*, (2015); Gess-Newsome *et al.*, (2016) highlighted problem solving techniques, content knowledge and classroom management as major determinant for effective teaching and learning of mathematics. Studies have attributed teachers content knowledge (Ahmed, 2019); negative attitude towards mathematics (Moussa & Saali, 2022); poor instructional methods (Jameel & Ali, 2016) as major causes of students poor performance in mathematics. Among these variables teacher's content knowledge has recently gained increasing attention in the literature as the most influencer of students academic performance.

Toom *et al.* (2019) defined mathematics teachers content knowledge as the readiness to act in response to mathematics problems at any given time. Bowie *et al.* (2019) stated that mathematics teachers content knowledge is essential to improving students academic performance. Mathematics teachers content

knowledge is pivotal to students understanding and learning of mathematics (Kelcey *et al.*, 2019). Reza *et al.*, (2023); Bui *et al.*, (2023) stated that mathematics teachers content knowledge central to classroom professional standards practices. Content knowledge is the teacher's thorough understanding of mathematical contents (Nousheen *et al.*, 2022). Possession of sound knowledge of mathematics is an important ingredient for teacher's effective instructional delivery in the class room (Shongwe, 2022; Rigelman & Lewis, 2023).

Studies such as Marshall and Sorto (2012); Schmidt *et al.*, (2017) opined that students understanding of mathematics is hinged on the teacher's sound knowledge of mathematics. Kraut *et al.*, (2016) stated that mathematics teachers content knowledge is fundamental to research in mathematics learning. Depaepe *et al.*, (2013) found that mathematics teacher's knowledge has positive effect on students performance in mathematics. Mathematics teacher's knowledge determines the extent of students engagement and interest in learning mathematics (Kiamba, *et al.*, 2017). Content knowledge is generally recognized as central to what is expected from a teacher and influences students understanding of the subject (Ingvarson & Rowley, 2017; Schmidt *et al.*, 2017). Teacher's content knowledge is an



effective instrument for students optimal performance in mathematics (Avcu, 2019; Konig *et al.*, 2020; Mapulanga *et al.*, 2022; Wiens *et al.*, 2022; Reza & Azari, 2023).

Ahmed (2019) in examining relationship between teacher's knowledge of subject matter and students' performance found that teacher's subject knowledge contributes significantly to students academic performance. Uwingabire and Andala (2023) their study found teacher's qualification significantly relate to students performance in mathematics. Hill *et al.*, (2005) study on effect teacher's mathematics knowledge for teaching on students performance found a significantly relationship between teacher's mathematics knowledge and students academic performance in mathematics. Although some studies were conducted on teacher's subject knowledge however not much is known of study on mathematics teachers content knowledge as correlate of students performance in mathematics.

Research Question

What is the relationship between mathematics teachers content knowledge and students performance in mathematics?

Results

Table : Matrix Correlation on Relationship Between Mathematics Teachers Content Knowledge and Students Performance in Mathematics

	Mathematics Teachers Content Knowledge	Students Performance in Mathematics
Mathematics Teachers Content Knowledge	1	.873**
	Sig.	.000
Students Performance in Mathematics	.	1
	N	143

** . significant at the 0.05

Table above gives a strong positive r value of 0.87, significant at 0.000 indicating there is a strong positive relationship between mathematics teachers content knowledge and students performance in mathematics.

Discussion

Finding of the study revealed a strong positive relationship between mathematics teacher's content knowledge and students performance in mathematics. Students who possess high performance in mathematics was as a result of their teacher's knowledge of mathematics. This finding agrees with Ahmad (2019) who reported a strong positive

Hypothesis

H₀₁: There is no significant relationship between mathematics teachers content knowledge and students' performance in mathematics.

Method

The study adopted correlational research design to determines the relationship between independent and dependent variables. Population was 475 comprising of 450 Senior Secondary Two SSII students and 25 mathematics teachers in Kazaure Local Government Area. Sample for the study was 25 mathematics teachers and 118 SSII students obtained using stratified random sampling. Instrument for data collection was Mathematics Teacher Content Knowledge Performance Test (MTCKPT) while students performance in mathematics was determined from their grade in first term examination 2025/2026 academic Proforma. Validity of MTCKPT was ascertained by experts in Mathematics Education. Split half reliability coefficient of 0.78 was obtained for MTCKPT. Data collected were analyzed using correlational analysis at 0.05 level of significance.

Decision Rule: Accept $r \geq 0.50$

Accept $p < 0.05$

relationship between teacher's subject knowledge and students academic performance. Hill, *et al.*, (2005) reported mathematics teacher's subject knowledge is significantly related to students performance in mathematics. Also in line was Uwingabire and Andala (2024) who reported that teacher's knowledge of mathematics is significantly related to students performance in mathematics.

Conclusion

Mathematics teachers content knowledge is significant to students performance in mathematics. Teacher who possess sound knowledge of mathematics would always device means of



enhancing students learning and understanding of mathematics in the classroom.

Recommendations

Based on the findings the study recommends regular training and recruitment of qualify mathematics teachers.

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