



A MULTILEVEL ANALYSIS OF THE NATIONAL TEACHERS' STANDARDS' IMPACT ON MATHEMATICS TEACHERS' INSTRUCTIONAL PRACTICES

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Abstract:

The study examined the impact of the National Teachers' Standards on the instructional methods of mathematics educators in the Sekyere Central District of the Ashanti Region of Ghana, guided by the Concerns-Based Adoption Model. A cross-sectional research design was adopted. The target population was all basic school teachers in the district, whereas the accessible population was all junior high school mathematics teachers, thus, through the census sampling technique, a sample size of 82 respondents participated in the study. The researchers deployed a closed-ended questionnaire to unravel the impact of the National Teachers' Standards on instructional methods among mathematics teachers. Reliability coefficients for NTS and instructional practices constructs were 0.92 and 0.85, respectively, indicating strong reliability. Data analysis utilized frequency, percentage, mean, standard deviations, simple linear regression, and Pearson's correlation. The findings revealed prevalent practices such as question-based learning support and group engagement, with limited emphasis on low-cost materials and gender-responsive pedagogy. Teachers demonstrated a robust understanding of NTS and the curriculum framework, though variability existed. Notably, teachers' NTS knowledge significantly predicted instructional practices, highlighting its crucial role. Hence, it was recommended, among others, that the Sekyere Central Directorate of Education should invest in the design and delivery of evidence-based, teacher-centered professional development interventions and collaborative learning networks to enhance teachers' pedagogical content knowledge and facilitation skills in alignment with the National Teachers Standards, thereby improving teaching quality, student learning outcomes, and overall educational effectiveness.

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1. Introduction

The quality of education is a universal concern in today's interconnected world, with mathematics education occupying a central role due to its foundational importance in various fields. Across the globe, nations grapple with the challenge of enhancing mathematics instruction to ensure students develop the necessary skills and competencies to thrive in an increasingly complex and technology-driven society. Amidst this backdrop, the influence of national teachers' standards on mathematics teachers' instructional practices has emerged as a critical area of inquiry. Globally, educational systems strive to establish frameworks and guidelines to govern the professional practices of teachers. These standards serve as benchmarks for teacher preparation, development, and evaluation, aiming to elevate the quality of instruction and ultimately improve student learning outcomes (Darling-Hammond & Bransford, 2005). In mathematics education, the alignment between national teachers' standards and instructional practices holds significant implications for the effectiveness and equity of mathematics teaching and learning (Sztajn et al., 2012).

In Africa, the pursuit of quality mathematics education is equally paramount. Across the continent, nations recognize the pivotal role of mathematics in driving socio-economic development and fostering innovation (Adegoke & Adu, 2020). As such, efforts to enhance mathematics instruction align closely with broader aspirations for educational advancement and societal progress. However, challenges abound, including limited resources, inadequate teacher training, and cultural factors influencing educational practices (Makgato & Seru, 2016).

Ghana, endowed with a rich cultural heritage and a burgeoning economy, Ghana places a strong emphasis on education as a catalyst for national development. However, like many African nations, Ghana faces multifaceted challenges in its quest to improve mathematics education. These challenges range from teacher shortages and inadequate infrastructure to disparities in access and quality across regions (Opoku-Amankwa, 2016). To address these challenges and advance its educational agenda, Ghana has embarked on various initiatives, including the formulation of National Teachers' Standards (NTS). These standards aim to provide a framework for professional excellence among educators, including mathematics teachers, and to guide the development and implementation of effective instructional practices (Ministry of Education, Ghana, 2013). However, the extent to which these standards influence mathematics teachers' practices remains an area warranting empirical investigation. Drawing upon relevant literature and empirical evidence, we endeavor to shed light on the influence of National Teachers' Standards (NTS) on the instructional practices of teachers and offer insights to inform policy and practice. Ultimately, this study

contributes to the scholarly discourse on mathematics education in Ghana with specific implications for the Sekyere Central District.

2. Problem Statement

The National Teachers' Standards serve as a fundamental framework guiding the professional development and performance expectations of teachers, delineating the knowledge, skills, and attributes necessary to ensure optimal learning outcomes (National Teachers Council, 2018; Toledo et al., 2017). These standards, developed by educational authorities, consolidate various criteria from institutions offering initial teacher training and continuing professional development into a unified national standard, thereby providing a coherent set of expectations for the development of student teachers. According to the National Teachers Council (2018), the development of these standards arose from the need to consolidate various standards used by institutions offering initial teacher training and those providing continuing professional development into a unified national standard. This consolidation ensures that the development of student teachers is consistently guided by a coherent set of expectations. The NTS framework not only sets the benchmark for teacher performance but also supports ongoing professional development by highlighting areas where teachers can enhance their skills and knowledge. Theoretical perspectives on instructional practices further emphasize the importance of employing varied teaching strategies and methods to facilitate student learning. Instructional practices theory posits that effective teaching involves a range of pedagogical approaches, such as questioning techniques, collaborative learning, and differentiated instruction. While the NTS outlines essential competencies for effective teaching, including subject matter expertise, pedagogical skills, and professional behavior, their influence on instructional practices remains understudied, particularly in the context of mathematics education. Additionally, theoretical perspectives on instructional practices emphasize the importance of employing varied teaching strategies to accommodate diverse learning needs (Hattie, 2009). Despite these theoretical underpinnings, the mathematics teachers' knowledge of the National Teachers' Standards and their instructional practices, and the subsequent influence on teaching effectiveness is underexplored. This has led the researchers to investigate the influence of the National Teachers' Standards on the instructional practices of mathematics teachers in the Sekyere Central District.

2.1 Purpose of the Study

The purpose of the study was to explore the impact of the National Teachers' Standards on mathematics teachers' instructional practices in the Sekyere Central District of the Ashanti Region of Ghana.

2.2 Research Questions

The following research questions were addressed:

- 1) What is the level of knowledge of the National Teachers' Standards among basic school mathematics teachers in the Sekyere Central District?
- 2) What are the instructional practices of basic school mathematics teachers in the Sekyere Central District, and to what extent do they align with the NTS?

2.3 Hypotheses

The following hypotheses were tested:

H₀₁: Basic school mathematics teachers' knowledge level of the National Teachers' Standards will not significantly predict their instructional practices.

H₀₂: There is no statistically significant relationship between the basic school mathematics teachers' knowledge of the national teachers' standards and their instructional practices.

2.4 Significance of the Study

The study is anticipated to offer valuable insights into the pivotal role of National Teachers' Standards (NTS) in shaping instructional practices in mathematics education. The findings would underscore the significance of teachers' comprehension and application of NTS in enhancing teaching effectiveness, emphasizing the necessity for targeted professional development and collaborative initiatives among educators. Moreover, the study's implications transcend the Sekyere Central District, contributing to enhancing teaching effectiveness and student learning outcomes in mathematics education on a global scale. By informing educational policies and practices, it aims to elevate the quality of mathematics education and foster instructional diversity. Additionally, the study's rigorous methodological approach adds credibility and applicability to the findings, providing guidance for future research in this area and establishing a basis for evidence-based decision-making. By delving into the intricate nexus between NTS and instructional practices, this study is a valuable resource for educators, policymakers, and researchers striving to advance mathematics education.

3. Theoretical Framework

The Concerns-Based Adoption Model (CBAM) by Hall et al. (1970) offers a structured approach to understanding the process of change and adoption of innovations in educational contexts. CBAM comprises two main components: Stages of Concern (SoC), which assesses individuals' evolving concerns and attitudes towards innovation, and Levels of Use (LoU), which measures the extent and effectiveness of its implementation. Relevant to this study is CBAM's application in examining the integration of the National Teachers' Standards (NTS) among basic school mathematics teachers in the Sekyere Central District. By utilizing CBAM, the research aims to gauge teachers' awareness, concerns, and usage levels regarding the NTS, thereby identifying areas requiring additional support or resources for effective implementation. Specifically, the study's

research questions align with CBAM's dimensions, evaluating teachers' knowledge of the NTS and their instructional practices vis-à-vis these standards. The use of this model provided insights into mathematics teachers' knowledge of the NTS and their successful adoption in teaching, contributing to a comprehensive understanding of the implementation process.

4. Teachers' Knowledge of the National Teachers' Standards

The National Teaching Standards (NTS) outline the anticipated knowledge, abilities, and behaviors for effective teaching, influencing both initial teacher education (ITE) and continuous professional development. Research reveals that teachers' acquaintance with these criteria has a substantial impact on their instructional quality and effectiveness. For example, Blömeke and Delaney (2012) discovered a significant link between teachers' understanding of professional standards and their teaching performance. Similarly, Darling-Hammond (2014) emphasized the significance of incorporating these criteria within ITE programs to appropriately prepare future teachers. However, Fitzgerald et al. (2016) found gaps in teachers' knowledge of the NTS, which were often caused by poor training and professional development. This disparity might lead to unequal application of standards and varying teaching quality across regions. The quality of ITE programs, the availability of ongoing professional development, supportive school leadership, and access to practical resources all have an impact on teachers' knowledge. Desimone (2009) suggested that professional development should be ongoing and aligned with the standards to be effective, but Leithwood et al. (2004) emphasized the need for supportive leadership in driving engagement with the standards. Despite the obvious benefits, barriers to efficient NTS implementation include resistance to change, unpredictability in training quality, and time restrictions. Evans (2011) observed that resistance is frequently related to a lack of knowledge or perceived relevance of the standards. To overcome these issues, initiatives such as comprehensive training programs, mentorship, collaborative learning communities, and providing accessible resources are suggested.

Guskey (2002) advocated for training with practical applications and ongoing support, but Ingersoll and Strong (2011) emphasized the value of mentorship in strengthening teaching techniques. Overall, increasing teachers' awareness of the NTS through focused measures can result in considerable improvements in teaching quality and student results, emphasizing the importance of ongoing research and policy efforts in this area. Desimone (2009) and Ball and Cohen (1999) point out that teachers frequently understand practical components of standards while struggling with deeper structural elements. According to Shulman (1986) and Hill, Rowan, and Ball (2005), knowledge diversity is common and linked to disparities in education and professional development, which have an impact on instructional quality. Garet et al. (2001) and Borko (2004) emphasized the importance of continuous, content-focused professional development in bridging these gaps. In contrast, Darling-Hammond et al. (2009) and Kennedy (2016) argue that opposition to new standards and implementation issues might

lead to superficial understanding, emphasizing the difficulty of properly integrating theoretical knowledge and practical application.

5. Instructional Practices of Teachers

Instructional practices in mathematics education have been a focal point of educational research for decades. Effective mathematics instruction is crucial for laying a strong foundation in students' mathematical understanding and skills, particularly at the basic school level. Traditionally, mathematics instruction has been characterized by direct instruction, where the teacher demonstrates procedures and students practice these through repetition and memorization. This method has been criticized for its lack of engagement and failure to develop deep conceptual understanding (Cai et al., 2017; Hiebert & Grouws, 2007). In contrast, innovative instructional practices, such as inquiry-based learning, problem-solving approaches, and the use of manipulatives, have been shown to enhance student engagement and understanding. These practices, according to Boaler (2016) encourage students to explore mathematical concepts, ask questions, and develop their reasoning skills. Inquiry-based learning (IBL) in mathematics involves students actively exploring mathematical problems and constructing their own understanding. Research indicates that IBL promotes critical thinking, problem-solving skills, and a deeper understanding of mathematical concepts (Artigue & Blomhøj, 2013). Teachers facilitate learning by guiding students through questions and discussions rather than providing direct answers. A problem-solving approach to mathematics instruction emphasizes teaching through complex, real-world problems. This method encourages students to apply their knowledge to new situations, fostering flexibility in thinking and the ability to transfer skills across contexts (Schoenfeld, 2016). Students taught through problem-solving approaches develop a stronger understanding of mathematical concepts and improved problem-solving skills. Manipulatives, such as blocks, counters, and geometric shapes, are physical tools that help students visualize and understand abstract mathematical concepts. Research suggests that the use of manipulatives can improve students' conceptual understanding, particularly for younger learners and those struggling with abstract thinking (Carbonneau, Marley, & Selig, 2013). However, the effectiveness of manipulatives depends on how they are integrated into instruction and the teacher's ability to connect them to mathematical concepts (Moyer-Packenham & Westenskow, 2013). The integration of technology in mathematics instruction, including interactive whiteboards, educational software, and online resources, has been shown to enhance learning outcomes.

Hiebert and Grouws (2007) emphasize the importance of interactive questioning techniques in promoting student engagement and a deeper understanding of mathematical concepts. Similarly, studies by Stein et al. (2008) and Smith et al. (2009) highlight the effectiveness of group work in fostering collaborative learning environments and supporting diverse student needs in mathematics classrooms. However, there is less emphasis on using low/no cost teaching and learning materials

(TLMs) and gender-responsive pedagogy. These insights suggest areas for potential professional development and resource allocation to enhance teaching effectiveness and inclusivity in mathematics education. Boaler (2016) and Civil (2017) emphasized the importance of incorporating real-world contexts and manipulatives into mathematics instruction to enhance student learning outcomes. Additionally, Herbel-Eisenmann et al. (2018) underscored the significance of adopting gender-inclusive teaching practices to address gender disparities in mathematics achievement and participation. Technology can provide dynamic representations of mathematical concepts, offer immediate feedback, and cater to diverse learning styles (Drijvers, 2015). Effective use of technology requires teachers to be proficient in both the technology itself and in integrating it seamlessly into their instructional practices (Goos et al., 2010). Effective instructional practices are closely linked to ongoing professional development. Teachers need continuous training to stay updated with the latest educational research, instructional strategies, and technological advancements (Desimone, 2009; Emmer & Sabornie, 2015). Professional development programs that are collaborative, sustained, and aligned with teachers' instructional contexts are particularly effective in improving instructional practices (Borko, 2004). The classroom environment and management strategies employed by teachers also significantly impact instructional practices. Fraser (2012) asserted that a positive classroom environment that encourages collaboration, respect, and active participation can enhance student engagement and learning outcomes. Effective classroom management ensures that instructional time is maximized, and disruptions are minimized, allowing for more focused and productive learning experiences. Despite the proven benefits of innovative instructional practices, teachers often face challenges in implementing them. These include a lack of resources, insufficient professional development, large class sizes, and rigid curricular demands (Valli & Buese, 2007). Additionally, teachers' beliefs about mathematics teaching and learning can influence their willingness and ability to adopt new practices (Cross, 2009). The literature highlights the importance of employing a variety of instructional practices to enhance student's understanding and engagement in mathematics. While traditional methods have their place, innovative practices such as inquiry-based learning, problem-solving approaches, and the use of manipulatives and technology are more effective in developing deep mathematical comprehension.

6. Methodology

This study employed a cross-sectional survey methodology to systematically investigate basic school mathematics teachers' knowledge of the National Teachers' Standards and their instructional practices in the Sekyere Central District. Cross-sectional design was utilized to provide a snapshot of a particular situation at a specific time (Babbie, 2016). Employing this design helped the researcher to capture a comprehensive overview of the current state of curriculum implementation within the district. The respondents included basic school mathematics teachers within the Sekyere Central District. The researchers

utilized a stratified sampling technique to ensure adequate representation across various demographic groups (Creswell & Creswell, 2017). This approach allowed us to select respondents from different backgrounds and educational settings, providing more information about mathematics teachers' knowledge of the National Teachers' Standards and their instructional practices. The target population was all basic school teachers in the district, whereas the accessible population was all junior high school mathematics teachers, thus, through the census sampling technique, a sample size of 82 respondents was determined, ensuring sufficient statistical power to detect meaningful relationships between variables (Creswell & Creswell, 2017). Five (5) point Likert scale Closed-ended questionnaires were developed to collect data from mathematics teachers. These questionnaires were carefully designed to include items that assessed teachers' knowledge of the National Teachers' Standards and teachers' instructional practices in teaching mathematics. The reliability coefficient of the items measuring the two (2) constructs (National Teachers' Standards and Teachers' Instructional Practices) were 0.92 and 85 respectively indicating a good strength of reliability (Cohen et al., 2017), and content validity and construct validity were ascertained through expert judgment (Akinade & Owolabi, 2009; Creswell & Creswell, 2017).

Data obtained from the questionnaires were analyzed using mean, standard deviations, simple linear regression, and Pearson's correlation. The assumptions of simple linear regression and Pearson's correlation were checked to ascertain the feasibility of using regression for the analysis. The analysis revealed that the relationship between the independent variables and the dependent variable was linear; the differences between observed and predicted values were independent of each other, the variance of the residuals was constant across all levels of the independent variables, and the residuals were normally distributed.

7. Results and Discussions

Research Question 1: What is the level of knowledge of the National Teachers' Standards among basic school mathematics teachers in the Sekyere Central District?

Table 1: Knowledge of National Teachers Standard

Item	N	Mean	S.D
I understand the use of the National Teachers' Standard	82	3.88	1.08
I understand the new curriculum framework for Basic Education	82	3.80	1.17
I understand and use the implications of the new curriculum framework for students	82	3.79	0.94
I understand the implications of the new curriculum framework on work as a teacher	82	3.77	1.03
I can identify which standards will be addressed in my lesson	82	3.76	1.05
I understand the proposed structure of the curriculum framework	82	3.63	1.15
I understand the philosophy and legal underpinning of NTS	82	3.59	1.02

Source: Field Data, (2024).

The data in Table 2 indicate that the highest mean score was for the item “I understand the use of National Teachers’ Standard” ($M = 3.88$, $SD = 1.082$), indicating that teachers generally have a good understanding of how to use the NTS. Similarly, “I understand the new curriculum framework for Basic Education” ($M = 3.80$, $SD = 1.170$) and “I understand and use the implication of the new curriculum framework for students” ($M = 3.79$, $SD = 0.939$) were also rated highly, suggesting that teachers are fairly knowledgeable about the new curriculum framework and its implications for student learning. Moderate levels of knowledge were indicated by the items “I understand the implication of the new curriculum framework on work as a teacher” ($M = 3.77$, $SD = 1.034$) and “I can identify which standards will be addressed by my lesson” ($M = 3.76$, $SD = 1.049$), reflecting a good but not comprehensive understanding. The lowest mean scores were found for “I understand the proposed structure of the curriculum framework” ($M = 3.63$, $SD = 1.149$) and “I understand the philosophy and legal underpinning of NTS” ($M = 3.59$, $SD = 1.018$), suggesting that while teachers have some knowledge in these areas, there is more variability and potentially less overall understanding compared to other items. Generally, the analysis indicates that basic school mathematics teachers have a generally good understanding of the National Teachers’ Standards and the new curriculum framework, particularly in terms of their use and implications for student learning. However, there is some variability in their knowledge, especially concerning the proposed structure of the curriculum framework and the philosophy and legal underpinnings of the NTS. These findings suggest areas where additional professional development and training could be beneficial to further enhance teachers’ understanding and application. The findings that basic school mathematics teachers generally understand the National Teachers’ Standards (NTS) and the new curriculum framework, but show variability in their knowledge, especially regarding the curriculum’s structure and philosophical/legal underpinnings, are supported by existing literature. Desimone (2009) and Ball and Cohen (1999) highlight that teachers often grasp practical aspects of standards while struggling with deeper structural elements. Shulman (1986) and Hill, Rowan, and Ball (2005) note that variability in knowledge is common and linked to differences in education and professional development, impacting instructional quality. Garet et al. (2001) and Borko (2004) emphasize the need for sustained content-focused professional development to address these gaps. Contrastingly, Darling-Hammond et al. (2009) and Kennedy (2016) suggest that resistance to new standards and implementation challenges can lead to superficial understanding, highlighting the complexity of effectively bridging theoretical knowledge and practical application. Overall, the literature supports the need for targeted professional development to enhance teachers’ comprehensive understanding and application of the NTS.

Research Question 2: What are the instructional practices of basic school mathematics teachers in Sekyere Central District?

Table 2: Teaching Practices

Statements	N	Mean	SD
I use questions to support student learning	82	4.41	0.90
I put students/pupils into groups for group work	82	4.30	0.94
I involve everybody in questioning	82	4.30	1.07
I use different assessment strategies such as self and peer-assessment	82	4.18	1.00
I use questioning to promote thinking	82	4.11	1.18
I practice inclusivity	82	4.02	1.14
I make use of reflective practice	82	3.98	0.98
I know how best to initiate talk for learning	82	3.94	0.95
I develop TLMs for use in my lessons	82	3.90	1.10
I Manage talk for learning using think pair share	82	3.89	1.03
I build on what others say	82	3.85	1.22
I use the role-play method to teach	82	3.84	1.09
I assess students/pupils based on the National Teachers Standard	82	3.82	1.03
I use open-education resources	82	3.78	1.01
I use modelling when teaching	82	3.77	1.20
I avoid common mistakes in questioning	82	3.72	1.14
I use storytelling in delivering instructions	82	3.56	1.11
I use low/no cost TLMs	82	3.40	1.27
I use gender-responsive pedagogy	82	3.39	1.24

Source: Field Data, (2024).

Data in Table 1 shows that the most frequently used practice is “I use questions to support student learning” (M = 4.41, SD = 0.90). This high mean score, coupled with a relatively low standard deviation, suggests that many teachers consistently use questioning as a strategy to enhance student learning. Other highly rated practices include “I put students/pupils into groups for group work” (M = 4.30, SD = 0.94) and “I involve everybody in questioning” (M = 4.30, SD = 1.07), indicating a strong emphasis on collaborative learning and inclusive questioning techniques. Moderately high usage is seen in practices such as “I use different assessment strategies such as self and peer assessment” (M = 4.18, SD = 1.00), “I use questioning to promote thinking” (M = 4.11, SD = 1.18), and “I practice inclusivity” (M = 4.02, SD = 1.14). These practices have slightly lower mean scores but still show a significant level of use, reflecting a focus on diverse assessment methods and inclusive teaching approaches. The standard deviations for these items are higher, indicating more variation in how frequently different teachers employ these strategies. Less frequently used practices include “I use low/no cost TLMs” (M = 3.40, SD = 1.27) and “I use gender responsive pedagogy” (M = 3.39, SD = 1.24). The lower mean scores for these items suggest that these strategies are not as commonly implemented. The higher standard deviations indicate substantial variability among teachers in their use of these methods, pointing to potential areas for professional development and support. Generally, the analysis reveals a strong reliance on interactive and inclusive questioning techniques, while also identifying areas where there is room for growth, such as in the use of cost-effective teaching materials and gender-responsive strategies. Specifically, the analysis reveals that the most common instructional practices

among basic school mathematics teachers involve using questions to support learning, engaging students through group work, and inclusive questioning techniques. The findings regarding the prevalent instructional practices among basic school mathematics teachers align with Hiebert and Grouws (2007) and emphasize the importance of interactive questioning techniques in promoting student engagement and deeper understanding of mathematical concepts. Similarly, studies by Stein et al. (2008) and Smith et al. (2009) highlight the effectiveness of group work in fostering collaborative learning environments and supporting diverse student needs in mathematics classrooms. However, there is less emphasis on using low/no cost teaching and learning materials (TLMs) and gender-responsive pedagogy. These insights suggest areas for potential professional development and resource allocation to enhance teaching effectiveness and inclusivity in mathematics education. Boaler (2016) and Civil (2017) emphasized the importance of incorporating real-world contexts and manipulatives into mathematics instruction to enhance student learning outcomes. Additionally, Herbel-Eisenmann et al. (2018) underscore the significance of adopting gender-inclusive teaching practices to address gender disparities in mathematics achievement and participation.

8. Hypothesis Testing

H₀: Basic school mathematics teachers' knowledge level of the National Teachers' Standards will not significantly predict their instructional practices.

Table 3: ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8293.459	1	8293.459	120.352	0.000 ^b
	Residual	5512.797	80	68.910		
	Total	13806.256	81			
a. Predictors: (Constant), Knowledge of National Teachers' Standards						
b. Dependent Variable: Instructional Practices						

The data in Table 3 reveal a statistically significant effect of the predictor (Knowledge of National Teachers' Standards) on Instructional Practices, ($F(1, 80) = 120.352, p < 0.001$). This indicates that teachers' knowledge of National Teachers' Standards significantly predicts their instructional practices. The substantial F-statistic and the very low p-value suggest that the predictor variable (knowledge of National Teachers' Standards) explains a significant portion of the variance in the dependent variable (instructional practices). This finding underscores the importance of teachers' understanding of the standards in shaping their instructional methods. These findings provide support for the alternative hypothesis (H₁), suggesting that Basic school mathematics teachers' knowledge level of the National Teachers' Standards will significantly predict their instructional practices. Based on this finding, the null hypothesis was rejected. Table 4 presents the summary of the regression model, indicating the relationship between the predictors (teachers'

knowledge level of the National Teachers' Standards) and the dependent variable (instructional practices).

Table 4: Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.775 ^a	0.601	0.596	8.30120	1.633
a. Predictors: (Constant), Knowledge of National Teachers' Standards					
b. Dependent Variable: Instructional Practices					

The model summary in Table 4 provides key statistics that describe the fit of the regression model predicting instructional practices based on teachers' knowledge of National Teachers' Standards. The correlation coefficient ($R = 0.775$) indicates a strong positive relationship between the predictor variable and the dependent variable, suggesting that as teachers' knowledge of the standards increases, their instructional practices tend to improve. The R Square value (0.601) indicates that approximately 60.1% of the variance in instructional practices can be explained by teachers' knowledge of National Teachers' Standards, demonstrating the model's strong explanatory power. The adjusted R Square (0.596) accounts for the number of predictors and provides a more accurate measure, showing that about 59.6% of the variance is explained when adjusting for potential overestimation. The standard error of the estimate (8.30120) measures the average distance that the observed values fall from the regression line, indicating a reasonably precise model. The Durbin-Watson statistic (1.633) tests for autocorrelation in the residuals, with a value close to 2 suggesting no significant autocorrelation. In this case, the value indicates that the residuals are largely independent. Overall, the model summary indicates that the regression model is a good fit for the data, reinforcing the importance of teachers' understanding of the National Teachers' Standards in shaping effective instructional practices. In Table 5, regression coefficients are presented for the relationship between the predictor variable (Knowledge of National Teachers' Standards) and the dependent variable (Instructional Practices) in teaching mathematics.

Table 5: Regression Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	25.259	4.553		5.548	0.000
Knowledge of NTS	1.866	.170	.775	10.971	0.000
a. Dependent Variable: Instructional Practices					

The regression coefficients analysis provides detailed insights into the relationship between teachers' knowledge of National Teachers' Standards (NTS) and their instructional practices. The unstandardized coefficient for the constant is 25.259 (with a standard error of 4.553), indicating that when the knowledge of NTS is zero, the predicted value of instructional practices is 25.259. This establishes a baseline level of instructional

practices. The unstandardized coefficient for the knowledge of NTS is 1.866 (with a standard error of 0.170), meaning that for every one-unit increase in knowledge of NTS, the instructional practices score increases by 1.866 units.

The standardized coefficient (Beta) for the knowledge of NTS is 0.775, which signifies a strong positive relationship between the predictor variable (knowledge of NTS) and the dependent variable (instructional practices). This indicates that higher levels of knowledge of NTS are associated with better instructional practices. The t-statistic for the constant is 5.548 with a significance level (p-value) of 0.000, confirming that the constant is significantly different from zero. Similarly, the t-statistic for the knowledge of NTS is 10.971 with a significance level of 0.000, indicating that the knowledge of NTS is a significant predictor of instructional practices.

Generally, the regression coefficients suggest that teachers' knowledge of National Teachers' Standards significantly and positively influences their instructional practices. The strong Beta value and highly significant t-statistics underscore the importance of teachers' understanding of NTS in enhancing their instructional methods. The result is consistent with Tabachnick and Fidell (2019), who found a strong positive relationship between the knowledge of NTS and instructional practices. This is corroborated by Field (2013) that knowledge of NTS has a significant influence on instructional practices. These results highlight the need for effective professional development and training programs focused on improving teachers' knowledge of National Teachers' Standards to promote better instructional practices, as advocated by Guskey (2002) and Hattie (2009).

H₀₂: There is no statistically significant relationship between the basic school mathematics teachers' knowledge of the national teachers' standards and their instructional practices.

Table 6: Instructional Practices and Knowledge of National Teachers' Standards (NTS)

Variable	Mean	Sd	R	R ²	P
Instructional Practices	26.23	5.42	0.775	0.601	0.000
Knowledge of NTS	74.18	13.06			

** . Correlation is significant at the 0.05 level (2-tailed).

The results presented in Table 6 indicate that there is a significant positive correlation between instructional practices and teachers' knowledge of the National Teachers' Standards (NTS). The mean score for instructional practices is 74.18 (SD = 13.06), while the mean score for knowledge of NTS is 26.23 (SD = 5.42). The correlation coefficient (r) between these two variables is 0.775, which is statistically significant (p < 0.05). This indicates a strong positive relationship, meaning that as teachers' knowledge of NTS increases, their instructional practices tend to improve as well. The coefficient of determination (R²) is 0.601, suggesting that approximately 60.1% of the variance in instructional practices can be explained by teachers' knowledge of the NTS. The data demonstrate a significant relationship between teachers' knowledge of the National Teachers' Standards and their instructional practices, highlighting the importance of NTS knowledge in enhancing instructional methods.

9. Findings of the Study

The results of the study revealed that:

- 1) The most common instructional practices among basic school mathematics teachers in the Sekyere Central District involve using questions to support learning, engaging students through group work, and inclusive questioning techniques. However, there is less emphasis on using low/no cost teaching and learning materials (TLMs) and gender-responsive pedagogy.
- 2) Basic school mathematics teachers in the Sekyere Central District have a generally good understanding of the National Teachers' Standards and the new curriculum framework, particularly in terms of their use and implications for student learning. However, there is some variability in their knowledge, especially concerning the proposed structure of the curriculum framework and the philosophy and legal underpinnings of the NTS.
- 3) Teachers' knowledge of National Teachers' Standards significantly predicts their instructional practices. The strong positive relationship, as indicated by the Beta value and the high explained variance, underscores the critical role that understanding and applying these standards play in enhancing instructional methods. Additionally, the results demonstrate a significant relationship between teachers' knowledge of the National Teachers' Standards and their instructional practices, highlighting the importance of NTS knowledge in enhancing instructional methods.

10. Conclusion

In conclusion, this study's findings underscore the vital role of National Teachers' Standards (NTS) in enhancing teaching effectiveness and student outcomes in basic school mathematics, emphasizing the need for sustained professional development initiatives that prioritize NTS and instructional innovation to optimize student learning outcomes and advance mathematics education in basic schools.

11. Recommendations

To enhance teaching effectiveness and promote student success, it is crucial to foster instructional diversity among basic school mathematics teachers in the Sekyere Central District. Encouraging a variety of teaching methods, such as questioning techniques and group work, through professional development programmes and peer collaboration can facilitate this. Additionally, there is a need to deepen teachers' understanding of National Teachers' Standards (NTS) and integrate them into classroom practices. Continuous professional development tailored to NTS application, along with inclusion in teacher education programmes, can achieve this. Moreover, recognizing the significant correlation between NTS knowledge and instructional practices highlights the

importance of NTS-focused training initiatives in the Sekyere Central District. School administrators should, therefore, prioritize funding for such programs and facilitate knowledge sharing among teachers to improve overall instructional practices. Ongoing monitoring and evaluation are essential to gauge the effectiveness of these efforts and make necessary adjustments.

Conflict of Interest Statement

The authors declare no conflicts of interest.

About the Authors

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