



Challenges of Implementing Gender Transformative Pedagogies in Mathematics Instruction in Public Secondary Schools in Lower Eastern Region, Kenya

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Abstract

The study sought to determine the challenges that Mathematics teachers encounter while implementing gender transformative pedagogies in Mathematics instruction in public secondary schools in the Lower Eastern region of Kenya. The study adopted descriptive survey research design. The target population consisted of 108,705 respondents, including 105,764 Form Three students, 1,763 Mathematics teachers, 1,175 Heads of Mathematics Subject, and 3 County Quality Assurance and Standards Officers drawn from Machakos, Makueni and Kitui Counties. A sample size of 399 respondents was selected through multistage sampling, comprising stratified, purposive and simple random sampling techniques. Pilot testing was conducted within the study area and the instruments yielded a Cronbach's alpha coefficient above 0.70, affirming reliability. Data was collected using questionnaires and interview schedules and analyzed using descriptive statistics with the aid of SPSS version 30.0. The findings illustrated a number of challenges facing implementation of gender transformative pedagogies in Mathematics instruction in public secondary schools. Findings indicated that systemic (curriculum, resources, administration) and cultural (societal norms, resistance) as barriers that hinder effective implementation of GTPs, highlighting the need for capacity-building, institutional support, and policy-driven monitoring for effective Mathematics instruction. The study therefore recommends that the school management in collaboration with education stakeholders to ensure adequate support to teachers, including in-service training on GTPs implementation. Further, the government through the Ministry of Education to enhance implementation of policies geared towards ensuring adequate resource allocation for schools, ensuring a balanced curriculum as well as adequate monitoring and evaluation mechanisms to enhance implementation of GTPs in schools.

Keywords: Gender transformative pedagogies, Mathematics instruction, Gender responsive learning techniques, Gender responsive feedback and assessment activities, Gender responsive curriculum designs.

1. INTRODUCTION

Despite the promise that gender transformative pedagogies (GTPs) hold for addressing gender disparities in Mathematics instruction, their implementation faces several significant challenges. One of the most substantial barriers is teacher resistance. Many teachers, particularly those trained in traditional, teacher-centered methods, may hesitate to adopt gender-transformative strategies. This reluctance often stems from a lack of awareness or understanding of these pedagogies. Some teachers may feel that their existing practices are sufficient, despite evidence showing that these methods may inadvertently reinforce gender biases (Valiandes & Neophytou, 2018). Fryer and Levitt (2020) argue that teachers who have not received training in gender equity and inclusive teaching may unconsciously perpetuate gender stereotypes such as calling on male students more often or providing more encouragement to boys, reinforcing the belief that boys are naturally better at Mathematics.

Another major factor contributing to teacher resistance is unconscious bias. Teachers may hold deeply ingrained beliefs about gender roles that affect how they interact with students. For example, teachers might assume that boys are better suited for advanced mathematical tasks while underestimating the abilities of girls or giving them fewer opportunities to engage in challenging activities. These biases are often difficult to recognize and address, making it challenging to implement GTPs effectively (Patel & Jenkins, 2022). To overcome this, ongoing professional development is crucial, teachers need

continuous training that focuses on recognizing and mitigating unconscious bias, alongside developing inclusive teaching strategies. A related challenge is the lack of professional development and training in gender-sensitive pedagogies. While some teachers may be open to implementing GTPs, many lack the necessary knowledge or skills to do so effectively. In many countries, professional development programs focusing on gender equality, particularly in STEM subjects like Mathematics, are limited (Clarke & Gunter, 2021). Without adequate training, teachers may struggle to incorporate GTPs into their teaching. Moreover, GTPs require teachers to rethink their teaching methods and assessment approaches, which can be difficult for educators who are accustomed to more traditional methods focused on rote memorization and standardized testing.

Even when gender-equity training is available, it is often insufficient or ineffective. Guiso, Monte, Sapienza and Zingales (2021) established that while gender-sensitive teaching strategies were promoted in many educational systems, their actual implementation remained superficial. In some cases, teachers received only one-off training sessions that didn't provide practical tools or ongoing support for implementing GTPs in the classroom. To be effective, professional development must be sustained and deeply embedded in teacher training programs, with a focus on practical strategies that teachers can use in their classrooms.

The institutional and structural barriers within schools and education systems also pose significant obstacles to the widespread implementation of GTPs in Mathematics instruction. In many educational settings, gender-transformative practices are not prioritized, and there is minimal institutional support for teachers who wish to implement inclusive pedagogies (Mutua & Ochieng, 2022). School policies often do not mandate or incentivize the use of GTPs, leaving teachers feeling unsupported when they try to challenge traditional gender norms in their teaching. In some schools, there may be little awareness of the importance of gender equity in Mathematics education, further limiting the motivation of both teachers and students to engage with gender-transformative strategies. Additionally, classroom resources are often insufficient to support the implementation of GTPs. Many schools, particularly those in under-resourced areas, lack gender-neutral textbooks, teaching materials, or other resources that reflect diverse role models and promote gender equality (Van der Merwe & Botha, 2024). Even when teachers are motivated to apply GTPs, they may be constrained by a lack of appropriate materials or teaching aids. This issue is particularly prevalent in rural or marginalized areas, where schools may not have the financial resources to update or adapt their curricula to incorporate gender-sensitive content, especially in STEM subjects.

Another challenge is the cultural and societal norms that continue to define gender roles. In many communities, Mathematics and related STEM fields are still seen as male-dominated domains. This belief not only affects how students view their own potential but also shapes the expectations set by teachers and families. Guiso et al. (2021) found that such stereotypes lead to boys being viewed as more competent in Mathematics, while girls receive less encouragement and often lack confidence. These biases manifest in classroom practice, where girls are less likely to participate in discussions or take leadership roles in group activities (Fryer & Levitt, 2020). For GTPs to be effective, there must be a deliberate effort to challenge and dismantle these deeply ingrained gender stereotypes through both pedagogical reforms and cultural awareness initiatives.

Cultural rigidity adds to the difficulty of implementing GTPs. In some communities, any deviation from traditional gender expectations is met with resistance. Teachers who try to introduce gender-inclusive practices may face pushback from students, parents, or even school administrators. Walton (2021) documented instances of such resistance in conservative communities, where even minor changes to gender roles are seen as problematic. Chaffee and Plante (2022) also noted that in certain settings, parents actively discourage girls from pursuing advanced Mathematics, believing that such fields are better suited to boys. This kind of resistance underscores the need for broader community engagement and awareness campaigns that highlight the importance of gender equity in education not just as a social issue but as a critical factor in educational quality and national development. Curriculum and assessment practices also Boaler (2016) pose significant barriers to the effective implementation of GTPs. Traditional Mathematics instruction often emphasizes competition, speed, and right-answer thinking, values that do not equally serve all students. Boaler (2016) argues that this traditional approach reinforces the stereotype of the "math genius," typically associated with male students, while sidelining collaborative and conceptual learning, which many students especially girls prefer. Furthermore,

standardized assessments often prioritize procedural accuracy over a deeper understanding of the material, making it harder to align with the goals of GTPs. Research suggests that adapting the curriculum to focus on project-based learning, group problem-solving, and diversified assessments could create a more inclusive and equitable environment for learning Mathematics.

From the foregoing, it is evident that a myriad of challenges hinder the successful implementation and sustenance of GTPs in Mathematics instruction. While initial implementation may show promise, without sustained commitment and continuous support, these efforts often fade. Teachers are more likely to revert to traditional methods if they lack ongoing professional development, incentives, or resources. Clarke and Gunter (2021) emphasize that gender equity must be embedded into the very fabric of educational policy and institutional priorities if GTPs are to be sustained long term. Systemic support, policy alignment, and institutional accountability are essential to ensuring that GTPs continue to thrive and benefit students in Mathematics classrooms.

1.1. Theoretical Framework

The study was guided by Gender Theory, largely developed by philosopher Judith Butler, is centered around the concept of gender performativity. Butler's groundbreaking work, *Gender Trouble: Feminism and the Subversion of Identity* (1990), challenges the traditional binary understanding of gender. Her ideas have had a profound influence across various fields, including sociology, psychology, and education. At its core, gender theory argues that gender is not an inherent or biological characteristic but a social construct that is shaped by societal expectations. According to Butler (1990), gender is not something a person "is," but rather something a person "does." This performative view turns the idea of gender being a natural or biologically determined trait on its head. Instead, it suggests that gender is fluid, socially constructed, and shaped by societal norms, roles, and power relations.

In the context of education, gender theory provides valuable insight into how gendered roles are enacted and reinforced, often unconsciously, by both students and teachers. For example, in Mathematics classrooms, there is a longstanding stereotype that boys are naturally better at the subject, while girls are often perceived as less capable. This stereotype can influence how students view their own abilities and affect how teachers interact with and assess students. Gender theory posits that these ingrained gender assumptions and behaviors can be deconstructed and challenged through education.

However, gender theory, particularly Butler's concept of gender performativity, has faced some criticism. Critics argue that it may underplay the material and biological realities of gender by focusing too much on the fluidity of gender roles and not enough on how gendered expectations manifest in real-life experiences. Schilt & Westbrook (2009) suggest that this view might overlook the tangible ways in which gender discrimination and bias play out in people's lives. Additionally, some scholars feel that Butler's theory is overly abstract and lacks practical applications, particularly in educational settings (Walters, 2018). While gender theory critiques the binary system of gender, it doesn't always offer clear, actionable solutions for achieving equity within these frameworks. Despite these critiques, gender theory remains highly relevant to this study as it offers a lens through which to understand how gender roles and stereotypes affect student engagement and achievement in Mathematics. The theory helps explain how societal expectations like the belief that boys are inherently better at Mathematics than girls are perpetuated in the classroom, often unconsciously by both teachers and students.

By applying gender theory, this study explored how gender transformative pedagogies (GTPs) could challenge and break down these stereotypes, promoting a more inclusive and equitable learning environment. For example, strategies like collaborative learning, providing gender-neutral feedback, and featuring female mathematicians as role models can help transform the traditional gendered understanding of Mathematics. These practices encourage both boys and girls to engage equally with the subject and to excel in it. The study also examined how GTPs could disrupt the performative nature of gender roles in the classroom, empowering all students to see themselves as capable of succeeding in Mathematics, regardless of gender.

Furthermore, gender theory guided the study by offering a critical lens for examining the broader power dynamics in Mathematics education. It encouraged reflection on how deeply rooted gender norms were embedded in teaching practices and educational structures, and how these could be shifted through the intentional application of GTPs in Mathematics instruction.

2. METHODOLOGY

The study adopted descriptive survey research design. The study sample entailed 163 respondents who included 80 Mathematics teachers, 80 Mathematics Heads of Subject and 3 County Quality Assurance and Standards Officers (CQASOs), sampled from a population of 2941 respondents. Sample size was determined using the Yamane’s formula, a widely accepted method for determining sample size in surveys with large populations. Data was collected using questionnaires for Mathematics teachers and Mathematics HOS, while interview schedules were used to gather qualitative data from CQASOs. Obtained data was analyzed both qualitatively and quantitatively. Qualitative data was analyzed thematically while quantitative data was analyzed using descriptive statistics with the aid of SPSS version 30.0.

2.1. Research Questions

The research question developed and used in the study sought to establish the challenges that teachers encounter when implementing gender transformative pedagogies in Mathematics instruction in secondary schools in Lower Eastern region, Kenya.

2.2. Study Variables

The variables adopted for the study were assessed using Likert scaled statements ranging from 1=Strongly Disagree to 5=Strongly Agree. They included seven statements to Mathematics teachers and Mathematics HOS on possible challenges of implementing GTPs in Mathematics instruction. Instrument used attained a reliability index of 0.789 for teachers and 0.743 for HOS.

3. RESULTS AND DISCUSSION

The study sought to establish the challenges that Mathematics teachers encounter while implementing gender transformative pedagogies in Mathematics instruction in public secondary schools in Lower Eastern region, Kenya. Findings from Mathematics teachers were as shown in Table 1.

Table 1. Challenges of Implementing Gender Transformative Pedagogies (Teachers)

Item	SD	D	N	A	SA	Total
Lack of adequate in-service training	17.1	18.4	9.2	17.1	38.2	100.0
Limited resources	15.8	6.6	27.6	9.2	40.8	100.0
Entrenched societal norms	-	5.3	6.6	19.7	68.4	100.0
Lack of support from school administration	-	6.6	5.3	26.3	61.8	100.0
Overloaded curriculum	-	6.6	7.9	10.5	75.0	100.0
Resistance to change	-	6.6	14.5	31.6	47.4	100.0
Inadequate monitoring and evaluation mechanisms	-	10.5	2.6	15.8	71.1	100.0

Key: 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

Findings revealed that slightly more than half (55.3%) of Mathematics teachers sampled for the study acknowledged that lack of adequate in-service training was a challenge of implementing GTPs in Mathematics instruction while half (50.0%) of the teachers cited limited resources as a challenge. A significant proportion of teachers identified entrenched societal norms (88.1%), lack of support from school administration (88.1%), overloaded curriculum (85.5%), resistance to change (79.0%) and inadequate monitoring and evaluation mechanisms (86.9%) as challenges facing GTPs implementation in Mathematics instruction. These findings thereby imply that more than three quarters (76.1%) of sampled Mathematics teachers acknowledged that challenges existed in implementation of GTPs in Mathematics instruction in public secondary schools in Lower Eastern region, Kenya. Data obtained from Mathematics HOS was as presented in Table 2.

Table 2. Challenges of Implementing Gender Transformative Pedagogies (HOS)

Item	SD	D	N	A	SA	Total
Lack of adequate in-service training	6.8	13.7	13.7	32.9	32.9	100.0
Limited resources	4.1	8.2	19.2	32.9	35.6	100.0
Entrenched societal norms	11.0	5.5	15.1	53.4	15.1	100.0
Lack of support from school administration	1.4	6.8	2.7	43.8	45.2	100.0
Overloaded curriculum	13.7	2.7	19.2	24.7	39.7	100.0
Resistance to change	5.5	6.8	15.1	45.2	27.4	100.0
Inadequate monitoring and evaluation mechanisms	-	6.8	20.5	20.5	52.1	100.0

Key: 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree

Data obtained from Mathematics HOS showed that about two thirds indicated that lack of adequate in-service training (65.8%), limited resources (68.5%) and entrenched societal norms (68.5%) were challenges facing implementation of GTPs in Mathematics instruction. A significant proportion (89.0%) identified lack of support from school administration, while less than this proportion acknowledged overloaded curriculum (64.4%), resistance to change (72.6%) and inadequate monitoring and evaluation mechanisms (72.6%) as implementation challenges of GTPs in class. Findings therefore mean that a slightly more than two thirds (71.6%) of Mathematics HOS noted that implementation of GTPs in Mathematics instruction faced a myriad of challenges in public secondary schools in Lower Eastern region, Kenya. Findings from Mathematics HOS and teachers compared fairly well, confirming that challenges did exist in regard to use of GTPs in Mathematics lessons. A study by Mustafa (2023) entitled transformative approaches and challenges in 21st century mathematics education: a comprehensive review underscored the importance of teacher training, parental involvement, and targeted interventions in creating an inclusive and empowering the Mathematics classroom. According to the study, there is need for educators to stay abreast of promising and effective teaching strategies as education continues to evolve with technological advancements. Similarly, Fryer and Levitt (2020), teachers who have not been exposed to training in gender equity and inclusive teaching practices may unconsciously reinforce gender stereotypes, even if they do not intend to do so. The study observed that, teachers may inadvertently call on male students more often in Mathematics lessons or provide more encouragement and recognition to boys, reinforcing the stereotype that boys are naturally better at Mathematics.

Qualitative data sought from CQASOs on the possible challenges in implementation of GTPs in Mathematics instruction showed an acknowledgement by the officers of presence of a number of challenges. According to CQASO1 and CQASO3;

Teachers face high workload in schools emanating from an overloaded curriculum, understaffing and the requirement to undertake other administrative duties, limited time to use innovative pedagogies such as GTPs and poor instructional supervision in schools.

The officers felt that the presence of these challenges contributed a great degree to Mathematics teachers not being able to integrate the GTPs in Mathematics instruction. Their observation was supported by CQASO2 who felt that besides the highlighted challenges;

There exists resistance to change by most teachers who despite having the know how about the GTPs and their relevance to the Mathematics instruction still continued to use conventional instructional strategies rather than integration of the GTPs.

Qualitative findings therefore illustrated a number of challenges facing GTPs implementation in public secondary schools in Lower Eastern region, Kenya which continue to hinder effective integration of the GTPs in Mathematics instruction. Valiandes and Neophytou (2018) observed that one of the most significant barriers to the implementation of GTPs in Mathematics instruction is teacher resistance. The study noted that many teachers, particularly those who have been trained in conventional, teacher-centered methods, may be reluctant to adopt GTPs due to a lack of awareness or understanding of these pedagogies. In some cases, teachers may not fully appreciate the importance of gender-sensitive teaching methods or may feel that their current teaching practices are sufficient, despite evidence to the contrary. Overall, findings indicate that systemic (curriculum, resources, administration) and cultural (societal norms, resistance) barriers hinder effective implementation of GTPs, highlighting the need for capacity-building, institutional support, and policy-driven monitoring.

4. CONCLUSION AND RECOMMENDATION

The study sought to examine the challenges of implementing gender transformative pedagogies in Mathematics instruction. Findings revealed that more than three quarters of sampled Mathematics teachers admitted to existence of challenges in the implementation of gender transformative pedagogies in Mathematics instruction. The possible challenges identified include lack of adequate in-service training, limited resources, entrenched societal norms, lack of support from school administration, overloaded curriculum, resistance to change and inadequate monitoring and evaluation mechanisms. Qualitative information affirmed the teachers' observation, ascertaining that a number of challenges

exist that limits implementation of gender transformative pedagogies in Mathematics instruction. It can therefore be concluded that a number of challenges exist that hinder implementation of gender transformative pedagogies in Mathematics instruction in public secondary schools in Lower Eastern region, Kenya. The study thus recommends that school managements in collaboration with education stakeholders to ensure adequate support to teachers, including in-service training on GTPs implementation. Further, the Government through the Ministry of Education to enhance implementation of policies geared towards ensuring adequate resource allocation for schools, ensuring a balanced curriculum as well as adequate monitoring and evaluation mechanisms to enhance implementation of GTPs in schools.

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