

MATHEMATICS PERFORMANCE IN GRADE SEVEN EXAMINATIONS IN ZAMBIA: A CONTEXTUAL ANALYSIS OF INFLUENCING FACTORS

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Abstract

Mathematics plays a critical role in national development through its application in science, technology, and economic growth. Despite this importance, performance in mathematics among Grade Seven students in Zambia continues to raise concern among educators and policymakers. This study investigates the factors influencing the outcomes of Grade Seven students in mathematics, focusing on public primary schools in Lusaka District. The research explores variables such as teacher qualifications, instructional methods, availability of teaching resources, learner attitudes, and socio-cultural influences within the Zambian context. Employing a mixed-methods approach, the study integrates both qualitative and quantitative data derived from questionnaires, interviews, classroom observations, and document analysis of examination records. The theoretical grounding draws from Vygotsky's Social Constructivism, emphasizing the role of socio-cultural context in shaping learning experiences. The sample included mathematics teachers, Grade Seven learners, and District Education Board officials, selected through stratified and purposive sampling techniques. The findings reveal that inadequate teaching resources, lack of specialized mathematics training among teachers, overreliance on teacher-centered methods, and negative student attitudes significantly contribute to underperformance in mathematics. Additionally, contextual factors such as parental involvement, curriculum design, and policy implementation challenges further impact learners' outcomes. The study concludes that improving mathematics performance requires a multidimensional strategy, including policy reforms, teacher training, and enhanced resource allocation. Recommendations are made for curriculum review, stakeholder engagement, and the introduction of specialized subject teaching at the upper primary level. These findings offer valuable insights for educational planning, curriculum

development, and national strategies to strengthen foundational mathematics education in Zambia.

Keywords: *Mathematics education, Grade Seven, Zambia, student performance, teaching methods, instructional resources, socio-cultural factors, teacher qualifications*

1. Introduction

Mathematics is universally acknowledged as a foundational subject that underpins scientific innovation, technological development, and economic advancement. In educational systems around the world, mathematics occupies a central place in curricula due to its role in developing analytical thinking, logical reasoning, and problem-solving skills. In Zambia, mathematics is a core subject across all primary and secondary school levels, and performance in this subject serves as a critical benchmark for academic progression, particularly at Grade Seven—the terminal point of primary education. The Grade Seven Examination in Zambia represents a pivotal transition for learners, determining their eligibility for entry into secondary education. Despite this importance, national performance statistics have consistently highlighted mathematics as one of the weakest areas among learners. According to the Examination Council of Zambia (ECZ), the national pass rate in mathematics for Grade Seven students stood at just 34.6% in 2020, revealing deep-rooted issues in content mastery, instructional delivery, and systemic support. Numerous factors contribute to the persistently poor performance in mathematics. At the instructional level, the shortage of qualified teachers, especially those trained to deliver mathematics based on the revised national curriculum, remains a critical challenge. Many teachers have not undergone specialized training in mathematics pedagogy, often relying on outdated, teacher-centered methods that limit learner engagement and conceptual understanding. At the same time, learners' attitudes towards mathematics are frequently shaped by fear, anxiety, and the belief that the subject is inherently difficult—perceptions that are reinforced by inadequate support structures and a lack of contextualized teaching materials. The situation is further exacerbated by socio-economic and cultural conditions. In many cases, learners come from disadvantaged backgrounds where parental support for learning is minimal, and home environments are not conducive to studying. Infrastructural deficits, including overcrowded classrooms, limited access to textbooks, and insufficient teaching aids, compound the problem. Additionally, the

introduction of a revised competence-based curriculum has presented challenges for both teachers and learners, especially in the absence of adequate orientation and resource provision. The Zambian government, through the Ministry of Education, has acknowledged the need for urgent reforms. Policies such as the 2013 National Curriculum Framework and the 2018 Mathematics Education Policy aim to align teaching practices with national development goals. However, effective implementation of these policies remains inconsistent, particularly in under-resourced schools. This study seeks to examine the contextual factors influencing Grade Seven mathematics performance in Lusaka District. By investigating the interplay between teaching methods, learner attitudes, instructional resources, and socio-cultural variables, the research aims to provide a comprehensive understanding of the challenges and opportunities within the Zambian primary education system. Grounded in the theoretical framework of Vygotsky's Social Constructivism, the study emphasizes the importance of social interactions, cultural tools, and the learning environment in shaping educational outcomes. Ultimately, this research contributes to the discourse on educational equity, quality, and reform by offering evidence-based insights and recommendations for strengthening mathematics education in Zambia's primary schools.

2. Literature Review

Mathematics education, particularly at the foundational level, is a globally researched field due to its profound implications on learner competence in science, technology, and logical reasoning. In Zambia, persistent underperformance in mathematics among Grade Seven learners has spurred a growing body of research investigating various influencing factors. This section reviews the theoretical frameworks and empirical studies relevant to understanding mathematics achievement in the Zambian context.

2.1 Theoretical Frameworks

This study is grounded in **Vygotsky's Social Constructivist Theory**, which emphasizes that learning is a social process shaped by cultural tools, language, and interactions with more knowledgeable others. Vygotsky's concept of the "Zone of Proximal Development" (ZPD) highlights the importance of teacher scaffolding and peer support in mastering challenging

content. Applied to mathematics education, this theory supports learner-centered pedagogies and contextualized content that resonate with students' lived experiences.

Supporting this perspective is **Bandura's Social Cognitive Theory**, which focuses on self-efficacy, motivation, and the reciprocal interactions between personal, behavioral, and environmental factors. In mathematics learning, students' belief in their ability to succeed significantly affects their performance. Low self-efficacy and math anxiety—common among learners—can inhibit participation and hinder achievement.

2.2 Empirical Evidence in the Zambian Context

Several studies have examined the conditions surrounding mathematics education in Zambia. **Mwewa et al. (2015)** identified teacher qualifications, instructional materials, and socio-economic status as significant predictors of mathematics performance. Their research revealed that students taught by trained and motivated teachers showed higher proficiency than those taught by underqualified instructors.

Kabwe et al. (2018) evaluated the role of continuous professional development and found that in-service training for mathematics teachers positively influenced learner outcomes. However, they also noted a lack of systemic implementation of training programs, particularly in rural and peri-urban schools.

Mumba et al. (2020) investigated the relationship between math anxiety and performance, discovering that students often associate mathematics with fear and failure, leading to avoidance behaviors. The study emphasized the need for affective support and student-centered teaching to foster positive attitudes toward mathematics.

Other researchers, such as **Mulendema (2007)** and **Kalumbi (2005)**, explored the influence of teacher attitudes and instructional styles. Findings indicated that teachers who lacked confidence in their mathematical ability often transferred this apprehension to their students, contributing to negative learner perceptions and poor classroom dynamics.

2.3 Challenges Highlighted in Literature

Common challenges affecting mathematics performance in Zambia include:

- Overcrowded classrooms and limited instructional time.
- Inadequate teaching and learning materials aligned to the revised curriculum.
- Limited parental involvement and poor home learning environments.

- Cultural beliefs that stereotype mathematics as a subject for the intellectually elite.
- Shortage of subject-specialized teachers at the primary level.

2.4 Identified Gaps

Although considerable research has explored mathematics performance in Zambian secondary schools, there is limited literature focusing specifically on Grade Seven learners within the context of curriculum reforms and socio-cultural realities. Moreover, few studies combine both quantitative and qualitative data to explore the interconnected factors influencing performance.

This study seeks to fill this gap by integrating multiple perspectives to offer a nuanced understanding of the specificity of mathematics in the Zambian primary school context.

3. Methodology

This study employed a **mixed-methods research design** to investigate the factors influencing Grade Seven mathematics performance in Lusaka District. Combining both quantitative and qualitative approaches enabled the researcher to triangulate findings and gain a comprehensive understanding of contextual, instructional, and individual variables affecting student achievement.

3.1 Research Design

The study utilized a **descriptive exploratory design**. The quantitative aspect involved structured questionnaires administered to learners and teachers, while the qualitative component included interviews, observations, and document analysis. This hybrid approach allowed the researcher to capture not only statistical trends but also nuanced perspectives from education stakeholders.

3.2 Target Population and Sampling

The target population included **Grade Seven learners, mathematics teachers, and District Education Board (DEBS) officials** in Lusaka District. A **purposive sampling technique** was used to select 10 DEBS officials, while **stratified random sampling** was applied to select 70 mathematics teachers and 20 Grade Seven learners across selected public primary

schools. The stratification ensured that respondents from both urban and peri-urban schools were adequately represented.

3.3 Research Instruments

The study utilized the following tools:

- **Questionnaires** for teachers and students captured data on teaching strategies, learner engagement, resource availability, and classroom challenges.
- **Semi-structured interviews** were conducted with DEBS officials to understand policy implementation, curriculum alignment, and teacher development initiatives.
- **Observation checklists** were used during classroom visits to assess instructional methods, student participation, and learning environments.
- **Document analysis** of Grade Seven mathematics examination records over the past three years provided a longitudinal perspective on student performance trends.
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3.4 Data Collection Procedure

Data were collected over a period of six weeks. The researcher obtained authorization from the Ministry of Education and individual school authorities before administering instruments. Teachers and students completed questionnaires during school hours under researcher supervision. DEBS officials participated in in-depth interviews conducted at their offices, and classroom observations were carried out discreetly to minimize disruption.

3.5 Data Analysis

Quantitative data from questionnaires were analyzed using **Statistical Package for the Social Sciences (SPSS)**. Descriptive statistics such as frequencies, means, and percentages were used to summarize responses. **Inferential statistics** such as Analysis of Variance (ANOVA) helped compare performance differences across schools and respondent groups.

Qualitative data from interviews and observations were analyzed using **thematic analysis**. Transcripts were coded to identify recurrent themes related to teaching practices, learner attitudes, curriculum challenges, and support structures.

3.6 Ethical Considerations

Ethical integrity was maintained throughout the research process:

- **Informed consent** was obtained from all participants, including assent for students and consent from guardians where applicable.
- **Confidentiality** was ensured through anonymization of responses and secure storage of data.
- **Voluntary participation** was emphasized, with participants free to withdraw at any stage without repercussions.
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3.7 Reliability and Validity

To enhance reliability, the research instruments were **pilot-tested** in a non-participating school to refine question clarity and structure. **Data triangulation** from multiple sources (teachers, learners, DEBS officials) ensured validity and strengthened the study's conclusions.

4. Results and Discussion

This section presents key findings from the mixed-methods research conducted across selected Grade Seven classes in Lusaka District. It highlights the interplay between teacher qualifications, instructional practices, resource availability, learner attitudes, and performance outcomes in mathematics.

4.1 Demographic Overview

Analysis of teacher demographics revealed that 70% held a diploma, 13% had bachelor's degrees, and only 1% held a master's degree. While most teachers had relevant qualifications, many lacked specialized mathematics training. Additionally, more than 66% of the teachers had less than 10 years of experience, potentially limiting their pedagogical flexibility in teaching mathematics under the revised curriculum. Among student respondents, 75% were aged between 12 and 15, which aligns with the expected age bracket for Grade Seven. However, varied age distribution also reflected instances of grade repetition and delayed entry, factors that may contribute to learning disparities.

4.2 Teaching Methods and Learner Engagement

The study found that **teacher-centered methods** dominated classroom instruction. Approximately 60% of teachers relied primarily on explanation and question-answer techniques, while only 15% incorporated group work or hands-on activities. Although teacher-centered methods offer structure, they may not sufficiently engage learners or promote critical thinking. Classroom observations confirmed limited use of teaching aids, with most lessons delivered through chalk-and-talk formats. This traditional approach, while prevalent, often inhibits interactive learning and discourages student curiosity—especially in abstract subjects like mathematics.

4.3 Challenges in Teaching and Learning Mathematics

Major barriers identified included:

- **Inadequate teaching and learning materials:** 80% of respondents indicated a shortage of textbooks, geometric instruments, and curriculum-aligned guides.
- **Overcrowded classrooms:** With class sizes often exceeding 50 learners, individualized instruction was impractical.
- **Poor student attitudes:** 60% of students expressed negative feelings towards mathematics, describing it as difficult and intimidating. These attitudes stemmed partly from poor performance histories and inadequate support systems.

Furthermore, teachers cited **curriculum overload** as a challenge. Topics traditionally taught at secondary levels had been incorporated into the Grade Seven syllabus without sufficient training or orientation for primary teachers. This mismatch left teachers ill-prepared to handle complex topics effectively.

4.4 Statistical and Thematic Correlations

Statistical analysis using ANOVA revealed a significant relationship ($p < 0.05$) between teacher qualifications and student performance. Schools with teachers holding degrees reported better performance metrics than those with certificate holders. The analysis also highlighted disparities in performance between schools with adequate teaching materials and those without. Thematic analysis of interviews and focus groups underscored the importance of learner-centered instruction, adequate resource allocation, and parental involvement.

DEBS officials emphasized the need for improved policy implementation, noting that while guidelines exist, execution is hampered by funding constraints and staffing shortages.

4.5 Interpretation of Findings

The findings align with existing literature emphasizing the multifaceted nature of mathematics underperformance. The results suggest that improving Grade Seven mathematics performance in Zambia requires addressing structural, instructional, and socio-cultural factors simultaneously. Enhancing teacher capacity, updating pedagogical methods, and increasing student engagement are vital strategies to reverse current trends.

5. Conclusion and Recommendations

5.1 Conclusion

This study explored the factors influencing Grade Seven mathematics performance in selected public primary schools in Lusaka District, Zambia. The findings reveal that underachievement in mathematics is the result of a complex interplay of factors including inadequate instructional resources, insufficient teacher specialization, learner disengagement, and systemic implementation challenges related to the revised national curriculum. Despite having a high percentage of qualified teachers, the absence of specialized mathematics training and the prevalence of teacher-centered instructional practices undermined the effectiveness of classroom delivery. Learners, in turn, exhibited negative attitudes towards mathematics, often viewing it as an abstract and intimidating subject. This perception was fueled by a lack of practical learning experiences and insufficient academic support both at school and at home. Resource limitations—including textbooks, mathematical instruments, and learning aids—were cited as significant impediments. Overcrowded classrooms and large student-teacher ratios further constrained individualized learning, limiting the capacity of teachers to address diverse learner needs. While curriculum reforms aimed to modernize and deepen content understanding, their implementation was marred by inadequate orientation and support for teachers. From a theoretical perspective, Vygotsky's Social Constructivist Theory highlighted the missed opportunities for social interaction and learner scaffolding in mathematics classrooms. When teachers are unable to engage students through meaningful and contextualized content delivery, the development of mathematical reasoning and

problem-solving skills remains stunted. The findings confirm that improving mathematics performance at the Grade Seven level demands not just classroom-level interventions but system-wide reforms. It requires coordinated action among educators, policymakers, curriculum developers, and community stakeholders.

5.2 Recommendations

Based on the findings, the study presents the following key recommendations:

- 1. Specialized Teacher Training:** The Ministry of Education should introduce subject specialization for upper primary school teachers, particularly in mathematics. Pre-service and in-service training should focus on modern pedagogical methods, curriculum content, and assessment strategies.
- 2. Learner-Centered Approaches:** Teachers should be encouraged and trained to adopt participatory teaching strategies such as group work, manipulatives, real-life problem-solving, and technology integration. These methods can boost learner engagement and demystify abstract concepts.
- 3. Resource Provision and Infrastructure:** Government and donor agencies should prioritize the provision of updated textbooks, geometry kits, teaching guides, and ICT tools. Additionally, schools must be equipped with adequate classroom space to ensure conducive learning environments.
- 4. Curriculum Review and Implementation Support:** Curriculum developers should review content to ensure age-appropriateness and practicality. Implementation support should include regular teacher orientation sessions, feedback loops, and classroom support visits by educational officers.
- 5. Student Support Programs:** Schools should introduce remediation programs such as after-school tutoring, peer-assisted learning, and counseling services to help learners who are struggling with mathematics. Encouraging positive attitudes through praise, relatable examples, and inclusive teaching will also enhance learner motivation.
- 6. Strengthening Parental and Community Involvement:** Programs that involve parents in monitoring and supporting their children's mathematics learning at home should be promoted. Community math clubs and holiday study camps can also help foster a culture of mathematical appreciation.

7. Further Research: More in-depth studies are needed on the effectiveness of intervention programs, the role of digital technologies in primary mathematics education, and longitudinal tracking of learner outcomes in mathematics post-primary school.

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