Global Journal of Basic Education (GJBE)
Volume 2 Issue 1 Year 2025 Pages 01 - 18
e–ISSN : 3110-8687 | DOI: 10.61227
e-mail : gjbe.journal@gmail.com
https://journal.pusmedia.com/index.php/GJBE/index

Actualizing the Effect of Formative Assessment (FA) Constructive Feedback on Mathematics Teaching and Learning Processes in Kisarawe District Primary Schools

Fatuma Maleko[1]*, Georgina Mugisha[2], Raymond Ndomba[3]

[1] Kisarawe District
[2,3] Department of Education Foundations, St. Augustine University of Tanzania

Correspondence e-mail * : Fatuma.maleko@gmail.com

Abstract: Formative assessment (FA) is a dynamic process of collecting and interpreting student understanding data during instruction to provide timely feedback, enabling teachers to adjust lessons and students to improve their learning. This study investigates the effect of FA constructive feedback on mathematics teaching and learning processes in primary schools, with a specific focus on Kisarawe District, where persistent challenges in mathematics performance are observed. Employing a mixed-methods convergent parallel design involving interviews, observations, questionnaires, and document reviews with 149 respondents, the research found that FA significantly enhances pupils' understanding of mathematical concepts, boosts their motivation and confidence, guides teachers in adjusting instruction, promotes active learning and engagement, and fosters a positive classroom environment. The findings, grounded in Constructivist Theory, demonstrate that timely and constructive feedback is a critical component for improving both teaching practices and learning outcomes in primary mathematics, highlighting the need for targeted teacher training and support to overcome implementation barriers such as large class sizes and insufficient pedagogical knowledge.

Keyword : Formative Assessment, Constructive Feedback, Teaching and Learning processes

Article info: Submitted : 2026-01-02 | Accepted : 2026-02-15 | Published : 2026-02-18

Copyright © 2026 Authors.

This is an open-access article under the CC BY 4.0

INTRODUCTION

Formative assessment is widely recognized as a vital component of effective teaching and learning, particularly because of its role in continuously collecting and interpreting information about learners' understanding during instruction. It emphasizes the provision of timely and constructive feedback that enables teachers to adjust instructional strategies while supporting learners in improving their performance (Myers, 2024; EBSCO, 2024). Unlike summative assessment, which evaluates learning at the end of an instructional period, formative assessment operates as an ongoing "check-in" mechanism through strategies such as exit tickets, quizzes, classroom observations, and interactive discussions. These approaches help to ensure

that learning remains on track and that misconceptions are identified and corrected as they arise (Crossouard, 2024). Importantly, the effectiveness of formative assessment lies not merely in its design but in how assessment information is used to inform instruction and promote learner self-regulation, thereby enhancing learning outcomes (ERIC, 2024).

Mathematics occupies a central position in education due to its foundational role in science, technology, and national development. Tshabalala and Ncube (2016) describe mathematics as a gateway subject that underpins social and economic advancement, while Ker (2013) emphasizes its importance in developing competencies required in science, technology, engineering, and other innovation-driven fields. As a result, mathematics is given significant emphasis in educational curricula and policies from pre-primary to tertiary levels, making it a core subject in both primary and secondary education systems. Despite this emphasis, a considerable number of learners continue to struggle with understanding mathematical concepts, leading to persistent underperformance in the subject (Mazana et al., 2019).

One of the key instructional practices influencing the teaching and learning of mathematics is formative assessment. Assessment broadly refers to the processes involved in making decisions about how learners achieve their learning goals (Monteiro et al., 2021), while formative assessment specifically integrates results from classroom activities, tests, and examinations to inform teaching and learning. For teachers, formative assessment guides decisions on whether a topic requires further revision based on learners' performance (Ngunjiri, 2022; Takele & Melese, 2022). Blankman (2022) identifies several effective formative assessment strategies in mathematics, including exit tickets, which are short tasks administered at the end of a lesson to assess understanding and identify learning gaps. Formative assessment is inherently interactive, as it enables learners to adjust their learning based on feedback received while teachers adapt their instructional approaches accordingly (Pat-El et al., 2015).

International evidence highlights both the importance and challenges of implementing formative assessment in mathematics education. In the United States, Fatima (2022) reports that achieving grade-level proficiency in mathematics is a national and state priority; however, low performance in middle school arithmetic remains a widespread concern. Many students fail to meet state standards, with mathematics often recording the lowest scores on report cards. Learners frequently express negative attitudes toward mathematics, while teachers report low levels of student engagement during lessons. In response, professional development programs were introduced to train teachers in formative assessment practices as a strategy to improve mathematics instruction in middle schools.

Similarly, in Indonesia, mathematics teachers face considerable challenges in designing and analyzing assessments that measure reasoning and proof. Sari et al.

(2020) note difficulties related to developing appropriate assessment frameworks, managing time effectively, and interpreting learners' mathematical thinking. Trisnani et al. (2024) further observe that elementary school teachers struggle to integrate critical thinking into mathematics instruction due to time constraints, limited pedagogical knowledge, and low confidence levels, all of which negatively affect the quality of psychomotor and affective assessments.

In South Africa, despite the implementation of various mathematics development programs over several years, learner performance has shown limited improvement. Reports from the Southern African Consortium for Monitoring Education Quality (SACMEQ) and the Trends in International Mathematics and Science Study (TIMSS) continue to indicate poor learner achievement in mathematics (DBE, 2019). Research suggests that teachers experience difficulties implementing formative assessment effectively in intermediate phase mathematics (Grades 4–6). Mahlambi et al. (2022) argue that although Assessment for Learning (AFL) is mandatory and widely acknowledged for its instructional benefits, its practical application remains problematic due to teachers' limited understanding of AFL strategies and insufficient subject-specific pedagogical knowledge. Vandeyar and Killen (2020) add that curriculum reforms are often poorly translated into classroom practice, particularly in under-resourced schools, while Spaull (2019) highlights how socioeconomic inequalities and uneven teacher training further exacerbate disparities in mathematics outcomes.

In the Nigerian context, Edosomwan (2024) reports that mathematics assessment in primary schools largely relies on written tests, assignments, and group work. These methods are preferred for their convenience and ease of administration and form the basis of continuous assessment used for grading. However, alternative formative assessment approaches such as classroom observation, oral questioning, and peer assessment are rarely used. Factors such as large class sizes, time constraints, and limited teacher knowledge of formative assessment strategies contribute to this narrow assessment focus. Consequently, mathematics assessment tends to emphasize learners' mastery of content rather than promoting deeper mathematical thinking or connecting learning to broader societal goals.

A similar challenge is evident in Tanzania, where primary school learners continue to demonstrate inconsistent performance in mathematics. Data from the National Bureau of Statistics (NBS) show that average mathematics scores in Dar es Salaam increased from 55% in 2019 to 62% in 2023; however, these results remain below the national average of 70%, indicating a need for more effective instructional strategies (NBS, 2023). Several studies confirm persistent underachievement in mathematics across both lower and higher levels of education (Ngussa & Mbuti, 2017; Mzomwe et al., 2019; Areelu, 2023). In Kisarawe District specifically, mathematics performance in primary schools remains critically low. Examination results from the

2022 Primary School Leaving Examinations (PSLE) reveal that only 38% of pupils passed mathematics, compared to the national average of 45%, with over 60% failing the subject entirely (Regional Education Office, 2023). Comparative data further show that Kisarawe continues to lag behind neighboring districts such as Kibaha and Mkuranga. These poor outcomes are attributed to factors including inadequate teacher training in formative assessment, overcrowded classrooms, and widespread learner disinterest in mathematics.

In light of these challenges, there is a growing need to investigate instructional practices that can enhance mathematics teaching and learning at the primary school level. Therefore, the aim of this study is to examine the effect of formative assessment constructive feedback on mathematics teaching and learning processes in primary schools.

Statement of the Problem

Mathematics remains a crucial foundation for scientific, technological, and socio-economic development, yet primary school pupils in many countries, including Tanzania, continue to struggle with achieving satisfactory competence in the subject (Mazana et al., 2019). In Tanzania, persistent low performance in mathematics has been documented in various national examination reports, indicating that many learners fail to master basic mathematical skills required at the primary level (NBS, 2023).

Although formative assessment is globally recognized as an effective tool for improving learners' understanding, engagement, and correction of misconceptions its implementation in many Tanzanian primary schools is limited. Existing studies reveal that teachers often lack adequate knowledge and skills on how to design and use formative assessment strategies such as observation, questioning, peer assessment, and feedback. Practical classroom evidence further suggests that many mathematics teachers rely heavily on summative assessments and written exercises, rather than continuous, interactive assessment practices. In addition, large class sizes, limited teaching resources, and heavy workloads hinder teachers from effectively integrating formative assessment during lessons. These barriers hinder the effective use of formative assessment to address pupils' learning gaps and improve performance in mathematics. Therefore, this study intends to investigate the influence of mathematics formative assessment on learning among pupils in primary schools in Kisarawe District

Literature Review

1. Theoretical Framework

The study is grounded in Constructivist Theory, which views learning as an active process whereby pupils build new knowledge by interacting with their

environment and connecting new ideas to prior understanding, drawing on the contributions of Piaget's developmental stages and Vygotsky's emphasis on social and cultural influences. The theory aligns closely with formative assessment because it promotes active engagement, allows teachers to identify and address misconceptions, and positions the teacher as a facilitator who guides learning through feedback and instructional adjustments. Its strengths include encouraging hands-on and reflective learning, ensuring developmental appropriateness in assessment tasks, and fostering collaboration through peer interaction and guided support within the Zone of Proximal Development. In the context of primary mathematics in Kisarawe District, Constructivist Theory is highly relevant as it supports the design of formative assessments such as quizzes, group tasks, and discussions that engage pupils actively, accommodate their cognitive stages, promote social learning, and ultimately enhance their understanding and performance in mathematics.

2. Empirical Literature Review

a. The Effect of Formative Assessment (FA) Feedback on Mathematics Teaching and Learning Processes in Primary Schools

Kültür and Kutlu (2021) carried out a 12-week quasi-experimental study in Turkey to evaluate how formative assessment practices influenced the academic achievement of and attitudes toward mathematics among 10th-grade high school students, in addition to exploring the students' perspectives on the practice. The study involved 51 students divided into an experimental group (26) and a control group (25). Quantitative data, collected using a functions academic test and a math attitude scale, demonstrated a statistically significant positive effect of formative assessment on both student achievement and attitudes. Qualitatively, using semi-structured interviews, the researchers found that these practices were valuable for aiding learning processes and encouraging student expression in the classroom. Based on these results, the authors recommended that teachers employ formative assessment to foster student-centered mathematics classes and more effectively gauge learners' mathematical competence

Avvisati and Borgonovi (2020) in France conducted a case study to examine the use of test-enhanced learning as a formative assessment in high school mathematics. Building on a large-sample investigation by the study, the focus was to explore the relationship between the testing effect and problem solving in mathematics. The findings from Avvisati and Borgonovi demonstrated a small positive effect of the first test on students' performance in a subsequent test, specifically among fifteen-year-old students. However, the researchers noted that the environment in their study did not reflect a real educational context, as it only measured the effects of a single test practice. This raised concerns about the generalizability of their results to actual classroom settings, where the testing effect may not be as evident.

Palm et al. (2017) in Sweden, review of the impact of formative assessment on student achievement in Mathematics. This review analyzed the effect of formative assessment on mathematics student achievement by examining scientific journal articles published and Web of Science-indexed between 2005 and 2014. The review used search terms like "formative assessment," "assessment for learning," and "self-regulated learning," thereby encompassing various formative assessment methods. Despite these differing approaches, they all shared the core feature: classroom participants gather evidence of student progress to modify teaching or learning strategies. While existing literature already suggests that formative assessment can significantly boost overall student achievement, the authors identified a need for subject-specific reviews. Crucially, this study confirmed a positive correlation between student achievement in Mathematics and the formative assessment methods included in the analysis.

Alordiah (2025) conducted a study on enhancing learning outcomes through formative assessments in Africa: a systematic review of practices, challenges, and opportunities, conducted in Nigeria. The study applies a systematic review methodology guided by PRISMA standards to examine literature on formative assessment across African educational contexts. Through meta-analysis and thematic synthesis, the review finds that formative assessments significantly enhance academic achievement, critical thinking, and problem-solving skills among African learners. Promising innovations include Gamified platforms and mobile applications, though challenges persist due to inadequate teacher training, policy misalignment, and limited resources. The study recommends prioritizing infrastructure, professional development, and scalable low-tech solutions to strengthen formative assessment practices.

Wafubwa and Csíkos (2022) investigated the impact of formative assessment on the mathematics achievement and metacognitive awareness of secondary school students. The study involved 164 Grade 11 students (84 boys) and four mathematics teachers from four secondary schools in Kenya. A quasi-experimental pretest-posttest non-equivalent group design was employed to assess whether there were significant differences in students' mathematics achievement scores and their metacognitive awareness following a formative assessment intervention. The results suggest that when formative assessment strategies are tailored to meet the need of students, they could lead to enhanced learning achievement. The approach of formative assessment implemented in this study specifically designed to address the challenges faced by students with proportional reasoning in Arithmetic.

METHODOLOGY

The study adopted a mixed-method research approach combining qualitative and quantitative techniques including interviews, observations, questionnaires, and

document reviews to gain a comprehensive understanding of formative assessment practices in Kisarawe District. Using a Convergent Parallel Design, quantitative and qualitative data were collected and analyzed separately before being integrated to provide complementary insights into how teachers' assessment strategies influence pupils' learning experiences. Kisarawe District was selected due to persistent challenges in mathematics performance, limited research on formative assessment, and contextual issues such as overcrowded classrooms, resource shortages, and varying teacher competencies. The target population comprised 149 respondents, and a sample of pupils, mathematics teachers, and head teachers was selected using purposive and simple random sampling, with sample sizes determined using the Yamane formula. Data collection involved semi-structured interviews, direct observations, documentary reviews, and questionnaires, preceded by a pilot study to ensure reliability and clarity of research instruments. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were examined thematically. Ethical considerations including informed consent, confidentiality, voluntary participation, and institutional approval were strictly observed throughout the research process.

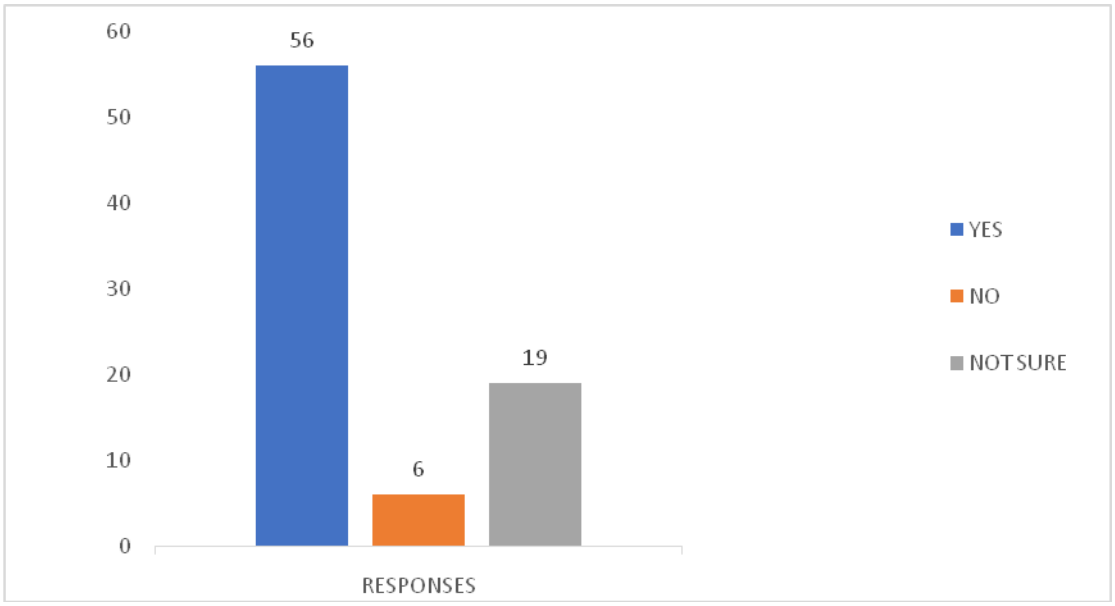
FINDINGS AND DISCUSSIONS

The Effect of Formative Assessment (FA) Constructive Feedback on Mathematics Teaching and Learning Processes in Primary Schools

This objective intended to investigate the impact of formative assessment on teaching mathematics teaching and learning processes in primary schools. The researcher intended to know if those assessment have positive impact to the pupils in their learning processes. In order to get wider understanding of this objective, this section divided into two sub sections. The first section is small tests/exercises help pupils to understand Mathematics better. The second section is the effect of formative assessment (fa) constructive feedback on mathematics teaching and learning processes in primary schools. The finding has been presented below:

1. Small Tests/Exercises Help Pupils to Understand Mathematics Better

Under this sub-section pupils were asked to answer yes, no and not sure question to get understanding if the formative assessment which conducted by their mathematics teachers improves their understanding in mathematics subject. The finding has been presented below:



Source: Researcher (2025)

Figure 1.
Pie Chart Showing Response on Exercises Help Pupils to Understand Mathematics Better

The results from the bar chart show that a large majority of pupils (56) indicated Yes, meaning their teachers mark their classwork and provide feedback, while only 6 pupils responded No, and 19 pupils were Not sure. This suggests that most mathematics teachers attempt to practice formative assessment by checking pupils' work and offering feedback during lessons. However, the presence of a sizeable group who are uncertain indicates inconsistency in how feedback is delivered or communicated. According to the literature, effective formative assessment requires continuous feedback that is clear, timely, and specific enough to help learners understand their strengths and areas needing improvement. Studies such as Fatima (2022) and Fetahu et al. (2023) emphasize that feedback is a core component of formative assessment because it guides learners toward deeper understanding and supports their progress. The Constructivist Theory also supports this by arguing that learners build knowledge through active engagement and reflection, processes that can only happen when teachers help them identify errors and correct misunderstandings.

In addition, through observation research found that students who given assessment tools including homework and exercise are developed in their mathematics understanding. Furthermore, through documentary review researcher observed the exercises which provided by mathematics teachers which helped the students to improve their understanding in mathematics subjects (See Appendix VI). Similarly, Fatima (2022) show that frequent exercises help learners reinforce concepts,

correct misconceptions, and retain knowledge more effectively. Similarly, Thinwiangthong et al. (2020) found that regular formative tasks improve pupils' confidence, problem-solving abilities, and capacity to identify learning gaps. Consistent with Constructivist Theory, this evidence shows that active engagement with learning tasks enables pupils to build deeper conceptual understanding, confirming that continuous assessment through homework and exercises enhances mathematics mastery.

The Effect of Formative Assessment (FA) Constructive Feedback on Mathematics Teaching and Learning Processes in Primary Schools

This was the second sub-section under the second objective, this section intends to investigate the effectiveness of the formative assessment on improving pupils understanding of the mathematics subject in primary schools. The findings have been presented below:

Table 1.
The Effect of Formative Assessment (FA) Constructive Feedback on Mathematics Teaching and Learning Processes in Primary Schools

S/N	Statements	SD F (%)	D F (%)	N F (%)	A F (%)	SA F (%)
1	Formative assessment improves learners' understanding of mathematical concepts	1(1.2)	3(3.7)	8(9.9)	50(61.7)	19(23.5)
2	Formative assessment enhances learners' motivation and confidence	2(2.5)	4(4.9)	7(8.6)	48(59.3)	20(24.7)
3	Formative assessment guides teachers in adjusting instruction	1(1.2)	5(6.2)	9(11.1)	47(58.0)	19(23.5)
4	Formative assessment promotes active learning and learner engagement	2(2.5)	4(4.9)	10(12.3)	46(56.8)	19(23.5)
5	Formative assessment creates a positive classroom learning environment	1(1.2)	3(3.7)	11(13.6)	45(55.6)	21(25.9)

Source: Researcher (2025)

Table 1 presents the findings on the effect of formative assessment (FA) constructive feedback on mathematics teaching and learning processes in primary schools. Those findings have supported by the interview findings below:

1. Improves Learners' Understanding of Mathematical Concepts

Most students agreed that formative assessment improves their understanding of mathematical concepts. Specifically, 19 students (23.5%) strongly agreed and 50 students (61.7%) agreed, totaling 85.2%. Eight students (9.9%) were neutral, while 3 (3.7%) disagreed and 1 (1.2%) strongly disagreed. This indicates that the majority of learners perceive formative assessment as a tool that enhances comprehension by identifying gaps and reinforcing key concepts. Teachers reported that using diagnostic questions and activities during lessons allows learners to grasp difficult mathematical ideas more effectively. During interviews, some teachers pointed out that providing constructive and timely feedback during lessons helps them identify areas where pupils struggle and clarify difficult concepts. As one respondent argued:

> *When I provide feedback immediately after a pupil attempts a problem, I don't just indicate whether the answer is right or wrong. I explain the reasoning behind the correct solution, suggest alternative methods, and ask follow-up questions to ensure understanding. For example, when teaching addition of fractions, I may ask pupils to solve problems on the board, discuss their methods in pairs, or use fraction strips to demonstrate the concept. By doing this, I can see which pupils understand the concept and which ones need additional guidance.* (Teacher from School C, August 2025)

This implies that using formative assessment with constructive feedback in teaching Mathematics has significant implications for both pupils and teachers. It allows teachers to develop a stronger awareness of each pupil's conceptual understanding and provide targeted support where necessary. For learners, it enhances their awareness of their own understanding by helping them correct misconceptions, understand problem-solving strategies, and consolidate mathematical concepts. In addition, during interviews, another respondent argued:

> *I recognize that providing timely and constructive feedback is essential for helping pupils master mathematical concepts. I ensure that learners receive guidance immediately after they make mistakes, which helps prevent misconceptions from persisting and builds their confidence in tackling similar problems* (HT 2, August 2025)

The statement implies that effective Mathematics teaching is closely linked to the use of formative assessment with feedback. By giving timely guidance, teachers can continuously monitor pupils' understanding, address errors as they occur, and strengthen learning. Consequently, learners are more likely to achieve a deeper understanding of mathematical concepts and improve overall academic performance. According to Constructivist Theory**,** learning is most effective when pupils actively engage with content, construct their own understanding, and receive guidance from teachers to scaffold their learning. In this context, formative assessment with constructive and timely feedback aligns perfectly with constructivist principles. By observing learners' responses, identifying misconceptions, and providing immediate

explanations or alternative problem-solving strategies, teachers facilitate active learning and help pupils build meaningful mathematical knowledge. Kültür and Kutlu (2021) demonstrated that formative assessment practices in mathematics significantly enhance both academic achievement and students' ability to articulate understanding, as immediate feedback helps learners correct misconceptions and consolidate knowledge. Similarly, Palm et al. (2017) and Wafubwa and Csíkos (2022) found that formative assessment enables teachers to identify learning gaps in real time, adjust instruction accordingly, and improve comprehension of mathematical concepts. Moreover, the practice of providing feedback enhances pupil engagement, as lessons become more interactive and responsive to their learning needs. It also promotes inclusivity by giving pupils of varied abilities the opportunity to understand and demonstrate concepts in ways that suit their learning styles, thereby improving comprehension and participation across the class.

2. Enhances Learners' Motivation and Confidence

Regarding motivation and confidence, 20 students (24.7%) strongly agreed and 48 students (59.3%) agreed, making 84% of the students acknowledging that formative assessment encourages them to participate and build self-assurance. Seven students (8.6%) were neutral, while 4 (4.9%) disagreed and 2 (2.5%) strongly disagreed. This shows that providing timely feedback and guidance boosts learners' confidence in solving mathematical problems. During interviews, teachers noted that positive reinforcement and corrective feedback motivate students to attempt challenging tasks without fear of failure. During interviews, some teachers highlighted that providing timely feedback and constructive guidance boosts pupils' motivation and confidence in mathematics. As one respondent argued:

> *I provide positive reinforcement along with corrective feedback whenever pupils make mistakes. For example, when a student struggles with solving word problems, I praise their effort, explain the correct approach, and encourage them to try again. This helps pupils feel more confident and willing to attempt challenging problems without fear of failure. (Teacher from School D, August 2025)*

This implies that formative assessment in mathematics has significant implications for both learners and teachers. For teachers, it provides a tool to encourage active participation and foster a supportive learning environment. For learners, it enhances self-assurance, motivates them to engage in problem-solving activities, and reduces anxiety when faced with difficult tasks. In addition, Kültür and Kutlu (2021) found that formative assessment practices, including feedback, significantly improved students' attitudes and confidence in mathematics, fostering a positive classroom climate where learners were willing to attempt tasks without fear of failure. Furthermore, during interviews, another respondent argued:

> *I recognize that using formative assessment to provide timely feedback and encouragement is key to building pupils' confidence. When learners see that mistakes are part of the learning process and receive guidance to correct them, they are more motivated to participate actively in lessons. (HT 3, August 2025)*

The statement implies that effective mathematics teaching is closely linked to the use of formative assessment to support learners' motivation and confidence. By providing constructive feedback and reinforcement, teachers create an environment where pupils feel safe to explore concepts, ask questions, and attempt challenging tasks. Consequently, learners are more likely to engage actively in lessons, persist in problem-solving, and develop a positive attitude toward mathematics. Similarly, Palm et al. (2017) observed that formative assessment enhances self-regulated learning, allowing students to monitor their own understanding and gain confidence as they progress. Alordiah (2025) also noted that constructive feedback motivates learners to persist with challenging problems, leading to improved engagement, problem-solving skills, and overall academic performance. Thus, providing formative assessment with timely feedback not only strengthens learners' comprehension but also cultivates motivation, resilience, and self-confidence in mathematics. For teachers, this approach serves as a practical tool to foster an encouraging learning environment, while for learners, it creates opportunities to actively participate, explore concepts safely, and develop a positive attitude toward mathematics. Consequently, integrating formative assessment strategies into teaching is essential for both academic success and learner motivation.

3. Guides Teachers in Adjusting Instruction

Most students agreed that formative assessment helps teachers adjust their instruction. Nineteen students (23.5%) strongly agreed and 47 (58.0%) agreed, totaling 81.5%. Nine students (11.1%) were neutral, while 5 (6.2%) disagreed and 1 (1.2%) strongly disagreed. This suggests that teachers use information from formative assessments to modify teaching strategies, reteach misunderstood concepts, and provide individualized support. Interviews confirmed that teachers monitor learners' responses to make informed instructional decisions. During interviews, some teachers highlighted that formative assessment provides critical information that helps them adjust their teaching strategies to meet learners' needs. As one respondent argued:

> *I continuously monitor pupils' responses during lessons, through activities like questioning, group discussions, and quizzes. If I notice that several pupils struggle with a concept, I immediately adjust my teaching by reteaching the topic using different examples or approaches. This allows me to address misunderstandings before they become entrenched. (Teacher from School E, August 2025)*

This implies that formative assessment in mathematics has significant implications for both teaching and learning. For teachers, it provides real-time insights into learners' comprehension, allowing them to modify instructional strategies, pace lessons appropriately, and provide individualized support where needed. For

learners, this ensures that instruction is responsive to their learning gaps, helping them grasp concepts more effectively and improving overall understanding. Similarly, Palm et al. (2017) reported that formative assessment provides teachers with actionable feedback about learning progress, which enables timely adjustments in teaching strategies to support mastery of concepts. In addition, during interviews, another respondent argued:

> *I recognize that monitoring learners through formative assessments is key to making informed instructional decisions. By analyzing students' errors and understanding where they face difficulties, I can adjust my lesson plans, provide additional exercises, or offer one-on-one guidance to help them master the concepts. (HT 4, August 2025)*

This means that effective mathematics teaching is closely linked to the use of formative assessment for instructional adjustment. By using assessment data to guide teaching, teachers can ensure lessons are tailored to learners' needs, promote mastery of concepts, and enhance overall academic performance. According to Constructivist Theory, learning is an active, dynamic process in which teachers facilitate students' construction of knowledge by responding to learners' current understanding and providing scaffolding when necessary. Formative assessment serves as a practical tool for teachers to gather real-time evidence of learners' understanding, identify misconceptions, and adjust instruction accordingly. By continuously monitoring pupils' responses through questioning, group work, quizzes, or class discussions, teachers can tailor explanations, reteach difficult concepts, or provide individualized support. This approach ensures that instruction aligns with the developmental and cognitive needs of learners, a core principle of constructivism, where the teacher acts as a facilitator rather than a mere transmitter of knowledge. Furthermore, Alordiah (2025) highlighted that effective formative assessment practices help teachers identify learning gaps and adapt instruction to meet individual and group needs, resulting in improved learner engagement and achievement. Thus, the use of formative assessment to guide instructional adjustments has significant implications for both teaching and learning. For teachers, it offers a structured method to respond to learners' needs, optimize lesson pacing, and provide targeted support.

4. Promotes Active Learning and Learner Engagement

The data indicate that formative assessment promotes active learning. Nineteen students (23.5%) strongly agreed and 46 students (56.8%) agreed, totaling 80.3%. Ten students (12.3%) were neutral, while 4 (4.9%) disagreed and 2 (2.5%) strongly disagreed. This demonstrates that formative assessment strategies, such as group work, problem-solving activities, and questioning, encourage students to participate actively in lessons. Teachers highlighted that engaging learner in discussions and peer assessments enhances their involvement and understanding. During interviews,

teachers emphasized that formative assessment plays a crucial role in promoting active learning and engagement among pupils. One respondent explained:

> *When I use formative assessment activities such as group work, questioning, and quick exercises, the learners become more active. They share ideas, discuss answers with their peers, and participate more freely. This approach makes them feel part of the lesson rather than just listening to the teacher.* (Teacher from School C, August 2025)

This suggests that formative assessment methods create opportunities for learners to interact more deeply with mathematical concepts. Techniques like peer assessment, class discussions, and problem-solving tasks shift learners from passive recipients of information to active participants in the learning process. Such involvement helps them construct their own understanding and develop critical thinking skills. Additionally, Alordiah (2025) noted that formative assessment encourages African learners to participate actively through discussions and feedback, enhancing both conceptual understanding and problem-solving abilities. In addition, another respondent emphasized the importance of engaging learners through continuous assessment:

> *I encourage students to explain their answers and discuss different ways of solving mathematical problems. This not only keeps them engaged but also helps them learn from each other. Through these activities, I can see who understands the topic and who needs more support.* (HT 2, August 2025)

This statement implies that formative assessment not only stimulates learner participation but also enhances learning outcomes by enabling students to articulate their reasoning, reflect on their work, and receive immediate feedback. When learners are actively involved, they become more confident and motivated, which strengthens their understanding of mathematical concepts. Furthermore, Kültür and Kutlu (2021) found that formative assessment enhances students' active participation in mathematics, fostering deeper engagement and better understanding of complex concepts. Palm et al. (2017) highlighted that using formative assessment methods, such as questioning and collaborative tasks, creates interactive classrooms where students are more involved in their learning processes. Moreover, the findings indicate that active learning enhances collaboration, communication, and problem-solving skills. By engaging learners in hands-on activities and continuous interaction, formative assessment fosters an inclusive classroom environment where every student has the opportunity to contribute and participate meaningfully. This ultimately supports better retention of knowledge and improved performance in mathematics.

5. Creates a Positive Classroom Learning Environment

Most students agreed that formative assessment contributes to a positive classroom environment. Twenty-one students (25.9%) strongly agreed and 45 students (55.6%) agreed, totaling 81.5%. Eleven students (13.6%) were neutral, while 3 (3.7%) disagreed and 1 (1.2%) strongly disagreed. This indicates that formative assessment fosters a supportive and encouraging classroom climate where learners feel comfortable asking questions and making mistakes. Teachers reported that such an environment improves collaboration and participation among students. During interviews, teachers emphasized that formative assessment plays a major role in shaping a positive and supportive classroom atmosphere. One teacher explained:

> *When I continuously assess my pupils and give them constructive feedback, the classroom becomes a comfortable place for learning. Learners participate freely because they know the purpose of the assessment is to help them improve, not to punish them. Even those who used to fear Mathematics start asking questions and sharing their ideas. They understand that making mistakes is part of the learning journey, so they no longer feel embarrassed when they get something wrong. This has created a more relaxed, respectful, and engaging environment where all pupils feel included and supported. (Teacher from School B, August 2025)*

This quotation shows that formative assessment reduces anxiety and encourages learners to engage more openly in Mathematical activities. It creates an atmosphere where mistakes are accepted as learning opportunities, which boosts confidence and participation. In a similar vein, Alordiah (2025) highlighted that African classroom implementing formative assessment reported improved classroom dynamics, where students were more confident to participate, collaborate, and take ownership of their learning. Kültür and Kutlu (2021) also observed that students in classrooms with consistent formative assessment exhibited more positive attitudes toward mathematics and higher willingness to engage, indicating a supportive and inclusive classroom environment. Another respondent supported this view, stating:

> *I have observed that when teachers use different formative assessment strategies, such as oral questioning, peer activities, and continuous feedback, the classroom becomes more cooperative and learner-friendly. Pupils feel that the teacher understands their struggles and is willing to guide them step by step. This strengthens the relationship between teachers and pupils because learners trust that the feedback they receive is meant to help them. As a result, the classroom becomes calm, interactive, and supportive, with pupils working together and showing improved behavior compared to when only traditional tests were used. (HT 1, August 2025)*

The statement implies that formative assessment not only enhances learning but also improves the emotional and social climate of the classroom. When learners feel safe, respected, and supported, they develop positive attitudes towards

Mathematics, participate more actively, and collaborate more effectively. According to Constructivist Theory, learners build knowledge actively through engagement with content, peers, and teachers, while the teacher acts as a facilitator guiding the learning process. Formative assessment aligns with this theory by creating a classroom climate where learners feel safe to ask questions, make mistakes, and participate actively, fostering collaboration and constructive interactions. Furthermore, Wafubwa and Csíkos (2022) found that formative assessment promotes metacognitive awareness and student engagement in mathematics, creating a learning environment where students feel supported in exploring concepts. Avvisati and Borgonovi (2020) noted that continuous formative assessment encourages cooperative learning, allowing students to interact with peers while receiving guidance, which enhances motivation and reduces anxiety. Therefore, the findings indicate that formative assessment contributes significantly to building a positive classroom learning environment. It fosters trust, motivation, and cooperation, which are essential for successful Mathematics teaching and learning in primary schools.

CONCLUSION

The study affirms that formative assessment with constructive feedback is a powerful pedagogical tool that significantly enhances the teaching and learning of mathematics in primary schools by improving conceptual understanding, boosting learner confidence and motivation, enabling instructional adjustments, promoting active engagement, and creating a supportive classroom climate. To actualize these benefits, it is recommended that educational authorities and school administrations prioritize comprehensive and continuous professional development for teachers to deepen their understanding and application of diverse FA strategies, allocate resources to address contextual challenges such as overcrowded classrooms, and integrate FA-focused training into both pre-service and in-service teacher development programs to ensure that formative assessment becomes a sustainable and effective cornerstone of primary mathematics education.

REFERENCES

Alordiah, C. (2025). Enhancing learning outcomes through formative assessments in Africa: A systematic review of practices, challenges, and opportunities. *e-Kafkas Journal of Educational Research, 12*(2), 592–615. https://doi.org/10.30900/kafkasegt.1630814

Avvisati, F., & Borgonovi, F. (2020). Learning mathematics problem solving through test practice: A randomized field experiment on a global scale. *Educational Psychology Review, 32*(3), 791–814. https://doi.org/10.1007/s10648-020-09516-2

Edosomwan, E. (2024). Assessment practices in Nigerian primary mathematics classrooms: A descriptive study. *Journal of Educational Measurement and Practice, 12*(1), 33–48.

Fatima, I. (2022). *Examining the implementation of formative assessment practices in middle school mathematics: A basic qualitative study* [Doctoral dissertation, Capella University]. ProQuest Dissertations & Theses Global.

Ker, H. W. (2013). Trend analysis on mathematics achievements: A comparative study using TIMSS data. *Universal Journal of Educational Research, 1*(3), 200–203. https://doi.org/10.13189/ujer.2013.010309

Kültür, Y. Z., & Kutlu, M. O. (2021). The effect of formative assessment on high school students' mathematics achievement and attitudes. *Journal of Pedagogical Research, 5*(4), 155–171.

Mazana, M. Y., Montero, C. S., & Casmir, R. O. (2019). Investigating students' attitude towards learning mathematics. *International Electronic Journal of Mathematics Education, 14*(1), 207–231. https://doi.org/10.29333/iejme/3997

Palm, T., Andersson, C., Boström, E., & Vingsle, L. (2017). A review of the impact of formative assessment on student achievement in mathematics. *Nordic Studies in Mathematics Education, 22*(3), 25–50.

Pat-El, R. J., Tillema, H., Segers, M., & Vedder, P. (2015). Multilevel predictors of differing perceptions of assessment for learning practices between teachers and students. *Assessment in Education: Principles, Policy & Practice, 22*(2), 282–298. https://doi.org/10.1080/0969594X.2014.975675

Spaull, N. (2019). Equity and efficiency in South African education: A comparative analysis. *International Journal of Educational Development, 66*(2), 21–33.

Thinwiangthong, S., Eddy, C. M., & Inprasitha, M. (2020). Mathematics teachers' abilities in developing formative assessment after the introduction of lesson study and open approach innovations. *Malaysian Journal of Learning and Instruction, 17*(1), 101–132. https://doi.org/10.32890/mjli2020.17.1.5

Trisnani, N., Retnawati, H., & Wuryandani, W. (2024). Challenges of Indonesian elementary school mathematics teachers in integrating critical thinking into the classroom. *Journal on Mathematics Education, 15*(3), 905–924. https://doi.org/10.22342/jme.v15i3.pp905-924

Tshabalala, T., & Ncube, A. C. (2016). Causes of poor performance of ordinary level pupils in mathematics in rural secondary schools in Nkayi district: Learners' attributions. *Nova Journal of Medical and Biological Sciences, 1*(1), 1–6. https://doi.org/10.20286/nova-jmbs-010113

Vandeyar, S., & Killen, R. (2020). Teacher responses to curriculum reform in post-apartheid South Africa. *Journal of Curriculum Studies, 52*(3), 356–371. https://doi.org/10.1080/00220272.2020.1740320

Wafubwa, R. N., & Csíkos, C. (2022). The impact of formative assessment on the mathematics achievement and metacognitive awareness of secondary school students. *Journal of Educational Research, 115*(4), 234–245.