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# Studies in Technology and Education

Volume 5, Issue 3, 2026 | <https://www.azalpub.com/index.php/ste>

## RESEARCH ARTICLE

### INSTRUCTIONAL PRACTICES AND LEARNER ENGAGEMENT IN MATHEMATICS EDUCATION: EXPERIENCES IN JUNIOR HIGH SCHOOL LEARNERS

#### Article Info

**Received:** 2-7-2026

**Accepted:** 4-9-2026

**Published:** 6-1 -2026

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#### Abstract

Learner engagement and instructional practices are essential components of effective mathematics education, particularly in rural secondary school settings where learners encounter diverse academic and socio-economic challenges. This study explored the instructional practices and learner engagement in mathematics education among Junior High School learners at Abuyo National High School. Anchored on Constructivist Learning Theory and Student Engagement Theory, the study employed a descriptive qualitative research design to examine learners' classroom experiences, participation, instructional interactions, and engagement in mathematics learning activities. Participants included selected Junior High School learners and mathematics teachers. Data were gathered through semi-structured interviews, focus group discussions, classroom observations, and document analysis. Braun and Clarke's (2006) thematic analysis approach was utilized in analyzing the gathered data. Findings revealed that collaborative learning activities, contextualized mathematics instruction, supportive teacher facilitation, and interactive classroom practices significantly contribute to learner engagement and conceptual understanding in mathematics education. Learners demonstrated greater confidence and participation when instructional activities were collaborative, practical, and connected to real-life situations. The findings further revealed that positive teacher-learner relationships strengthen learners' emotional engagement and motivation to participate in mathematical discussions and problem-solving activities. However, mathematics anxiety, conceptual difficulties, insufficient instructional resources, and fear of making mistakes negatively affected classroom engagement and learner participation. The study concludes that meaningful instructional practices and supportive classroom environments significantly contribute to learner engagement and participation in mathematics education within rural secondary school contexts. Strengthening collaborative instruction, contextualized learning experiences, and emotionally supportive classroom environments is recommended to improve mathematics engagement among Junior High School learners.

**Keywords:** mathematics education, learner engagement, instructional practices, rural education, secondary education, qualitative research, mathematics learning

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## INTRODUCTION

Mathematics education plays a vital role in developing learners' analytical thinking, logical reasoning, problem-solving competence, and decision-making abilities necessary for academic success and real-life applications. Through mathematics instruction, learners acquire conceptual understanding and critical thinking skills that support learning in science, technology, engineering, and various practical disciplines. Mathematics also contributes significantly to learners' confidence, perseverance, and cognitive development.

In secondary education, instructional practices greatly influence learners' classroom participation, engagement, confidence, and mathematical understanding. Effective mathematics instruction requires learner-centered and interactive pedagogical approaches that encourage active participation, collaboration, inquiry, and meaningful problem-solving experiences. Learner engagement in mathematics becomes stronger when instructional activities are relevant, supportive, contextualized, and emotionally safe for learners.

Learner engagement refers to learners' behavioral, emotional, and cognitive participation in classroom learning activities. Behavioral engagement involves active participation in classroom tasks and instructional activities. Emotional engagement refers to learners' confidence, motivation, interest, and emotional responses toward mathematics learning. Cognitive engagement involves learners' mental effort, reasoning processes, conceptual understanding, and persistence during problem-solving activities.

Within the Philippine educational context, the Department of Education emphasizes learner-centered and contextualized instruction under the K–12 curriculum to strengthen meaningful learning and conceptual understanding in mathematics education. Teachers are encouraged to implement collaborative learning, inquiry-based activities, contextualized instruction, and problem-solving approaches to improve learner engagement and mathematical competence.

However, mathematics learning in rural school settings often presents several challenges that affect classroom participation and learner engagement. Learners in geographically isolated and rural communities may experience mathematics anxiety, limited instructional resources, low academic confidence, and varying learning abilities. These conditions may influence learners' willingness to participate in classroom discussions and problem-solving activities.

At Abuyo National High School, mathematics teachers continuously implement adaptive instructional strategies and learner-centered classroom practices to improve learners' engagement and participation despite instructional and environmental limitations. Understanding learners' classroom experiences and instructional interactions is therefore important in strengthening mathematics instruction and improving learner engagement within rural secondary school contexts.

Several studies emphasized that collaborative and contextualized mathematics instruction positively influences learner engagement and conceptual understanding. Boaler (2021) explained that learner-centered mathematics instruction strengthens participation, confidence, and mathematical understanding among learners. Similarly, Fredricks et al. (2019) argued that supportive classroom environments significantly influence learners' emotional and behavioral engagement in academic learning.

Although learner engagement in mathematics has been widely discussed in educational research, there remains limited qualitative research exploring learners' instructional experiences and classroom engagement in rural Philippine secondary school settings. Thus, this study aimed to explore instructional practices and learner engagement in mathematics education among Junior High School learners at Abuyo National High School.

## THEORETICAL FRAMEWORK

This study was anchored on Constructivist Learning Theory by Vygotsky (1978) and Student Engagement Theory by Fredricks et al. (2019).

Constructivist Learning Theory posits that learners actively construct mathematical understanding through interaction, collaboration, reflection, and meaningful classroom experiences. Mathematical learning becomes more effective when learners participate actively in collaborative instructional activities and socially meaningful problem-solving tasks.

Student Engagement Theory explains that learners' behavioral, emotional, and cognitive engagement significantly influence classroom participation, academic motivation, and learning outcomes. Learners become more engaged when instructional environments are supportive, interactive, learner-centered, and emotionally safe.

These theories provided the framework for understanding how instructional practices influence learner engagement and classroom participation in mathematics education.

## **OBJECTIVES OF THE STUDY**

This study aimed to explore instructional practices and learner engagement in mathematics education among Junior High School learners at Abuyo National High School. Specifically, it sought to examine learners' classroom experiences and participation in mathematics instruction and identify instructional practices that contribute to learner engagement in mathematics education. The study further aimed to explore how learners demonstrate behavioral, emotional, and cognitive engagement during mathematics instruction. Additionally, it intended to identify the challenges encountered by learners and teachers in mathematics learning and classroom engagement. Finally, the study aimed to derive insights from the participants' experiences that may serve as basis for strengthening instructional practices and learner engagement in mathematics education.

## **METHODOLOGY**

This study employed a descriptive qualitative research design to explore instructional practices and learner engagement in mathematics education among Junior High School learners at Abuyo National High School. The qualitative approach enabled the researcher to gather rich and contextualized descriptions regarding classroom experiences, instructional interactions, learner participation, and mathematics engagement within secondary classrooms. Through qualitative inquiry, the study captured the lived classroom experiences of learners and teachers and examined how instructional practices influence learner engagement and mathematical understanding.

The study was conducted at Abuyo National High School, a rural public secondary school operating under the supervision of the Department of Education. The school serves learners from geographically isolated and rural communities in Nueva Vizcaya.

The participants of the study included selected Junior High School learners and mathematics teachers. Purposive sampling was utilized to select participants who possessed direct experiences and active involvement in mathematics instruction and classroom learning activities. The selected learners represented varying participation levels, mathematics performance, and engagement experiences.

The study utilized semi-structured interview guides, focus group discussion guides, classroom observation notes, and document analysis checklists as qualitative research instruments. Interview questions focused on classroom participation, mathematics learning experiences, instructional practices, learner engagement, problem-solving activities, and challenges encountered during mathematics instruction.

Prior to data gathering, permission was secured from school administrators and ethical considerations including informed consent, confidentiality, anonymity, and voluntary participation were strictly observed throughout the study. Data were gathered through interviews, focus group discussions, classroom observations, and document analysis. All interviews and discussions were audio-recorded with participants' consent and transcribed verbatim for analysis.

The gathered data were analyzed using Braun and Clarke's (2006) thematic analysis approach. Significant statements and recurring patterns were identified, coded, categorized, and organized into themes representing instructional practices and learner engagement experiences in mathematics education. Trustworthiness was established through triangulation, member checking, audit trails, and thick description to ensure credibility and dependability of the findings.

## RESULTS AND DISCUSSION

### **Theme 1: Collaborative and Interactive Mathematics Instruction Enhances Learner Participation**

The findings revealed that collaborative and interactive instructional practices significantly contribute to learner engagement and classroom participation in mathematics education among Junior High School learners at Abuyo National High School. Participants consistently emphasized that collaborative activities such as group problem-solving, peer tutoring, cooperative discussions, and interactive classroom exercises help learners better understand mathematical concepts and improve their confidence in participating during lessons.

One learner participant stated:

"Mas naiintindihan ko ang math kapag may group activities kasi nagtutulungan kami sa pagsagot."

Another learner shared:

"Kapag collaborative ang lesson, mas hindi ako natatakot magkamali."

Similarly, another participant explained:

"Mas active kami kapag may interaction at sharing of ideas sa classroom."

These responses indicate that collaborative learning environments positively influence learners' behavioral and emotional engagement during mathematics instruction. Learners become more participative and confident when instructional activities encourage communication, teamwork, and peer interaction.

Teachers also emphasized that interactive mathematics instruction improves classroom participation and learner confidence.

One teacher participant stated:

"Mas nagiging lively ang klase kapag collaborative ang activities."

Another participant explained:

"Kapag nagtutulungan ang learners, mas naiintindihan nila ang proseso ng pagsagot."

The findings suggest that collaborative instructional practices strengthen learners' mathematical understanding and engagement in problem-solving activities. Learners become more willing to explore mathematical ideas and solutions when classroom environments are participatory and learner-centered.

The findings support Boaler (2021), who emphasized that collaborative mathematics instruction improves learner confidence, participation, and conceptual understanding. Similarly, Johnson and Johnson (2020) argued that cooperative learning environments strengthen learners' communication skills, engagement, and academic participation.

The findings further align with Vygotsky's (1978) Constructivist Learning Theory, which posits that learning develops through interaction, collaboration, and socially meaningful experiences.

Classroom observations further revealed that learners demonstrated higher levels of attentiveness and participation during collaborative problem-solving tasks and interactive mathematics discussions.

One learner participant shared:

"Mas enjoyable ang math kapag may teamwork at interaction."

This finding highlights the importance of collaborative and interactive instructional practices in strengthening learner engagement in mathematics education within rural secondary school settings.

### **Theme 2: Contextualized Mathematics Instruction Promotes Meaningful Learning Experiences**

The study further revealed that contextualized mathematics instruction significantly strengthens learners' conceptual understanding and engagement in mathematics learning. Participants emphasized that learners become more interested and motivated when mathematical concepts are connected to real-life experiences, practical situations, and community-based examples.

One learner participant stated:

"Mas madaling maintindihan ang math kapag may examples na ginagamit sa totoong buhay."

Another learner shared:

"Kapag practical ang examples, mas nakikita namin ang gamit ng math."

Similarly, another participant explained:

"Mas meaningful ang lesson kapag related sa experiences namin sa araw-araw."

These responses indicate that contextualized mathematics instruction positively influences learners' cognitive engagement and conceptual understanding during problem-solving activities. Learners become more capable of understanding abstract mathematical concepts when lessons are connected to familiar experiences and practical applications.

Teachers also emphasized the importance of contextualizing mathematics instruction according to learners' realities and community experiences.

One teacher participant stated:

"Mas mabilis nilang naiintindihan ang lesson kapag relatable ang examples."

Another participant explained:

"Kapag practical at contextualized ang instruction, mas interested ang learners."

The findings suggest that contextualized mathematics instruction promotes meaningful learning experiences and strengthens learners' appreciation of mathematics in everyday life.

The findings support Gay (2018), who emphasized that contextualized instruction strengthens learner engagement and meaningful participation by connecting lessons to learners' lived experiences. Similarly, Schoenfeld (2019) argued that meaningful mathematics learning occurs when learners engage in authentic and contextualized problem-solving experiences.

The findings further align with Experiential Learning Theory, which explains that learners develop stronger understanding through practical application and meaningful experiences (Kolb, 2019).

Participants further revealed that contextualized examples help reduce confusion and improve learners' confidence during mathematics activities.

One learner participant stated:

"Mas madali kong masolve ang problem kapag familiar ang situation."

This finding highlights the importance of contextualized mathematics instruction in strengthening learner engagement and conceptual understanding among Junior High School learners.

### **Theme 3: Supportive Teacher Facilitation Strengthens Learner Confidence and Emotional Engagement**

The findings revealed that supportive teacher facilitation significantly contributes to learners' confidence, emotional engagement, and classroom participation in mathematics learning. Participants consistently described effective mathematics teachers as patient, approachable, encouraging, and willing to provide guidance during problem-solving activities and classroom discussions.

One learner participant stated:

"Mas ginaganahan akong sumali kapag supportive si teacher."

Another learner explained:

"Kapag hindi ko maintindihan ang lesson, tinutulungan ako ni teacher hanggang matuto ako."

Similarly, another participant shared:

"Hindi ako natatakot magkamali kapag understanding ang teacher."

These responses indicate that positive teacher-learner relationships positively influence learners' emotional engagement and confidence during mathematics instruction. Learners become more willing to participate in classroom discussions and mathematical problem-solving when teachers create supportive and emotionally safe learning environments.

Teachers also emphasized the importance of patience, encouragement, and emotional support in facilitating mathematics instruction.

One teacher participant stated:

"Kailangan talaga ng patience at encouragement sa pagtuturo ng math."

Another participant explained:

"Kapag supportive ang classroom environment, mas nagiging confident ang learners."

The findings suggest that supportive instructional relationships significantly contribute to learners' emotional security, confidence, and willingness to participate in mathematics learning activities.

The findings align with Fredricks et al. (2019), who argued that emotional engagement increases when learners feel supported, respected, and encouraged within classroom settings. Similarly, Pianta et al. (2021) emphasized that positive teacher-learner relationships significantly influence learner motivation, classroom participation, and academic confidence.

The findings further revealed that supportive teachers help reduce learners' fear and hesitation during classroom recitations and problem-solving tasks.

One learner participant shared:

"Mas comfortable akong magtanong kapag approachable si teacher."

This finding highlights the importance of supportive teacher facilitation in promoting emotional engagement and learner confidence in mathematics education.

#### **Theme 4: Mathematics Anxiety, Conceptual Difficulties, and Limited Resources Affect Learner Engagement**

Despite positive classroom experiences, the findings revealed that learners and teachers encounter several challenges affecting learner engagement in mathematics education. Participants identified mathematics anxiety, fear of making mistakes, conceptual difficulties, insufficient instructional resources, and varying learner abilities as major barriers to classroom participation and mathematical understanding.

One learner participant stated:

"Nahihirapan ako minsan sa math kasi natatakot akong mali ang sagot ko."

Another learner explained:

"May mga lessons na sobrang hirap intindihin kaya nawawalan ako ng confidence."

Similarly, another participant shared:

"Minsan hindi ako makasabay kapag mabilis ang discussion."

These responses indicate that emotional and cognitive barriers negatively influence learners' classroom participation and engagement during mathematics instruction. Learners who experience fear, confusion, and low confidence become less willing to participate in discussions and mathematical activities.

Teachers also emphasized that limited instructional materials and classroom resources affect instructional delivery and learner participation.

One teacher participant stated:

"Challenge minsan ang kakulangan sa instructional resources at materials."

Another participant explained:

"Iba-iba ang abilities ng learners kaya mahirap minsan i-balance ang instruction."

The findings suggest that learner engagement in mathematics education is influenced not only by instructional strategies but also by emotional experiences, conceptual understanding, and institutional support systems.

The findings support OECD (2019), which highlighted that mathematics anxiety and low academic confidence significantly affect learner engagement and academic participation. Similarly, Boaler (2021) emphasized that fear of failure negatively influences learners' confidence and classroom engagement in mathematics education. Participants further revealed that some learners become hesitant to participate because of fear of embarrassment from classmates.

One learner participant stated:

"Nahihiya akong sumagot kapag baka pagtawanan kapag mali."

This finding implies the importance of creating emotionally safe and inclusive mathematics classrooms that encourage participation, collaborative learning, and risk-taking in mathematical reasoning.

Despite these challenges, participants emphasized that supportive teachers and collaborative classroom environments help improve learners' confidence and participation.

One learner participant shared:

"Kahit mahirap minsan ang math, natututo pa rin kami kapag supportive ang teacher at classmates."

This finding highlights the resilience of learners and the importance of supportive instructional practices in sustaining meaningful mathematics engagement among Junior High School learners in rural school settings.

## **CONCLUSION**

The study revealed that collaborative, contextualized, and learner-centered instructional practices significantly contribute to learner engagement and meaningful mathematics learning experiences among Junior High School learners at Abuyo National High School. Collaborative learning activities, peer-assisted instruction, and interactive classroom discussions strengthen learners' participation, confidence, and conceptual understanding during mathematics instruction.

The findings further revealed that contextualized mathematics instruction promotes meaningful learning

experiences by helping learners connect mathematical concepts to practical applications and real-life situations. Learners become more motivated and engaged when mathematics lessons are relatable and relevant to their daily experiences.

The study also found that supportive teacher facilitation significantly influences learners' emotional engagement, classroom participation, and mathematical confidence. Positive teacher-learner relationships help reduce fear, hesitation, and mathematics anxiety among learners.

However, the findings revealed that mathematics anxiety, conceptual difficulties, insufficient instructional resources, varying learner abilities, and fear of making mistakes continue to affect learner engagement and participation in mathematics education.

Overall, the study concludes that meaningful instructional practices and supportive classroom environments significantly contribute to learner engagement and participation in mathematics education within rural Philippine secondary school contexts. Strengthening collaborative instruction, contextualized learning experiences, and emotionally supportive classroom environments is essential in improving mathematics engagement among Junior High School learners.

## IMPLICATIONS OF THE STUDY

The findings of the study provide important implications for mathematics education, instructional practices, learner engagement, educational leadership, curriculum implementation, and future research. The study emphasizes the importance of collaborative, contextualized, and supportive instructional environments in strengthening learner engagement and participation in mathematics education.

### **Educational Implications**

The findings imply that mathematics instruction should become more learner-centered, collaborative, contextualized, and interactive to strengthen learners' participation, confidence, and conceptual understanding. Teachers may integrate collaborative problem-solving activities, peer-assisted learning, contextualized examples, and inquiry-based instructional strategies to improve learner engagement in mathematics learning.

The study further implies that mathematics education should focus on meaningful understanding and practical application rather than procedural memorization alone.

Additionally, the findings suggest that emotionally supportive classroom environments contribute significantly to learners' confidence and willingness to participate in mathematics instruction.

### **Pedagogical Implications**

The findings imply that teachers play a critical role in shaping learners' classroom experiences and engagement in mathematics education. Teachers should demonstrate patience, encouragement, flexibility, and learner-centered pedagogical approaches in facilitating mathematics instruction.

The study also highlights the importance of contextualized and collaborative instructional practices in strengthening learner participation and mathematical understanding. Teachers may utilize practical examples, collaborative learning tasks, inquiry-based activities, and real-life problem-solving situations to improve learners' engagement and conceptual understanding.

Furthermore, the findings imply that emotionally supportive instructional environments reduce mathematics anxiety and encourage learners to participate actively in classroom discussions and problem-solving activities.

### **Institutional and Policy Implications**

The findings provide important implications for educational leaders and policymakers within the Department of Education regarding the strengthening of mathematics instruction and learner support systems in rural secondary schools. Educational institutions may strengthen mathematics education by providing contextualized instructional materials, learner-centered teaching resources, and professional development programs focusing on collaborative and engaging mathematics instruction.

The study further implies the importance of strengthening institutional support systems that address learners' emotional needs, mathematics anxiety, and varying learning abilities.

Moreover, the findings suggest the need for adequate instructional resources and sustained teacher support systems that improve mathematics engagement and classroom participation among learners in rural educational settings.

### **Social Implications**

The findings imply that meaningful mathematics learning experiences contribute significantly to learners' critical thinking, communication skills, confidence, and problem-solving competence necessary for academic success and real-life decision-making.

The study also highlights the importance of creating inclusive and supportive learning environments that encourage collaboration, respect, confidence-building, and active learner participation.

### **Implications for Future Research**

The findings highlight the need for future studies exploring instructional practices and learner engagement across different mathematics learning contexts and educational settings. Future researchers may conduct comparative studies involving urban and rural schools to examine variations in learner engagement, instructional practices, and classroom experiences.

Longitudinal and mixed-methods studies may also be conducted to explore the long-term influence of collaborative and contextualized mathematics instruction on learners' academic performance and mathematical confidence.

Future studies may likewise investigate the role of educational technology, gamification, differentiated instruction, and peer mentoring in strengthening learner engagement in mathematics education.

Overall, the study emphasizes that strengthening learner engagement in mathematics education requires collaborative efforts among teachers, school leaders, educational institutions, policymakers, and learners. Contextualized instruction, collaborative learning environments, emotionally supportive classrooms, and learner-centered pedagogical practices are essential in promoting meaningful mathematics learning experiences among Junior High School learners in rural Philippine secondary schools.

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