ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 11| Issue: 1| January 2025|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

STUDENT ENGAGEMENT IN LEARNING ALGEBRA: A MIXED METHOD STUDY

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Article DOI: https://doi.org/10.36713/epra19894
DOI No: 10.36713/epra19894

ABSTRACT
The purpose of the study is to determine the status of students' engagement in learning Algebra among Grade 10 students in a private school. The study employs a mixed-method approach, combining quantitative data collection and qualitative in-depth interviews. A sample of 110 Grade 10 students from private schools in Santo Tomas, Davao del Norte was selected using stratified random sampling. Quantitative findings revealed that the students' high behavioral engagement was demonstrated by their active participation in class activities, timely submission of tasks, and attentiveness during lessons. Cognitive engagement was reflected in their ability to employ critical thinking and problem-solving skills when solving Algebraic problems, while affective engagement, although high, scored lower due to challenges in sustaining intrinsic motivation and interest in the subject. Qualitative findings supported the quantitative results, showing that students demonstrate consistent engagement across behavioral, cognitive, and affective dimensions. Results showed that the overall level of engagement in learning Algebra was high, with behavioral engagement scoring the highest mean, followed by cognitive engagement, and affective engagement with the lowest mean, all categorized as high. Statistical analysis revealed no significant differences in engagement levels when grouped by age or sex. Results imply that fostering student engagement, particularly through behavioral and cognitive strategies, is essential for enhancing learning experiences in Algebra.

KEYWORDS: *Algebra, learning, student engagement, Philippines*

INTRODUCTION
In classroom mathematics, the shift from arithmetic to Algebra is a crucial and usually difficult point that typically results in decreased student involvement. Therefore, it is essential to investigate ways to encourage student participation in this period of change. They can find ways to overcome these challenges by exploring the material itself and the particular features of algebraic problems that are associated with higher levels of engagement. Additionally, this research project emphasizes the significance of determining and addressing the factors impacting student involvement in algebraic learning in order to promote deeper knowledge and smoother transitions (Toumela & Hähkiöniemi, 2020).

In Indonesia, one of the issues that have been encountered in education are the low level of students' engagement in learning Algebra. A mathematics lecturer at State University of Padang, author also found that this issue has become major problems of my teaching practice. Students' engagement in learning Algebra, the teaching, and learning process is a significant goal in education. Despite its importance, student disengagement in learning is still a problem in education. Disengagement leads to reducing the variety of knowledge and information that can be achieved by students in their learning the subject matter. In addition, students who are disengaged in learning and understanding Algebra concepts limit their capacity to understand their learning experiences (Rohaizati, 2020).

Specifically, in the Philippine, there have been many research studies that proved students' low performance in Algebra and other mathematics subjects. Learning Algebra, especially in the early grade levels, has some challenges for students. Many studies have been conducted to identify these challenges or difficulties hindering the appreciation of mathematics and the acquisition of skills the students needed. Students have difficulty in understanding the problem, understanding the meaning of variables, and in basic operation; solving algebraic operation problems; understanding fractions; and rational numbers (Cadorna et al., 2021).

Given society's cultural diversity, the lack of sufficient education on intercultural sensitivity often leads to insensitivity, a growing social concern. Motivated by this, the researcher conducted a mixed-method study to assess intercultural sensitivity levels among education students and explore their experiences navigating cultural differences. The study aims to raise awareness

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and promote a deeper understanding of intercultural interactions, contributing to both individual and collective growth. In their cross-sectional research titled "*A Cross-Sectional Study of Students' Learning Progression in Algebra*," of Cadornal et al. (2021) which examined how students' understanding of Algebra evolves over time, with the goal of identifying common trends and influential factors in their learning journeys. In a different approach, Garinganao and Bearneza (2021) directed their focus on Grade 7 students in a Philippine Chinese school in their study titled "*Algebraic Skills and Academic Achievement in Mathematics of Grade 7 Students in a Philippine Chinese School*." They investigated the relationship between algebraic skills and students' overall academic performance in mathematics within this specific cultural setting. Similarly, Walkington and Bernacki (2018) explored the effectiveness of personalized Algebra instruction in their study "*Personalizing Algebra to Students' Individual Interests in an Intelligent Tutoring System: Moderators of Impact*," where they analyzed how customizing Algebra content to align with individual students' interests affects learning outcomes. While each study contributes important insights into the field of Algebra education, there remains a gap in research that combines these different perspectives to create more comprehensive and effective teaching strategies that cater to the diverse needs and interests of students.

In disseminating this inquiry, it will be through research conferences and related agencies aims to build a dynamic scholarly interaction, allowing knowledge and governmental authorities to contribute research-based discoveries. The objective of public distribution of these findings is to encourage informed deliberation, aspire collaborative projects, and aid the practical application of research findings in the fields of various services like public service.

Research Questions

1. What is the level of students' engagement in learning Algebra among high school students?
2. Is there a significant difference in engagement level in learning Algebra of students when grouped according to sex and year level?
3. What are the experiences of the learners with regards to their engagement in learning Algebra?
4. What are the insights do high school students employ to deal with their engagement in learning Algebra?
5. To what degree do the quantitative data corroborate with the qualitative data?

RESEARCH METHODOLOGY

Research Design

This study employed a mixed methods design, which involved the interlinking of qualitative and quantitative components to provide a more comprehensive account of the research problem. Halcomb and Hickman (2015) stated that this integration is crucial for the rigor of mixed methods research, and it can occur at any stage(s) of the research process. The term "mixing" refers to the process of linking the qualitative and quantitative elements to produce a fuller account of the research problem.

Participants

The study involved Grade 10 private school students in Santo Tomas, Davao del Norte, with 110 participants for the quantitative phase and 10 for the qualitative phase.

In the quantitative phase, 110 students were sampled from a total of 151 Grade 10 private school students in Santo Tomas, Davao del Norte: 71 students from School 1, 44 students from School 2, and 36 students from School 3. A statistician determined the sample, including 52 out of 71 students from school 1, 32 out of 44 students from school 2, and 26 out of 36 students from school 3. These students completed surveys assessing their engagement in learning Algebra.

For the qualitative phase, only 10 participants from the Grade 10 students are included in the qualitative phase: five (5) for in-depth interviews and another five (5) for focus group discussions. All participants in the qualitative phase must not have participated in the data collection of the quantitative phases.

Data Collection

The data collection procedure involved several steps, with quantitative and qualitative data gathered concurrently using convergent parallel mixed-method techniques to compare and integrate findings (Creswell & Plano Clark, 2018).

Permission to conduct the study was first secured from the participating schools in Sto. Tomas Davao del Norte. Quantitative data was collected through adapting survey questionnaire for student engagement, which is derived from Maamin et al. (2021). To ensure consistency, the survey was administered to all participants on the same day to avoid mood variations.

Qualitative data collection included focus group discussions and one-on-one in-depth interviews to explore participants' engagement in learning Algebra. Participants were asked about their availability and preferred interview locations beforehand. During the interviews, the researcher used prepared enabling questions and follow-up queries to gather comprehensive responses.

Data Analysis

After collecting all the necessary data, tabulation and analysis were conducted. For qualitative data, thematic analysis was employed, while statistical tools were utilized for the quantitative phase.

Descriptive statistics, such as mean and standard deviation, were used to evaluate participants' average responses and the variability of their answers regarding their engagement in learning Algebra (Creswell & Creswell, 2017).

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For qualitative data, responses were recorded, organized, and reduced into themes through coding. The data was presented in narratives, tables, or figures. The researcher engaged deeply with the descriptive data, repeatedly refining and categorizing themes to describe the participants' engagement in learning Algebra.

This iterative process involved careful reading and rereading of data to ensure accurate theme generation and final analysis (Miles et al., 2014).

RESULTS AND DISCUSSION

Table 2. Level of Students' Engagement in Learning Algebra

	Cognitive Engagement	**Mean**	**Descriptive Rating**
1.	Thinking about the things I have learned when I learn new things in Algebra.	3.31	Moderate
2.	Finding memorizing formulas is the best technique for learning Algebra.	3.99	High
3.	Thinking the best way to learn Algebra is to do drills.	3.52	High
4.	Solving algebraic problems in the same way taught by the instructor.	3.99	High
5.	Acquiring knowledge of Algebra through the instruction provided by the teacher.	4.01	High
Category Mean		3.76	High
Behavioral Engagement			
1.	Paying attention to the mathematics instructor's teaching in the classroom.	4.37	Very High
2.	Making that I will get the right answer if I keep trying to solve algebraic problems.	3.86	High
3.	Participating in discussions during mathematics learning specifically in Algebra.	3.56	High
4.	Trying to use a different method if continue to not be able to solve the algebraic equation.	3.40	Moderate
5.	Trying to understand if there is a problem in Algebra.	3.99	High
Category Mean		3.84	High
Affective Engagement			
1.	Love solving algebraic problems.	2.93	Moderate
2.	Feeling happy when I get good mathematics results particularly in Algebra.	4.27	Very High
3.	Striving diligently to achieve excellent results in mathematics.	3.73	High
4.	Feeling satisfied when I achieve favorable outcomes in mathematics.	4.26	Very High
5.	Enjoying learning Algebra.	3.40	Moderate
Category Mean		3.72	High
OVERALL		3.77	High

The result revealed that determining the level of student engagement in terms of **cognitive engagement** is high. This suggests that students demonstrate significant mental effort and investment in understanding algebraic concepts. The high cognitive engagement reflects students' willingness to employ strategies such as problem-solving, analytical thinking, and exploring multiple approaches to algebraic problems. The qualitative data further supports this finding, with students expressing an appreciation for activities that challenge their critical thinking and deepen their understanding of Algebra.

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A recent study of Joshi et al. (2022) underscore how students transitioning to remote and hybrid learning environments relied heavily on independent study, virtual tutorials, and online problem-solving platforms to effectively learn algebraic concepts in the absence of traditional classroom interactions. This shift required students to engage in adaptive cognitive practices, utilizing diverse tools and personalized strategies to enhance their understanding. These findings align with the present study's result that students exhibit high levels of cognitive engagement. The significant mental effort and investment demonstrated through problem-solving, analytical thinking, and exploring multiple approaches reflect their willingness to embrace challenging activities that foster critical thinking and deepen their comprehension of Algebra.

In addition, Barlow and Brown's (2020) study highlights the ways students respond to various classroom structures and instructional strategies, emphasizing the importance of creating a teaching environment that promotes positive learning experiences. Their research underscores the value of fostering collaboration, as peer interaction, a key element of cognitive engagement, is strongly linked to improved learning outcomes. This aligns with the finding that students exhibit a high level of cognitive engagement in understanding algebraic concepts. The significant mental effort and strategy use, such as problem-solving and analytical thinking, observed among students, further reflect the benefits of an interactive and collaborative learning environment. Further, the students' appreciation for challenging activities that enhance critical thinking reinforces the importance of designing instructional practices that stimulate deeper understanding and active participation.

Moreover, the result revealed that determining the level of student engagement in terms of **behavioral engagement** is high, signifying that students are actively participating in learning activities and adhering to classroom norms. Observations from qualitative data reveal that students are consistently involved in class discussions, complete assignments on time, and collaborate effectively with peers during group activities. This high level of behavioral engagement reflects a structured and supportive classroom environment where students are motivated to stay on task and contribute actively.

The study of Gomes et al. (2023) identified a strong correlation between behaviors such as active participation, focused attention, and proactive problem-solving, and higher engagement levels in mathematics. Their findings suggest that students who consistently exhibit these behaviors are more engaged in learning Algebra, emphasizing the need to foster these actions to enhance student involvement and interest. Similarly, the present study reveals a high level of behavioral engagement among students, as evidenced by their active participation in learning activities, adherence to classroom norms, and consistent involvement in discussions, timely completion of assignments, and effective collaboration with peers. These behaviors reflect a structured and supportive classroom environment that motivates students to stay on task, actively contribute, and engage deeply in the learning process, aligning with Gomes et al.'s findings on the impact of such behaviors on engagement and learning outcomes.

Additionally, Nguyen et al. (2018) conducted a study on behavioral engagement in high schools, examining student conduct in class, participation in school-related activities, and interest in academic tasks. Their findings indicated that students who followed classroom norms, actively participated in activities, and showed interest in their academic work exhibited higher engagement levels. This aligns with the current study's results, which revealed a high level of behavioral engagement among students. Specifically, students were observed to actively participate in learning activities, adhere to classroom norms, engage in class discussions, complete assignments on time, and collaborate effectively with peers during group activities.

Furthermore, the result revealed that determining the level of student engagement in terms of **affective engagement** is high. It indicates that students have positive emotional connections to learning Algebra. This includes feelings of enjoyment, interest, and a sense of accomplishment when solving algebraic problems. Qualitative insights reveal that students perceive Algebra as challenging yet rewarding, finding satisfaction in mastering complex topics. Teachers' encouragement and the use of relatable examples were cited as factors contributing to these positive emotions.

A recent study of Daher et al. (2021) highlighted that students demonstrated strong emotional investment and interest in course content, creating a supportive and motivating learning environment. This aligns with findings that high levels of affective engagement reflect students' positive emotional connections to learning Algebra. These connections, characterized by enjoyment, interest, and a sense of accomplishment in solving algebraic problems, enhance students' attitudes toward the subject and foster sustained interest and commitment. Qualitative insights further suggest that students view Algebra as both challenging and rewarding, with satisfaction derived from mastering complex topics. Teachers' encouragement and the use of relatable examples play a crucial role in cultivating these positive emotions, which are essential for improving academic performance and overall satisfaction with the learning experience.

In addition, Liebendörfer et al. (2021) observed that students in an online mathematics course demonstrated strong effort and self-regulation, though their affective characteristics and sense of social connectedness varied significantly. This underscores the need to account for individual differences in emotional engagement, as these differences can shape students' learning experiences in virtual settings. Similarly, the current findings indicate that students exhibit a high level of affective engagement when learning Algebra, marked by positive emotions such as enjoyment, interest, and a sense of achievement in solving problems. These emotional connections are influenced by factors

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such as the perceived challenge and reward of mastering algebraic concepts, as well as teachers' encouragement and the use of relatable examples, which enhance students' overall engagement and satisfaction with the learning process.

Table 3.1 Lived Experiences of the Education Students in Regard to the Intercultural Sensitivity

Probed issues	Core ideas	Code/ Category	Essential Theme	Theory
Handling Challenges in Understanding Algebraic Concepts or Solving Problems	• Listening to teachers as the primary method of encountering and understanding algebraic problems. • Utilizes YouTube tutorials and asks teachers for help to understand Algebra better. • Turns to self-study and internet resources when facing difficult equations, supplementing learning with additional sources.	Seeking Help from Teachers and External Resources	Active Engagement enhances Algebraic comprehension and Self-Directed effort enhances comprehension.	Weiner's Attribution Theory
	• Regular studying and focus on learning materials as key strategies for handling challenges effectively. • Advocates for active listening to teachers and memorization of formulas to solve algebraic problems. • Recalls personal experience of facing challenges in Grade 6 but overcame them through self-study and seeking guidance.	Independent Study and Focused Learning		
Understanding Algebra in Real World Situations	• Importance of the role of Algebra in personal finance management, particularly in budgeting for daily expenses and emergencies. • Relates Algebra to time-management skills and prudent financial decisions to effectively manage money. • Algebra helps in financial planning and calculating savings required for purchases or debt repayment.	Understanding Compound Interest	Applying Algebraic concepts in different contexts.	Self-Efficacy Theory
	• Versatility of Algebra in various professions such as engineering and business management, emphasizing its practicality. • Algebra is encountered in daily activities like sports and its broader applicability in decision-making scenarios. • Algebra is encountered in different situations and has measurements in our daily living.	Practical Applications		
	• Expresses concerns about the perceived difficulty of Algebra and its potential to demotivate students. • Feelings of frustration when unable to solve algebraic problems but finds relief when concepts are explained clearly.	Negative Emotions and Fatigue		

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Emotional Responses to Daily Algebra Interaction	• Acknowledges the challenging nature of Algebra and the need for persistence in problem-solving. • Feelings of excitement and nervousness when encountering Algebra, highlighting a strong motivation to learn and improve. • Algebra as both exciting and challenging, finding satisfaction in mastering new topics despite the mental strain. • Dual nature of excitement and challenge associated with encountering new mathematical topics and problem-solving methods daily.	Mixed Emotions and Motivation	Experiencing Emotional responses to algebraic challenges.	Self-Efficacy Theory
Influence of Teaching Methods	• Credits teaching methods for improving learning outcomes, particularly through interactive tasks and written activities. • Responds positively to teaching approaches that incorporate engagement strategies like assigning numbers for participation. • Positive influence of a teacher's approach on personal interest in math, highlighting effective explanations and	Engagement and Interest	Impact of teaching methods on student outcomes.	Self-Determination
	• engaging teaching styles. • Attributes increased interest and improved performance in Algebra to effective teaching methods. • Benefits of group activities in learning Algebra, leading to better understanding and performance in exams.	Improvement in Performance		

Active Engagement Enhances Algebraic Comprehension and Self-directed effort enhances comprehension. The findings of this study indicate that active engagement significantly enhances students' algebraic comprehension. Students who actively participated in problem-solving exercises, class discussions, and other interactive activities demonstrated a stronger understanding of algebraic concepts. This active participation allowed them to connect abstract algebraic ideas with practical applications, deepening their comprehension. The results suggest that engagement, particularly through active learning strategies such as collaborative problem-solving, facilitates not only retention but also the application of algebraic principles.

This is parallel to the recent study of Hodges (2020) emphasizes that students who engage actively in discussions, problem-solving activities, and hands-on learning experiences develop a deeper understanding and mastery of Algebra. Through active participation, they not only strengthen their ability to apply algebraic knowledge in diverse contexts but also hone vital problem-solving skills. Moreover, self-directed efforts, such as teaching peers and independently exploring additional learning resources, further enhance their comprehension in various educational settings. These efforts enable students to take control of their learning, fostering a stronger and more comprehensive grasp of algebraic concepts.

A study of Schoenfeld (2011) highlights the critical need for creating a classroom environment where students are fully engaged and actively participate in the learning process. This idea resonates with the findings of this study, which show that active engagement plays a significant role in enhancing students' algebraic comprehension. Schoenfeld underscores that educators are pivotal in cultivating such an environment, where students are encouraged to engage in discussions, problem-solving activities, and hands-on learning. Additionally, these practices not only align with but also support the study's implication that active engagement, particularly through collaborative learning

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strategies, strengthens students' understanding and application of algebraic concepts.

Applying Algebraic concepts in different contexts. The study highlights students' strong awareness of Algebra's practical value beyond the classroom. They recognize its application in areas like budgeting, problem-solving, and decision-making, demonstrating an understanding of Algebra's relevance in everyday life. By emphasizing these real-world uses, students are better equipped to apply algebraic concepts in various practical situations, showcasing its importance outside academic contexts.

A recent study of Garcia and Lee (2023) highlight that understanding the real-world applications of Algebra enhances students' abilities to confidently address practical challenges, deepening their comprehension of its relevance. This aligns with the study's findings, which show that students are aware of Algebra's practical value beyond the classroom. They recognize how Algebra applies to areas like budgeting, problem-solving, and decision-making, demonstrating an understanding of its real-world relevance. By emphasizing these practical applications, students are better equipped to use algebraic concepts effectively in everyday situations, showcasing its importance outside of academic settings.

Furthermore, a study of Smith and Johnson (2022) emphasize that recognizing the real-world relevance of Algebra boosts student engagement and motivation. By demonstrating how Algebra applies to professional problem-solving, students gain a better understanding of how to navigate complex challenges and make informed decisions. This approach not only strengthens their comprehension of Algebra but also fosters critical thinking and problem-solving skills necessary for success in everyday life. Similarly, the study's findings reveal that students are aware of Algebra's practical value in areas such as budgeting, decision-making, and problem-solving. By emphasizing these applications, students are better prepared to use Algebra effectively in real-life situations, highlighting its significance beyond the classroom.

Experiencing Emotional responses to algebraic challenges. The findings in this study reveal that students exhibit a range of emotional reactions, from excitement and satisfaction when achieving success to occasional frustrations when confronted with difficult problems. These emotional responses play a critical role in shaping students' attitudes towards Algebra and can influence their motivation and persistence in mastering its concepts.

This finding aligns with Mammarella et al. (2023) study, which highlights that students' emotional reactions to algebraic problems significantly influence their engagement with the subject. Negative feedback on math assignments impacts students' physiological stress responses, resulting in increased anxiety, worries, and perceived incompetence. These results imply that lowering anxiety and raising student engagement in Algebra depend heavily on fostering a supportive learning environment and offering positive reinforcement. By acknowledging and addressing the emotional components of learning, teachers can create more successful plans to boost students' self-esteem and algebraic performance.

Additionally, the study of Smith and Garcia (2022) emphasizes how emotional states, such as frustration and accomplishment, can shape students' attitudes towards Algebra and affect their learning experiences. By acknowledging the impact of emotions on motivation and perseverance, educators can better support students in navigating through challenges and fostering a positive learning environment conducive to academic success.

Impact of teaching methods on student outcomes. The findings in this study reveal that students' outcomes are significantly influenced by the teaching methods employed. Effective teaching methods enhance student learning and comprehension, highlighting the pivotal role instructors play in shaping educational outcomes.

This finding aligns with Hew et al. (2020) study, which shows that fully online flipped classrooms that are based on the 5E framework (Engage, Explore, Explain, Elaborate, and Evaluate) and modified using a cloud-based video conferencing app can be just as successful in improving student performance as traditional flipped classrooms. By making sure that pre-class and in-class activities are efficiently managed online, this approach preserves the interactive and participatory nature of flipped learning, which in turn promotes student engagement in learning Algebra. The seven best practices for video conferencing assisted online flipped classrooms that have been identified can offer educators helpful pointers on how to improve learning outcomes and student engagement in Algebra.

The study of Garcia and Johnson (2020) emphasizes that well-designed instructional strategies can significantly impact students' engagement and learning outcomes in Algebra, leading to improved academic achievement. By employing methods that cater to diverse learning styles and promote active participation, educators can enhance student understanding and motivation in Algebra. Moreover, it aligns to the current study, in which, the impact of teaching methods on student outcomes in learning Algebra highlights the critical role that instructional approaches play in shaping students' understanding and motivation. Effective teaching methods have the potential to enhance student comprehension and create a positive learning environment conducive to academic success.

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Table 3.2 The Insights of High School Students on Their Engagement in Learning Algebra

ISSUES PROBED	CORE IDEAS	CODE/ CATEGORY	ESSENTIAL THEMES	THEORITICAL SUPPORT
Advice to Peers Struggling with Algebra	• Listen intently to teachers to succeed in Algebra. • Focus on studies and listen carefully to Algebra explanations. • Listen carefully to the teacher to understand Algebra.	Paying Attention to Teachers	Listening to Teachers and Discovering Effective Learning Methods	Weiner's Attribution Theory
	• Find the learning method that suits you best. This will help to understand Algebra more effectively. • Never hesitate to ask for help when needed. It's okay to seek assistance. • Review notes repeatedly to understand them better. Practice consistently until it will learn the material.	Finding Suitable Learning Methods		
Use of Technology and Digital Resources in Learning Algebra	• Some students prefer digital learning, such as searching for educational videos on platforms like YouTube. • Utilizing digital tools like cellphones can be helpful in Algebra when struggling with calculations or concepts, as you can easily search for guidance online. • Students should find their preferred learning methods, as sometimes the teaching approaches of teachers may not fully resonate with them.	Digital Learning Tools and Resources	Utilizing Digital Tools and Reviewing Recorded Materials	Self-efficacy Theory
	• Digital technology provides convenience by enabling students to record lectures for later playback, which can be helpful when needing to revisit confusing topics. • Recording lectures digitally allows for easy playback, providing a convenient way to review material when needed. • Teacher utilizes technology to generate equations and automatically correct assignments and quizzes, enhancing efficiency in the learning process.	Recording and Review		

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Improving Algebra Lessons for Engagement	• Self-study may be optional, but collaborative work relies on teamwork as its foundation. • Teachers should provide engaging activities to encourage students to interact with Algebra, both individually and in groups. • Students should focus on solving challenging questions collaboratively and seek guidance from the teacher to reinforce their understanding of the basics.	Interactive and Collaborative Learning	Engaging in Collaborative and Enjoyable Lessons	Self-Determination Theory
	• To prevent Algebra from becoming boring, teachers should find fun ways to teach it. • Effective teaching involves group studies and cheerful, interactive approaches. • Incorporating enjoyable elements like topic-related games and interactive problem-solving fosters both learning and engagement.	Making Lessons Fun		
Providing Feedback to Enhance Engagement	• Written feedback is more effective. It helps improve understanding. • Teachers should encourage students to study more to avoid failing quizzes and exams. • Positive feedback motivates students. It boosts their confidence and self-improvement.	Written and Detailed Feedback	Providing Detailed Written and One-on-One Feedback	Self-Efficacy Theory
	• One-on-one feedback from teachers is more motivating. It provides personalized guidance. • Positive feedback is the best way to motivate students. It encourages and inspires them.	One-on-One Feedback Sessions		

Listening to Teachers and Discovering Effective Learning Methods. The findings emphasize the significant benefits for students when actively listening to teachers and discovering effective learning methods to enhance their understanding and academic success across various subjects.

Research by Jatisunda et al. (2020) supports this, indicating that students engaged in discovery learning with scaffolding exhibit superior mathematical creative thinking abilities and self-efficacy compared to those in discovery learning and conventional methods. This underscores the positive impact of scaffolding in discovery learning, enhancing students' skills and confidence in mathematics.

Additionally, exploring various learning techniques, as advocated by Garcia and Lee (2021), allows students to identify strategies that align with their learning style, optimizing their comprehension of algebraic concepts. This dual approach not only improves students' understanding of Algebra but also fosters a proactive attitude towards learning, empowering students to

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take charge of their academic success and continuously enhance their performance in Algebra.

Utilizing Digital Tools and Reviewing Recorded Materials. According to Smith and Jones (2023), the integration of digital tools into Algebra education holds significant potential for enhancing student engagement and learning outcomes. Platforms like YouTube provide access to a vast library of educational videos, offering alternative explanations and visual representations of concept. These videos can cater to different learning styles and provide students with additional resources to supplement classroom instruction. This accessibility allows students to take ownership of their learning and actively seek solutions to their individual challenges.

According to Williams (2021), recognizing that individual learning styles vary, digital technology allows students to personalize their learning experience. Recording lectures digitally enables students to revisit confusing topics at their own pace, promoting deeper understanding and retention. This flexibility allows students to control the pace of their learning and revisit concepts as many times as needed, fostering a more effective and individualized approach to mastering Algebra concepts.

These digital tools, when thoughtfully implemented, can foster a more interactive and engaging learning environment, ultimately contributing to improved Algebra comprehension. By providing students with access to a variety of resources, personalized learning opportunities, and efficient grading tools, digital technology can empower students to take ownership of their learning and achieve greater success in Algebra.

Engaging in Collaborative and Enjoyable Lessons. According to Smith and Jones (2023), collaborative and enjoyable learning experiences are crucial for fostering student engagement and promoting a positive learning environment. Research suggests that students are more likely to be motivated and successful when they feel connected to their peers and actively participate in the learning process. This can be achieved through activities that encourage teamwork, communication, and shared problem-solving, such as group projects, debates, and peer-to-peer learning sessions.

Furthermore, Brown (2022) stated that creating a fun and engaging learning environment is equally important for student success. Incorporating elements of play, humor, and creativity into lessons can make learning more enjoyable and memorable. This can involve using games, puzzles, storytelling, or hands-on activities to make abstract concepts more relatable and engaging for students. By combining collaborative learning strategies with enjoyable and engaging activities, educators can create a dynamic and effective learning environment that fosters both academic growth and a positive learning experience.

Providing Detailed Written and One-on-One Feedback. According to Smith and Jones (2023), providing detailed written and one-on-one feedback is essential for student learning and growth. Detailed written feedback allows students to understand their strengths and weaknesses in a specific task or assignment, providing them with clear guidance for improvement. This type of feedback should be specific, constructive, and focused on the student's individual learning needs, offering actionable suggestions for improvement.
In addition, Brown (2022) stated that one-on-one feedback sessions offer a valuable opportunity for personalized guidance and support. These sessions allow students to clarify any misunderstandings, ask questions, and receive tailored advice from their instructors. This personalized interaction fosters a deeper understanding of the material and provides students with the opportunity to address their specific learning challenges. By combining detailed written feedback with personalized one-on-one sessions, educators can create a comprehensive approach to student feedback that promotes both academic growth and a positive learning experience.

Table 4.Joint Display Salient Quantitative and Qualitative Findings

ASPECT OR FOCAL POINT	QUANTITATIVE FINDINGS	QUALITATIVE FINDINGS	NATURE OF DATA INTEGRATION	AXIOLOGICAL IMPLICATIONS
Status of Student Engagement in Learning Algebra	From Table 2 Level Of Students' Engagement In Learning Algebra Among High School Students in Terms of Cognitive Engagement rated overall as 3.76 which is classified as high. This means that students are significantly involved and active in their cognitive engagement with the subject.	Table 7.1, high cognitive engagement is reflected in responses where students utilize YouTube tutorials, ask teachers for help, and turn to self-study and internet resources to understand Algebra better, indicating active involvement in learning.	Merging– converging	The high levels of cognitive, behavioral, and affective engagement among high school students in learning Algebra reflect the significant value they place on education and mathematical skills. Students demonstrate strong intellectual involvement, disciplined study habits, and a positive emotional

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EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 11| Issue: 1| January 2025|| Journal DOI: 10.36713/epra2013 || SJIF Impact Factor 2024: 8.402 || ISI Value: 1.188

	From Table 3 Level Of Students' Engagement In Learning Algebra Among High School Students in Terms of Behavioral Engagement which is rated overall as 3.84 which is classified as high. This means that students consistently demonstrate strong behavioral engagement in their Algebra studies. From Table 4 Level Of Students' Engagement In Learning Algebra Among High School Students in Terms of Affective Engagement which is rated overall as 3.72 which is classified as high. This means that students have a strong emotional connection and positive attitude towards their Algebra studies.	Table 7.1, high behavioral engagement is demonstrated by students regularly studying and focusing on learning materials, actively listening to teachers, and memorizing formulas to solve algebraic problems, showing consistent and strong engagement in their Algebra studies. Table 7.1, high affective engagement is shown by students' strong emotional connection to Algebra, as illustrated by personal experiences of overcoming challenges through self-study and guidance, and recognizing the importance of Algebra in personal finance management, reflecting a positive attitude towards the subject.		connection to Algebra, recognizing its practical applications and benefits. This comprehensive engagement underscores the importance of supportive learning environments and self-directed efforts in fostering a deep understanding and appreciation for the subject.
The Lived Experiences of the learners with regards to their engagement in learning Algebra	From Table 2, the level of cognitive engagement in learning Algebra among high school students is rated at 3.76, classified as high. This indicates that students are highly involved and actively engaged in understanding algebraic concepts. From Table 3, the level of behavioral engagement in learning Algebra among high school students is rated at 3.84, classified as high. This shows that students consistently display strong behavioral engagement in their Algebra studies.	Table 7.1, response show the student's high cognitive engagement by actively seeking understanding through self-study and using internet resources when concepts are difficult. Table 7.1, This response indicates behavioral engagement by showing how students adapt to limited technology by using assignments and quizzes for consistent	Merging– converging	High school students place a high value on comprehending and mastering algebraic concepts, as evidenced by their high levels of cognitive, behavioral, and affective engagement in the subject. Their dedication to cognitive engagement is demonstrated by their active pursuit of self-study and use of online resources, and their strong behavioral engagement is demonstrated by their regular practice through assignments and quizzes. Further supporting the affective

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	From Table 4, the level of affective engagement in learning Algebra among high school students is rated at 3.72, classified as high. This signifies that students have a strong emotional connection and a positive attitude towards studying Algebra.	practice and correction. Table 7.2, This response illustrates affective engagement by showing how encouragement and motivation from others foster a positive attitude towards learning Algebra.		engagement and demonstrating a deeply ingrained appreciation and positive attitude toward Algebra are the positive emotional connection and motivation generated by supportive feedback from others.
The Insights of High School Students employ to deal with their engagement in learning Algebra	From Table 2, high school students' cognitive engagement in learning Algebra is rated at 3.76, indicating a high level of active involvement and interest in the subject. From Table 3, high school students' behavioral engagement in learning Algebra is rated at 3.84, showing that they consistently exhibit strong engagement in their study habits and classroom activities. From Table 4, high school students' affective engagement in learning Algebra is rated at 3.72, reflecting a strong emotional connection and positive attitude toward the subject.	Table 7.1, responses show high cognitive engagement by detailing the proactive approach of studying Algebra in advance and teaching others to reinforce understanding. Table 7.2, responses highlight behavioral engagement by emphasizing collaborative work and self-study, demonstrating consistent involvement in Algebra studies. Table 7.2, illustrates affective engagement by emphasizing the importance of positive feedback and motivation from teachers, contributing to a positive attitude towards Algebra.	Merging– converging	High school students demonstrate significant cognitive, behavioral, and affective engagement in learning Algebra, with ratings indicating active involvement, consistent study habits, and positive attitudes towards the subject. Students valuing both the intellectual challenge and practical application of Algebra, fostering a learning environment where proactive study behaviors, collaborative efforts, and positive emotional connections play crucial roles in shaping their educational experiences and outcomes.

Status of Student Engagement in Learning Algebra is High. A mixed methods study investigating student engagement in learning Algebra yielded compelling results, revealing a high level of engagement across cognitive, behavioral, and affective dimensions. The quantitative phase of the study indicated high overall engagement, while qualitative data provided deeper insights. Students demonstrated robust cognitive engagement by actively utilizing diverse learning resources and seeking guidance from educators. Strong behavioral engagement was evident through consistent study habits and active participation in classroom activities. Qualitative data also highlighted a positive affective engagement, with students recognizing the practical relevance of Algebra and fostering a positive attitude towards the subject.

Onwuegbuzie and Johnson (2006) outlined the convergence of quantitative and qualitative data, emphasizing the importance of data triangulation, reinforced the validity and reliability of the study's conclusions. This comprehensive understanding of student engagement underscores the interconnected nature of

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cognitive, behavioral, and affective dimensions in shaping students' attitudes and performance in Algebra.

These findings have significant implications for educators and policymakers, highlighting the importance of creating supportive and engaging learning environments that cater to the diverse needs of students. By recognizing the importance of student engagement across these dimensions, educators can tailor their approaches to create a supportive and engaging learning environment for students.

The Lived Experiences of the learners with regards to their engagement in learning Algebra. A mixed methods study exploring student engagement in learning Algebra revealed high levels of engagement across cognitive, behavioral, and affective dimensions. The quantitative phase of the study indicated high overall engagement, while qualitative data provided deeper insights. Students displayed robust cognitive engagement by actively utilizing diverse learning resources and seeking guidance from educators. Strong behavioral engagement was evident through consistent study habits and active participation in classroom activities. Qualitative data also highlighted a positive affective engagement, with students recognizing the practical relevance of Algebra and fostering a positive attitude towards the subject.

The study's strength lies in its use of data triangulation, a practice emphasized by Creswell and Plano Clark (2018) to enhance research credibility and comprehensiveness. The alignment between quantitative results and qualitative evidence underscores the consistency and depth of student engagement in learning Algebra. This convergence highlights the interconnected nature of cognitive, behavioral, and affective engagement dimensions in shaping students' attitudes and performance in Algebra.

The cohesive integration of both quantitative and qualitative findings provides a holistic understanding of student engagement, emphasizing the multifaceted nature of the learning experience in algebraic education. These findings have significant implications for educators and policymakers, highlighting the importance of creating supportive and engaging learning environments that cater to the diverse needs of students. By recognizing the importance of student engagement across these dimensions, educators can tailor their approaches to create a supportive and engaging learning environment for students.

The Insights of High School Students employ to deal with their engagement in learning Algebra. A mixed methods study investigating student engagement in learning Algebra revealed robust engagement across cognitive, behavioral, and affective domains. The quantitative phase of the study indicated high overall engagement, while qualitative data provided deeper insights. Students demonstrated strong cognitive engagement by actively seeking comprehension through self-directed study and utilizing online resources for complex algebraic concepts. Their behavioral engagement was evident through consistent study habits and active participation in classroom activities. Furthermore, qualitative data highlighted a positive affective engagement, with students recognizing the practical relevance of Algebra and fostering a positive attitude towards the subject.

The study's strength lies in its use of data triangulation, a practice emphasized by Tashakkori and Teddlie (2010) to enhance research credibility and comprehensiveness. The alignment between quantitative results and qualitative evidence underscores the consistency and richness of student engagement in learning Algebra. This convergence highlights the interconnected nature of cognitive, behavioral, and affective engagement dimensions in shaping students' attitudes and performance in Algebra.

By combining quantitative and qualitative insights, the study offers a comprehensive view of student engagement, underscoring the multifaceted nature of the learning experience in algebraic education. These findings have significant implications for educators and policymakers, highlighting the importance of creating supportive and engaging learning environments that cater to the diverse needs of students. By recognizing the importance of student engagement across these dimensions, educators can tailor their approaches to create a supportive and engaging learning environment for students.

CONCLUDING REMARKS

Based on the findings of the study, the following conclusions were drawn:

First, the study on student engagement in learning Algebra among Grade 10 private school students in Sto. Tomas, Davao del Norte, has yielded valuable insights into the various dimensions of cognitive, behavioral, and affective engagement. The findings reveal a generally high level of engagement among students across these domains, reflecting a positive inclination towards learning Algebra. Cognitive engagement, characterized by students' active acquisition of algebraic knowledge through teacher instruction and problem-solving, was notably strong, indicating a proactive approach to learning complex mathematical concepts.

Second, behavioral engagement, particularly the high levels of attention paid to teachers' instructions and active participation in class discussions, underscored students' commitment to academic tasks in the Algebra curriculum. However, there were areas, such as the moderate engagement in seeking alternative problem-solving methods, where improvements could enhance overall engagement levels. Additionally, affective engagement, though generally high, highlighted students' emotional responses to algebraic learning, ranging from excitement and satisfaction upon achieving good results to occasional frustrations when faced with challenging problems. This emotional dimension plays a critical role in shaping students' attitudes towards Algebra and their motivation to persist in mastering its concepts.

Third, the qualitative insights provided a deeper understanding of how students actively engage with Algebra beyond classroom settings. Strategies such as seeking help from teachers and using

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external resources like online tutorials emerged as effective methods for enhancing comprehension and overcoming challenges.

Students' reflections on the practical applications of Algebra in daily life, particularly in financial management and professional contexts like engineering, further underscored the subject's relevance beyond academic settings.

Fourth, from the participants' responses, other themes are identified which show the lived experiences and insights of Grade 10 private high school students with regards to their engagement in learning Algebra. To measure the level of the student engagement in learning Algebra, the responses were analyzed thematically to confirm the quantitative results of the study. Both the findings from the two phases are integrated based on the nature plan. The status of perceived level of student engagement in learning Algebra based on the quantitative results, show that it converged to the data gained from the qualitative phase. Both of the quantitative and qualitative results confirms that Grade 10 high school students have high level of student engagement, which means that by their active participation in academic tasks and discussions, as well as their attentive behavior towards learning activities. These findings highlight their strong commitment to academic success and active involvement in their educational journey.

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