International Journal of Multidisciplinary Research and Publications
ISSN (Online): 2581-6187

Learner's Cognitive, Affective Perspective in Their Dimensions of Engagement and Mathematics Performance

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Abstract*—The main purpose of the study is to determine the learners' cognitive and affective perspectives and their relationship with the dimensions of engagement and mathematics performance. This study aims to assess the level of learner's cognitive and affective perspective, dimensions of engagement and mathematics performance. Furthermore, the study also seeks to find the relationship between learner's cognitive and affective perspective and dimensions of engagement. It also examined the effect of the learner's cognitive and affective perspective on mathematics performance. The study employed descriptive research design to determine the relationship of learner's cognitive and affective perspective on their dimensions of engagement and effect of learner's cognitive and affective perspective on mathematics performance. A purposive sampling technique was used to select sixty-five (65) learners of Grade 4 of San Antonio Elementary School. The learners demonstrated a positive cognitive perspective across all domains, likewise in an affective perspective, learners showed a positive perception. Furthermore, a high level of dimensions of engagement was observed on learners. A very satisfactory level of mathematics performance exhibited in Grade 4 learners in the 3rd grading period. There is a significant relationship between cognitive and affective perspective on dimensions of engagement. Likewise, there is no significant effect between cognitive and affective perspective on mathematics performance. A significant relationship is found between learner's cognitive and affective perspective and dimensions of engagement, leading to the rejection of the null hypothesis. This implies that learners' cognitive and affective perspectives are significantly associated with how they engage in learning activities. However, no significant effect between learner's cognitive and affective perspective and mathematics performance, resulting in the acceptance of the null hypothesis. This means that even if students have positive thoughts and feelings toward learning, these do not necessarily translate into higher math achievement. Based on these findings, it is recommended that teachers should implement instructional strategies that promote higher-order thinking skills, particularly in creating and problem-solving, to enhance students' deeper understanding of mathematics.*

***Keywords*—** *Cognitive perspective, affective perspective, dimension of engagement, mathematics performance, higher-order thinking skills.*

I. INTRODUCTION

Teaching mathematics is essential for developing pupils' capacity for logical reasoning, analytical thinking, and problem-solving. Despite its importance, many students still struggle to perform at acceptable levels in mathematics. These challenges have prompted teachers and students to look at factors other than curriculum content and instructional strategies, particularly those related to students' internal processes and involvement in their education. Among these, learners' emotional and cognitive perspectives have drawn increasing attention as crucial determinants of mathematical achievement.

The cognitive perspective focuses on the mental processes of learners involved in acquiring, understanding, and applying mathematical knowledge, including reasoning, problem-solving, and metacognitive strategies. At the same time, the affective perspective encompasses students' emotions, attitudes, convictions, drive, and confidence concerning mathematics. These affective and cognitive factors significantly influence how students interact with mathematical tasks, persist in problem-solving, and respond to challenges encountered during their learning journey. When students possess strong cognitive strategies and favorable emotional attitudes, they tend to engage more meaningfully in mathematical activities.

Student engagement serve as a vital link between these perspectives and academic success. Learners' active involvement, dedication to learning, and emotional ties to classroom experiences are reflected in the engagement, which is often divided into behavioral, cognitive, and emotional parts. Students who are actively involved typically demonstrate greater focus, effort, and determination, resulting in improved learning outcomes and achievement in mathematics.

Considering the intricate relationships among learners' cognitive and emotional views, participation, and academic success, it is essential to conduct empirical research that explores how these elements interact in the context of mathematics education. This research seeks to investigate the cognitive and affective perspective of learners and how they relate to engagement levels and mathematics performance. By comprehending these connections, the research aims to offer insights that could guide teaching methods, boost student involvement, and ultimately enhance mathematics performance.

1.1 Statement of the Problem

Problem/s which were addressed by the research

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The study aimed to determine the relationship between Learner's Cognitive and Affective Perspective on Mathematics and Their Academic Engagement.

Specifically, it sought the answer for the following questions:

1. What is the level of the Learner's Cognitive Perspective in terms of:
   1.1 Remembering;
   1.2 Understanding;
   1.3 Applying;
   1.4 Analyzing;
   1.5 Evaluating;
   1.6 Creating?
2. What is the level of the Learner's Affective Perspective in terms of:
   2.1 Attitude;
   2.2 Value;
   2.3 Emotion;
   2.4 Self-clarity?
3. What is the level of the Dimensions of Engagement of students in terms of:
   3.1 Behavioral;
   3.2 Emotional;
   3.3 Social;
   3.4 Temporal?
4. What is the level of the Mathematics Performance in terms of Mathematics Grade in 3rd Grading Period?
5. Is there a significant relationship between Learner's Cognitive Perspective and the Dimensions of Engagement in Mathematics?
6. Is there a significant relationship between Learner's Affective Perspective and the Dimensions of Engagement in Mathematics?
7. Is there a significant effect between Learner's Cognitive Perspective and the Mathematics Performance?
8. Is there a significant effect between Learner's Affective Perspective and the Mathematics Performance?

II. Methodology

The study employed descriptive research design to determine the relationship of learner's cognitive and affective perspective on their dimensions of engagement and effect of learner's cognitive and affective perspective on mathematics performance. A purposive sampling technique was used to select sixty-five (65) learners of Grade 4 of San Antonio Elementary School.

III. Results and Discussion

This part presents, analyzes, and interprets the data gathered that showed a significant relationship between learner's cognitive perspective and learner's affective perspective and dimensions of engagement in Mathematics, and significant effect of learner's cognitive perspective and learner's affective perspective on the mathematics performance.

Learner's Cognitive Perspective

In this study, this refers to their mental processes, thoughts and understanding related to learning and academic tasks.

The level of the learner's cognitive perspective in terms of remembering, understanding, applying, analyzing, evaluating and creating, was treated statistically using mean and standard deviation.

Table 1 presents the level of the learners' cognitive perspective in terms of remembering, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that learners typically have a positive cognitive perspective towards their remembering of Math concepts. All students confirmed they have an ability to recall different Math formulae/concepts, remember Math vocabulary/definitions, and retrieve from memory procedures to solve Math problems, recall previously learnt Math concepts, and remember Math principles as well as rules, although the last was rated somewhat lower than the other variables. An overall weighted mean of 3.61 and a standard deviation of 1.100 reflect learners' positive perception with regard to remembering math concepts. Therefore, learners generally agree with their ability to recall math formulas, terms, procedures and concepts, but there is variability as evidenced by the relatively moderate standard deviation.

Table 1. Level of the Learner's Cognitive Perspective in Terms of Remembering

Statements	Mean	SD	Remarks
I can recall mathematical formulas and concepts with ease.	3.68	0.95	Agree
I remember key mathematical terms and definitions.	3.71	0.98	Agree
I can retrieve procedures for solving mathematical problems.	3.69	1.13	Agree
I have a good memory of mathematical concepts learned in previous classes.	3.75	1.13	Agree
I can easily recall mathematical rules and principles.	3.23	1.32	Moderately Agree
Weighted Mean	3.61		
SD	1.10		
Verbal Interpretation	Positive Perception		

In summary, this implies that learners generally show a positive cognitive perspective in terms of remembering mathematics. Although most of the learners are able to recall math concepts and procedures; however, continued attention is needed on improving their ability to more consistently recall math rules and principles that are critical to achieving deeper understanding in mathematics and to successful problem solving.

Table 2 presents the level of the learners' cognitive perspective in terms of understanding, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that learners typically have a positive cognitive perspective towards their understanding of Math

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concepts. All students confirmed they have an ability to understand and explain different Math concepts, grasp the relation of different Math concepts, apply concept in real-life situation and interpret Math data/results.

Table 2. Level of the Learner's Cognitive Perspective in Terms of Understanding

Statements	Mean	SD	Remarks
I understand the underlying concepts of mathematical problems.	3.40	1.18	Agree
I can explain mathematical concepts in my own words.	3.45	1.19	Agree
I grasp the relationships between different mathematical concepts.	3.62	1.16	Agree
I understand how mathematical concepts apply to real-life situations.	3.58	1.20	Agree
I can interpret mathematical data and results.	3.75	1.23	Agree
Weighted Mean	3.56		
SD	1.19		
Verbal Interpretation	Positive Perception		

An overall weighted mean of 3.56 and a standard deviation of 1.19 reflect learners' positive perception with regard to understanding math concepts. Therefore, learners generally agree with their ability to understand math concepts, data and results in mathematics problems, but there is variability as evidenced by the relatively moderate standard deviation.

In summary, this implies that learners generally show positive cognitive perspective in terms of understanding mathematics. Although most of the learners are able to interpret math concepts and procedures; however, continued focus is needed to enhance the learner's understanding of mathematics, particularly in developing in underlying concepts of math problems that are essential for deeper comprehension and effective problem-solving.

Table 3. Level of the Learner's Cognitive Perspective in Terms of Applying

Statements	Mean	SD	Remarks
I can apply mathematical concepts to solve problems.	4.00	1.12	Agree
I use mathematical models to solve real-world problems.	3.94	1.06	Agree
I apply mathematical procedures to complete tasks.	4.12	0.96	Agree
I can use mathematical concepts to make predictions.	2.74	1.18	Moderately Agree
I apply mathematical skills to solve complex problems.	3.92	1.22	Agree
Weighted Mean	3.74		
SD	1.11		
Verbal Interpretation	Positive Perception		

Table 3 presents the level of the learners' cognitive perspective in terms of applying, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that learners typically have a positive cognitive perspective towards their applying of Math concepts. All students confirmed they have an ability to apply different Math concepts to solve problems, utilize math procedures to complete task, use math skills to solve complex problems and mathematics concepts to make predictions, although the last was rated somewhat lower than the other variables.

An overall weighted mean of 3.74 and a standard deviation of 1.11 reflect learners' positive perception with regard to use math concepts. Therefore, learners generally agree with their ability to apply math concepts, models to solve real-world problems but there is variability as evidenced by the relatively moderate standard deviation.

In summary, this implies that learners generally show a positive cognitive perspective in terms of applying mathematics. Although most of the learners are able to apply math concepts and models; however, continued attention is needed to improve the learner's ability to consistently apply mathematical concepts to make prediction, which are essential for developing deeper understanding and achieving success in problem-solving.

Table 4. Level of the Learner's Cognitive Perspective in Terms of Analyzing

Statements	Mean	SD	Remarks
I can break down complex mathematical problems into simpler components.	3.66	1.02	Agree
I analyze mathematical data to identify patterns and trends.	3.58	1.20	Agree
I evaluate the validity of mathematical arguments.	4.09	1.17	Agree
I identify relationships between different mathematical concepts.	3.75	0.98	Agree
I can distinguish between relevant and irrelevant mathematical information.	3.46	1.28	Agree
Weighted Mean	3.71		
SD	1.13		
Verbal Interpretation	Positive Perception		

Table 4 presents the level of the learners' cognitive perspective in terms of analyzing, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that learners typically have a positive cognitive perspective towards their analyzing of Math concepts. All students confirmed they have an ability to assess the accuracy of mathematical solutions, analyze mathematical data, evaluate validity of mathematical arguments, identify different mathematical concepts, and distinguish relevant and irrelevant mathematical information.

An overall weighted mean of 3.71 and a standard deviation of 1.13 reflect learners' positive perception with regard to analyzing math concepts. Therefore, learners generally agree with their ability to analyze components, patterns, concepts

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and information but there is variability as evidenced by the relatively moderate standard deviation.

In summary, this implies that learners generally show positive cognitive perspective in terms of analyzing mathematics. Although most of the learners are able to analyze components, patterns, concepts and information; however, continued attention is needed on improving their ability to more consistently distinguish between relevant and irrelevant mathematical information that are critical to achieving deeper understanding in mathematics and to successful problem solving.

Table 5 presents the level of the learners' cognitive perspective in terms of evaluating, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that learners typically have a positive cognitive perspective towards their evaluating of Math concepts. All students confirmed they have an ability to assess the accuracy of mathematical solutions, evaluate mathematical models, judge validity of math arguments, identify strengths and weaknesses and relevance mathematical concepts.

An overall weighted mean of 3.71 and a standard deviation of 1.20 reflect learners' positive perception with regard to analyzing math concepts. Therefore, learners generally agree with their ability to assess math solutions, models, arguments and concepts, but there is variability as evidenced by the relatively moderate standard deviation.

Table 5. Level of the Learner's Cognitive Perspective in Terms of Evaluating

Statements	Mean	SD	Remarks
I can assess the accuracy of mathematical solutions.	3.83	1.31	Agree
I evaluate the effectiveness of mathematical models.	3.89	0.94	Agree
I judge the validity of mathematical arguments. (Nagdedesisyon ako kung tama o mali ang mga ideya sa matematika.)	3.40	1.43	Agree
I can identify the strengths and weaknesses of mathematical solutions.	3.49	1.19	Agree
I assess the relevance of mathematical concepts to real-world situations.	3.92	1.12	Agree
Weighted Mean	3.71		
SD	1.20		
Verbal Interpretation	Positive Perception		

In summary, this implies that learners generally show a positive cognitive perspective in terms of analyzing mathematics. Although most of the learners are able to assess math solutions, models, arguments and concepts; however, continued attention is needed on improving their ability to more consistently judge the validity of mathematical arguments that are essential for developing a deeper understanding of mathematics and effective problem-solving skills.

Table 6 presents the level of the learners' cognitive perspective in terms of creating, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that learners typically have a positive cognitive perspective towards their creating of Math concepts. All students confirmed they have an ability to generate math ideas and solutions, mathematical models to solve complex problems, develop innovative solutions, design mathematical experiments and generate math concepts and theories.

Table 6. Level of the Learner's Cognitive Perspective in Terms of Creating

Statements	Mean	SD	Remarks
I can generate new mathematical ideas and solutions.	3.54	1.24	Agree
I create mathematical models to solve complex problems.	3.49	1.12	Agree
I develop innovative solutions to mathematical problems.	3.34	1.25	Agree
I can design mathematical experiments to test hypotheses.	3.38	1.17	Agree
I generate new mathematical concepts and theories.	3.37	1.31	Agree
Weighted Mean	3.42		
SD	1.22		
Verbal Interpretation	Positive Perception		

An overall weighted mean of 3.42 and a standard deviation of 1.22 reflect learners' positive perception with regard to create math concepts. Therefore, learners generally agree with their ability to generate math ideas, solutions, theories and concepts, but there is variability as evidenced by the relatively moderate standard deviation.

In summary, this implies that learners generally show a positive cognitive perspective in terms of creating mathematics. Although most of the learners are able to generate math ideas, solutions, theories and concepts; however, continued attention is needed on improving their ability to more consistently develop innovative solutions to mathematical problems that are critical to achieving deeper understanding in mathematics and to successful problem solving.

Learner's Affective Perspective

In this study, it refers to their emotional and attitudinal responses to learning, including their feelings, emotions and motivations.

The level of the learner's affective perspective in terms of emotion, attitude, value and self-clarity was treated statistically using mean and standard deviation.

Table 7 presents the level of the learners' affective perspective in terms of emotion, including the indicators with their corresponding mean, standard deviation, and descriptive remarks.

The findings revealed that students tend to have a generally positive emotional outlook toward mathematics. They agreed with all the statements presented, showing that their feelings about the subject are mostly favorable. Among these, students most strongly expressed that mathematics is an

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important subject, highlighting how much they value its role. On the other hand, while they still showed agreement, their feelings about having a positive attitude toward learning mathematics were less strong, indicating that there is still room to further improve their overall disposition toward the subject.

Table 7. Level of the Learner's Affective Perspective in Terms of Emotion

Statements	Mean	SD	Remarks
I believe that mathematics is an important subject.	4.20	1.16	Agree
I think that mathematics is useful in real-life situations.	3.78	1.10	Agree
I have a positive attitude towards learning mathematics.	3.49	1.21	Agree
I believe that mathematics is a valuable tool for problem-solving.	3.82	1.20	Agree
I am interested in learning more about mathematics.	3.69	1.30	Agree
Weighted Mean	3.80		
SD	1.19		
Verbal Interpretation	Positive Perception		

The overall weighted mean of 3.80 and a standard deviation of 1.19 indicate that learners, on average, agree with statements reflecting their emotional perspective toward mathematics. The standard deviation implies a moderate level of variability in responses, meaning that while many learners show positive emotions, some may still have less favorable attitudes toward the subject.

In summary, the findings suggest that learners possess a generally positive affective perspective in terms of emotion toward mathematics. However, there is still a need to strengthen learners' positive attitudes and interest in learning mathematics to foster greater engagement and motivation. Table 8 presents the level of the learners' affective perspective in terms of attitude, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that learners generally have a positive affective perspective toward mathematics in terms of attitude. All students affirmed that they value the importance of mathematical knowledge, believe that mathematics helps develop critical thinking skills, recognize its importance for their future careers, appreciate its role in understanding the world, and consider mathematics as a fundamental subject. However, the appreciation of mathematics in understanding the world and as a fundamental subject was rated slightly lower compared to the other indicators.

An overall weighted mean of 3.75 and a standard deviation of 1.11 reflect learners' positive perception regarding their attitudes toward mathematics. This indicates that learners generally agree with the value and importance of mathematics in their academic and personal lives, although there is some variability in their responses as shown by the moderate standard deviation.

Table 8. Level of the Learner's Affective Perspective in Terms of Attitude

Statements	Mean	SD	Remarks
I value the importance of mathematical knowledge.	4.17	1.11	Agree
I believe that mathematics helps me develop critical thinking skills.	3.91	1.07	Agree
I think that mathematics is essential for my future career.	3.82	0.93	Agree
I value the role of mathematics in understanding the world.	3.40	1.07	Agree
I believe that mathematics is a fundamental subject.	3.48	1.38	Agree
Weighted Mean	3.75		
SD	1.11		
Verbal Interpretation	Positive Perception		

In summary, this implies that learners generally demonstrate a positive affective perspective in terms of attitude toward mathematics. While most learners recognize its importance and usefulness, there is still a need to further strengthen their appreciation of mathematics in broader real-world contexts to enhance their overall engagement and motivation in learning the subject.

Table 9. Level of the Learner's Affective Perspective in Terms of Value

Statements	Mean	SD	Remarks
I enjoy learning mathematics.	3.89	1.34	Agree
I feel confident when solving mathematical problems.	3.42	1.07	Agree
I feel frustrated when I don't understand mathematical concepts.	3.69	1.17	Agree
I am enthusiastic about learning new mathematical concepts.	3.49	1.32	Agree
I feel anxious when faced with mathematical problems.	3.31	1.25	Agree
Weighted Mean	3.56		
SD	1.23		
Verbal Interpretation	Positive Perception		

Table 9 presents the level of the learners' affective perspective in terms of value, including the indicators with their corresponding mean, standard deviation, and remarks The results revealed that learners generally have a positive affective perspective toward mathematics in terms of value. Students expressed that they enjoy learning mathematics, feel confident when solving mathematical problems, experience frustration when they do not understand certain concepts, show enthusiasm in learning new mathematical ideas, and feel some level of anxiety when dealing with mathematical problems. While all indicators were rated as "Agree," feelings of anxiety and confidence were rated slightly lower compared to the other variables.

An overall weighted mean of 3.56 and a standard deviation of 1.23 reflect learners' positive perception with regard to their values toward mathematics. Therefore, learners generally

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agree that they have both positive and negative emotional experiences in learning mathematics, although there is noticeable variability in their responses as indicated by the moderate standard deviation.

In summary, this implies that learners demonstrate a positive affective perspective in terms of value toward mathematics. Although many learners enjoy and are enthusiastic about learning mathematics, emotional factors such as anxiety and frustration still influence their learning experience, indicating the need for supportive strategies to help learners build confidence and reduce negative emotions in mathematics learning.

Table 10. Level of the Learner's Affective Perspective in Terms of Self-Clarity

Statements	Mean	SD	Remarks
I know my strengths and weaknesses in mathematics.	3.95	1.16	Agree
I am aware of my mathematical abilities and limitations.	3.80	1.08	Agree
I can identify areas where I need improvement in mathematics.	3.65	1.19	Agree
I set realistic goals for my mathematical development.	3.48	1.00	Agree
I understand how mathematics fits into my overall academic goals.	3.74	1.16	Agree
Weighted Mean		3.72	
SD		1.12	
Verbal Interpretation		Positive Perception	

Table 10 presents the level of the learners' affective perspective in terms of self-clarity, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that learners generally have a positive affective perspective toward mathematics in terms of self-clarity. Students expressed that they are aware of their strengths and weaknesses in mathematics, recognize their abilities and limitations, can identify areas that need improvement, set realistic goals for their mathematical development, and understand how mathematics contributes to their overall academic goals. However, setting realistic goals for mathematical development was rated slightly lower compared to the other indicators.

An overall weighted mean of 3.72 and a standard deviation of 1.12 reflect learners' positive perception with regard to their self-clarity in mathematics. Therefore, learners generally agree that they have a good understanding of their mathematical abilities and learning needs, although there is some variability in responses as indicated by the moderate standard deviation.

In summary, this implies that learners demonstrate a positive affective perspective in terms of self-clarity toward mathematics. While most learners are aware of their strengths, weaknesses, and areas for improvement, there is still a need to further support them in setting realistic goals and developing clearer academic directions in mathematics.

Dimensions of Engagement

In this study, this refers to various ways in which students engage with learning, including their behavioral, emotional and cognitive involvement.

The level of the dimensions of engagement of students in terms of behavioral, emotional, social and temporal was treated statistically using mean and standard deviation.

Table 11 presents the level of the dimensions of engagement of students in terms of behavioral engagement, including the indicators with their corresponding mean, standard deviation, and remarks.

Table 11. Level of the Dimensions of Engagement of Students in Terms of Behavioral

Statements	Mean	SD	REMARKS
I participate actively in mathematics class.	3.75	1.30	Agree
I complete my mathematics homework regularly.	3.60	1.07	Agree
I engage in mathematical activities outside of class.	3.38	1.11	Agree
I ask questions in mathematics class.	3.18	1.24	Agree
I seek help from teachers or peers when struggling with mathematics.	3.65	1.28	Agree
Weighted Mean		3.51	
SD		1.20	
Verbal Interpretation		High Engagement	

The results revealed that students generally demonstrate a high level of behavioral engagement in mathematics. Students reported that they actively participate in mathematics class, complete their homework regularly, engage in mathematical activities outside of class, ask questions during discussions, and seek help from teachers or peers when they encounter difficulties. However, asking questions in mathematics class and engaging in activities outside of class were rated slightly lower compared to the other indicators.

An overall weighted mean of 3.51 and a standard deviation of 1.20 reflect students' high level of engagement in terms of behavioral aspects. Therefore, students generally agree that they are actively involved in mathematics-related tasks and classroom activities, although there is some variability in responses as indicated by the moderate standard deviation.

In summary, this implies that students exhibit a high level of behavioral engagement in mathematics. While most students actively participate and complete required tasks, there is still a need to further encourage them to ask questions and engage more in mathematical activities beyond the classroom to enhance their overall learning experience.

Table 12 presents the level of the dimensions of engagement of students in terms of emotional engagement, including the indicators with their corresponding mean, standard deviation, and remarks.

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Table 12. Level of the Dimensions of Engagement of Students in Terms of Emotional

Statements	Mean	SD	Remarks
I feel engaged and motivated during mathematics lessons.	3.83	1.22	Agree
I enjoy discussing mathematical concepts with peers.	3.86	1.03	Agree
I feel a sense of accomplishment when solving mathematical problems.	3.68	0.94	Agree
I am enthusiastic about participating in mathematical activities.	3.68	1.12	Agree
I feel bored during mathematics lessons.	3.38	1.39	Agree
Weighted Mean	3.69		
SD	1.14		
Verbal Interpretation	High Engagement		

The results revealed that students generally demonstrate a high level of emotional engagement in mathematics. Students expressed that they feel engaged and motivated during mathematics lessons, enjoy discussing mathematical concepts with peers, experience a sense of accomplishment when solving problems, and show enthusiasm in participating in mathematical activities. However, feelings of boredom during mathematics lessons were also noted and rated slightly lower compared to the other indicators.

An overall weighted mean of 3.69 and a standard deviation of 1.14 reflect students' high level of engagement in terms of emotional aspects. Therefore, students generally agree that they have positive emotional experiences in learning mathematics, although some variability in responses is evident as indicated by the moderate standard deviation.

In summary, this implies that students exhibit a high level of emotional engagement in mathematics. While most students feel motivated, interested, and accomplished during learning, there is still a need to address instances of boredom to further enhance their emotional involvement and overall learning experience in mathematics.

Table 13 presents the level of the dimensions of engagement of students in terms of social engagement, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that students generally demonstrate a high level of social engagement in mathematics. Students reported that they work collaboratively with peers on mathematical tasks, seek feedback from teachers and classmates, participate in mathematical discussions and debates, assist peers in solving mathematical problems, and feel supported by their peers during mathematics classes. However, participation in discussions and seeking feedback were rated slightly lower compared to the other indicators.

An overall weighted mean of 3.68 and a standard deviation of 1.19 reflect students' high level of engagement in terms of social aspects. Therefore, students generally agree that they are actively involved in collaborative and interactive learning in mathematics, although there is some variability in responses as indicated by the moderate standard deviation.

In summary, this implies that students exhibit a high level of social engagement in mathematics. While most students collaborate and support one another in learning, there is still a need to further encourage active participation in discussions and feedback-seeking behaviors to strengthen their overall social interaction and learning experience in mathematics.

Table 13. Level of the Dimensions of Engagement of Students in Terms of Social

Statements	Mean	SD	Remarks
I work collaboratively with peers on mathematical tasks.	3.91	1.25	Agree
I seek feedback from teachers and peers on my mathematical work.	3.58	1.13	Agree
I participate in mathematical discussions and debates.	3.43	1.16	Agree
I help my peers with mathematical problems.	3.66	1.09	Agree
I feel supported by my peers in mathematics class.	3.83	1.32	Agree
Weighted Mean	3.68		
SD	1.19		
Verbal Interpretation	High Engagement		

Table 14. Level of the Dimensions of Engagement of Students in Terms of Temporal

Statements	Mean	SD	Remarks
I manage my time effectively to complete mathematical tasks.	3.91	1.31	Agree
I prioritize mathematical tasks and assignments.	3.82	1.07	Agree
I meet deadlines for mathematical projects and assignments.	3.62	1.01	Agree
I allocate sufficient time for mathematical study and practice.	3.62	1.10	Agree
I balance my time between mathematics and other subjects.	3.31	1.36	Agree
Weighted Mean	3.65		
SD	1.17		
Verbal Interpretation	High Engagement		

Table 14 presents the level of the dimensions of engagement of students in terms of temporal engagement, including the indicators with their corresponding mean, standard deviation, and remarks.

The results revealed that students generally demonstrate a high level of temporal engagement in mathematics. Students reported that they manage their time effectively to complete mathematical tasks, prioritize mathematical assignments, meet deadlines for projects, allocate sufficient time for study and practice, and balance their time between mathematics and other subjects. However, balancing time between mathematics and other subjects was rated slightly lower compared to the other indicators.

An overall weighted mean of 3.65 and a standard deviation of 1.17 reflect students' high level of engagement in terms of temporal aspects. Therefore, students generally agree that they are able to manage their time effectively in relation to mathematics tasks and responsibilities, although there is some variability in responses as indicated by the moderate standard deviation.

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In summary, this implies that students exhibit a high level of temporal engagement in mathematics. While most students are able to manage their time and meet academic demands, there is still a need to further support them in balancing mathematics with other subjects to enhance their overall time management and learning efficiency.

Mathematics Performance

In this study, this refers to a student's ability to demonstrate understanding, apply concepts, and solve problem in mathematics.

The level of the mathematics performance in terms of mathematics grade in 3rd Grading Period was treated statistically using the frequency and percentage.

Table 15 presents the level of mathematics performance in terms of students' grades in the 3rd grading period, including the distribution of grades with their corresponding frequency, percentage, and descriptive remarks. The result shows that most students performed in the high and moderately high ranges (43.08% scored high and 38.46% scored moderately high). In addition, 16.92% of the students obtained very high grades, while only 1.54% fell under the low category. Notably, no students obtained grades in the very low category, indicating that all learners met at least the minimum expected level of performance in Mathematics.

Table 15. Level of the Mathematics Performance in Terms of Mathematics Grade in 3rd Grading Period

Grade	Frequency	Percentage	Descriptive Equivalent
90 above	11	16.92%	Outstanding
85-89	28	43.08%	Very Satisfactory
80-84	25	38.46%	Satisfactory
75-79	1	1.54%	Poor
74 below	0	0.00%	Needs Improvement
Total	65	100%	

Weighted Mean = 85.83 SD=3.22
Verbal Interpretation = Very Satisfactory

On average, the mathematics grades of the students were 85.83% with a standard deviation of 3.22, which is an indication of the overall strength of the students' performance in mathematics during this grading period. The relatively small standard deviation indicates that the students' grades were fairly closely clustered about the mean, suggesting that there is a generally consistent performance level among the students.

To summarize, the data demonstrates that the majority of the students are doing well in mathematics and are meeting the expected minimum level of performance, as evidenced by the absence of students performing very low. There are very few students performing at a very high level in mathematics; therefore, the school needs to continue to enhance instructional practices to improve academic achievement for all students and help more students to achieve at the highest level in mathematics.

Test of significant Relationship between Learner's Cognitive Perspective and Dimensions of Engagement in Mathematics

To test the significant relationship between learner's cognitive perspective and dimensions of engagement in mathematics in terms of behavioral, emotional, social and temporal, was treated statistically using Jamovi 2.3.28 using the Pearson correlation coefficient.

Table 16 presents the relationship between the learner's cognitive perspective in mathematics and the dimensions of engagement in terms of behavioral, emotional, social, and temporal engagement using the Pearson correlation coefficient.

The results revealed that the cognitive aspect indicators consistently show a positive and significant relationship with all levels of engagement. With respect to remembering, all behavioral ($r = 0.48$, $p < 0.001$), emotional ($r = 0.44$, $p < 0.001$), social ($r = 0.46$, $p < 0.001$) and temporal ($r = 0.46$, $p<.001$) are significant and the same direction; thus, learners demonstrating the best remembering ability are much more likely to be engaged when learning mathematics.

Table 16. Significant Relationship of Learner's Cognitive Perspective and Dimensions of Engagement in Mathematics

Learner's Cognitive Perspective	Behavioral	Emotional	Social	Temporal
Remembering Pearson Correlation	0.48***	0.44***	0.46***	0.46***
Sig. (2-tailed)	<.100	<.100	<.100	<.100
N	63	63	63	63
Understanding Pearson Correlation	0.53***	0.51***	0.54***	0.49***
Sig. (2-tailed)	<.100	<.100	<.100	<.100
N	63	63	63	63
Applying Pearson Correlation	0.47***	0.43***	0.63***	0.61***
Sig. (2-tailed)	<.100	<.100	<.100	<.100
N	63	63	63	63
Analyzing Pearson Correlation	0.43***	0.48***	0.46***	0.42***
Sig. (2-tailed)	<.100	<.100	<.100	<.100
N	63	63	63	63
Evaluating Pearson Correlation	0.66***	0.71***	0.69***	0.67***
Sig. (2-tailed)	<.100	<.100	<.100	<.100
N	63	63	63	63
Creating Pearson Correlation	0.59***	0.63***	0.56***	0.54***
Sig. (2-tailed)	<.100	<.100	<.100	<.100
N	63	63	63	63

Note: *p<.05, ** p<.01, ***p<.001

Similar to the results for remembering, the student's understanding of mathematics shows moderate to strong positive correlations with all engagement dimensions; for example, the behaviors ($r = 0.53$, $p < 0.001$), emotions ($r = 0.51$, $p < 0.001$), socialization ($r = 0.54$, $p < 0.001$) and combined tempo ($r = 0.49$, $p < 0.001$). Essentially, those students who understand the math concept deeper will generally demonstrate a greater level of participation, emotional connection with their peers, social interaction and sustained engagement with their learning.

With respect to applying, the engagement levels are also positively and significantly correlated with students demonstrating an application of the maths concepts ($r = 0.47$, $p < 0.001$), emotions ($r = 0.43$, $p < 0.001$), socialization ($r= 0.63$, $p < 0.001$) and combined tempo ($r = 0.61$, $p < .001$). Therefore, students demonstrating a greater ability to apply will also demonstrate a higher level of social engagement and stronger sustained engagement in their learning activities.

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The analysis of the data showed that analyzing has significant relationships with all four dimensions of engagement. The positive correlations for analyzing are: behavioral (r = .43, p < .001), emotional (r = .48, p < .001), social (r = .46, p < .001), and temporal (r = .42, p < .001). This means that students who demonstrated higher-order thinking skills through analysis were found to have higher engagement based on all four dimensions.

Similarly, evaluating have demonstrated the same pattern of strong positive correlations to all four dimensions of engagement. The positive correlations for evaluation are: behavioral (r = .66, p < .001), emotional (r = .71, p < .001), social (r = .69, p < .001), and temporal (r = .67, p < .001). Therefore, learners who demonstrate evaluative thinking also tend to experience higher engagement across each of the four dimensions of engagement, particularly in the emotional and social dimensions.

Lastly, creating thoughts are shown to be strongly and significantly related to each of the four dimensions of engagement in a positive direction. The positive correlations for creativity are: behavioral (r = .59, p < .001), emotional (r = .63, p < .001), social (r = .56, p < .001), and temporal (r = .54, p< .001). Therefore, students who demonstrate higher levels of creativity in mathematics learning tend to have higher levels of engagement, emotional engagement, social interactions, and continuous engagement over time.

In summary, this implies that all levels of a student's cognitive perspective were positively and significantly related to each of the four dimensions of engagement in mathematics learning; however, the strongest relationships were demonstrated through evaluating and creating. This indicates that higher-order thinking skills also demonstrate the strongest relationship to deeper levels of behavioral, emotional, social, and temporal engagement in mathematics learning.

Test of significant Relationship between Learner's Affective Perspective and Dimensions of Engagement in Mathematics

To test the significant relationship between learner's affective perspective and dimensions of engagement in mathematics in terms of behavioral, emotional, social and temporal, was treated statistically using Jamovi 2.3.28 using the Pearson correlation coefficient.

Table 17 presents the relationship between the learners' affective perspective and the dimensions of engagement in mathematics in terms of behavioral, emotional, social, and temporal engagement using the Pearson correlation coefficient.

The results revealed that all indicators of the learners' affective perspective show a positive and significant relationship with all dimensions of engagement. Learners' emotion, attitude, value, and self-clarity were all significantly correlated with behavioral, emotional, social, and temporal engagement. This indicates that as learners' affective dispositions toward mathematics improve, their level of engagement in mathematics also increases. Among the affective variables, self-clarity and attitude showed relatively stronger correlations compared to emotion and value.

All correlation coefficients ranged from moderate to strong (r = 0.49 to 0.70) and were statistically significant at p < .001, indicating a consistent and meaningful relationship between affective perspective and engagement. This suggests that learners who have positive emotions, attitudes, values, and self-awareness in mathematics are more likely to actively participate, feel motivated, interact with peers, and manage their time effectively in learning mathematics.

Table 17. Significant Relationship of Learner's Affective Perspective and Dimensions of Engagement in Mathematics

Learner's Affective Perspective		Behavioral	Emotional	Social	Temporal
Emotion	Pearson Correlation	0.54***	0.49***	0.53***	0.57***
	Sig. (2-tailed)	<.100	<.100	<.100	<.100
	N	63	63	63	63
Attitude	Pearson Correlation	0.65***	0.63***	0.60***	0.61***
	Sig. (2-tailed)	<.100	<.100	<.100	<.100
	N	63	63	63	63
Value	Pearson Correlation	0.59***	0.56***	0.53***	0.58***
	Sig. (2-tailed)	<.100	<.100	<.100	<.100
	N	63	63	63	63
Self-clarity	Pearson Correlation	0.65***	0.69***	0.65***	0.70***
	Sig. (2-tailed)	<.100	<.100	<.100	<.100
	N	63	63	63	63

Note: *p<.05, ** p<.01, ***p<.001

In summary, this implies that learners' affective perspective is significantly related to all dimensions of engagement in mathematics. While all affective components contribute to engagement, self-clarity and attitude demonstrate stronger relationships, indicating that students' awareness of their abilities and positive outlook toward mathematics play a crucial role in enhancing their overall engagement in mathematics learning.

Test of Significant Effect between Learner's Cognitive Perspective and Mathematics Performance

The Significant Effect between learner's cognitive perspective and mathematics performance in terms of 3rd Grading Period was treated statistically using Real Statistics Data Analysis Tools using multiple regression analysis.

A multiple regression analysis was conducted to determine whether the learner's cognitive perspective in terms of remembering, understanding, applying, analyzing, evaluating, and creating could significantly predict students' mathematics performance in the 3rd grading period.

An analysis of variance (F (6, 58) = 1.38, p = 0.239) confirmed that the overall regression model is not statistically significant. In sum, taken together, the learner's cognitive perspectives do not contribute significantly toward predicting students' mathematics performance as evidenced by their grades during the 3rd grading period.

In examining the various cognitive perspectives separately, most of the cognitive perspectives did not provide significant predictions for mathematics performance including remembering (B = 0.10, t = 0.44, p = 0.662), understanding (B = 0.23, t = 1.31, p = 0.197), applying (B = 0.00, t = -0.01, p= 0.995), analyzing (B = 0.20, t = 0.97, p = 0.337), and evaluate (B = 0.08, t = 0.33, p = 0.745) as p-values for each (greater

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than 0.05). Only creating (B = -034, t = -2.01, p = 0.049) yielded statistically significant (negative) predictions for mathematics performance (indicating a small negative effect) among students' grades during the 3rd grading period.

Table 18. Significant Effect of Learner's Cognitive Perspective and Mathematics Performance in Terms of 3rd Grading Period

a. Dependent Variable: 3RD GRADING PERIOD

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.50	6	0.75	1.38	0.239
	Residual	31.57	58	0.54		
	Total	36.07	64			

a. Dependent Variable: 3rd Grading Period

b. Predictors: (Constant), Remembering, Understanding, Applying, Analyzing, Evaluating and Creating

Coefficients[a]

Unstandardized Coefficients

Model		B	Std. Error	t	Sig.
1	(Constant)	2.72	0.71	3.81	<.001
	Remembering	0.10	0.22	0.44	0.662
	Understanding	0.23	0.17	1.31	0.197
	Applying	0.00	0.22	-0.01	0.995
	Analyzing	0.20	0.20	0.97	0.337
	Evaluating	0.08	0.25	0.33	0.745
	Creating	-0.34	0.17	-2.01	0.049

Note: *p<.05, ** p<.01, ***p<.001

In summary, the results indicate that while the learner's cognitive perspectives as a whole predict students' mathematics performance, among the cognitive areas only creating is demonstrate to exhibit a significant statistical relationship with performance. This implies that although higher-order thinking skills are critical to mathematics learning, they may not be directly related to higher mathematics grades; on the other hand, there could be variables absent from this model that will influence students' academic performance more than the cognitive perspectives do.

Recent studies support the finding that cognitive perspectives do not always directly predict academic performance, as achievement in mathematics is influenced by multiple factors beyond cognitive abilities alone. While higher-order thinking skills are important, variables such as motivation, instructional quality, and learning environment often play a more significant role in determining students' academic outcomes (OECD, 2023; Hattie, 2021).

Test of Significant Effect between Learner's Affective Perspective and Mathematics Performance

The Significant Effect between learner's affective perspective and mathematics performance in terms of 3rd Grading Period was treated statistically using Real Statistics Data Analysis Tools using multiple regression analysis.

Table 19 presents the regression analysis on the effect of the learners' affective perspective on mathematics performance in terms of the 3rd grading period, using multiple regression analysis.

The results revealed that the overall regression model is not statistically significant (F(4, 60) = 2.42, p = 0.058), indicating that the learners' affective perspectives—emotion, attitude, value, and self-clarity—do not significantly predict students' mathematics performance when taken as a whole. Although the p-value is close to the 0.05 level, it still suggests that affective factors collectively do not have a strong predictive effect on students' grades during the 3rd grading period.

Table 19. Regression Analysis on the Effect of Learner's Affective Perspective and Mathematics Performance in Terms of 3rd Grading Period

a. Dependent Variable: 3RD GRADING PERIOD

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.02	4	1.25	2.42	0.058
	Residual	31.04	60	0.52		
	Total	36.06	64			

a. Dependent Variable: 3rd Grading Period

b. Predictors: (Constant), Emotion, Attitude, Value and Self-clarity

Coefficients[a]

Unstandardized Coefficients

Model		B	Std. Error	t	Sig.
1	(Constant)	2.16	0.58	3.69	<.001
	Emotion	0.10	0.21	0.47	0.641
	Attitude	-0.27	0.23	-1.17	0.247
	Value	0.08	0.19	0.42	0.676
	Self-clarity	0.52	0.26	1.98	0.052

Note: *p<.05, ** p<.01, ***p<.001

Further analysis of the individual predictors showed that none of the affective variables significantly influenced mathematics performance, as all obtained p-values greater than 0.05. However, self-clarity (B = 0.52, t = 1.98, p = 0.052) showed a value close to significance, suggesting a potential positive influence on performance. Meanwhile, emotion, attitude, and value did not demonstrate significant effects on students' mathematics grades.

In summary, this implies that learners' affective perspective does not significantly predict mathematics performance in the 3rd grading period. While factors such as self-clarity may show a tendency to influence performance, the findings suggest that other variables beyond affective perspectives may play a more important role in determining students' academic achievement in mathematics.

Recent studies also support the finding that affective factors alone may not significantly predict mathematics performance, although they contribute indirectly to learning through motivation and engagement. Emotional and attitudinal variables influence how students approach learning tasks, but their impact on academic achievement is often mediated by other factors such as teaching strategies and student engagement (OECD, 2023; Fredricks et al., 2021).

IV. Conclusion and Recommendations

Learner's Cognitive Perspective is significantly related to dimensions of engagement, leading to the rejection of null hypothesis. This indicates that improvements in these areas can enhance students' participation and involvement in mathematics learning. It further implies that strengthening

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students' thinking processes can foster more active and meaningful engagement in classroom activities.

Learners' affective perspectives have a significant relationship with their dimensions of engagement, which consequently leads to the rejection of the null hypothesis. This indicates that students' emotions, attitudes, values, and self-clarity toward mathematics play a crucial role in shaping how actively they participate in learning activities. When learners develop positive feelings and a strong interest in mathematics, they are more likely to become involved, attentive, and committed during lessons.

However, Learner's Cognitive Perspective has no significant effect on mathematics performance, leading to the acceptance of the null hypothesis. This emphasizes that academic achievement is influenced by other factors such as teaching strategies, learning environment, and external support systems.

Learners' affective perspective does not have a significant effect on their mathematics performance, which leads to the acceptance of the null hypothesis. This means that factors such as students' emotions, attitudes, and motivation toward mathematics may not directly translate into higher or lower academic achievement in the subject. While affective aspects are important in shaping students' experiences, they do not appear to be strong predictors of actual performance outcomes in this case.

In the formulated conclusions from the findings, it was recommended that:

Schools Heads may provide supportive learning environments and programs that reduce mathematics anxiety and enhance students' confidence and motivation.

Teachers may implement instructional strategies that promote higher-order thinking skills, particularly in creating and problem-solving, to enhance students' deeper understanding of mathematics.

Teachers may encourage students to actively participate in class discussions, ask questions, and engage in independent learning activities to strengthen their engagement and understanding.

Future researchers may explore other factors influencing mathematics performance, such as teaching methods, socio-economic background, and learning styles, to provide a more comprehensive understanding of student achievement.

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