Problem-Solving, Numeracy Rate and Academic Performance of Senior High School Students

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ABSTRACT

This study is titled "Problem-Solving, Numeracy Rate and Academic Performance of Senior High School Students". It examined the relationship between Grade 11 Academic Track students' problem-solving perception, numeracy rate, and academic performance in General Mathematics at a public senior high school in Negros Island Region during school year 2025-2026. A descriptive-correlational research design was employed to determine the levels of the variables and their interrelationships. Findings revealed that students demonstrated a high level of problem-solving perception, with interest and pride as the highest indicator, while enjoyment and positive feelings obtained the lowest but still within a high level. The respondents also showed a proficient level of numeracy, with subtraction as the strongest skill and division as the weakest. In terms of academic performance, students obtained a very satisfactory level in General Mathematics, indicating consistent academic achievement. Furthermore, results revealed significant relationships between problem-solving perception and academic performance, and between numeracy rate and academic performance. These findings suggest that both cognitive skills and students' perceptions play important roles in mathematics achievement. The study concludes that enhancing problem-solving perception and numeracy skills may contribute to improved academic performance in General Mathematics among Senior High School students.

INTRODUCTION

This chapter discusses the background of the study, theoretical framework, conceptual framework, statement of the problem, hypotheses of the study, significance of the study, scope and limitations, and definition of terms.

Background of the Study

Numeracy is essential for students' academic success, with numeracy enabling them to interpret, analyze, and apply quantitative information effectively. Problem-solving perception, or students' attitudes, beliefs, and confidence in tackling mathematical problems, significantly influences their performance. Malgapo and Villaflor (2022) note that students who perceive themselves as capable problem solvers tend to engage more actively and perform better in General Mathematics.

Likewise, Andal and Hermosa (2024) highlight that problem-based learning strategies enhance creative thinking and foster positive problem-solving perceptions, leading to improved academic outcomes. Understanding both numeracy and problem-solving perception is therefore vital for designing effective interventions.

Research shows that students' perceptions affect their engagement and performance in mathematics. Malgapo and Villaflor (2022) observed that students with higher confidence and positive attitudes toward problem solving perform better academically. Similarly, Andal and Hermosa (2024) report that problem-based learning strengthens both creative thinking and problem-solving confidence. These findings suggest that academic

success depends not only on cognitive skills but also on perceptions and attitudes toward mathematical challenges.

At one of the public schools in Negros Island Region, the recent fourth grading test in General Mathematics showed a mean percentile score of 48%, indicating most students are performing at a satisfactory level. This highlights a gap between students' mathematical skills and the demands of problem-solving tasks, emphasizing the need for targeted learning interventions. Assessing both numeracy and problem-solving perception will help identify areas for improvement and guide strategies to enhance competence and confidence.

As a Mathematics major teaching senior high school, the researcher was motivated to explore ways to improve students' mathematical performance. Observing students' struggles and successes in problem solving underscores the importance of understanding their perceptions and numeracy skills. This study, therefore, investigates the *Problem-Solving Perception, Numeracy Rate and Academic Performance of Senior High School Students* as a basis for designing a Learning Intervention Plan that promotes mathematical competence and confidence.

Theoretical Framework

This study was anchored with the Theory of Perceptual Number Encoding by Lourenco and Aulet (2023), which posits that humans possess an innate ability to perceive and encode numerical quantities directly through perceptual mechanisms, independent formal counting or symbolic representation. According to the theory, numerosity, the perception of quantity is a primary perceptual attribute that can be estimated rapidly and automatically, supported by specialized cognitive and neural processes.

Differences in perceptual number encoding influence individuals' confidence, attitudes, and performance in mathematical tasks, linking basic perceptual skills with higher-order numeracy and problem-solving abilities. This theory was appropriate for the study because it provides a scientific basis for examining how students' perceptions of numerical quantities affect their problem-solving confidence and numeracy performance, which can inform the design of targeted learning intervention plans aimed at enhancing both competence and confidence in mathematics.

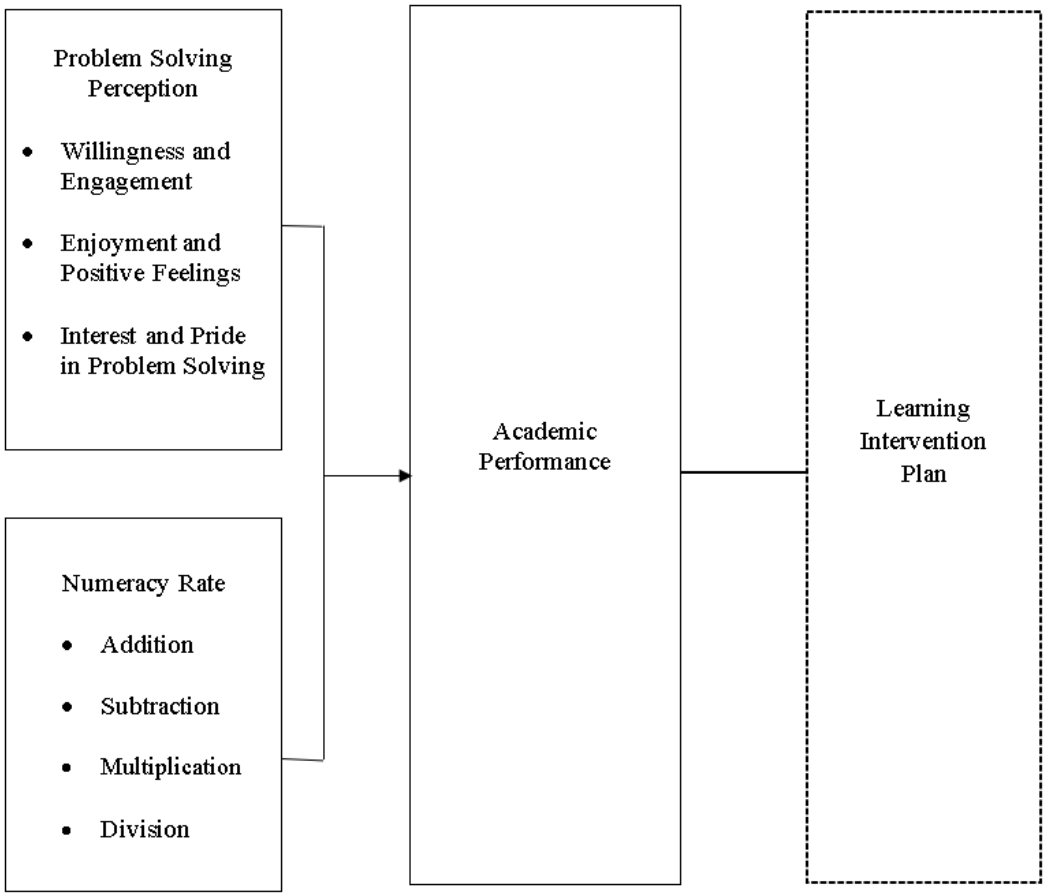
Conceptual Framework

This study was conducted to determine how numeracy rate and problem-solving perception influence the academic performance of Grade 11 students. In this study, numeracy rate and problem-solving perception served as the independent variables, while Academic Performance served as the dependent variable**.**

Problem-solving perception was measured using a 5-point Likert scale (5 – Strongly Agree to 1 – Strongly Disagree). It consisted of three dimensions**:** willingness and engagement in problem solving**,** enjoyment and positive feelings toward problem solving, and interest and pride in problem solving, which reflect students' readiness, positive attitudes, and motivation in solving mathematical problems.

The numeracy rate represented students' ability to understand, interpret, and apply mathematical concepts and problem-solving strategies in the four fundamental operations: addition, subtraction, multiplication, and division**.** Academic performance was measured using the students' grades in mathematics. It was assumed that higher levels of numeracy and more positive problem-solving perceptions would contribute to better academic performance.

Figure 1. Schematic Diagram of the Study.



Statement of the Problem

This study determined the relationship between Grade 11 students' perception of mathematical problem-solving, their numeracy rate and academic performance at a public school in Negros Island Region during school year 2025-2026.

Specifically, this study answered the following questions:

1. What is the level of problem-solving perception of the respondents, as a whole and in terms of:

   a. willingness and engagement

   b. enjoyment and positive feelings

   c. interest and pride?

2. What is the numeracy rate of the respondents when taken as a whole and grouped in according to:

   a. addition

   b. subtraction

   c. multiplication and;

   d. division?

3. What is the level of academic performance of the respondents?

4. Is there a significant relationship between problem-solving perception and academic performance of the respondents?
5. Is there a significant relationship between numeracy rate and academic performance of the respondents?

6. What Learning Intervention Plan can be suggested at the end of the study?

Hypotheses of the Study

Based on the prior statement of the problem, the following were the hypotheses of the study:

1. There is no significant relationship between problem-solving perception, and academic performance of Grade 11 students.

2. There is no significant relationship between numeracy rate and academic performance of Grade 11 students.

Significance of the Study

This study's findings hold significant implications for various stakeholders involved in the teaching and learning of mathematics, particularly in enhancing students' problem-solving skills and numeracy competence. The anticipated benefits extend to the following key groups:

Schools Division Superintendent. The insights from this research can assist the division superintendent in formulating strategies to improve mathematics education in Senior High School. This includes creating programs and initiatives that support professional development for teachers in implementing problem-solving activities and enhancing numeracy skills among students.

Curriculum Implementation Division Chief. The findings can guide the creation of targeted training programs for mathematics teachers, focusing on strategies to foster positive problem-solving perceptions and improve students' mastery of the four fundamental operations in mathematics. Such initiatives can ensure that teachers are well-equipped to support student learning effectively.

Education Program Supervisor in Mathematics. Supervisors can use the results of this study to develop interventions that enhance students' problem-solving engagement and numeracy performance. These programs can help ensure that teaching strategies are aligned with students' learning needs, promoting better understanding and application of mathematical concepts.

School Head. School heads in Senior High Schools play a crucial role in fostering a supportive learning environment. The insights from this study can empower them to advocate for necessary resources, implement programs that promote active problem-solving engagement, and support teachers in applying effective numeracy instruction, ultimately improving overall mathematics education in their schools.

Mathematics Teachers. The study can provide valuable insights for mathematics teachers regarding students' attitudes, confidence, and engagement in problem solving. Teachers can use the findings to design instructional strategies that strengthen students' problem-solving perception, boost enjoyment and pride in learning mathematics, and improve numeracy in the four fundamental operations.

Students. The results of this study can directly benefit students by identifying strategies and interventions that enhance their engagement, confidence, and competence in mathematics.

Researchers. This study can contribute to the growing body of knowledge on the relationship between students' problem-solving perception and numeracy performance. Future researchers can build upon this study to explore additional factors that influence numeracy, design further interventions, and enhance teaching strategies that develop students' confidence and competence in mathematics.

Scope and Limitations of the Study

This study focused on the problem-solving perception and numeracy rate of Grade 11 students in the academic strands of one of the public senior high school, enrolled in the second semester of the school year 2025–2026.

The problem-solving perception of the students was measured using a 30-item questionnaire, adapted from the study by Ersoy and Dağyar (2022), which reported strong psychometric properties and reliability for the Mathematical problem-solving perception scale. The questionnaire assessed students' willingness and engagement, enjoyment and positive feelings, and interest and pride in solving mathematical problems.

The numeracy rate was measured using the last standardized numeracy test from DepEd Region 6, Western Visayas, consisting of 40 items that cover the four fundamental operations: addition, subtraction, multiplication, and division. The results of this test served as the basis for determining students' numeracy competence.

This study was limited to the Grade 11 students in the academic strands of a public school in Negros Island Region and focused only on problem-solving perception and performance in numeracy. The findings were generalized to students in other schools, strands, or grade levels, as different contexts and learning environments may influence both problem-solving perception and numeracy performance.

Definition of Terms

In order to facilitate full understanding, the following terms were defined conceptually and operationally:

Academic Performance. Conceptually, Kuş (2025) defines academic performance as students' achievement in educational outcomes, which is influenced by various factors, including technology-related resources, digital competencies, and learning environments that contribute to academic success.

Operationally, Academic performance is reflected through the average grade of the learner in General Mathematics.

Engagement. Conceptually, Maamin, Maat, & Iksan (2021) define engagement as the degree to which students actively participate in and commit to learning activities, encompassing behavioral, emotional, and cognitive involvement that contributes to academic achievement. It reflects how invested students are in their learning process, influencing both their persistence and performance in mathematics.

In this study, engagement refers to students' self-reported involvement and participation in problem-solving tasks, specifically their willingness to exert effort, sustain attention, and interact positively with mathematical challenges. It is measured through items in the questionnaire that capture students' motivation to engage, their persistence in solving problems, and their active role in the learning process.

Intervention Plan. Conceptually, Conway (2024) defines an intervention plan as a structured program within a school improvement framework, designed to provide targeted instructional strategies and support to address students' learning needs, particularly in mathematics. It emphasizes systematic planning, implementation, and evaluation to enhance student achievement.

In this study, the intervention plan was used as the culminating instructional framework developed at the end of the research. It refers to the set of organized actions, teaching methods, and support strategies proposed based on the study's findings, aimed at improving students' problem-solving skills, engagement, and confidence in mathematics.

Learning Intervention Plan. Conceptually, Jansen et al. (2020) define a learning intervention plan as a structur-

ed program or strategy designed to support learners' knowledge acquisition, skill development, and self-regulated learning.

In this study, the learning intervention plan refers to the instructional strategies, activities, or programs that was suggested at the end of the study to improve students' problem-solving perception and numeracy rate based on the research findings.

Numeracy. Conceptually, Reyna and Brainerd (2023) describe numeracy as the ability to understand and use numerical information effectively in reasoning, decision-making, and problem solving. It involves comprehension of quantitative data and applying it in practical contexts.

In this study, numeracy refers to students' ability to correctly solve problems involving the four basic operations: addition, subtraction, multiplication, and division, as assessed through a standardized 40-item numeracy test from DepEd Region VI.

Perception. Conceptually, Baggs and Steffensen (2023) define perception as the process by which individuals interpret, organize, and make sense of information from their environment, which influences their thoughts, attitudes, and behaviors, particularly in problem-solving contexts.

In this study, perception refers to students' self-reported attitudes, confidence, and engagement toward problem solving, measured through a 30-item questionnaire covering three dimensions: Willingness and Engagement, Enjoyment and Positive Feelings, and Interest and Pride.

Perception. According to Koenderink (2023) and Keenan (2024), is the process of organizing, identifying, and interpreting sensory information through both bottom-up detection and top-down cognitive processing. It involves awareness, context, and prior experience, allowing individuals to construct meaning from stimuli.

In this study, perception refers to how students interpret and make sense of mathematical problems in the numeracy test, influenced by their prior knowledge, reasoning strategies, and contextual understanding.

Problem Solving. Conceptually, according to Treffinger et al. (2023), problem solving is the process of identifying, analyzing, and generating solutions to challenges through creative and systematic approaches. It involves critical thinking, decision-making, and the application of strategies to reach effective outcomes.

In this study, problem solving refers to the mathematical problems presented in the numeracy test, where students are required to apply their knowledge and reasoning to solve problems involving the four basic operations.

Rate. Conceptually, Grotlüschen et al. (2020) define rate as a measure of the level or frequency of performance in literacy and numeracy tasks, reflecting the learners' competence in these areas.

In this study, rate refers to the numeracy rate of Grade 11 students, computed based on the scores obtained in the standardized numeracy test.

Senior High School. Conceptually, Hermino and Arifin (2020) describe senior high school as the educational stage that prepares students for higher education, employment, or entrepreneurship, emphasizing the development of academic and life skills.

In this study, senior high school refers specifically to Grade 11 students enrolled in the academic strands of a public school in Negros Island Region during the second semester of the school year 2025–2026.

REVIEW OF RELATED LITERATURE AND STUDIES

The contents of this chapter were literature and studies that have been evaluated by the researcher. Their purpose is to give a clear background and understanding in the conception of this study.

Problem-Solving Perception in Mathematics

Student engagement in problem solving plays a crucial role in improving learning outcomes, as active participation encourages deeper understanding and retention of mathematical concepts. Bature, Atweh, and Oreoluwa (2020) found that senior secondary students who were actively engaged in classroom problem-solving activities demonstrated higher levels of comprehension and confidence in mathematics.

Additionally, the study emphasized that students' perception of engagement significantly influenced their willingness to attempt challenging problems, highlighting the importance of fostering an interactive learning environment.

Furthermore, Davenport Huyer et al. (2020) reported that implementing inclusive and scalable inquiry-based programs enhanced both engagement and academic performance among senior high school students. These programs encouraged students to take ownership of their learning, collaborate with peers, and persist through complex problem-solving tasks. This supports the notion that engagement is not merely behavioral participation but also involves cognitive and emotional investment in the learning process.

However, Benjamin (2024) observed that despite high levels of reported engagement in problem-solving activities, some students did not show corresponding improvements in academic achievement in chemistry. This suggests that engagement alone may not guarantee performance gains, and it must be coupled with effective instructional strategies and guidance to translate participation into measurable learning outcomes.

Similarly, Kartinah and Prasetyowati (2022) highlighted that online learning environments can impact cognitive engagement differently, with some students experiencing difficulty maintaining focus and motivation during remote problem-solving tasks. However, the study also found that structured activities and interactive digital tools can enhance engagement if designed thoughtfully, demonstrating that context and instructional design are critical factors.

The implications of these studies for the present research are significant. They suggest that student engagement in problem-solving tasks can strongly influence both confidence and numeracy performance, but it must be nurtured through supportive, well-structured instructional strategies.

Additionally, while engagement can enhance academic achievement, it is most effective when integrated with clear guidance, collaborative opportunities, and activities that challenge students cognitively and emotionally. Therefore, the current study will consider students' engagement as a key variable in understanding the relationship between problem-solving perception and numeracy, providing insights for the development of a learning intervention plan.

Problem-Solving Perception in Mathematics in terms of Willingness and Engagement

Students' willingness to engage in mathematical problem-solving is strongly linked to their persistence and active participation. Liparto and Asoy (2026) found that teacher support and effective learning strategies significantly correlated with students' problem-solving performance, highlighting that engagement is fostered when learners feel supported and guided. Similarly, Sugiharti et al. (2026) reported that authentic problem-based learning strategies increased students' willingness to participate, as these approaches made problem-solving tasks more meaningful and relevant to real-life contexts. These findings suggest that engagement is not only a matter of student attitude but also shaped by instructional design and teacher facilitation.

Problem-Solving Perception in Mathematics in terms of Enjoyment and Positive Feelings

Positive emotions toward mathematics play a crucial role in shaping students' perceptions of problem-solving. Nauli et al. (2024) emphasized that enjoyment in mathematics learning enhances motivation and reduces anxiety, thereby improving students' ability to approach complex problems with confidence. Likewise, Leonardo and Ortega-Dela Cruz (2024) demonstrated that students who experienced enjoyment in collaborative problem-solving activities reported higher satisfaction and stronger mathematical achievement.

These studies confirm that emotional engagement is a vital dimension of problem-solving perception, as enjoyment fosters resilience and reduces avoidance behaviors.

Problem-Solving Perception in Mathematics in terms of Interest and Pride

Interest and pride in problem-solving are associated with students' intrinsic motivation and sense of accomplishment. Ulya et al. (2024) developed and validated instruments to measure creative problem-solving ability, finding that students who expressed pride in their problem-solving achievements were more likely to sustain interest in mathematics. Furthermore, Almubarak et al. (2025) highlighted that evolving strategies in geometry learning promoted students' sense of ownership and pride in their mathematical progress, reinforcing long-term interest in problem-solving tasks. These findings indicate that pride and interest are not only emotional outcomes but also predictors of sustained engagement in mathematics.

The reviewed literature collectively demonstrates that problem-solving perception is multidimensional, encompassing willingness and engagement, enjoyment and positive feelings, and interest and pride. While engagement ensures active participation, enjoyment reduces anxiety and fosters persistence, and pride sustains long-term interest in mathematics. These dimensions interact to shape students' overall perception of problem-solving, suggesting that interventions must address both cognitive and emotional aspects of learning.

For the current study, these insights underscore the importance of designing questionnaires and intervention plans that capture not only students' confidence but also their emotional and motivational states. In integrating these dimensions, the research can provide a more holistic understanding of how perception influences mathematical achievement and problem-solving success.

Numeracy Rate

Numeracy competence, particularly mastery of the four basic operations, is foundational to students' mathematical understanding and problem-solving ability. Hoogland (2023) emphasized that the nature of numeracy has evolved, requiring students not only to perform calculations accurately but also to interpret, analyze, and apply numerical information in real-world contexts. Additionally, students who develop mastery in basic operations are more likely to approach complex mathematical problems with confidence, highlighting the importance of solid foundational skills.

Furthermore, Ajibade et al. (2023) demonstrated that mastery learning significantly improves numeracy skill acquisition among lower primary pupils. Their study reported that students who received structured and repetitive practice in basic operations achieved higher competence, suggesting that targeted instructional strategies can strengthen both accuracy and efficiency in numeracy.

Similarly, Celemin (2023) highlighted that authentic performance tasks enhance students' numeracy skills by providing opportunities to apply addition, subtraction, multiplication, and division in meaningful contexts. The study indicated that students develop both procedural fluency and conceptual understanding when engaged in tasks that require active problem solving, reinforcing the link between competence in basic operations and overall mathematical achievement.

However, Sa'dijah et al. (2023) observed that junior high school students often struggle with numeracy tasks that require multi-step reasoning and application of basic operations, despite being able to perform simple calculations. This finding suggests that numeracy competence involves more than procedural knowledge; it requires understanding the context and strategy selection, which not all students achieve consistently.

Similarly, Susanto et al. (2023) reported that students' performance in minimum competency assessments revealed gaps in both conceptual understanding and procedural mastery of basic operations. Nevertheless, the study noted that targeted interventions and practice-focused instruction could significantly improve numeracy skills, indicating that mastery can be developed through structured learning experiences.

The implications of these studies for the present research are substantial. They collectively suggest that numeracy competence and mastery of basic operations are critical for students' problem-solving perception and performance in mathematics. Additionally, while foundational skills are essential, students' ability to apply these operations in problem-solving tasks must also be nurtured. Therefore, this study will assess the numeracy rate of Grade 11 students in terms of addition, subtraction, multiplication, and division, using the findings to inform a learning intervention plan aimed at strengthening both

Performance in Mathematics

Mathematics education has long been recognized as a fundamental driver of personal and national development, prompting nations to prioritize it in their educational agendas. In the Philippines, however, an alarming trend has been observed: while students often excel in acquiring factual knowledge, they struggle considerably with tasks that require higher-order thinking, such as problem solving. Consequently, understanding how students learn Mathematics and measuring their performance in critical areas like numeracy and problem solving have become priority concerns for educators and policymakers. Furthermore, many prospective college students remain unprepared for advanced Mathematical learning, highlighting the urgent need to address gaps in competence and achievement.

According to Benito in Cabatay et al. (2021), students study Mathematics for several reasons. First, mastering basic Mathematical skills is essential to meet the demands of daily life, which include being numerically literate, preparing for future employment, and building prerequisites for higher education. Additionally, Mathematics serves as the language of the sciences, providing a symbolic means of communication across disciplines. Moreover, Mathematics education fosters decision-making and problem-solving skills, which are crucial for academic and practical life. In this context, students' ability to solve numerical problems and apply basic operations becomes a key indicator of their readiness to meet educational and life challenges.

Parental involvement, in particular, has been shown to increase students' success, while insufficient numbers of qualified Mathematics teachers in developing countries exacerbate learning challenges (Obama, 2024; World Bank, 2024). Teachers who demonstrate positive attitudes, provide engaging learning experiences, and maintain high but realistic expectations encourage students to develop confidence, pride, and interest in Mathematics. Additionally, effective teachers foster environments where students actively participate in problem-solving tasks, which in turn enhances their numeracy competence and overall academic achievement. However, studies show that despite teacher efforts, many students still struggle with basic operations and higher-order problem solving, often due to negative prior experiences or limited engagement.

Given these realities, this study seeks to explore the relationship between students' Problem-Solving Perception and their Numeracy Rate among Senior High School students at Kabankalan National High School. Investigating how students perceive problem-solving tasks and how these perceptions relate to their mastery of basic operations will provide practical evidence for designing targeted learning interventions. Furthermore, understanding this relationship may inform teaching strategies, enhance student engagement, and ultimately improve students' academic performance in Mathematics. This research aims to fill a gap in the literature by linking teacher influence, student attitudes, and competence in problem solving to measurable outcomes in numeracy.

Problem Solving Perception and Numeracy Rate

The students' perception of Mathematics and their numeracy has been widely studied, as students' attitudes and beliefs toward the subject play a crucial role in shaping learning outcomes. Hagan, Amoaddai et al. (2020) examined senior high school students' perception of Mathematics and found that positive perceptions significantly influence performance. Students who view Mathematics as useful, interesting, and relevant to daily life tend to perform better academically, while negative perceptions often correlate with low achievement and decreased motivation. This study underscores the importance of understanding students' perceptions to improve instructional strategies and learning outcomes.

Similarly, Salifu and Bakari (2022) explored the interplay between students' perception, interest, and Mathematics achievement. Their findings revealed a strong positive relationship between students' perception of Mathematics and their academic performance. Students who are confident in their mathematical abilities and perceive the subject positively are more likely to engage actively in learning, participate in problem-solving tasks, and demonstrate higher achievement levels. This suggests that fostering a constructive perception of Mathematics can enhance both interest and performance.

Shone et al. (2024) further emphasized the role of perception alongside self-efficacy in predicting students' Mathematics achievement. They reported that students who perceive Mathematics as manageable and believe in their capacity to succeed demonstrate higher achievement scores. Conversely, negative perceptions and low self-efficacy contribute to anxiety, avoidance behaviors, and poor performance. The study highlights that perception is not merely a psychological factor but also a practical determinant of academic success in Mathematics.

The influence of teacher-student relationships on students' perception and performance was also highlighted in studies by Appiah et al. (2022), as well as Appiah et al. (2023). These studies indicated that supportive and engaging teacher-student interactions positively shape students' perception of Mathematics. When students feel valued, supported, and guided effectively by their teachers, their attitudes toward Mathematics improve, which mediates higher academic achievement. Furthermore, these studies revealed that cooperative learning strategies and fostering students' self-efficacy enhance the beneficial impact of positive perception on performance.

Beyond perception, classroom and teacher-related factors also play significant roles in academic performance. Arifin, Suryaningsih, and Arifudin (2024) found that an encouraging classroom environment and continuous teacher professional development directly influence student achievement. A positive environment enhances students' engagement, while skilled teachers employ strategies that align with students' perceptions and learning needs, further improving performance outcomes. Kearney and Garfield (2022) also stressed that students' readiness to learn, combined with teacher effectiveness, are key predictors of achievement in middle grades Mathematics. Their study suggests that perception interacts with external factors such as teaching quality and classroom dynamics to shape learning outcomes.

In the context of senior high school students, the reviewed studies collectively highlight that students' perception of Mathematics is a critical determinant of academic performance. Positive perception encourages active engagement, persistence in problem-solving, and confidence, all of which are associated with better achievement.

Conversely, negative perception can limit students' willingness to learn, reduce motivation, and impede performance. These findings provide a strong foundation for investigating how senior high school students' perception of Mathematics correlates with their numeracy skills and overall academic achievement, particularly in a public school in Negros Island Region, where enhancing problem-solving skills is a priority.

RESEARCH METHODOLOGY

This chapter discussed the research design, subject and the respondents of the study, population and sample size, sampling techniques, data-gathering instruments, validity and reliability of the research instruments, data gathering procedures and data analyses.

Research Design

This study employed a descriptive-correlational research design. According to Creswell (2021), a descriptive-correlational design is used to describe variables and examine the relationships between them without manipulating any of the study's variables. This design is particularly suitable for this research because it aims to determine the relationship between students' perception, attitude, and engagement in Mathematics and their numeracy performance.

The descriptive component of the design focuses on accurately portraying the characteristics of the participants, such as their confidence, enjoyment, and interest in Mathematics, as well as their competence in basic operations (Gagnon et al., 2021). Meanwhile, the correlational component investigates the degree and direction of the relationship between these factors and the students' numeracy rate (Murphy, 2026). This approach allows the researcher to identify patterns and associations in the data without exerting control or intervention over the variables, making it ideal for understanding naturally occurring phenomena in the classroom setting (Abdallah, 2025).

Subject and Respondents of the Study

Yamane's formula was used to get the sample size. The subject and respondents of this study were the Grade 11 students enrolled in the Humanities and Social Sciences (HUMSS) Strand at a public school in Negros Island Region, S.Y. 2025–2026. The respondents were selected to represent this strand to provide a comprehensive understanding of students' perceptions, and numeracy rate in Mathematics.

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{227}{1 + (227)(0.05)^2}$$

$$n = \frac{227}{1 + 0.5675}$$

$$n = \frac{227}{1.5675}$$

$$n = 144.82$$

$$n = 145$$

Population and Sample Size

The population of this study consisted of all Grade 11 students enrolled in the Humanities and Social Sciences (HUMSS) Strand at a public senior high school in Negros Island Region, S.Y. 2025–2026, totaling 227 students.

Sampling Techniques

The study employed a stratified random sampling technique to select the respondents. Since the total population of Grade 11 students in the Humanities and Social Sciences (HUMSS) Strand at a public school in Negros Island Region was 227, students were grouped according to their respective sections. From each section, a proportionate number of students was randomly selected to reach the computed sample size of 145 ensuring representation from all sections. This method allowed for accurate reflection of the population while maintaining the rigor of randomization, with a 5% margin of error and a 95% confidence level applied in the sampling process.

Table 1. Distribution of the Respondents.

Section	N	n
A	50	32
B	49	31
C	41	26
D	49	31
E	38	25
Total	227	145

Data Gathering Instruments

The researcher used a two-part instrument to collect data for this study. Each part was designed to measure specific aspects of the respondents' perception and performance in Mathematics.

Part I: Problem-Solving Perception Questionnaire. This part assessed students' perception of mathematical problem-solving. It was divided into three sub-dimensions.

A 5-point Likert scale was used for all statements, ranging from Strongly Agree (5) to Strongly Disagree (1). Higher scores indicate more positive perception toward problem-solving in Mathematics.

Part II: Numeracy Test. The second part of the instrument measured the students' numeracy competence, with particular focus on mastery of the four basic mathematical operations: addition, subtraction, multiplication, and division. This section consisted of a total of 40 items designed to assess the students' speed, accuracy, and conceptual understanding in performing fundamental arithmetic operations. The test was composed of multiple-choice and word problem items; 10 items for addition, 10 items for subtraction, 10 items for multiplication, and 10 items for division.

Part III. Academic Performance. The third part was the general average of the respondents in General Mathematics for school year 2025-2026.

Validity and Reliability of the Research Instrument

The instruments used in this study, namely the Problem-Solving Perception Questionnaire and the Numeracy Test, were adapted from standardized tools and have undergone validity and reliability assessments to ensure accuracy and consistency of results.

For Problem-Solving Perception, the study by Ersoy and Dağyar (2022) reported strong psychometric properties for the Mathematical Problem-Solving Perception Scale. Construct validity was confirmed through both exploratory and confirmatory factor analyses, with acceptable model fit indices and an explained variance of 66.15%. The 24- item scale demonstrated excellent overall internal consistency, with a Cronbach's alpha of 0.93, while sub-scale reliabilities ranged from 0.61 to 0.92, indicating acceptable to high reliability across all factors. This confirms that the instrument is suitable for measuring students' perception toward mathematical problem-solving.

The Numeracy Test was based on the Region VI Western Visayas Standardized Numeracy Test for Senior High School (2023). This standardized tool has been previously validated and normed for senior high school students, ensuring its relevance and reliability in assessing students' competence in the four basic mathematical operations: addition, subtraction, multiplication, and division.

These instruments provide both valid and reliable measures of students' problem-solving perception and numeracy competence, which are central to this study's objectives.

Data Gathering Procedures

The researcher sent a letter of request to the office of the Schools Division Superintendent in one of the public schools in Negros Island Region, for approval to conduct the study. A letter of permission was also sent to the principal in one of the public schools in Negros Island Region. The researcher administered the adapted questionnaires to the respondents to determine their perception of problem-solving in Mathematics, as well as their numeracy rate in terms of addition, subtraction, multiplication, and division.

After the data are gathered, it was tabulated and subjected to statistical treatment using the Statistical Package for the Social Sciences (SPSS), and the results was subsequently analyzed and interpreted.

Data Analyses

To address statement of the problem number 1, which focuses on the level of students' perception in mathematical problem-solving in terms of willingness and engagement, enjoyment and positive feelings, and interest and pride, descriptive statistics such as mean and standard deviation were used.

Formula: $\bar{x} = \frac{\Sigma x}{N}$

Where: $\bar{x}$=mean

Σx=sum of all data values

N=total no. of Respondents

Formula: $s = \sqrt{\frac{\sum(X-\bar{x})^2}{n-1}}$

Where: X= the data values

$\bar{x}$= mean

n=total no. of Respondents

The level of problem-solving perception of students was described as shown below.

Scale	Description	Mean Score Range	Interpretation	Verbal Description
5	Strongly Agree	4.21 – 5.00	Very High	The respondents strongly agree with the statement, indicating a very high level of performance, competence, or positive perception regarding the variable being measured.
4	Agree	3.41 – 4.20	High	The respondents agree with the statement, reflecting a high level of performance, competence, or positive perception, with only minor areas for improvement.
3	Neutral	2.61 – 3.40	Moderate	The respondents neither agree nor disagree with the statement, indicating a moderate or average level of performance, competence, or perception.
2	Disagree	1.81 – 2.60	Low	The respondents disagree with the statement, suggesting a low level of performance, competence, or positive perception, and indicating the need for improvement.
1	Strongly Disagree	1.00 – 1.80	Very Low	The respondents strongly disagree with the statement, indicating a very low level of performance, competence, or positive perception regarding the variable being measured.

For statement of the problem number 2, which examines the level of students' numeracy rate in basic operations (addition, subtraction, multiplication, and division), mean and standard deviation were used.

Formula: $\bar{x} = \frac{\Sigma x}{N}$

Where: $\bar{x}$=mean

Σx=sum of all data values

N=total no. of Respondents

The level of numeracy rate of students for addition, subtraction, multiplication and division was described as shown below.

Score Range	**Verbal Description**	**Interpretation**
9 – 10	Advanced	The learner demonstrates excellent mastery of the skill in the four basic operations, showing high accuracy, speed, and understanding.
7 – 8	Proficient	The learner demonstrates good mastery of the skill, with minor errors and generally accurate performance in the four basic operations.
5 – 6	Developing	The learner shows partial understanding of the skill and requires further practice to improve accuracy and efficiency.
0 – 4	Beginning	The learner demonstrates limited or no mastery of the skill and needs significant assistance and remediation in the four basic operations.

The descriptive interval scale for numeracy competence is aligned with the Department of Education's standards for learner assessment. The score ranges (33–40 Advanced, 25–32 Proficient, 17–24 Developing, and 0–16 Beginning) reflect levels of mastery in basic mathematical operations, consistent with DepEd's emphasis on formative and summative evaluation of student performance (Department of Education, 2021). This framework ensures that learners are categorized according to their demonstrated accuracy, fluency, and conceptual understanding, providing a basis for targeted remediation and enrichment.

Score Range	Verbal Description	Interpretation
33 – 40	Advanced	The learner demonstrates an excellent level of mastery in numeracy competence across the four basic operations, showing high accuracy, speed, and conceptual understanding.
25 – 32	Proficient	The learner demonstrates a good level of mastery in numeracy competence, with generally accurate performance and minor errors in computation and application.
17 – 24	Developing	The learner shows partial mastery of numeracy competence and requires further practice to improve accuracy, fluency, and understanding of the four operations.
0 – 16	Beginning	The learner demonstrates limited mastery of numeracy competence and needs significant support and remediation in the basic mathematical operations.

For statement of the problem number 3, which examines the level of academic performance of the respondents, the researcher used the mean and standard deviation were used.

The DepEd K-12 grading scale was used for interpretation.

Score Range	**Verbal Interpretation**
90–100	Outstanding
85–89	Very Satisfactory
80–84	Satisfactory
75–79	Fairly Satisfactory
Below 75	Did Not Meet Expectation

To address statement of the problem number 4, which investigates whether a significant relationship exists between students' perception in mathematical problem-solving and their academic performance, the Pearson Product-Moment Correlation Coefficient (Pearson's r) was used to determine the strength and direction of the relationship between the two variables.

The formula for Pearson's *r* is:

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{[n\sum X^2 - (\sum X)^2]\,[n\sum Y^2 - (\sum Y)^2]}}$$

Where:

r = Pearson's correlation coefficient

n = Number of respondents

X = Scores on students' perception in mathematical problem-solving

Y = Academic performance scores

Σ = Summation

To address statement of the problem number 5, which investigates whether a significant relationship exists between the numeracy rate of students and their academic performance, the Pearson Product-Moment Correlation Coefficient (Pearson's r) was likewise employed to determine the strength and direction of the relationship between the two variables.

Pearson's r Value	Strength of Relationship	Interpretation
±0.90 – ±1.00	Very Strong	Very high positive/negative relationship
±0.70 – ±0.89	Strong	High positive/negative relationship
±0.40 – ±0.69	Moderate	Moderate positive/negative relationship
±0.20 – ±0.39	Weak	Low positive/negative relationship
±0.00 – ±0.19	Very Weak	Negligible or very low relationship

Presentation, Analysis and Interpretation of Data

This chapter presents the results and discussion of the descriptive-correlational study on the problem-solving perception, numeracy rate, and academic performance of Grade 11 students at a public senior high school in Negros Island Region. Descriptive and inferential statistical tools were utilized to analyze the data and determine the relationships among the variables under investigation.

Level of Problem-Solving Perception of Students

The table presents the level of problem-solving of Grade 11 students at a public senior high school in Negros

Island Region.

Table 1. Level of Problem-Solving Perception of Students.

Variable	Mean	SD	Verbal Interpretation
Willingness and Engagement in Problem Solving	4.04	0.55	High Perception
Enjoyment and Positive Feelings Toward Problem Solving	3.97	0.60	High Perception
Interest and Pride in Problem Solving	4.06	0.69	High Perception
Over-all Problem-Solving Perception	4.02	0.57	High Perception

Legend: (4.21 – 5.00)-Very High; (3.41 – 4.20)-High; (2.61 – 3.40)-Moderate; (1.81 – 2.60)-Low; (1.00 – 1.80)-Very Low

Table 1 shows the level of problem-solving perception among Grade 11 students in terms of willingness and engagement, enjoyment and positive feelings, and interest and pride in problem solving. Among the indicators, interest and pride in problem solving obtained the highest mean (M = 4.06, SD = 0.69), interpreted as high perception, suggesting that students generally feel a stronger sense of accomplishment and value when engaging in mathematical problem-solving tasks. On the other hand, enjoyment and positive feelings toward problem solving obtained the lowest mean (M = 3.97, SD = 0.60), though still interpreted as high perception, indicating that while students are generally positive, their emotional enjoyment is slightly less pronounced compared to their sense of interest and pride. The overall problem-solving perception resulted in a high level (M = 4.02, SD = 0.57), indicating a generally favorable perception of mathematical problem solving among the respondents.

The findings align with the study of Asigigan and Samur (2021), who emphasized that students' perception of problem-solving skills is strongly influenced by engaging learning environments that enhance intrinsic motivation. Their results suggest that when learners are exposed to interactive and meaningful learning experiences, their confidence and positive perception toward problem-solving increase. This supports the high level of perception found in the present study, particularly in terms of students' interest and pride.

Similarly, Alt et al. (2023) found that structured problem-solving programs significantly improve students' perceived creativity and innovative thinking. Their study highlights that consistent exposure to problem-solving activities strengthens students' cognitive engagement and fosters a more positive academic mindset. This reinforces the current findings, where students demonstrated high levels of engagement and positive perception toward mathematical problem solving.

In addition, Wink et al. (2021) highlighted that students' perceptions are shaped by classroom interactions and teacher support, emphasizing that positive relational environments contribute to better student attitudes and engagement. This suggests that supportive teaching practices may have contributed to the generally high perception levels observed in this study.

However, despite the generally high perception levels, slight variations in emotional response—particularly in enjoyment—suggest that not all students experience problem solving with the same level of enthusiasm. This implies that while cognitive appreciation (interest and pride) is strong, affective engagement (enjoyment) may still need reinforcement through more interactive and engaging instructional strategies.

Overall, the findings imply that strengthening student engagement strategies such as gamified learning, collaborative problem-solving, and real-life applications may further enhance both the emotional and cognitive dimensions of problem-solving perception. Teachers may focus on improving enjoyment alongside interest to develop a more balanced and deeply positive perception of mathematical problem solving among learners.

Level of Numeracy Rate of Students

The table 2 presents the level of numeracy rate of Grade 11 students at a public national high school in Negros Island Region.

Table 2. Level of Numeracy Rate of Students.

Variable	Mean	SD	Verbal Interpretation
Addition	8.57	1.58	Proficient
Subtraction	8.91	0.99	Proficient
Multiplication	8.83	1.30	Proficient
Division	7.75	1.89	Proficient
Over-all Numeracy	32.06	4.83	Proficient

Legend for Mean per Operation: (8.51 – 10)-Advanced Numeracy; (6.51 – 8.50)-Proficient Numeracy; (4.51 – 6.50)-Developing Numeracy; (0 – 4.50)-Beginning Numeracy;

Legend for Overall Mean: (33 – 40)-Advanced Numeracy; (25 – 32)-Proficient Numeracy; (17 – 24)-Developing Numeracy; (0 – 16)-Beginning Numeracy

Table 2 shows the numeracy level of Grade 11 Academic Track respondents in terms of addition, subtraction, multiplication, and division, along with their overall numeracy performance. Among the indicators, Subtraction obtained the highest mean (M = 8.91, SD = 0.99), interpreted as proficient, indicating that students demonstrate relatively stronger computational accuracy and consistency in subtraction operations. In contrast, Division obtained the lowest mean (M = 7.75, SD =1.89), also interpreted as proficient, suggesting that although students are generally competent, division remains the most challenging area among the four fundamental operations. The overall numeracy level is proficient (M= 32.06, SD = 4.83), implying that the respondents have a satisfactory level of mathematical competence across basic operations.

The findings are supported by Lanuza et al. (2022), who emphasized that instructional strategies such as interactive and student-centered approaches significantly enhance learners' mathematics performance. Their study suggests that consistent engagement in structured mathematical activities strengthens computational fluency, which aligns with the proficient level observed among Academic Track students in this study.

Similarly, Casinillo et al. (2020) highlighted that students' learning experiences in mathematics are strongly associated with their performance in fundamental operations. Their findings indicate that exposure to meaningful practice and problem-solving activities improves learners' numeracy skills, particularly in computation-heavy tasks such as multiplication and division. This supports the present result, where students demonstrated overall proficiency but showed slight variation across operations.

In addition, Mirabueno and Boyon (2020) found that academic progression in mathematics is influenced by students' foundational skills in basic operations. Their study emphasizes that strengths in core numeracy skills serve as predictors of higher mathematical achievement in higher-level concepts. This reinforces the current findings, where respondents exhibited a generally proficient numeracy level, suggesting readiness for more advanced mathematical learning.

However, the lower mean in division compared to other operations indicates that procedural complexity and multi-step computation may still pose difficulty for some learners. This implies that while students are proficient overall, targeted reinforcement in division and problem-solving strategies is still necessary to balance their numeracy skills.

Overall, the results imply that strengthening drill exercises, contextualized problem-solving, and differentiated instruction may further enhance students' numeracy performance, particularly in areas requiring higher cognitive processing such as division. Continued support in foundational skills is essential to sustain and improve their proficiency level in mathematics.

Level of Academic Performance of Students

The table 3 on the next page presents the level of academic performance of Grade 11 students at a public national high school in Negros Island Region.

Table 3. Level of Academic Performance of Students in Mathematics.

Academic Performance	n	Mean	SD	Verbal Interpretation
Outstanding	39	86.94	3.82	Very Satisfactory
Very Satisfactory	62			
Satisfactory	44			
Fairly Satisfactory	0			
Did Not Meet Expectations	0			

Legend: (90-100)-Outstanding; (85-89)-Very Satisfactory; (80-84)-Satisfactory; (75-79)-Fairly Satisfactory; (Below 75)-Did Not Meet Expectations

Table 3 shows the academic performance of Grade 11 Senior High School students in General Mathematics based on their general average. The results show that the respondents obtain a very satisfactory performance (M = 86.94, SD = 3.82). This indicates that, as a group, the students demonstrate a strong academic standing in General Mathematics and are performing above the minimum expected level. The relatively low standard deviation further suggests that the students' grades are fairly clustered, indicating a generally consistent level of performance across respondents.

The results imply that the highest performance level is reflected in the overall mean itself, which falls within the very satisfactory range. This suggests that most students are performing within or near the 85–89 grade bracket, showing competence in foundational mathematical concepts. The standard deviation of 3.82 indicates some variation in performance, meaning that while many students perform well, a smaller group may still be within the Satisfactory range or slightly lower.

The findings align with Mirabueno and Boyon (2020), who emphasized that senior high school students' mathematical performance is influenced by their progression and adaptation to increasingly complex mathematical content. Their study suggests that students who develop strong foundational skills tend to maintain satisfactory to very satisfactory performance in core mathematics subjects, which supports the present result.

Similarly, Mamolo and Sugano (2020) found a relationship between students' perceived competencies and their actual performance in General Mathematics. Their results highlight that students who demonstrate confidence and competence in mathematical tasks tend to achieve higher academic grades, reinforcing the very satisfactory performance observed in this study.

In addition, Legarde (2020) emphasized that students' performance in General Mathematics serves as a critical foundation for higher-level subjects such as Statistics and Probability. The study noted that students who achieve satisfactory to very satisfactory performance are more likely to transition successfully to advanced mathematical topics, suggesting that the respondents in this study are academically prepared for further mathematics learning.

However, despite the very satisfactory rating, the presence of variation (±3.82) implies that not all students are performing at the same level. This suggests the need for targeted support interventions for learners who may still be performing at the lower end of the range to ensure consistent academic achievement across the group.

Overall, the findings imply that maintaining strong instructional strategies, reinforcing conceptual understanding, and providing differentiated learning support may further enhance students' performance in General Mathematics and sustain their very satisfactory academic standing.

Relationship between Problem-Solving Perception and Academic Performance of Students

The table 4 below presents the relationship between problem-solving perception and academic performance of Grade 11 students at a public national high school in Negros Island Region.

Table 4. Relationship between Problem-Solving Perception and Academic Performance of Students.

Variable	Test Statistics (r_s)	p-value	Decision for H_o	Interpretation
Problem-Solving Perception vs. Academic Performance	0.214**	0.010	Reject H_o	Significant

Table 4 presents the Spearman's rho correlation analysis on the relationship between students' problem-solving perception and academic performance. The results reveal a significant relationship between the two

variables at the 0.01 level (r_s = 0.214, p = 0.010). This means that as students' problem-solving perception increases, their academic performance also tends to increase.

The findings suggest that students who have more positive perceptions of their problem-solving abilities are more likely to achieve better academic performance in General Mathematics. However, the weak correlation implies that while perception plays a role, it is not the sole or dominant factor influencing academic achievement. Other variables such as study habits, instructional methods, and prior knowledge may also contribute significantly to performance outcomes.

This result is supported by Benjamin (2024), who found that students' perceptions of engagement and problem-solving skills are significantly associated with academic achievement in chemistry. The study emphasized that students who perceive themselves as capable problem-solvers tend to perform better academically due to increased motivation and persistence in academic tasks.

Similarly, Bal and Or (2023) reported a significant relationship between problem-solving achievement and students' perceptions, highlighting that cognitive engagement and self-perception positively influence academic outcomes. Their findings suggest that learners who view problem-solving as manageable and meaningful are more likely to succeed in academic tasks, which aligns with the present study's results.

In addition, Ahmed et al. (2020) emphasized that cooperative problem-solving approaches improve both students' perceptions and their mathematics performance. Their study shows that when students are exposed to collaborative and interactive problem-solving activities, their confidence and academic achievement improve, reinforcing the positive relationship observed in this study.

However, despite the significant relationship, problem-solving perception alone does not strongly determine academic performance. This suggests that additional academic, cognitive, and environmental factors may influence students' achievement levels.

Overall, the findings imply that enhancing students' problem-solving perception through engaging, collaborative, and student-centered learning strategies may contribute to improved academic performance. Strengthening learners' confidence and positive attitudes toward problem-solving may serve as a supportive factor in improving mathematics achievement.

Relationship between Numeracy Rate and Academic Performance

Table 5 presents the relationship of numeracy rate and academic performance of Grade 11 students at a public national high school in Negros Island Region.

Table 5. Relationship between Numeracy Rate of students and Academic Performance.

Variable	Test Statistics (r_s)	p-value	Decision for H_o	Interpretation
Numeracy Rate vs. Academic Performance	0.201*	0.015	Reject H_o	Significant

Table 5 shows the Spearman's rho correlation analysis on the relationship between students' numeracy rate and academic performance. The results show a significant relationship between the two variables ($r_s = 0.201$, p = 0.015). This implies that students with higher numeracy rates tend to have slightly higher academic performance in General Mathematics, although the relationship is not strong.

The findings suggest that numeracy skills play a contributory role in academic performance. Students who demonstrate better mastery of basic mathematical operations are more likely to perform well academically. However, the weak correlation indicates that numeracy alone does not strongly determine academic

achievement, as other factors such as engagement, study habits, and instructional strategies may also influence student performance.

This result is supported by Jannati et al. (2025), who emphasized that numeracy literacy is strongly linked with the development of critical thinking skills, which in turn enhance academic achievement. Their findings highlight that improving numeracy skills can support learners in solving more complex mathematical problems, thereby improving overall performance.

Similarly, Dole and Geiger (2020) stressed that numeracy across the curriculum strengthens students' ability to apply mathematical thinking in various learning areas. Their study suggests that consistent exposure to numeracy-based learning activities improves students' understanding and academic outcomes, which aligns with the present findings.

In addition, Tomaszewski, Xiang, and Western (2020) found that student engagement mediates the relationship between socio-economic status and academic performance, emphasizing that numeracy skills combined with active engagement contribute to better academic outcomes.

However, despite the significant relationship, numeracy rate is only one of several factors influencing academic performance. This suggests the need for holistic instructional approaches that integrate numeracy development with engagement strategies and problem-solving activities.

The findings imply that strengthening numeracy skills through targeted practice, contextualized learning, and integrative teaching strategies may help improve students' academic performance in mathematics.

SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the summary of the findings, conclusions, and recommendations of the descriptive-correlational research on Grade 11 students' problem-solving perception, numeracy rate, and academic performance in General Mathematics, as well as the relationships among these variables.

Summary of Findings

Based on the data gathered, the following findings were posted:

1. The level of problem-solving perception of students was high (M = 4.02, SD = 0.57), with the respondents showing the highest mean in interest and pride in problem solving (M = 4.06, SD = 0.69). Meanwhile, enjoyment and positive feelings obtained the lowest mean (M = 3.97, SD = 0.60), though still interpreted as high perception.

2. The level of numeracy rate of students was proficient (M = 32.06, SD = 4.83), with subtraction obtaining the highest mean (M = 8.89, SD = 0.99) and division obtaining the lowest mean (M = 7.75, SD = 1.89), although both were still interpreted as proficient numeracy.

3. The level of academic performance of students in General Mathematics was very satisfactory (M = 86.94, SD = 3.82), indicating consistent and above-minimum academic achievement among the respondents.

4. There is a significant relationship between problem-solving perception and academic performance of students as shown by the computed Spearman's rho correlation coefficient of (r_s= 0.214, p = 0.010).

5. There is a significant relationship between numeracy rate and academic performance of students as shown by the computed Spearman's rho correlation coefficient of (r_s= 0.201, p = 0.015).

Conclusions

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

1. The students generally have a positive perception of mathematical problem solving, showing that they are engaged and value problem-solving tasks, although their enjoyment of these tasks is slightly less pronounced.

2. The students are competent in basic mathematical operations, but still experience relative difficulty in more complex processes such as division.

3. The students demonstrate strong academic performance in General Mathematics, reflecting consistent learning achievement and satisfactory mastery of the subject.

4. Students who view problem solving more positively tend to perform better in mathematics.

5. Students with stronger basic mathematical skills tend to achieve higher academic outcomes.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are hereby proposed:

1. The Schools Division Superintendent may strengthen policies and programs that enhance mathematics instruction in Senior High School. Initiatives may include division-wide training and capacity-building programs that focus on improving students' problem-solving perception and numeracy skills, ensuring that schools are supported in implementing effective mathematics interventions.

2. It is recommended to the Curriculum Implementation Division Chief that targeted professional development programs be designed for mathematics teachers, focusing on strategies that enhance students' engagement in problem-solving and mastery of basic numeracy skills. These programs may emphasize instructional approaches that develop both cognitive and affective aspects of mathematics learning.

3. It is recommended that supervisors develop and monitor intervention programs that strengthen students' problem-solving engagement and numeracy competencies. Regular classroom observations, mentoring, and feedback mechanisms may be implemented to ensure that instructional practices are aligned with learners' needs.

4. School heads may provide strong instructional leadership by supporting programs that promote active problem-solving activities and numeracy development. They can also ensure the availability of instructional materials and learning resources that enhance mathematics teaching and learning.

5. Mathematics teachers can integrate learner-centered and interactive instructional strategies such as collaborative problem-solving, contextualized tasks, and guided practice in the four fundamental operations. These strategies may help improve students' problem-solving perception, increase engagement, and strengthen numeracy skills.

6. The students may actively participate in problem-solving activities and practice numeracy exercises regularly to further enhance their mathematical competence. Developing positive study habits and maintaining a positive mindset toward mathematics may also help improve their academic performance.

7. It is recommended that future researchers explore additional variables that may influence students' numeracy and academic performance, such as learning styles, motivation, and instructional strategies. Further studies may also be conducted using larger samples or different contexts to validate and expand the findings of this research.

RECOMMENDED LEARNING PLAN

Title: Strengthening Problem-Solving Perception, Numeracy Skills, and Academic Performance in General Mathematics

I. Rationale

Based on the findings of the study, students demonstrate a high problem-solving perception, a proficient numeracy level, and a very satisfactory academic performance in General Mathematics. However, results also show that division skills are the weakest area, enjoyment in problem solving is slightly lower compared to other perception indicators, and both problem-solving perception and numeracy are significantly related to academic performance.

Thus, this learning plan aims to further enhance students' mathematical engagement, strengthen numeracy skills (especially division), and sustain or improve academic performance through structured, interactive, and learner-centered activities.

II. General Objectives

At the end of the intervention period, students will be able to:

1. Enhance their problem-solving perception by increasing engagement, enjoyment, and confidence in mathematics.
2. Strengthen numeracy skills, particularly in division and multi-step operations.
3. Maintain or improve academic performance in General Mathematics.
4. Apply mathematical concepts in real-life problem-solving situations.

III. Target Learners: Grade 11 Academic Track Students

IV. Learning Areas Covered

- Problem-Solving Perception Development
- Numeracy Skills Enhancement (Addition, Subtraction, Multiplication, Division)
- General Mathematics Competencies

V. Learning Strategies / Activities

1. Daily Warm-Up Numeracy Drill (5–10 minutes)

- Mental math exercises (focus on division and mixed operations)
- Timed drills to improve speed and accuracy
- Immediate feedback and peer checking

Purpose: Strengthen numeracy fluency and address weak areas (division).

2. Problem-Solving Relay Activities

- Group-based word problem solving
- Step-by-step solution presentation

- Rotating roles (solver, checker, presenter)

Purpose: Improve engagement, enjoyment, and collaborative problem-solving perception.

3. Real-Life Math Integration Tasks

- Budgeting activities (allowance, savings, expenses)
- School-related scenarios (grades computation, averages)
- Community-based math problems

Purpose: Increase relevance and enjoyment of mathematics.

4. Think–Pair–Share Problem Solving

- Individual attempt → pair discussion → class sharing
- Teacher guides misconceptions

Purpose: Improve confidence and conceptual understanding.

5. Math Game-Based Learning Sessions

- Kahoot / Quizizz / board games
- Competitive but friendly environment
- Focus on mixed operations and problem-solving speed

Purpose: Enhance motivation and positive perception of mathematics.

6. Error Analysis Activity

- Students analyze incorrect solutions
- Identify mistakes and correct reasoning

Purpose: Strengthen critical thinking and deepen numeracy understanding.

VI. Assessment Strategies

- Weekly formative quizzes (numeracy focus)
- Performance tasks (real-life problem solving)
- Observation checklist for engagement and participation
- Summative test per quarter

VII. Expected Outcomes

After implementation, students are expected to:

- Show improved confidence and enjoyment in problem solving
- Demonstrate higher accuracy in numeracy tasks, especially division

- Maintain or improve academic performance in General Mathematics
- Exhibit stronger engagement and participation in mathematics activities

VIII. Evaluation

The effectiveness of the learning plan will be evaluated through:

- Pre-test and post-test comparison (numeracy and problem-solving tasks)
- Academic grade monitoring
- Student perception survey on problem-solving engagement
- Teacher observation reports

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APPENDICES

Appendix C

Research Instrument

Dear Respondents,

I am a researcher from the Graduate School of La Carlota City College, conducting a study entitled "Problem-Solving Perception, Numeracy Rate and Academic Performance of Senior High School Students: Basis for a Learning Intervention Plan." This study aims to assess students' problem-solving perception in Mathematics and their numeracy performance.

I kindly request you to answer the questionnaire honestly. Rest assured that all responses will be kept confidential and will be used solely for research purposes.

Thank you for your cooperation.

Sincerely,
The Researcher

Note: The problem-solving perception questionnaire was adapted from the Mathematical Problem-Solving Perception Scale by Ersoy and Dağyar (2022), while the numeracy test was based on the DepEd Region VI Standardized Numeracy Test.

Part I. Problem-Solving Perception Questionnaire

Instruction: Read each statement carefully. Choose the response that best describes your perception of mathematical problem solving. The responses were measured using a five-point Likert scale ranging from **5 – Strongly Agree, 4 – Agree, 3 – Neutral, 2 – Disagree, to 1 – Strongly Disagree**.

A. Willingness and Engagement in Problem Solving	**1**	**2**	**3**	**4**	**5**
1. I willingly participate in problem-solving activities in Mathematics class.					
2. I try to solve math problems even when they are challenging.					
3. I am eager to start problem-solving tasks given by my teacher.					
4. I enjoy being involved in problem-solving discussions.					
5. I actively contribute ideas when solving problems in class.					
6. I stay focused while working on mathematical problems.					
7. I like working on problem-solving tasks independently.					
8. I am motivated to complete problem-solving activities.					
9. I enjoy collaborating with classmates to solve problems.					
10. I persist in solving problems until I reach a solution.					
B. Enjoyment and Positive Feelings Toward Problem Solving	**1**	**2**	**3**	**4**	**5**
11. I enjoy solving mathematical problems.					
12. I feel happy when I work on problem-solving activities.					

13. I find problem solving in Mathematics enjoyable. 14. I feel satisfied when I attempt to solve a problem. 15. I enjoy discovering the solution to a math problem. 16. I feel pleased when I understand how a problem is solved. 17. I enjoy learning through problem-solving activities. 18. I feel positive when solving Mathematics problems. 19. I enjoy lessons that focus on problem solving. 20. I feel encouraged when working on problem-solving tasks.					
C. **Interest and Pride in Problem Solving**	**1**	**2**	**3**	**4**	**5**
21. I find mathematical problem solving interesting. 22. I feel proud when I solve a problem correctly. 23. I enjoy challenging myself with complex math problems. 24. I feel accomplished after solving a difficult problem. 25. I am interested in learning new problem-solving strategies. 26. I feel confident when I successfully solve a problem. 27. I enjoy exploring different ways to solve a problem. 28. I feel proud when my solutions are recognized by my teacher. 29. I feel excited when I understand a new problem-solving method. 30. I enjoy improving my problem-solving skills.					

Part II. Numeracy

Directions: Read each item carefully. For the selected response test items (Multiple Choice and True-False/Yes- No), write the letter that corresponds to the correct answer in the space provided. For constructed response test items (no choices), write the correct answer in the space provided.

Score in Addition of Integers: _____

1. A swimmer dived 15 feet below the water's surface, then moved 10 feet deeper. How deep is the swimmer from the water's surface?

2. A. 100 ft B. 25 ft` C. -15 ft D. 15 ft

3. A seller loss Php 49.00 for selling ice cream and another loss of Php 100.00 for selling buko juice. How much did he loss?

4. A. Php 149.00 B. - Php 149.00 C. -Php 59.00 D. Php 51.00

5. In a basketball event, Team A, Team B, and Team C have the following scores:

	Team A	Team B	Team C
Score	75 points	88 points	78 points

Which team got the highest score? By how much greater is the highest score than the lowest score?

A. Team A, 10 points B. Team B, 13 points

C. Team C, 3 points D. Team B, 10 points

Answer:

6. A group of tourists took the hotel elevator from the ground floor, went up to the 18^{th} floor, down to the 15^{th} floor, then went up again six floors. On what floor are they now?

A. 13^{th} floor B. 3^{rd} floor C. 21^{st} floor D. 19^{th} floor

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Answer:

_____

7. From the terminal, a bus traveled 55 kilometers north on its first trip and 48 kilometers more in the same direction on the second trip. The car is now 98 kilometers away from the terminal.

A. TRUE B. FALSE

Answer:

_____

8. Mary has Php 98.00. She bought a roll of paper and a ball pen that cost Php 79.00. She said that her remaining money was Php 12.00. Her statement is:

A. TRUE B. FALSE

Answer:

9. The patient's body temperature is 38^0C. After 5 minutes, it increased by 5^0C. The new body temperature is 45^0C.

A. TRUE B. FALSE

Answer:

10. A football team scored 18 goals in the first game, 15 goals in the second game, and 10 goals in the third game. What is the total score of the football team now?

Answer:

_____

11. Bastie bought a book consisting of 95 pages. He found out that the book has 13 missing pages. How many pages has the book now?

Answer:

_____

12. Shane has 50 likers on her first Tik-Tok post, 93 on her second post, and 75 on her third post. How many likers does Shane had on her three posts?

Answer:

Score in Subtraction: _____

13. A car was parked in a garage 3 floors below the ground level. From there, the owner took the elevator and went up 20 floors more. On what floor did the owner get off the elevator?

A. 16^{th} floor B. 17^{th} floor C. 23^{rd} floor D. 24^{th} floor

Answer: _____

14. A submarine is 63 ft below the water's surface. It rises 35 ft and then dives 10 ft. How far is the submarine from the water's surface?

A. 38 ft B. 98 ft C. 108 ft D. 118 ft

Answer:

15. James saved Php 98.00, and then spent the same amount. How much money does James have now?

A. Php 176.00 B. -Php 176.00 C. -Php 170.00 D. 0

Answer:

Arriane has savings of Php 95.00 , Php75.00, and Php 85.00. If she spent Php 90.00 , the remaining amount is Php110.00.

B. TRUE B. FALSE

Answer:

16. Jordan loves going up and down the stairs. From the ground floor he goes up 15 steps, goes down 9 steps, then goes up 5 steps. How many steps away is he from the ground floor?

A. 49 B. 10 C. 31 D. 11

Answer:

17. Cassey weighs 99 pounds, but she has to lose weight in order to get qualified in a beauty contest. She loses 4 pounds in one week, gains back 2 pounds the next week, and loses 8 pounds in the third week. Now, she weighs 80 pounds.

A. TRUE B. FALSE

Answer: _____

18. The Mathematics Club of a Special Science High School has 100 members. If 76 of them are males, how many are female members?

Answer:

19. At a party, 90 visitors came before 1 p.m., then, 37 arrived after an hour. At 6:00 p.m., only 18 were left. How many visitors went home?

Answer:

20. The temperature outside the plane was -19^{0}C at an altitude of 1 500 m. The temperature at the ground level was 5^{0}C. What is the difference between the ground level temperature and the temperature at 1 500 m?

Answer: _____ _____

21. A man climbed a coconut tree 86 ft. tall. After reaching the top, he went down 23 ft. How far is he from the ground?

Answer: _____

Score in Multiplication: _____

21. The temperature drops by 3 degrees every hour. What is the total drop in temperature after 4 hours?

A. -7 degrees B. 7 degrees C. 12 degrees D. -12 degrees

Answer: _____

22. Mario has 4 boxes of marbles. Each box can hold 20 marbles . How many marbles does Mario have?

A. 40 B. 24 C. 80 D. 60

Answer: _____

23. For the past 8 years, the population of a city has increased by 19 people a year. What was the city's increase in population 8 years ago?

A. 152 people B. 150 people C. 100 people D. 90 people

Answer: _____

24. From sea level, a submarine descends 45 feet per minute. After 8 minutes of descending, the submarine is 300 feet in relation to sea level.

A. TRUE B. FALSE

Answer: _____

25. The temperature is currently at 100^0 Fahrenheit. If it decreases by 10^0 Fahrenheit every hour, then the temperature will be -40^0 F after 2 hours.

A. TRUE B. FALSE

Answer: _____

26. A test has 50 questions. The test awards 5 points if the answer is correct and takes away 3 points if the answer is incorrect. If a student answers 5 questions incorrectly, he will lose 15 points.

A. TRUE B. FALSE

Answer: _____

27. The temperature rises 5°C each hour. After four hours the temperature will have increased by 12°C.

A. TRUE B. FALSE

Answer: _____

28. A basketball team scored 5 points every 2 minutes. With this performance, the team will score _____points after 12 minutes.

ANSWER: _____

29. After a vigorous activity, your heart rate will decrease 11 beats per minute. Within 15 minute period, your heart rate will have decreased by _____beats.

Answer: _____

30. The height of the water in a pool decreases by 5 inches each week during summer due to evaporation. The decrease in the height of the water over an 8-week period is _____inches.

Answer: _____

Score in Division: _____

31. Rick has 56 candy bars. He wants to put them in 4 bags with the same number of candy bars. How many candy bars will each bag have?

A. 7 candy bars B. 8 candy bars C. 12 candy bars D. 14 candy bars

Answer: _____

32. Jake saves 25 pesos every day, how many days will it take him to have 100 pesos?

A. 4 days B. 5 days C. 6 days D. 10 days

Answer: _____

33. During a 4-hour period, the temperature dropped by 48^0F. How many degrees did the temperature drop each hour?

A. -12^0F B. 12^0F C. -4^0F D. 4^0F

Answer: _____

34. On a certain day, the temperature changed at a rate of 6^0F per hour. How long will it take for the change in temperature to be 90^0F?

A. 10 hours B. 11 hours C. 12 hours D. 15 hours Answer: _____

35. Thia has Php 93.00 cash in her wallet. She bought a ball pen, bond paper and pencil. After paying, she found out that she still had Php9.50 left. This means that the average amount of the 3 items she bought is Php20.00.

A. TRUE B. FALSE

Answer: _____

36. A painter was hired to paint an area of 60 square feet. He estimated that one quart of paint covers 35 square feet. So, only 2 quarts of paint are needed to finish the job.

A. TRUE B. FALSE

Answer: _____

37. Carlo's score in a video game was changed to -12 points because he missed some target points. If he got -4 points for every missed target, then he had missed 3 targets.

A. TRUE B. FALSE

Answer: _____

38. Nancy needs 5 oranges to make a glass of orange juice. If she has 50 oranges, then she can make 10 glasses of orange juice.

A. TRUE B. FALSE

39. Jason borrowed 15 pesos a day to buy snacks. He now owes 75 pesos. How many days did he borrow?

40. Eighty-eight persons have been invited to a party. The caterer arranged the tables in such a way that each table could seat 11 persons. How many tables are needed?

ANSWER KEY			
ADDITION	SUBTRACTION	MULTIPLICATION	DIVISION
1. B	11. B	21. D	31. D
2. A	12. A	22. C	32. A
3. B	13. D	23. A	33. B
4. C	14. B	24. B	34. D
5. B	15. D	25. B	35. B
6. B	16. B	26. A	36. A
7. B	17. 24	27. B	37. A
8. 43	18. 109	28. 30	38. A
9. 82	19. 24^0C	29. 165	39. 5
10. 218	20. 63 ft.	30. 40	40. 8

Appendix D

Normality Test Result

Normality Test Results

SOP 4

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Problem-Solving Perception	.186	145	<.001	.893	145	<.001
Academic Performance	.087	145	.009	.976	145	.011

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Numeracy Rate	.190	145	<.001	.890	145	<.001
Academic Performance	.087	145	.009	.976	145	.011

a. Lilliefors Significance Correction

Appendix E

Result of Statistical Data Analysis

SOP 1

Level of Problem-Solving Perception

N		Mean	Std. Deviation
A. Willingness and Engagement in Problem Solving	145	4.04	.55
1. I willingly participate in problem-solving activities in Mathematics class.	145	4.08	1.02
2. I try to solve math problems even when they are challenging.	145	3.60	1.00
3. I am eager to start problem-solving tasks given by my teacher.	145	3.86	.83
4. I enjoy being involved in problem-solving discussions.	145	4.19	.69
5. I actively contribute ideas when solving problems in class.	145	3.97	.38
6. I stay focused while working on mathematical problems.	145	3.83	.86

7. I like working on problemsolving tasks independently.	145	4.04	1.05
8. I am motivated to complete problem-solving activities.	145	4.23	.68
9. I enjoy collaborating with classmates to solve problems.	145	4.30	.60
10. I persist in solving problems until I reach a solution.	145	4.28	.81
B. Enjoyment and Positive Feelings Toward Problem Solving	145	3.97	.60
11. I enjoy solving mathematical problems.	145	4.14	.65
12. I feel happy when I work on problem-solving activities.	145	4.13	.88

Level of Problem-Solving Perception

N		Mean	Std. Deviation
13. I find problem solving in Mathematics enjoyable.	145	3.87	.97
14. I feel satisfied when I attempt to solve a problem.	145	3.89	.75
15. I enjoy discovering the solution to a math problem.	145	4.07	.81
16. I feel pleased when I understand how a problem is solved.	145	4.07	.81
17. I enjoy learning through problem-solving activities.	145	3.58	1.06
18. I feel positive when solving Mathematics problems.	145	3.86	1.07
19. I enjoy lessons that focus on problem solving.	145	4.11	.78
20. I feel encouraged when working on problem-solving tasks.	145	4.03	.99
C. Interest and Pride in Problem Solving	145	4.06	.69
21. I find mathematical problem solving interesting.	145	4.06	.59
22. I feel proud when I solve a problem correctly.	145	4.03	1.10
23. I enjoy challenging myself with complex math problems.	145	3.85	.54

24. I feel accomplished after solving a difficult problem.	145	3.91	1.00
25. I am interested in learning new problemsolving strategies.	145	4.41	.93
26. I feel confident when I successfully solve a problem.	145	4.14	.94
27. I enjoy exploring different ways to solve a problem.	145	4.16	.78

Level of Problem-Solving Perception

	N	Mean	Std. Deviation
28. I feel proud when my solutions are recognized by my teacher.	145	4.10	1.09
29. I feel excited when I understand a new problemsolving method.	145	4.15	.99
30. I enjoy improving my problem-solving skills.	145	3.79	.96
Problem-Solving Perception_Overall Mean	145	4.02	.57
Valid N (listwise)	145		

SOP 2

Level of Numeracy Rate

	N	Mean	Std. Deviation
Addition	145	8.57	1.58
Subtraction	145	8.91	.99
Multiplication	145	8.83	1.30
Division	145	7.75	1.89
Numeracy Rate_Overall Mean	145	32.06	4.83
Valid N (listwise)	145		

SOP 3

Academic Performance

	N	Mean	Std. Deviation
Academic Performance	145	86.94	3.82
Valid N (listwise)	145		

Level of Academic Performance

Academic Performance

Level of Academic Performance	N	Mean	Std. Deviation
Outstanding	39	91.92	1.84
Very Satisfactory	62	86.87	1.25
Satisfactory	44	82.61	1.43
Total	145	86.94	3.82

SOP 4

Association between Problem-Solving Perception and Academic Performance

			Level of Problem-Solving Perception	Level of Academic Performance
Spearman's rho	Level of Problem-Solving Perception	Correlation Coefficient	1	.214**
		Sig. (2-tailed)	.	0.01
		N	145	145
	Level of Academic Performance	Correlation Coefficient	.214**	1
		Sig. (2-tailed)	0.01	.
		N	145	145

**. Correlation is significant at the 0.01 level (2-tailed).

SOP 5

Association between Numeracy Rate and Academic Performance

			Level of Numeracy Rate	Level of Academic Performance
Spearman's rho	Level of Numeracy Rate	Correlation Coefficient	1.000	.201*
		Sig. (2-tailed)	.	.015
		N	145	145
	Level of Academic Performance	Correlation Coefficient	.201*	1.000
		Sig. (2-tailed)	.015	.
		N	145	145

*. Correlation is significant at the 0.05 level (2-tailed).