

Perceptions of Mathematics and Its Effect on Learning Effectiveness Among Senior High Students in Atok District, Atok, Benguet

Charlie G. Manangwe

Northeastern College, Santiago City, Isabela, Philippines

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Email of Corresponding Author: charlie.manangwe@deped.gov.ph

Abstract

This study examined the perceptions of Senior High School students toward Mathematics and their effect on learning effectiveness in Atok District, Benguet. Anchored on the premise that students' perceptions and attitudes toward mathematics influence engagement, motivation, and learning outcomes, the study also considered the roles of parental support, teaching methods, instructional materials, learning environment, and health conditions in shaping mathematics learning experiences. A quantitative descriptive-correlational research design was employed. Data were collected from 103 Senior High School students enrolled in selected public secondary schools during School Year 2025–2026 through a validated researcher-made questionnaire utilizing a Likert scale. Frequency counts, percentages, weighted mean, ranking, and correlation analysis or chi-square test were used to analyze the data. Findings revealed that respondents generally demonstrated a positive attitude toward Mathematics, obtaining an overall weighted mean of 3.11, interpreted as “Moderately Agree.” Students expressed a strong desire to acquire further mathematical knowledge despite recognizing the subject as challenging. Among the factors examined, teaching materials and teaching methods were identified as the most influential, while health condition was the least influential. Common problems encountered in mathematics learning included excessive academic workload, carelessness in computations, difficulties catching up with lessons after absences, and weak foundational mathematical knowledge. The analysis further showed no statistically significant relationship between students' attitudes toward Mathematics and their gender, age, or parents' educational attainment. The study concludes that positive attitudes toward Mathematics can be sustained through effective instructional strategies and quality learning resources. It recommends the continued use of engaging teaching practices, adequate instructional materials, academic support programs, and strengthened parental involvement to enhance students' learning experiences and achievement in Mathematics. This study supports Sustainable Development Goal (SDG) 4: Quality Education by identifying factors that influence mathematics learning effectiveness and student achievement. It also relates to SDG 8: Decent Work and Economic Growth through the development of mathematical competencies essential for future employment and STEM-related opportunities. The sustainability impact of the study lies in its contribution to educational sustainability by providing evidence that can guide instructional improvement, learner support programs, and resource allocation. Its findings may also support long-term socio-economic development by strengthening students' mathematical competencies and academic preparedness.

Keywords: Academic Workload; Attitudes Toward Mathematics; Learning Effectiveness; Mathematics Education; Parental Influence; Senior High School Students; Teaching Materials; Teaching Methods; Teaching Strategies; Student Perceptions

1. Introduction

Mathematics is a fundamental discipline that develops critical thinking, problem-solving, and analytical skills necessary for academic success, daily life, and future careers. As a core component of Science, Technology, Engineering, and Mathematics (STEM) education, mathematics contributes significantly to technological and economic development (Eshaq, 2023; Suherman et al., 2025). Despite its importance, many students continue to experience difficulties in learning mathematics due to anxiety, low interest, and negative perceptions, which adversely affect their academic performance (Goos et al., 2023). Understanding students' perceptions of mathematics and the factors influencing their learning effectiveness is essential for improving educational outcomes. This study examines the perceptions of Senior High School students toward Mathematics and their effect on learning effectiveness in Atok District, Benguet.

1.1 Perceptions of Mathematics and Learning Effectiveness among Senior High School Students

Mathematics plays a crucial role in developing learners' cognitive abilities and preparing them for future educational and professional opportunities. Students' attitudes and perceptions toward mathematics significantly influence their motivation, engagement, and academic performance. Learners who possess positive perceptions of the subject tend to demonstrate higher levels of participation and achievement. This relationship is supported by Anselmo et al. (2026), who found that

positive student perceptions and engagement contribute to improved learning outcomes. In addition, several factors influence students' success in mathematics, including parental support, teaching strategies, instructional resources, learning environments, and health conditions (De Loof et al., 2022; Lubna et al., 2023).

1.2 Factors Influencing Mathematics Perceptions and Learning Effectiveness among Senior High School Students

Existing literature emphasizes the importance of students' perceptions and attitudes toward mathematics as determinants of learning effectiveness. Positive perceptions are associated with increased motivation and better academic performance, whereas negative perceptions often result in reduced engagement and learning difficulties (Goos et al., 2023). Research further indicates that external and personal factors, such as parental influence, teaching approaches, instructional materials, classroom environments, and health-related conditions, contribute to students' mathematics learning experiences and outcomes (De Loof et al., 2022; Lubna et al., 2023). Moreover, student engagement and positive academic perceptions have been linked to improved learning outcomes across educational settings (Anselmo et al., 2026).

1.3 Global, National, and Local Context of Mathematics Learning among Senior High School Students

Globally, mathematics remains a critical subject for advancing STEM education and supporting technological and economic progress (Eshaq, 2023; Suherman et al., 2025). Nevertheless, many learners continue to face challenges in mastering mathematical concepts and problem-solving skills due to anxiety, low interest, and unfavorable perceptions of the subject (Goos et al., 2023). In the Philippines, mathematics continues to be an area where many students encounter learning difficulties despite efforts by the Department of Education to improve mathematics instruction. Challenges in mathematics achievement are influenced by both school-related and personal factors. Similar concerns may be observed among Senior High School students in Atok District, Benguet, where students' perceptions and learning experiences may be shaped by parental support, teaching strategies, instructional resources, and learning environments.

1.4 Conceptual Basis of Mathematics Perceptions and Learning Effectiveness

This study is anchored on the premise that students' perceptions and attitudes toward mathematics influence their learning effectiveness and academic performance. Positive perceptions promote engagement and motivation, which contribute to improved learning outcomes (Anselmo et al., 2026). Furthermore, learning effectiveness is affected by multiple interconnected factors, including parental support, instructional practices, learning resources, environmental conditions, and health-related factors (De Loof et al., 2022; Lubna et al., 2023).

1.5 Research Gap on Mathematics Perceptions and Learning Effectiveness in Atok District, Benguet

Although numerous studies have examined mathematics achievement and performance, there appears to be limited research focusing specifically on the perceptions of Senior High School students toward Mathematics in Atok District, Benguet. There is also a lack of studies investigating the effects of parental influence, teaching methods, instructional materials, learning environment, and health conditions on students' attitudes and learning effectiveness in mathematics. Addressing these gaps is important for generating evidence-based strategies and interventions that can improve mathematics learning and student achievement.

1.6 Alignment of Mathematics Perceptions and Learning Effectiveness Research with Relevant Sustainable Development Goals (SDGs)

This study aligns with SDG 4 – Quality Education by contributing to the understanding of factors that influence mathematics learning effectiveness and academic achievement. By examining students' perceptions and the conditions that support successful learning, the study provides insights that may help improve educational quality and learning outcomes. The study also relates to SDG 8 – Decent Work and Economic Growth, as mathematics education strengthens competencies that are essential for future employment, productivity, and participation in STEM-related fields that contribute to economic development (Eshaq, 2023; Suherman et al., 2025).

1.7 Contribution of the Study to Educational and Socio-Economic Sustainability

The study contributes primarily to educational sustainability by identifying factors that affect students' learning effectiveness in mathematics and by providing information that may guide instructional improvement and learner support programs. It also supports socio-economic sustainability through the promotion of mathematical competencies that are essential for future career opportunities and workforce development. Furthermore, the findings may assist educators, school administrators, parents, and policymakers in developing sustainable interventions that enhance student engagement, learning outcomes, and overall educational quality.

2. Material and methods

2.1 Research Design

The study utilized a quantitative research method using a descriptive-correlational design. The descriptive aspect was used to describe the respondents' profiles and their attitudes toward mathematics, while the correlational aspect examined the

relationship between the respondents' profiles and their perceptions of mathematics. This design enabled the systematic collection and analysis of data relevant to the study objectives.

2.2 Locale of the Study

The study was conducted in selected public secondary schools offering Senior High School education in Atok District, Atok, Benguet. The locale was selected because it provided an appropriate setting for examining students' perceptions of mathematics and learning effectiveness. The district includes learners with varying experiences, attitudes, and challenges in mathematics learning, making it suitable for the study.

2.3 Respondents of the Study

The respondents were Senior High School students enrolled in selected schools within Atok District during the School Year 2025–2026. The participants included both male and female students from different academic strands who were directly engaged in learning mathematics and could provide relevant information regarding their attitudes and experiences toward the subject.

2.4 Sample and Sampling Procedure

Purposive sampling was employed to select the respondents. Only Senior High School students who were currently enrolled and willing to participate were included in the study. The researcher coordinated with school administrators and teachers to identify qualified participants, ensuring that the selected respondents could provide information relevant to the study objectives.

2.5 Research Instrument

Data were gathered using a researcher-made questionnaire. The instrument consisted of two sections: the first collected demographic information, while the second contained statements assessing students' attitudes toward mathematics in relation to parental influence, teaching methods, instructional materials, learning environment, and health condition. A Likert scale was used to measure responses, and the questionnaire was validated by experts prior to administration.

2.6 Data Gathering Procedure

Prior to data collection, permission was secured from the appropriate school authorities. Upon approval, the researcher personally distributed the questionnaires to the selected respondents and explained the purpose of the study and the instructions for completion. The accomplished questionnaires were collected immediately, after which the data were checked, organized, and prepared for statistical analysis.

2.7 Data Analysis Techniques

The collected data were analyzed using appropriate statistical tools. Frequency counts and percentages were used to describe the respondents' profiles, while the weighted mean was utilized to determine their perceptions and attitudes toward mathematics. Ranking was applied to identify the common problems encountered by students in studying mathematics. Correlation analysis or the chi-square test was used to determine the relationship between the respondents' profiles and their attitudes toward mathematics.

2.8 Ethical Considerations

Ethical principles were strictly observed throughout the study. Permission was obtained from school authorities before data collection. Respondents were informed of the study's purpose, and participation was voluntary. Confidentiality and anonymity were maintained, and all information gathered was used solely for research purposes. Honesty and integrity were likewise observed in the presentation and interpretation of the study findings.

3. Results and Discussion

3.1 Attitudes Toward Mathematics and Influencing Factors

3.1.1 Demographic Profile of the Respondents

The study involved 103 Senior High School students. Female respondents comprised the majority at 53.40%, while males accounted for 46.60%. Most respondents were 17 years old (54.37%), followed by 18-year-olds (36.89%). Regarding parental educational attainment, most fathers (39.81%) and mothers (41.75%) were high school graduates, while a considerable proportion were high school undergraduates. The findings indicate that most respondents came from families whose parents attained secondary education. This educational background may contribute to students' perceptions and attitudes toward mathematics by influencing the support and encouragement they receive in their academic pursuits.

3.1.2 Attitudes of Senior High School Students Toward Mathematics

The respondents demonstrated a generally positive attitude toward mathematics, with an overall weighted mean of 3.11, interpreted as "Moderately Agree." The highest-rated statement was the desire to acquire further knowledge in

mathematics, followed by perceptions that mathematics grades were generally fair and that studying mathematics was a challenge. Lower ratings were recorded for statements related to fear, nervousness, insecurity, and dislike of mathematics. These findings suggest that although students recognize mathematics as challenging, they remain interested in learning and improving their mathematical knowledge. This result supports the findings of Nair and Kareem (2025), who reported that positive attitudes and engagement contribute to improved learning outcomes. Similarly, Anselmo et al. (2025) emphasized that active participation in learning promotes the development of critical thinking skills. The persistence of some anxiety-related responses is consistent with Goos et al. (2023), who noted that mathematics anxiety continues to affect students' achievement and learning experiences. Furthermore, Ulum (2025) highlighted that positive beliefs and motivation toward mathematics are associated with better academic performance.

3.1.3 Factors Influencing Attitudes Toward Mathematics

The factors examined were generally rated as "Slightly Influential," with an overall weighted mean of 2.84. Teaching materials emerged as the most influential factor, followed by teaching methods. Parents and learning environment were considered slightly influential, while health condition received the lowest rating. The results indicate that instructional resources and effective teaching practices play important roles in shaping students' attitudes toward mathematics. The findings support De Loof et al. (2022), who emphasized the value of appropriate learning resources and engaging educational experiences in improving academic outcomes. Likewise, Anselmo (2023) found that quality instructional materials enhance students' understanding and learning experiences. The influence of teaching methods is also consistent with Mosimege & Winnaar (2021), who reported that effective instructional strategies improve students' engagement and achievement in mathematics. Although parental support and learning conditions contribute to students' attitudes, their influence appears less substantial, supporting the observations of Wei & Zhang (2025).

3.2 Common Problems Encountered in Mathematics Learning

The most frequently reported problem was being overloaded with different subjects, affecting 59.22% of respondents. Other common difficulties included carelessness in mathematical computations (56.31%), difficulty catching up on lessons after absences or tardiness (51.46%), and poor mathematical background and understanding of basic concepts (40.78%). Additional concerns included peer influence, lack of reference materials, difficulty understanding mathematics taught in English, poor study habits, and limited interest in mathematics due to its perceived lack of relevance to daily life. These findings suggest that both academic and contextual factors contribute to students' challenges in learning mathematics. Weak foundational knowledge may hinder the understanding of more advanced concepts, supporting the findings of Sari et al. (2023). Language-related difficulties may also increase cognitive demands and affect comprehension (Sari et al., 2023). Moreover, inadequate learning resources and ineffective study habits may limit students' ability to succeed in mathematics. The perception that mathematics lacks relevance to everyday life reflects broader concerns regarding student engagement and mathematical well-being, as discussed by Hill & Seah (2022).

3.3 Relationship Between Attitudes Toward Mathematics and Respondents' Profile

The analysis revealed no statistically significant relationship between attitudes toward mathematics and the respondents' gender, age, or parents' educational attainment. The computed chi-square values for all variables were lower than the critical value, resulting in the acceptance of the null hypothesis. The findings indicate that demographic characteristics did not significantly influence students' attitudes toward mathematics. This suggests that attitudes may be shaped more strongly by personal factors such as motivation, beliefs, and learning experiences than by demographic variables. The result is consistent with Ulum (2025), who emphasized the importance of intrinsic factors in shaping mathematical attitudes. Similarly, the absence of a significant relationship between attitudes and parental educational attainment suggests that its influence may vary depending on context, supporting the observations of Tristiana et al. (2025).

4. Conclusion & Recommendations

The study concluded that Senior High School students in Atok District generally have a positive attitude toward Mathematics, as reflected by their moderate agreement with statements related to the subject. Although students perceive Mathematics as challenging, they remain interested in expanding their knowledge. Teaching materials and teaching methods were identified as the most influential factors affecting students' attitudes, while health conditions had the least influence. Common challenges included academic workload, computational errors, and difficulties in catching up with lessons. Furthermore, no significant relationship was found between students' attitudes toward Mathematics and their gender, age, or parents' educational attainment.

Based on the findings, educators should continue utilizing effective teaching strategies and quality instructional materials to sustain students' interest and engagement in Mathematics. School administrators should provide adequate learning resources, intervention programs, and academic support to help students overcome challenges in the subject. Parents should also be encouraged to support their children's learning at home. Future studies may be conducted using larger samples, different educational levels, or additional variables related to students' attitudes and learning effectiveness in Mathematics.

This study was limited to selected Senior High School students in Atok District, Benguet, during the School Year 2025–2026. The use of a descriptive-correlational design and self-reported questionnaires may have restricted the depth and accuracy of the responses. In addition, the findings were based only on the variables included in the study and may not fully represent all factors influencing students' attitudes toward Mathematics. Therefore, the results should be interpreted within the scope and limitations of the study.

Compliance with ethical standards

The study adhered to established ethical principles throughout the research process. Permission was obtained from the appropriate school authorities before data collection. Participation was voluntary, and respondents were informed of the purpose of the study. Confidentiality and anonymity were maintained, and all information collected was used solely for research purposes. Honesty and integrity were observed in the collection, presentation, and interpretation of the data.

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